DEMOCRATIC SOCIALIST REPUBLIC
OF SRI LANKA

THE PREPARATORY SURVEY
ON
THE PROJECT
FOR
IMPROVEMENT OF AGRICULTURAL PRODUCTION
AND PRODUCTIVITY IN DRY ZONE AREAS
IN
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

FINAL REPORT

VOLUME-I
MAIN REPORT

OCTOBER 2012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD.

KRI INTERNATIONAL CORP.

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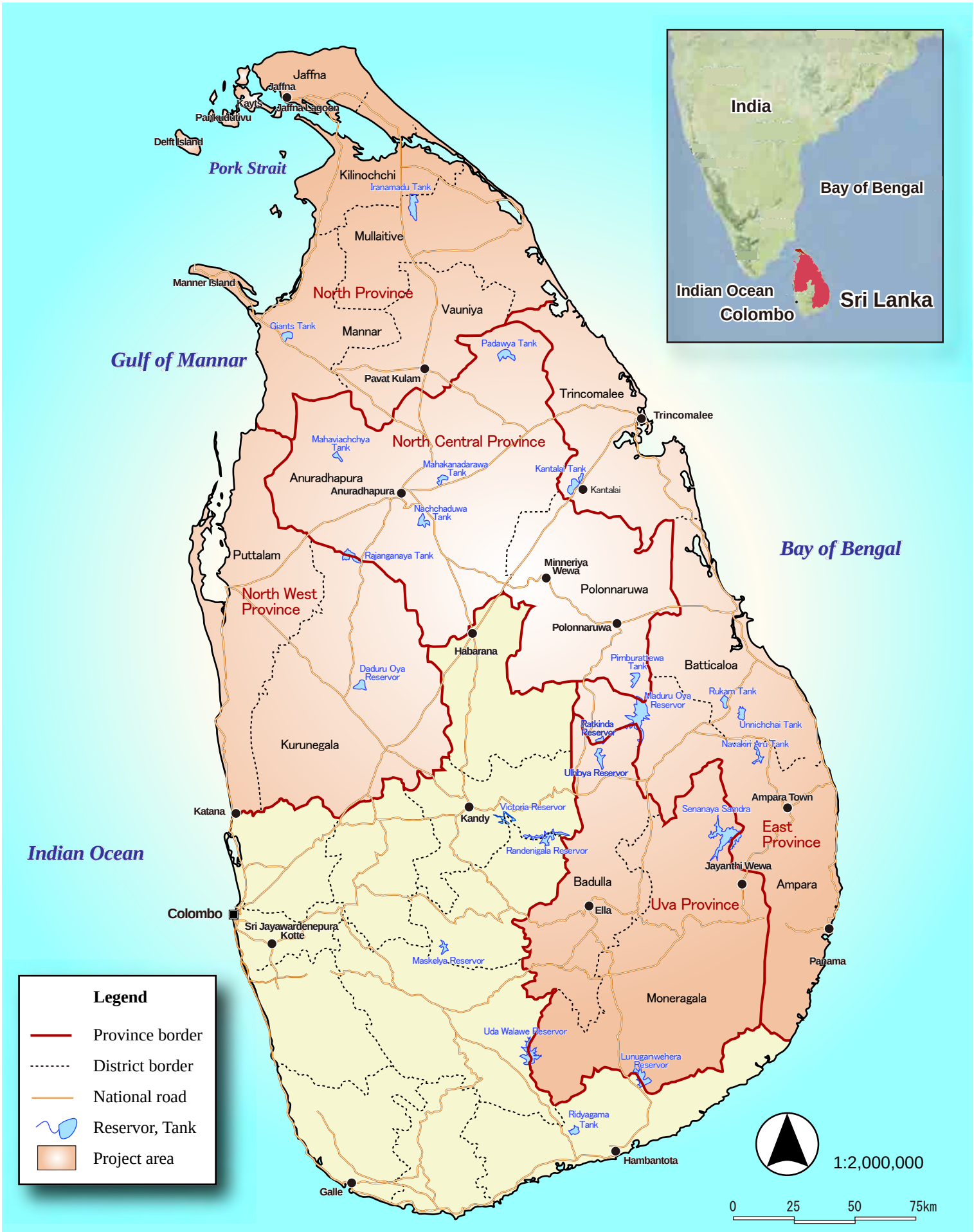


SUVRVEY AREA

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Cultivation of Tomato (Kurunegala)
The farmers in some areas are well trained in vegetable cultivation

Cultivation of Cowpea (Kurunegala)
Legumes are cultivated in Yala in limited extent in irrigation scheme.

Capsicum Cultivation (Anuradhapura)
The contract farming is observed in vegetable cultivation near the major market

Watermelon Cultivation (Puttalam)
Some farmer applies the drip irrigation system with solar power

Pumpkin Cultivation under major irrigation scheme (Kurunegala)
The tail end farmers are producing OFC or vegetables with limited water.

Big onion Cultivation (Trincomalee)
Basically, fallow irrigation system is applied for onion cultivation.

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Papaw Cultivation in Home Garden (Trincomalee)
Mahinda Chintana target Papaw production increase more than double from 2009 for 2020

Mix Cultivation of Red onion with Banana (Trincomalee)
DoA promote mix farming of OFC with fruit for productivity improvement

Production of Passion Fruits (Mannar)
Products are sale locally at nearest market at present

Village level Nursery Farm (Mannar)
The planting materials of fruits are produced jointly by member of FO.

Milk production (Kurunegala)
Hybrid cattle is more promoted in NWP but less in other dry zone.

Livestock Effluent Recycling System(Kurunegala)
The biogas production from livestock effluent is attempted in advanced farmer.

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Dambulla Dedicated Economic Center (Matale)
DDEC is the major trading place for upland and low land vegetables.

Manning Market (Colombo)
There are less proper facilities to keep the vegetable in good condition

Tambuttegama Dedicated Economic Center (Anuradhapura)
DECs were established in 12 locations, 6 centers in production area and 6 centers in consumer areas at present

Export Exhibition (Colombo)
Government of Sri Lanka encourage the agriculture export in his National Development Plan

Transporting Vegetables (Matale)
Report says that 20 to 40% loss are found in the post harvest

Rehabilitated Rural Road (Manner)
National and Province Road rehabilitation work is going on under several projects in dry zone with ADB and other fund

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Agro-well (Anuradhapura)
Agro-wells are constructed in the irrigable area and used for Yala cultivation

Irrigation Tank (Trincomalee)
More than 10,000 irrigation tanks are available in survey area

Red Onion with lift irrigation (Trincomalee)

Broken spillway (Trincomalee)
Even water resources available, farmer cannot cultivate due to the deterioration of the facilities.

Broken Outlet (Trincomalee)
The scheme was not in use due to conflicts.

Abandoned tank (Mullaitivu)
More than 1700 tanks are abandoned in survey area.

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Wariyapola Seed Farm Main Building (Kurunegala)
Farm is operated by Provincial Department of Agriculture of NWP

Seed Farm (Kurunegala)
1.5 acs area allocated for groundnut seed production at present

Seed Farm Nursary for Mango (Wariyapola)
Nearly 2,500 plants are produced per year

Galgamuwa Seed Farm Production (Galgamuwa)
Green seeds are produced for farmers in NWP

Mango Trees in High Tech Irrigation Agri-business Promotion and Development Center (Rajangana)
Banana, Grape, Annona (custard apple) and Dragon fruits are cultivated and experience are shared with farmer and other stakeholders

Pineapple Cultivation in High Tech Irrigation Agri-business Promotion and Development Center (Anuradhapura)
Banana, Grape, Annona (custard apple) and Dragon fruits are cultivated and experience are shared with farmer and other stakeholders

Photographs in Survey Area

The Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Sri Lanka

Inception meeting (Colombo)
Inception meeting was held on 6th February, 2012

Inception meeting (Northern Province)
Survey team visit each province to explain the outline of survey and to collect the information.

Provincial level workshop (Uva province)
The development plans prepared based on DS level workshop are shared and ratified.

Provincial level workshop (Eastern Province)
A lot of comments and inputs are given to the survey team in the meeting,

DS level workshop (North Central Province)
Discussed proposed project components based on production plan

DS level workshop (North Western Province)
The proposed plans are traced on the map for further discussion.

SUMMARY

I. INTORODUCTION

Authority

01. This is the final report on the Preparatory Survey on the Project for Improvement of Agricultural Production and Productivity in Dry Zone Areas in Democratic Socialist Republic of Sri Lanka (hereinafter referred to as "the Survey") prepared in accordance with the minutes of meetings agreed upon between the Government of Sri Lanka and the Japan International Cooperation Agency (JICA) on October 10, 2011. The report presents the outputs of the Survey undertaken from January to October 2012.

Objectives of the Survey

02. The objective of the Survey is to formulate a yen loan project for improving agricultural production and productivity in the dry zone areas through collection of necessary information on current situation of agriculture-related infrastructure, such as irrigation systems and farm roads, product distribution system, market linkage and extension services and technologies practiced in the identified survey area covering five provinces, i.e., North, North Central, North West, East, and Uva Province.

Execution of the Survey

03. The Survey consisted of field works and home office works, and was carried out for about ten months from January to October 2012.

II. NATIONAL BACKGROUND

2.1 National Socio-economy

04. Sri Lanka covers a land area of 62,705 km^2 (excluding inland waters). Its total population in 2010 was estimated at 20,653,000. The annual population growth was 1.0% in 2010. The GDP amounted to US$49.5 billion in 2010. The growth of agriculture sector including forestry and fishery was 5.5% p.a. during 2005-2010. The agriculture sector (including fishery and forestry) is still the mainstay of Sri Lanka's economy, accounted for 12.8% of GDP, 24.6% of merchandise exports, and 31.1% of the active labor force in 2010. Roughly, 75% of the country's population lived in rural areas and engaged in agriculture-related activities. In addition, much of the manufacturing, transport, and service sector activities were related to the supply of agricultural input and to the marketing and processing of agricultural output. Sri Lanka is divided into three agro-ecological zones, where the dry zone occupies three quarters of the total land area.

2.2 National Food Balance

05. Agricultural products imported with an increasing trend during 2002-2007 period were rice, millet, potatoes, and peas. More production would be required for these crops. In case of rice, Sri Lanka achieved self-sufficiency in recent years (except in 2007). As for maize and soybean, these crops were consumed by the livestock subsector as animal fodder at considerably higher increasing rate. Vegetable oils and vegetables, such as tomatoes and onions, were also imported due to the rapid increase of domestic consumption for food. Regarding livestock products, all major products such as meat, animal fat, and milk were imported at an increasing rate. Sri Lanka exports some non-traditional products like OFCs and fruits such a banana, pineapple, and papaw.

2.3 Agriculture and Livestock Related Ministry in Central Government

06. There are 14 ministries involved in agriculture and livestock at the national level. The core

ministries are the Ministry of Agriculture, Ministry of Irrigation and Water Resources Management and the Ministry of Livestock and Rural Community Development.

2.4 Agriculture and Livestock Development Plan and Policy

National Development Plan

07. "The Mahinda Chinthana, Vision for the Future", the government's policy framework, aims for the multiple goals in the agriculture sector including achievement of food security of the country and ensuring sustainable income of the farmers. The Mahinda Chinthana gives priority on the increment in paddy production and productively as a main food crop and gives also high priority on the production of OFCs such as onions, chili, legumes, maize, etc. The Mahinda Chinthana aims to achieve self-sufficiency for these crops by 2020 and decrease in foreign currency outflow spent for importation of these crops at present. The policy also says to increase fruits and vegetables production to attain near self-sufficiency level by 2020.
08. The Livestock Master Plan prepared by the Ministry of Livestock and Rural Community Development is a policy document based on the Mahinda Chintana. As an overview, the livestock sector consists mainly of dairy and poultry subsectors, which are considered as priority areas for future economic growth in rural areas. The dairy sector is considered as the first priority for public investment recognizing its contribution to national economic development. The master plan says to increase milk production by 300% by the end of 2015.
09. Government policy in irrigation sector aims to increase the efficiency of water usage. The policy places priorities on new water resources development, rehabilitation, and modernization of existing irrigation infrastructures, watershed management, institutional reforms, and enhancement of researches.

Provincial Development Policy and Programs

10. The provincial development plans were prepared in each province except for North Western Province. The Northern and Eastern provinces have a five-year investment program (2009-2013) and five-year development plan (2012-2016), respectively, placing priorities on the reconstruction, rehabilitation, and reactivation of social infrastructure and services. The Eastern Province puts priority on tourism development and allocates the highest budget for this sector. The North Central Province has a ten-year development plan (2003-2012) with programs related to agriculture and rural area development. In Uva Province, the seven-year development plan (2010-2016) for Budulla District and the two-year development program (2011-2012) for Monaragala District are available giving priority on the road network improvement.

Roles of the Central and Provincial Governments in Agriculture, Irrigation, Road, and Market Facilities Development

11. Many government agencies are involved in the agriculture, irrigation, and rural development sectors and their roles and responsibilities are complicated. The Provincial Department of Agriculture (PDOA) is principally responsible for the provision of agriculture extension services to farmers at the field level. However, Mahaweli Authority of Sri Lanka (MASL) and the Central Department of Agriculture take responsibility for extension activities in the MASL development area and inter-provincial development area, respectively. The Extension Service for livestock subsector has similar complication with the above mentioned agricultural extension service. The responsible agencies on the rehabilitation and operation and maintenance of irrigation scheme are different depending on location and size of irrigation command area.

III. PRESENT CONDITIONS AND ISSUES IN THE SURVEY AREA

3.1 Local Administration

Existing Setup and Budget of the Local Administration

12. The local administrative structure in Sri Lanka has four levels, namely, province, district,

division/local authority, and *grama niladhari*. Also, two governance systems, "public governance system" and "de-concentrated governance system", are being operated in the local administration. The functions of these two systems overlap at the district and division levels in some cases. The Chief Secretary's Office is the focal point of provincial administration. The Chief Secretary is the head of the provincial administration having the responsibility of planning, financing, and administration of provincial activities. The provincial ministries are available and are under the Chief Secretary such as the Ministry of Agriculture, Livestock and Fisheries, Ministry of Infrastructure including irrigation and road, Ministry of Local Government and Social Services, Ministry of Education and Health. The Provincial Department of Finance handles the province's financial activities. Block grant, matching grant, criteria based grant (CBG) and province specific development grant (PSDG) are the major budgets allocated to the provincial councils.

13. The district came to be recognized as the pivotal unit of administration and a GA is appointed to each district as head with wide range of responsibilities. The District Administration is mainly responsible for backstopping and for coordinating provincial and central program implementation at the district level, whereas, implementation of programs and delivery of services has been further decentralized to the division level administration. The divisional secretaries for DS Division, where is the implementation and operational base within the existing decentralization framework. The Grama Niladhari Division (GND) is the lowest administrative level. There is one GN in charge of each GND, commonly consisting of two or three villages.

Agriculture Extension Services and Ongoing Programs

14. There are multiple government agencies involved in agriculture and they are based on crop lines. Thus, the Central Department of Agriculture (Central DOA) is responsible for research and extension, agribusiness support, seed and planting material production, and regulatory services, namely, plant quarantine, soil conservation, and registration of pesticides. The service provided by the Central DOA is the most extensive as far as food sector is concerned. The Extension and Training Division of the Central DOA is well supported by three specialized research institutes, namely, Horticultural Crop Research and Development Institute, Rice Research and Development Institute, and Field Crops Research and Development Institute, as well as the Seed Certification and Plant Protection Centre, Seed and Planting Material Development Centre, and Socio Economics and Planning Centre. The Agricultural Extension Service of the Central DOA is confined to the inter-provincial major irrigation areas in the country, and the rest are under the Provincial Department of Agriculture. AI is the field level officer attached to both administrative set up involve in agricultural extension and training. According to statistics, one AI supports an average of about 3760 smallholders in the five provinces.

15. Representing the Commissioner General of Agrarian Development, the Divisional Officer (DO) is the authorized person at the field level having duties in input distribution and farmer institutional development. The agricultural research and production assistant (ARPA) works under the supervision of the DO, and while assisting the DO, he is supposed to do agricultural and livestock development extension activities. There is no particular agency handling the marketing aspects of the farmers at the village level.

16. Eight district agriculture training centers (DATCs) and two in-service training centers (ISTCs) are available in the survey area to carry out agricultural training. Some of the eight DATCs are operating with poor facilities and need urgent improvement.

17. Several special programs are on-going in the agriculture sector, namely, the national campaign to motivate food production, rice export program, other field crops development program, production and application of organic manure program, community-based seeds and planting material production program, big onion seed production program, farmer business school program, and sustainable organic farming project.

Livestock Extension Services and On-going Programs

18. Technical leadership in many aspects of livestock development including research, extension,

animal health management, and breeding services, such as artificial insemination inputs for the dairy sector, are provided by the DAPH.

3.2 Population and Employment

19. The survey area has a total population of 7,212,000. The male-to-female ratio is 99%. On the average, the population density is 177 persons/ km^2 in the five provinces or in the survey area, and 680 persons/ km^2 in other provinces. The total labor force is estimated at about 3.0 million where 2.7 million or 92% are employed. Female employment is 0.8 million or about 31% of the total employment in the survey area. Out of the 0.8 million, 49% are engaged in agriculture. Meanwhile, male employment is 42%.

3.3 Poverty and Socio-economic Situation

Ethnic Balance

20. In Sri Lanka, majority of the population is composed of Sinhalese as a whole. Since a large number of Tamil people are distributed in the northern and eastern part of the island, the share of Tamil people in these areas tends to be larger than the Sinhalese population. Among the five provinces of the survey area, Sinhalese people are widely found in North-Western Province (85.9%), North Central Province (90.6%) and Uva Province (79.9%). On the other hand, Tamil occupies almost all the population (95.7%) in the Northern Province. In Eastern Province, Tamil (41.0%), Muslim (37.0%), and Sinhalese (21.8%) are sharing the population percentage. It should be noted that the ethnic balance differs from community to community and their populated place of each ethnicity is clearly divided.

Poverty

21. Concerning poverty head count index (P0), among the five provinces of the survey area, four provinces show higher rate exceeding 10%, except for North Central Province. Eastern Province shows the highest share (14.8%) among them. Though the statistics of some districts are missing, it is assumed that Northern Province also has a large number of population living in poverty as that of Eastern Province. The data shows that even though poverty situation is severe in Eastern Province and Northern Province, the gap between the rich and the poor is not so large in the province compared with other provinces or with the whole country.

IDPs/Returnees

22. As of April 2012, there are 9272 IDP families and 30,085 individuals in Northern Province, and 2459 IDP families and 7914 individuals, in Eastern Province. According to UNHCR Trincomalee Office, though returning of IDPs to their original place is still ongoing as reported by the government with the help of several international and local NGOs, there are still some IDPs camps in Northern and Eastern provinces. Resettlement have been completed for around 146,000 families and 482,000 individuals in Northern Province, while 72,0000 families and 255,000 individuals in Eastern Province.

Farming System in Rural Society (Land Use System and Labor Use Pattern)

23. Land ownership is classified into two, that is, joint ownership and single ownership. Though single ownership is more popular in Sri Lanka, diversified and complex joint ownership of land still exists. Joint ownership of land is called "*Havul*". In joint ownership, no single person has sole ownership of the land, but instead shared by some individual farmers. Thus, any decision concerning the jointly owned land needs to be agreed by all owners, and no one can make any decision without obtaining a mutual agreement. In the case of single ownership, there is an agreement of "share cropping" between a land owner and a tenant. The land owner may rent out the land to the tenant for a certain period and the cultivated harvest from the land is shared by the land owner and tenant based on such agreement. This kind of relationship is called *'ande'*. It seems that one of the significant and key issues in planning and implementation of the project is the identification of beneficiaries of the project activities. In a community where land leasing system ('*badu*') and/or a land mortgage ('*ukas*') system exist, the cultivator of land may not be the land owner. For instance, if project components include the provision of farming equipment

to farmers, the project has to examine carefully and consider who should be the recipient of such equipment.

24. The labor use pattern present in a community may vary depending on the custom, season, availability of labor, and type of crops of each area. Hired labor and family labor are more popular labor patterns which can be observed in the field, currently. As one of the reasons for diminishing trend of mutual cooperation in farming in rural society, modernization and unification of farming system during colonial era by common way in entire country might be pointed out. In planning and implementation of project, it should be noted that mutual cooperation and collective work have been common practices for a long time in rural communities of the country. Therefore, such traditionally existing social relationships among people in the community should be considered in the project, and utilized for smooth implementation of the project activities.

3.4 Agro-ecological Zone

25. The northeast monsoon (October to February) brings rain to all parts of the island, whereas the southwest monsoon (May to August) brings rain only to the southwest part. The area that does not get rain from the southwest monsoon demarcates the dry zone, which receives a mean annual rainfall of less than 1750 mm with a distinct dry season from May to September. The area in between these two zones, the intermediate zone, receives a little rain from the southwest monsoon. According to the climatic zones of the country, about 78% of the survey area belongs to the dry zone. Furthermore, about 95% of the survey area is situated in the low-country agro-ecological region and only about 3% and 2% of the survey area are situated in mid-country and up-country, respectively.

3.5 Soils

26. Reddish brown earth soil group is prominent in the dry zone. The main feature of this soil group is their reddish brown color. They are best used for rainfed agriculture or for farming with highly controlled irrigation. However, there are other types such as dark brown to dark grayish brown, brown or yellowish brown, loamy sand to sandy loam. Red latosols are dark reddish brown to dark red in color, while the yellow latosols are yellowish brown to yellowish red which are distributed in various parts of the dry zone.

3.6 Surface Water and Groundwater Resources

27. Sri Lanka receives all its water from rainfall. The latest estimate of the total annual rainfall over the island is about 109 km^3. Part of the rainfall evaporates back to the atmosphere, while another part infiltrates into the ground and adds to the groundwater, while the remainder streams as runoff. A relatively high percentage of the rainfall is converted to runoff since over 90% of the island is made by Precambrian crystalline rocks of low primary porosities that reduce infiltration.

Surface Water Resources

28. The runoff from the dry zone catchments can be from 20% to 30%. The runoff from the island has been estimated to be about 45%. Out of the 103 river basins in Sri Lanka, there are 81 river basins covering the survey area. Except Jaffna District, all other 13 districts of the survey area are covered with some of these river basins.

Groundwater Resources

29. All seven types of aquifers identified in Sri Lanka are present in the survey area. However, 76% of the survey area is covered with shallow regolith aquifers, and the other six types of aquifers are distributed in the remaining 24% of the area.

3.7 Agricultural Production

Agricultural Land Use

30. The total survey area in the five provinces is 45,907 km^2. The largest agricultural land is mainly used for paddy extending 6529 km^2 or 14.2% of the survey area. Land category for a garden is

the second largest occupying 5167 km^2 or 11.3% of the survey area. For a garden, rain-fed agriculture is widely practiced for OFCs, vegetables, and fruit production. Among the plantation crops, rubber and tea are cultivated mainly in Uva Province, whilst coconut is densely-cultivated in North West Province.

Land Tenure and Holdings

31. There are two different land holding systems in the survey area, i.e., small holdings and estates. The percentage of land belonging to the estate sector is comparatively small and less than 1% in Northern and Eastern provinces. Meanwhile, this percentage is relatively large and more than 20% in Uva and North Western provinces. The average holding size of the small holdings sector in Jaffna (0.18 ha), Batticaloa (0.33 ha), and Trincomalee (0.43 ha) is smaller than that of the national average (0.47 ha).

Cropped Area and Crop Production

32. The survey area can be classified as Sri Lanka's paddy production area because more than 70% of the national paddy production is produced from the survey area. A range of cereals, grain legumes, and root crops as well as chili and onions are cultivated in the survey area. The production/cultivation area shares and of these crops in the dry zone are; maize (96%), kurakkan (67%), sorghum (47%), cowpea (91%), groundnut (89%), green gram (73%), potato (78%), manioc (56%), sweet potato (53%), red onion (95%), ginger (93%), mustard (80%), chili (75%), and big onion (36%). Low-country vegetables are mainly produced in the survey area. Both tropical and temperate fruits, such as banana, papaw, pineapple, mango, orange, lime, and passion fruit, are produced in the survey area. However, fruit production is not as significant in the survey area when compared with the production shares of paddy, OFCs, and low-country vegetables.

33. Seed supply in Sri Lanka is carried out both by the government and private sectors, and consists of both imported and local seeds. A major portion of vegetable seed supply is being carried out by the private sector, while the DOA also supplies a limited amount of seeds ranging from 4% to 20% of the total requirement of the country. The private sector and the DOA provide assistance in different levels to contract growers of seeds. Most farmers obtain their fertilizer needs from private traders, dealers, and agents of fertilizer importers in the village and town. Since May 2011, fertilizers have been available to farmers at subsidized prices, not only for paddy but also for other crops. Agro-chemicals are marketed through a chain of importers/packers, distributors, and local agents. There is no statistical data available on farm mechanization in Sri Lanka, even at the national level.

Agricultural Logistics and Marketing

34. There are some particular features in marketing that are being considered, e.g., cultivation area and season. Generally, cultivation of OFCs is higher in Maha season than in Yala season. The production features such as cultivation area and season affect the formation of marketing, transportation channels, and market prices. Sufficient quantities to meet market demands and effective capacity of transportation should be considered in commercial cultivation and effective marketing. Traditional marketing channel consists of producers, collectors, middlemen, and traders to formal types of markets as wholesalers or retailers. Marketing margin is formed based on the transportation costs at each stage. Also, marketing loss occurs due to increase of cost along the stages of transportation.

35. A new type of marketing channel for the wholesale system called the Dedicated Economic Centre is aimed in simplifying these stages. Further, the supermarket collection system is also more simplified in the process of reaching products from producers to retailers. There are some differences in the collection system between large-scale supermarkets and smaller ones. A large-scale supermarket has its own collection system and own distribution centers, while others collect their requirements from traditional marketing channels. The forward contract and buy-back system provide direct marketing from producers to final users of processing or exporters and supermarket distribution centers.

36. A simplified marketing channel is beneficial for both producers and consumers by reducing the

market margin. The producer's share in OFC commodity is over 70% of the retail price of five types of crops, and 12% and 15% shares for the wholesaler and retailer, respectively. The producer's share in the prices of 18 types of vegetable crops is 45%, and 14% and 41% for wholesaler and retailer, respectively. The market margins on commodities and marketing channels vary according to the type of commodity, type of business, and volume of trade. In general, perishable commodities such as fresh vegetables and fresh fruits are imposed to have high margins due to short period required to sell these crops. Wholesalers are dealing with smaller margins for commodities which sell out to retailers in a short time and deal with large volumes. As retailers are the final sellers to consumers, they deal with smaller volumes as compared with wholesalers and imposed higher margins due to high risk in sales. According to the study, an average of more than 40% of the retail price goes to producers, which is quite a high return in general. Also, it is considered that producers are expected to increase productivity and yield, and lower the production cost in order to increase their income as competitiveness intensifies in the future. As compared with the share of imported dried chilies to the local produce in the market, the share of wholesalers for local produce is extremely lower, while that of producers and retailers are higher.

37. Boutiques are the smallest conventional marketing system at the village level, which deal with surplus home garden and farm products for neighbors in the village and passers-by. '*Pola'* is the most popular commercial market situated in villages and small towns. '*Pola'* sells locally produced items, foods from wholesale markets, and all kinds of consumer items. Traders are not only local traders but also mobile traders and these traders play a role as a collector to the wholesale market. This market is managed by the *Pradeshiya Sabha* and charges a fee for cleaning stalls and management. Public markets are open everyday for consumers requiring daily consumable items located in medium and large townships and commercial areas. The setting up of Dedicated Economic Centers (DECs) has started in 1998, as a means of implementing marketing development strategy to provide marketing facilities for producers in the rural areas. Supermarkets were established in Sri Lanka during the 1980s. Since then, retail outlets expanded rapidly after 2000.

38. Agricultural inputs such as fertilizer, agro-chemical, planting materials, and machinery and equipment are distributed and sold in the local market. Fertilizer, agro-chemical, and seeds are distributed through a local agent or dealer in commercial towns and distributed to retailers in small towns or villages. Planting materials nurseries such as fruit plant nurseries are registered under DOA and the plants are sold as DOA certified planting material.

39. The government supports the marketing of agricultural products by publicizing market prices of food items and consumer items. Market price information is mainly collected by two organizations, namely, the Department of Census and Statistics (DCS) and Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI).

Agricultural Processing

40. Processing of agricultural products is traditionally carried out domestically as dried foods, powdered spices, legume, and cereal flour. However, commercial level processing is also in increasing trend due to local and export demands. The Export Development Board (EDB) has categorized processed food items of agricultural products and registered producers of those processed items.

41. Agricultural food commodities which are imported to the country include onion, chilies, pulses, and fruits. A considerable amount of foreign currency is spent for importation of these commodities. However, the country exports food commodities to Maldives, Middle-East, and European countries. Sri Lanka's fruits are also being exported to Maldives, Middle East, and European countries while the vegetables are exported to the Middle East, United Kingdom, and other European countries. In order to promote Sri Lankan exports in the future, there is a possibility to increase items and quantities not only to where Sri Lankan expatriates live, but also to ordinary markets such as supermarkets and local markets in the countries where exporters have connections if the production in Sri Lanka meets the demand type, quality, and quantity.

3.8 Livestock Production

Overview of Livestock Production

42. This area has cattle, buffaloes, goat, swine, broiler chicken, and a sizable population of native chickens but cattle rearing is the major income provider for the people. The ruminant stock density per rural family is 1.37, 0.63, 1.20, 0.91, 0.95, and 0.60 for the Eastern, North Western, North Central, Uva, survey area, and Sri Lanka, respectively. Milk producing herds consist of around 52% of the total cattle population, whereas, 48% of the cattle herds are bred for beef production. Cattle, buffaloes, and goat herding are usually carried out in available natural pastures and forest margins during cultivation period, but during off-season they are allowed to return to the crop farming area for a very brief period of time.

43. Present natural pastures and off season (Yala) cultivation land, utilized by cattle owners, can provide only 40%-50% of the total dry matter requirement of the cattle. It is apparent that most of the agricultural by-products go unutilized and wasted as herd owners have no effort to collect, process, and utilize them for ruminant feeding. Hence, this nutritional problem contributes to the late age maturity, short lactation periods, low milk production, and longer calving which lead to an increase in the number of non-producing ruminants within the herds. This also includes minimal integration with crop production sector through utilization of crop by-products. Most crop products and by-products are transported to Colombo for feed manufacturing especially for the poultry sector. It needs gradual changes and might be able to utilize produce as by-products for high quality nutritional feed products that can help the country to be self-sufficient in milk and other livestock. The native chickens provide a strong assurance against malnutrition since these are available in the backyard, as well as contribute to women empowerment.

44. Animals not responding to better nutrition should be changed with better animals by genetic improvement either through artificial insemination (AI) or natural mating (NM) of cross-bred bulls and indigenous female cows in order to produce more milk. The number of goat is gradually decreasing owing to the lack of clear goat breeding policy for a long time and consumer's demand of mutton has been higher than its supply capacity. The slaughtering of goats may be done easily without any limitation to the traditional habit. Furthermore, goat has not been used for milk production which is a main thrust area. A dual purpose goat population either be used for meat or milk production may address the negative growth observed in goats.

Milk and Dairy Production

45. Milk production is increasing gradually but not enough to meet the target levels. The average milk production of indigenous cows is less than 1 L/day whereas cross-bred cows produced 2-5 times more. Simultaneous improvement in nutritional management together with effective breeding program is required to achieve the targets.

Milk Collecting System and Marketing

46. Many large, medium, and small scale organizations are engaged in milk collection, processing, and marketing of processed dairy products. Milco Ltd. and Nestle Lanka Ltd. hold a market share of about 54% of the total milk collected in the formal market. The contributors to the informal market are small private milk collectors, small local processors of traditional dairy products, retailers and dairy producers themselves, who sell directly to hotels and restaurants, or to consumers.

Meat Production

47. In meat production, the contribution of small holder livestock producers is comparatively higher in the informal market than the formal market. Slaughter houses have an important role in providing a hygienic and quality meat for consumers. The present actual condition of slaughter houses is either poor in standard or rather critical.

Livestock Breeding and Management

48. Breeding services provided to dairy farmers in the five provinces are needed to be improved significantly. AI coverage is limited due to limited funds and lack of sufficient human resources.

There is a sizable population of indigenous cattle and buffaloes which can be upgraded through efficient and effective breeding program.

Food Supply for Livestock

49. Although the national production of dry matter is 230 times more than the yearly demand of livestock, it expresses a chronic food shortage of fodder for animals in the study areas. It seems that the distribution of total national dry matter production is highly unbalanced, and that there is a high production in southern wet area and in low dry zone.

Overall Issues in the Livestock Sector Development

50. High cost of cattle feed, non-availability of quality pasture/fodder, lack of efficient breeding services, and illegal slaughter of dairy animals are the main issues in the livestock sector development.

3.9 Irrigation and Rural Infrastructure

Major and Minor Irrigation Schemes

51. The Mahaweli Project, which started recently, is a major irrigation project that envisaged the development of above 365,000 ha of irrigable lands in dry zone and generation of about 508 MW of hydropower. In addition to Mahaweli Project, there are about 542 major and medium irrigation schemes and about 24,199 working minor irrigation schemes in Sri Lanka. The extent of the command area in each major or medium scheme exceeds 80 ha while that in each minor scheme is less than 80 ha. Irrigation schemes are managed by three main institutions. The performance of several irrigation schemes has not yet reached its threshold; therefore, improving the performance of existing systems has become a felt need. On the other hand, ground water resources in Sri Lanka have been extensively used since ancient times for domestic purposes using shallow open wells in almost all parts of the country. The quality of ground water is generally good and relatively constant throughout the year.

Road

52. Total length of road network in the survey area is 58,696 km. This includes 4966 km of national roads, 6214 km of provincial roads and 47,516 km of other roads. The average road density of the survey area is 1.31 km of the land area. More than 90% of the other roads are unpaved and need upgrading.

Market Facilities

53. Conventional formal marketing channels consist of *polas* are open weekly and being managed by public organizations of *Pradeshiya Sabha*. Permanent town market opens daily and being managed by the Urban Council or Municipality Council.

3.10 Community Based Organization (CBO)

54. Farmer organization (FO) is the only CBO the project can collaborate with as the counterpart organization in the field with respect to agriculture project including irrigation rehabilitation basically, though there may be a possibility that the project may identify RDS as the counterpart organization in some cases in Northern and Eastern provinces particularly for the project that aims for rural infrastructure development (e.g., farm access road). Depending on the situation of each FO, it is also suggested that the project supports to formulate sub-group(s) under the FO. Sub-group may undertake a particular task (e.g., development of irrigation maintenance plan), or it may be organized by crop base with farmers who produce the crop for the distribution of quality seed through the FO.

55. Concerning livestock activities, cooperative societies such as livestock production co-operative societies and milk collection cooperative society are the possible counterpart organization in the field. In case such kinds of cooperative societies are not available; the project may consider supporting a formation of these cooperative societies with the cooperation from the Department of Animal Production and Health.

56. Since the situation of CBOs (existence of a particular CBO, role and function of the CBO,

composition of members, etc.) may differ from village to village in rural areas, it is recommended that the project identify the structure of the CBOs in the community at the early stage. It is preferable that the project firstly examine the roles and functions of each CBO in each community, and then consider the realistic and reasonable measure to collaborate with the identified CBOs in the community.

3.11 Environmental and Social Condition

57. The general topography of Sri Lanka describes three peneplains depending on the elevation of the land compared to the mean sea level. The greater part of the island is made up of highly crystalline, non-fossil ferrous rocks of pre-cambrian age belonging to one of the most ancient and stable parts of the earth crust. The forest includes dry monsoon forests, mangroves, riverine forests, tropical savannah forests, *damana*, *Villu* grasslands, and mangroves forests found in the coastal areas. Most of the lagoons, bays, salt flats, wet lands, coral reefs, estuaries, etc., play a very important ecological role in the selected areas. In the dry zone, the forest area being larger has the level of biodiversity and endemism which are substantially lower than in the wet zone. The adverse impacts of forest loss on biodiversity are not as severe, except for the effects on large mammals like the leopard, elephant, and primate species.

58. The Department of Archaeology, has declared about 118 archaeological reserves and over 2000 protected monuments in Sri Lanka. Out of them, there are 56 such reserves in the project area. The indigenous people in Sri Lanka are traditionally hunters and gatherers while paddy cultivation and chena cultivation are the main economic engagement. It has been identified that settlements of indigenous people has been restricted mainly to Ampara, Batticaloa, Trincomalee, Polonnaruwa, Anuradhapura, Badulla, Moneragala districts in Eastern, Uva, and North Central provinces of Sri Lanka.

59. The main environmental and social issues related to the agriculture sector project in Sri Lanka are as follows; human-elephant conflict (HEC), over extraction and pollution of ground water, soil pollution, and soil erosion. These issues should be considered with special attention in the planning stage of the project component.

3.12 Major Foreign Funded Projects by Other Agencies

60. There are large numbers of on-going donor assisted projects/programs that develop the agriculture sector of Sri Lanka. Close coordination with these programs is necessary in planning a new project to realize the maximum benefits to the area as a whole.

IV. BASIC APPROACHES AND PROJECT RATIONALE

4.1 Selection of Potential Site

61. High potential sites for project implementation were selected on the basis of the Divisional Secretariat (DS) division's fair and objective criteria. The five criteria employed for the selection are (i) suitability of soil, (ii) appropriateness of water resource, (iii) farmer's needs and ability, (iv) marketability, and (v) adequateness of government extension services. The poverty level, agro-ecological conditions, and available workforce were to be considered as selection criteria. However, these were not employed as selection criteria, since these will give either an advantage or disadvantage for site selection. The potential for milk production was given less priority in the selection of sites, since milk production cannot be achieved without further integration of livestock farming with crop farming. With the above criteria and scoring method, 181 DS divisions available in the survey area were scored and out of them 54 DS divisions were selected as potential sites.

62. With the above criteria and scoring method, 181 DS divisions available in the survey area were scored. By looking at the scoring results, there are two major high potential areas that can be identified. One area covers the north of Kurunagala and Puttalam, Trincomalee in the Eastern Province and Mullativu in the Northern Province. Other high potential area is located in the Moneragala District, inland of the Eastern Province and northern part of Batticaloa. Out of 54

DS divisions, eight were selected from the Northern Province, ten from Eastern Province, 14 from North Central Province, 12 from North West Province and ten DS from Uva Province.

4.2 Basic Approaches

Target Development Areas by Strategic Agricultural Crop

63. Target development areas by strategic crop in relation to the improvement on agricultural production and productivity were determined based mainly on the following factors: i. target crop production figures stated in the Mahinda Chintana 2010, ii. proportion of dry zone's crop production in Sri Lanka's total production, iii. anticipated crop yield determined for the respective crops, and iv. the proposed development area of the DS level officers for each crop.

64. By combining the information in the National Development Plan and the DS level workshops reports, the strategic crops selected for the Project are chili, red onions, big onions, and legumes from OFCs, and mangos, bananas, sweet oranges, papaws, lime, and passion fruits for fruit crops. Estimates for anticipated yields of potential crops were made on the basis of relevant data obtained from related organizations.

65. Development area of each important crop proposed by the DS level officers was confirmed in DS level workshops held at ten locations during May 2012-June 2012 period. As one of the final outputs of the workshop, crop development areas in the survey area were confirmed to be 16,280 ha for OFCs and 3850 ha for fruits, which in total is 20,130 ha. Moreover, 13,110 ha or 83% of the total OFCs will be cultivated during Yala with surface irrigation schemes, and 2660 ha or 17% of the total remaining area will be cultivated during Maha, with pump irrigation. As for fruits, 2810 ha or 90% of the total fruits area will be cultivated with agro-well, and 300 ha or 10% of the remaining land for fruits will be cultivated using gravity irrigation.

Approaches to Livestock Sector Development

66. The project places priority on ruminant related products especially for dairy (cattle) production considering the high importation rate of milk and the National Development Plan of Mahinda Chintana addressing the increase of self-sufficiency on milk. There are three types of milk producers in the project site, namely, extensive system livestock farmer, semi-intensive system livestock famer, and intensive system livestock farmer. The project targets semi-intensive and intensive system livestock farmers since the extensive farmers are less interested in milk production and cattle being managed in the extensive system have high mortality rate. Moreover, a variety of cattle is good at present in the intensive and semi-intensive system farmers and there are more rooms to improve the milk yield in the short-term. The project targets the total cattle population of 30,496 in the said farming systems of the target DS divisions.

Zoning of Target Development Area

67. Zoning of target development area is made based on the distribution of strategic crops in each DS division. Area specific advantages of each district (e.g., soil, water availability, access to markets, etc.) are also considered in zoning, because these characteristics are already evident even under the present situation. As a result, a total of four cultivation zones were identified. Representative crops in each zone are chili and red onion in Zone-1, mango and papaw in Zone-2, sweet orange and passion fruit in Zone-3, and big onion and legumes in Zone-4.

4.3 Priority Subjects and Project Intervention

Needs Identified through the Village Level Workshop

68. The village level workshops were conducted in June 2012 for the five villages selected in the survey area in order to identify the actual needs of the project beneficiaries. Approximately, 30 participants consisting of leader(s), committee members, and members of CBOs such as Farmers Organization (FO), Rural Development Society (RDS), and Women Rural Development Society (WRDS) in the community were invited to participate in each workshop. The project approaches identified are categorized as follows: (i) water management, (ii) marketing, (iii) training/awareness building, (iv) extension services/expert inputs/service provisions subsidy, (v) organizational strengthening of FO, (vi) minimizing cost of production,

(vii) financial and credit, (viii) resource/land management, (ix) policy intervention, (x) chena farming, and (xi) economic development of re-settlers.

Priority Subjects and Project Intervention

69. The village workshop revealed that the most felt need of the beneficiaries is an efficient and effective provision and management of water resources. This includes the construction and rehabilitation of irrigation facilities and agro-wells. At the same time, high priority on the rehabilitation of irrigations and drainage facilities were identified during the field and provincial workshops that were conducted with relevant officers. In addition to irrigation and water management, the output of the workshop showed that concerns of farmers are not only on the production side but also on the marketing aspect of their agricultural produce as well. Farmers desire to have stronger and proper linkage with traders. They also organize themselves for collective bargaining. To support this, the project approach includes activities for logistic system improvement such as the construction of storage facilities and farm access roads/rural roads.

70. Not only the provision of infrastructure/facilities for production and marketing of agricultural products, it was also made known that farmers have a strong desire for opportunities to participate in training programs for learning modern agricultural technologies and marketing aspects. Hence, the provision of training opportunities (farm management, business (entrepreneur development), etc.) by the project will inevitably benefit the farmers. The needs for enhancement of government extension service and credit support were also some issues mentioned at the workshops.

71. With respect to milk production, the workshop identified the needs of the farmers both for the production and marketing aspects. The much emerged needs were the conduct of AI and breeding of quality cattle, establishment of milk collection center facilities, and collection networks. Needs for proper training and extension services provided by the government were also mentioned. The approach and activities concerning milk production consisting of productivity improvement, marketing development, and livestock service quality will satisfy most of farmer's needs.

Proposed Programs for Implementation

72. For the improvement of production and productivity of agricultural crops, three major programs with 18 sub-programs were formulated. As for the improvement of milk production, three major programs with 13 sub-programs were formulated.

4.4 Project Rationale

73. In line with the National Development Plan of Mahinda Chintana, the Ministry of Agriculture set the objective to ensure food security under changing and variable climate through improved and novel research, extension, advisory by promotion of increase production, and productivity of OFCs, vegetables, and fruits. On the other hand, the Ministry of Livestock and Rural Community Development sets the policy of "national self-reliance and food security" in the master plan following the Mahinda Chintana and has launched an ambitious program to be self-sufficient in milk production in 2020. For this reason in particular, it is understood that the pace of milk production today needs to be accelerated beyond what is observed. In addition, the Ministry of Finance and Planning has imposed high import taxes to agricultural products such as green gram, black gram, cowpea, and processed milk products to encourage the national food production campaign and livestock master plan.

74. The project objective is to promote a diversified agriculture with OFCs, fruits, and milk in compliance with the government policies. There is very high necessity of project intervention in the dry zone area through promotion of import substitution crop, fruit, and milk production due to many reasons. One reason is that it represents more than 65% of the country's land area which is occupied by 35% of the total population in the country and nearly more than 500,000 ha of irrigable land is available for enhanced agricultural production. Further, the dry zone consisting of 82% of the national cattle population produced 54% of the total national milk production without much financial and infrastructure interventions during the past several decades.

V. THE PROJECT

5.1 Project Objectives and Overall Goals

75. The project sets three overall goals namely (i) decrease in foreign currency outflow, (ii) improvement of self-sufficient ratio of food in OFC and milk and (iii) improvement of income of small holding farmers. In order to achieve these overall goals, the project sets the immediate objective, which is to "increase production and productivity of strategic agricultural and livestock product such as chili, onion, legumes, and milk in potential areas in the dry zone".

5.2 Project Works

General

76. The proposed project is composed of six works, namely, (i) preparatory work; (ii) survey and detailed planning; (iii) promotion of strategic agricultural crop production program, (iv) strategic livestock product promotion program, (v) monitoring and evaluation, and (vi) technical cooperation/consulting services.

Preparatory Work

77. Preparatory work mainly focuses on setting up a project management unit (PMU) at the national level and five project implementing units (PIU) at the provincial level. The project steering committees (PSC) and project coordination committees (PCC) will also be established in the central and provincial levels, respectively, to coordinate the activities of the national and provincial level stakeholders.

Survey and Detailed Planning

78. Although the agriculture and livestock production plan and targets are formulated in this survey, some of factors such as latest national and provincial agriculture or livestock production plan, actual agricultural trade, and national consumption data were reviewed at the beginning of the Project. Based on the reviewed data, the agricultural and livestock production targets were revised. The infrastructure components listed in this report were also reviewed based on the revised agricultural and livestock development target.

Promotion on Strategic Agricultural Crop Production

79. About 44 major/medium irrigation schemes, 71 minor irrigation schemes, and 5671 agro-wells are proposed to be rehabilitated or constructed for water resources development to improve the productivity of strategic agricultural crop production. These are selected from among the 530 irrigation schemes proposed by DS level workshop with the following criteria; a) availability of the data for study, b) availability of the water resources, and c) scale of the scheme. Below is the list of seven irrigation schemes with large extent and extensive proposal for rehabilitation and upgrading works. It is therefore necessary that these works be handled separately as individual sub-scheme from the others during the project implementation and study.
    - Mahaweli System H Rehabilitation Scheme (Anuradhapura /Kurunegala District)
    - Improvements to Ingnimitiya Scheme (Puttalam District)
    - Neelabemma Scheme (Puttalam District)
    - Kurai Tank Augmentation and Parangi aru Development Project (Mannar District)
    - Rehabilitation of Welimaruthamadu Irrigation Scheme (Mannar District)
    - Rehabilitation of Muthayankaddu Tank Lift Irrigation Scheme (Mullaitivue District)
    - Rehabilitation of Vavunikulam Tank - Right and Left Banks Lift Irrigation System (Mullaitivue District)
80. Out of the 5671 agro-wells, 3000 agro-wells are rehabilitated, while 2671 are newly constructed. Nearly 18,000 agro-wells are available, and out of these, 4000 need upgrading or rehabilitation in the target 54 DS divisions. The Survey Team estimated about 3000 agro-wells that can be

incorporated into the project components by desilting and/or deepening the well with rehabilitation of the protection wall based on the discussion during DS level workshops. The provision of pump and micro irrigation kit with necessary operation and maintenance training are planned under the project.

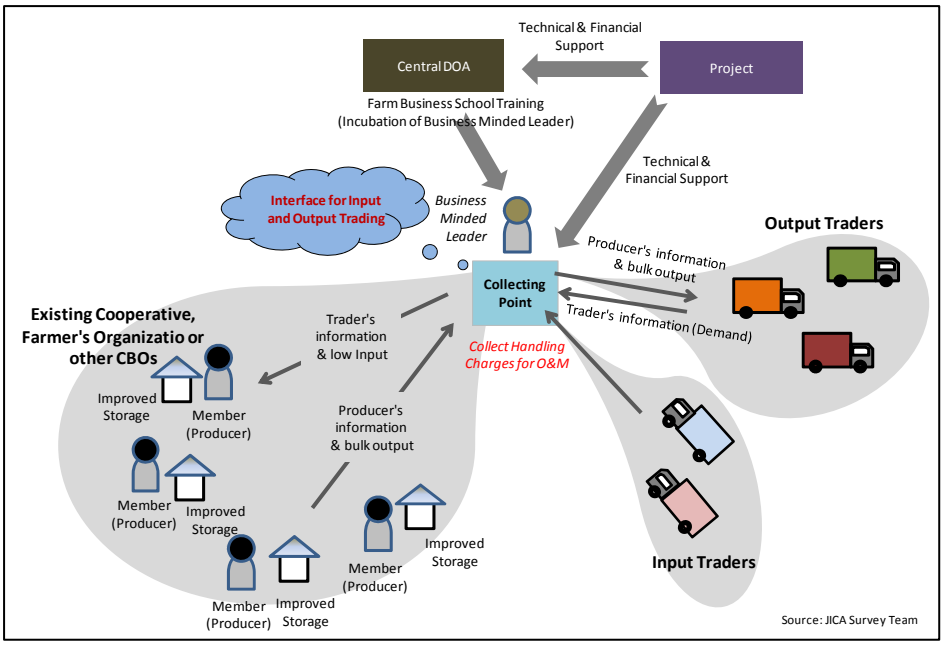
81. The enhancement of supply chain of quality seed and planting material, namely, (i) establishment of five provincial seed testing laboratories, (ii) rehabilitation of five provincial seed farms, and (iii) conduct of training program on quality self-seed and planting material production are planned under the project. Necessary quantity of interventions is estimated based on the calculated requirement of seed and planting material.

82. The project will provide training to the beneficiary farmers. Around 1260 farm management trainings, 872 OFC cultivation improvement trainings, and 568 fruits cultivation improvement trainings are planned.

83. The project plans to provide machineries necessary for farm mechanization so as to promote quality products with low production cost. The machineries to be provided are 368 manual highland seeders, 368 highland weeders, 184 ridgers, 52 groundnut decorticating machines, 134 legume splitting machines, 134 legume cleaning machines, and 397 grinding machines. In addition to the machineries, fence or fencing materials will be provided to the beneficiaries to mitigate the crop damages from domestic and wild animals.

84. According to the cost sharing concept, the beneficiary farmers will be required to pay 25% of the cost for procurement of machineries and barbed wire. The project will set up a fund in a certain bank to support the cost sharing concept. Since the cost for procurement of machineries, barbed wire, and agro-wells is estimated to be Rs.3,494 million, the total fund requirement is estimated at Rs.582 million assuming that two thirds of beneficiaries will obtain loan. A proper handling bank of the proposed fund will be studied and selected during the preparatory work period. Other details of loan conditions including bank handling charge, interest rates to the farmers, loan period, etc., will also be decided during this period

85. With the object of facilitating collective shipment in the crop production area, establishment of 108 collecting points are planned under the project. This will serve as interface between farmers and input and output traders, as well as a market information sharing hub. The trained business minded leaders involved in the collecting point will develop linkages with input traders, output traders, and relevant government officers, to help his fellow farmers in terms of market oriented production. Using the facility of collecting point, the member farmers are expected to carry out value adding activities with equipment provided by the project. To support the collective shipment of the producer’s group, improvement of individual storage is also planned.



Schematic Drawing of the Establishment of Proper Interface for Trading

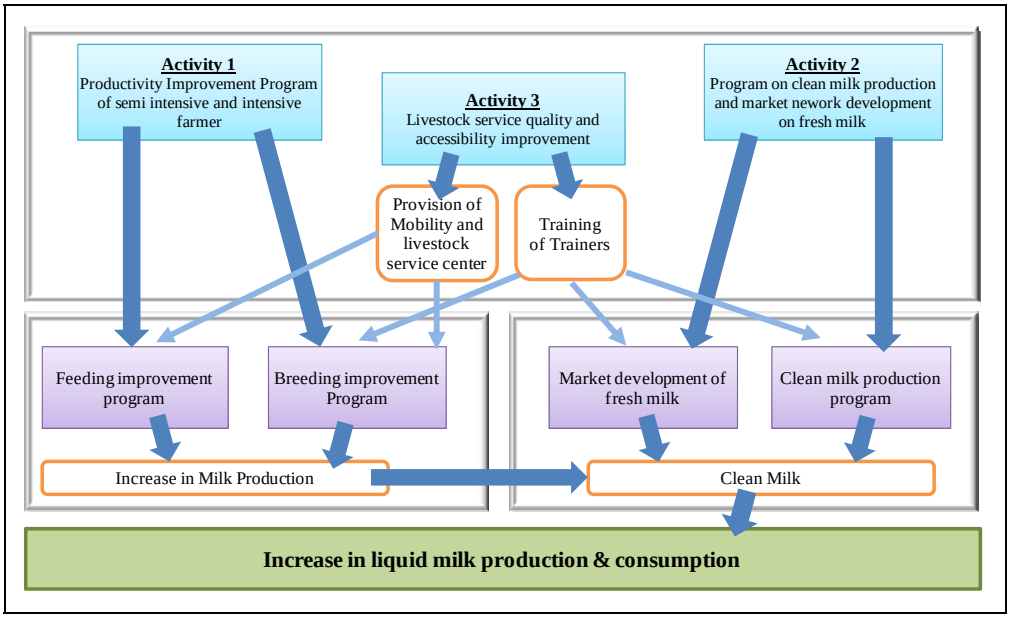
86. Road condition is critical since it largely affects the marketing and transportation of agricultural products. Improvement on the accessibility and availability of road to collection center, *pola*, and town market are planned to reduce the transport losses and cost, so as to increase the market opportunity. The upgrading or rehabilitation of 86 km of access road and 543 km of farm road are planned under the project.

87. Two study tours for the exporters/processors and government official to major export countries and potential import countries of agricultural products from Sri Lanka are planned aiming to (i) understand the food supply system in the countries, (ii) identify potential food items in kind and quality in the countries, (iii) understand business procedures and customs in the countries, and (iv) create communication and business relation.

88. To enhance the extension services and ground level adaptive trials, (i) provision of training to extension officers for the promotion of commercialized farming, (ii) enhancement of DATC/ISTC facilities to carry out ground level on-farm trials, (iii) provision of mobility for field extension officers and other equipment, (iv) overseas training for advanced commercial farming and extension method are planned.

<u>Strategic Livestock Product Promotion Program</u>

89. The livestock product promotion program consists of three major activities, namely, (i) productivity improvement program of semi-intensive and intensive farmers, (ii) program on clean milk production and market network development on fresh milk, and (iii) livestock service quality and accessibility improvement.



Schematic Drawing of the Strategic Livestock Product Promotion Program

90. The productivity improvement of semi-intensive and intensive farmers is enhanced by means of establishing a system to maintain a steady supply of quality feed and timed artificial insemination (TAI) with the promotion of estrus synchronization. The project nominates the 54 FOs and enhances the production of feed concentrate made of agricultural by-products which is available at the end of the rainy season. The project also focuses on the promotion of alfalfa and micro silage to improve the availability of the feeds. TAI with the promotion of estrus synchronization targets nearly 30,000 cattle for the project period.

Outline of Synchronization and AI Program

Items	Target Number or Number to be Supplied					Implemented by
	CZ-1	CZ-2	CZ-3	CZ-4	Total	
Estrus Synchronization	6,000	16,000	16,000	10,000	48,000	PDAPH and FVMAS
Artificial Insemination	25,600	66,000	66,800	41,600	200,000	PDAPH

91. The introduction of milking goat increases milk production and improves the feed efficiency of milk production in the livestock sector. Feed requirement for body maintenance in goat is much lesser than in cattle. Furthermore, goats consume different types of grasses from cattle. For these reasons, a dual purpose goat such as Jamnapari and Sanaan cross-type is promoted in the project area through the enhancement of Thalahara National Goat Breeding Center.

92. The program on clean milk production and market network development on fresh milk are implemented. First, by imparting knowledge on clean milk production to relevant stakeholders, and then, to supply equipment to maintain the quality throughout the milk market chain, and finally, to provide further market development with the promotion of mobile sales. Around eight UHT plants, ten chilling tanks, 20 mobile sale units, and necessary milk cans are planned to be procured for this activity.

93. Provision of five subjects for technical training, mobility and equipment of semen transport, and establishment of 60 livestock service centers are planned as the livestock service quality and accessibility improvement program. Livestock service centers are proposed to be constructed in VS range in the remote areas to improve efficiency of the extension services. The livestock service center will be a focal point of extension services and will have multipurpose functions such as milk collection, information service, training zone, extension, treatment, AI requests, commodity supply, monitoring of activity, vaccination service, etc.

Project Monitoring and Evaluation

94. The survey team proposes to set the operation and effective indicators as summarized in the table below to monitor and evaluate the project. Under the project, initial evaluation, ongoing evaluation, mid-term evaluation, terminal evaluation, and ex-post evaluation are planned during the project implementation and after completion of the project.

Proposed Performance Indicators

Category of Indicator	Indicator	Data Source
Operation Indicator	(1) Area benefited by the project (18,880 ha)	Progress report
	(2) Cultivation area by crops Fruits : 3,110 ha Chili : 5,280 ha Onion : 3,170 ha Legumes : 7,320 ha	Statistical data from MASL, Central Department of Irrigation, Provincial Department of Irrigation or DAD
	(3) Number of artificial insemination carried out (200,000 numbers)	Progress report and/or special survey conducted by PMU
	(4) Sufficiency rate of operation and maintenance cost of collection center and irrigation facilities (80%)	Progress report and/or special survey conducted by PMU
Effective Indicator	(1) Production volume of major crops Mango : 28,000 ton/year Papaw : 11,000 ton/year Chili : 14,000 ton/year Onion : 54,000 ton/year Legumes : 15,000 ton/year	Statistical data from provincial DoA
	(2) Yield of major crops (ton/ha) Mango : 20 ton/ha Papaw : 25 ton/ha Chili : 11 ton/ha R-Onion : 15 ton/ha B-onion : 18 ton/ha Green gram : 1.8 ton/ha	Statistical data from provincial DoA
	(3) Yield of milk 6.1 L/head/day for intensive and intensive systems	Statistical data from provincial DoAP&H
	(4) Gross annual average of farm income Surface irrigation scheme farmer : Rs.330,000 Agro well scheme farmer : Rs.210,000	Special survey conducted by PMU

5.3 Gender Consideration

95. Generally, it is said that the situation of Sri Lankan women is comparatively better than the situation of women in other developing countries in Asia. Even so, there seems to be a long way ahead to achieve the internationally acceptable level of gender equality. In rural areas of Sri Lanka, generally women are playing an important role in agricultural activities in addition to housework. However, compared with male, female's accessibility to information and knowledge such as new agricultural technologies is limited because less opportunities are being provided particularly on their participation in social activities, and or low level of education and literacy. In order to realize the improvement of agricultural production and productivity through the diversification of products, active participation of female farmers to the project is necessary. Thus, it is important to consider how the project can encourage female farmers to participate in the project activities paying special attention to their needs and requests.

Through the project, it is recommended that special attention should be given to the following gender consideration issues which serve as basic principles based on the JICA's guideline;

- Reduce the burden of women's labor,

- Income generation of women, and
- Social participation of women.

In line with the above basic principles, adaptation of the following gender approaches are recommended to be considered incorporating consultative and participatory process with female and female group of beneficiaries into the planning and implementation of the project.

- Conduct of gender situation survey and analysis
- Formulation of gender strategy
- Ensuring government officers to recognize gender issues
- Extensive capacity building of women's group
- Monitoring of gender situation

5.4 Environmental and Social Considerations

96. This project was classified as Category FI under the "JICA Guidelines for Environmental and Social Considerations (2010)". The rationale of this categorization is based on the following items; (i) the Government of Sri Lanka will define the project components after the loan agreement with the Japanese government, (ii) it is impossible to categorize each project components at this moment (before loan agreement), and (iii) it is predicted that project components will have some negative impact on the environment and social conditions.

97. The JICA Survey Team established the criteria for the selection of project components to ensure that there will be no project components included in this project under Category A. The PMU under the executing agency will carry out technical analysis of credit proposal taking into account the possibility of environmental and social consideration impacts.

98. The JICA Survey Team proposed to establish an Environmental and Social Management System (ESMS) for this project based on Sri Lanka's experience. There is a mechanism adopted through CEA procedure to establish an ESMS for new projects ensuring compliance with the Government of Sri Lanka regulations on environmental and social considerations. The procedures undertaken by executing agency or implementing agency in accordance with the National Environmental Act and relevant regulations have been well implemented, and been monitored and controlled by the CEA. Therefore, the JICA Survey Team suggested to establish an ESMS with qualified and experienced local environmental and social experts in the PMU under the executing agency covering the entire project components.

5.5 Institutional Arrangement

99. The executing agency of the project is not decided yet. The survey team proposed four candidates to be the executing agency, namely, (i) Ministry of Local Government and Provincial Council, (ii) Ministry of Economic Development, (iii) Ministry of Agriculture, and (iv) Ministry of Irrigation and Water Resources Management. Implementing agency will be (i) Ministry of Cooperative and Internal Trade, (ii) Irrigation Department of Ministry of Irrigation and Water Resources, (iii) Mahaweli Authority of Sri Lanka, (iv) Inter-provincial Extension Unit (IPU) of the Department of Agriculture, and (v) departments under the provincial councils (North, East, North West, North Central and Uva provinces).

100. The management consultant attached to the PMU and project consultant attached to PIUs are proposed for smooth implementation of the project. The man-months (MM) of the management consultant is 122 for foreign and 267 for national expert. The project consultant is composed only of national consultant with 1674 MM. Other than those experts, 3463 sub-professional and 3458 supporting staff are to be assigned.

5.6 Implementation Schedule

101. The project implementation period is for seven years. Preparatory work, survey, and detailed planning will consume one year after the loan agreement. The promotion on strategic agricultural crop production and strategic livestock product promotion program are carried out by DS division except for individual irrigation scheme. Selected 54 DS divisions are divided into four batches and each batch will be implemented every 1.5 years.

5.7 Estimated Cost

102. The total project cost is estimated to be Rs.18,561 million (¥11,160 million) consisting of ¥5,240 million as foreign counterpart (F/C) portion and Rs.9,890 million as local counterpart (L/C) portion.

Summary of Project Cost

Unit : Million

No.	Description	F/C (JPY)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Direct Cost	3,743	3,978	6,125	10,233
	(a) Mobilization of PMU & PIUs	*105*	*0*	*105*	*176*
	(b) Activities for Agricultural Crop	*3,335*	*3,442*	*5,393*	*9,015*
	(c) Activities for Milk	*303*	*536*	*627*	*1,042*
2	Price Contingency	402	876	926	1,548
3	Physical Contingency	207	243	352	589
4	Consulting Services	453	2,291	1,824	2,962
	Sub-total (1 to 4)	**4,805**	**7,388**	**9,228**	**15,332**
5	Interest during Construction	426	0	426	712
6	Commitment Charge	9	0	9	15
	Sub-total (Eligible Portion)	**5,240**	**7,388**	**9,663**	**16,059**
7	Administration Cost	0	582	348	582
8	Tax	0	1,920	1,149	1,920
	Sub-total (Non-eligible Portion)	**0**	**2,502**	**1,497**	**2,502**
	Total Project Cost	**5,240**	**9,890**	**11,160**	**18,561**

Source : estimated by JICA Survey Team

VI. PROJECT EVALUATION

6.1 General

103. The objective of the project evaluation is to assess the economic and financial feasibility of the project. For economic analysis, the economic internal rate of return (EIRR) and the benefit-cost ratio (B/C) are calculated to justify the project implementation. Regarding the financial analysis, the capacity to pay of typical farmers is analyzed to predict the financial sustainability of farmers.

6.2 Economic Evaluation

104. The economic project cost is estimated as excluding the transaction cost, such as interest and tax, and adopting the standard conversion factor and shadow wage rate to the financial project cost. The total economic project cost summed up to be Rs.12.7 billion during the seven years of project implementation period. Whereas, the economic benefit of incremental agricultural production (OFCs and fruits) and dairy production amounted to Rs.8.7 billion and Rs.1.8 billion, respectively, when the production amount achieves the target yield. For the analysis, the benefit is assumed to occur from the year 2018, and increases gradually until it achieves the target yield at year 2032 as it takes a long-term period for training and education of farmers. Conclusively, the EIRR and the B/C of the project resulted to 25.1% and 3.77, respectively. These figures imply the project is economically viable.

105. The project sensitivity in respect to the changes in benefit and cost is evaluated to analyze the feasibility of the project as shown in the below table. The EIRR and B/C resulted to 21.5% and 2.92, respectively, which indicates high viability of the project even if the cost increases to 10%

and the benefit decreases to 15% from the base case. The project is considered to be economically viable even under the worst environmental condition.

Results of the Economic Analysis and Sensitivity Analysis of the Project

Economic Indicators	Condition	EIRR	B/C
Base Case	-	25.1%	3.77
Case 1	Cost +10%	23.7%	3.43
Case 2	Benefit -15%	22.8%	3.21
Case 3 (worst case)	Cost +10%, Benefit -15%	21.5%	2.92

** The discount rate for B/C is set at 10%.*
Source: JICA Survey Team

6.3 Financial Evaluation

107. In order to evaluate the profit improvement of farmers and their capacity to pay for the O&M cost of the project, the farm budget is analyzed. Two typical project scheme, "Surface Irrigation Scheme" and "Agro-well Scheme", are assumed for the evaluation. Under the "With Project" condition, the incremental net profit of farmers became Rs.220 thousand to Rs.340 thousand/year under both assumed project schemes. The said profit significantly supports the improvement of the financial condition of farmers in the project area.

108. In terms of the O&M cost of both schemes, the payment for irrigation system and agro-wells are summed up to be Rs.1.9 thousand/year and Rs.8.4 thousand/year, respectively. The estimated O&M costs correspond to 0.6%–3.8% of the incremental net profit of each scheme. The amount accounted for below 5% of the annual net incremental income, and hence, farmers are capable of paying the additional cost.

6.4 Indirect Benefits

109. In addition to the benefit of incremental production, there are many indirect benefits provided by the project implementation as stipulated below. The value of these benefits should be realized to implement the project.

Improvement of Farmers' Livelihood	Influenced by the project implementation, income of farmers is expected to increase due to the profit improvement. Such increase in farmers' income directly contributes to the improvement of farmers' living standard, and makes it easy to further invest on their business.
Savings in the Foreign-Currency Reserve	The imported crops are substituted by the newly produced national crops, and the produced crop would be exported in the future.
Reduction of Subsidy	The current government provides significant amount of subsidy on fertilizers to alleviate the basic expenditure of farmers. Thorough implementation of the project, the affordability to pay of farmers increase, and the government subsidy could be reduced in the future.
Capacity Development of Implementing Agencies	The project includes training programs for implementing groups (officers and farmers) of both agriculture and livestock sector. Such capacity building would surely contribute to the development of operation and management skills of the implementing groups in the future.
Increase in Employment Opportunity	The project would increase the demand for labor in the project area because of its intensive farming style after the project implementation. In addition, during the construction period of irrigation system and roads, the employment opportunities for un-skilled labor will increase.
Reduction of Transportation Time	The main roads in the project area are rehabilitated. Around 20%–30 % of the present transportation time is supposed to be saved, and people could utilize the saved time for any other works.
Improvement of Marketing Structure	Future marketing structure in the project area will likely expand as compared with the present condition. The merchants would have a

	large turnover which could be invested for the improvement of marketing condition.
Mitigation of Water Shortage for Domestic Use	The project area has suffered water shortage during dry season. As the irrigation water is provided from agro-wells and open canals, it will contribute in reducing the social risk to farmers' livelihood.

VII. CONCLUSION AND RECOMMENDATIONS

Conclusion

110. The dry zone agriculture plays an important role in the national economy of Sri Lanka. For example, the agricultural GDP in the dry zone areas (five provinces) has a share of 51% in the national agricultural GDP. In addition, crop production in the dry zone areas accounts for 74% of the national production in rice, 91% in cowpea, 73% in green gram, and 95% in red onion, although productivities in these crops are still low. Meanwhile, the population share of the dry zone is only 35% of the national population. In light of these situations, the proposed project is designed to further increase the share of dry zone agriculture to the national production with the project objective of improving the production and productivity of commercialized agricultural products in the dry zone.

111. Overall for dry zone agriculture, fundamental infrastructure and supporting system in improving the production, productivity, and diversification are weakly and insufficiently arranged. For example, many irrigation schemes are already deteriorated, accessibility of rural and farm roads to markets is poor, distribution system for farm inputs/outputs and market linkages are weak, and agriculture extension service and its system for agricultural technique and technology are insufficient. In this context the overall situation is not strong enough to achieve a long leap in production and productivity and the proposed project is thus formulated as countermeasures for these issues.

112. The proposed project aims to diversify agricultural products and improve production and productivity of import substitute crops including livestock products for foreign exchange savings and for increase in income of small holding farmers. For the improvement of agricultural crops, the project plans to implement three programs, i.e., (i) productivity improvement program which includes rehabilitation of irrigation systems of major and minor tanks, (ii) logistic system improvement and entrepreneur development program, and (iii) program on enhancement of extension services and ground level adaptive trials. For the improvement of livestock product, the project proposes to implement also three programs, i.e., (i) productivity improvement program of semi-intensive and intensive farmers, (ii) program on market development on fresh milk through enhancement of cooperative or small and medium scale entrepreneurs, and (iii) livestock service quality and accessibility improvement program.

113. Through the implementation of these programs, a total of 18,880 ha of farm land will be irrigated by rehabilitating the existing surface and ground water irrigation schemes (13,410 ha and 2890 ha, respectively) and construction of new ground water schemes (2580 ha) additionally. Proposed products to be introduced are OFCs, fruits, and milk, following the national policy on diversification of agricultural products. Under with the project condition, the production of these products will be increased, and production target of Mahinda Chinthana (2020) will be achieved significantly, ranging from 100% in papaw to 14.5% in legumes. In case of milk, its achievement ratio will be comparatively small at 14%. To ensure the diversification and production and productivity improvement, the project proposes, under the above mentioned programs, to strengthen various sorts of supporting services covering all major stakeholders consisting of farmers, extension-related officers, and market-related persons. The project also plans to rehabilitate the existing facilities related to the extension and marketing services so as to improve their functions. The number of beneficiary farmers is estimated to be about 31,000 farm households with 124,000 persons of farm population.

114. The total project cost, including direct cost, price contingency, physical contingency, consulting services, administration cost, tax, interest during construction, and commitment charge is estimated to be Rs.18,561 million. The EIRR, which is evaluated to be 25.1%, is high enough to

justify the project implementation. Increase in farm household income per household, which is the basic development aim, is increased by 17 times while annual net income is increased to Rs.339,480 in typical farm under the surface irrigation scheme, and Rs.216,610 under the agro well rehabilitation/new construction scheme. The results of typical farm budget analysis also indicated the project feasibility.

Recommendations

115. In the Progress Meeting No. 2 between the Sri Lankan and Japanese sides held on July 23, 2012, the DG of Department of National Planning, Ministry of Finance and Planning announced to the Japanese side that an agriculture project like the one proposed in the Progress Report No.2 is not applicable for implementation using a loan from the Japanese government, because most parts of the project envisaged in the report could be implemented and funded solely by the Government of Sri Lanka. However, the Government of Sri Lanka still recommended to implement the proposed project using the loan from Japanese government due to the following reasons:
    1) Dry zone areas have high potential for development of diversified and commercialized agricultural crops, and such high potential would be realized by applying a comprehensive approach using large amount of fund as presented in this report. Development activities using its own fund would need longer time for development due to limited budget. Such approach for development is not recommendable, because available resources are still not effectively and efficiently utilized and needed to be developed as early as possible.
    2) Most small-scale farmers, who are primary target beneficiaries of the proposed project, are still weak in competitiveness compared with private business persons, in terms of fund availability, technical knowledge, and experiences in commercial transactions. These farmer beneficiaries would be left behind by diversified and commercialized agriculture, if no particular support is provided by the government, and as a result disparity between the rich and the poor would be widened. In order to avoid such situations, comprehensive supports which are proposed in this report would be needed for the small-scale farmers at least in the early stage of diversified and commercialized agriculture.
    3) Many agricultural products in Sri Lanka have high production costs. In case of OFCs, it is said that Sri Lankan production costs are three times higher than Indians. The high production costs generally increase in import and decrease in export of agricultural products. As for the issues in marketing, concerned individuals pointed out higher storage loss, transportation loss, and quality loss. With this situation, many food processing factories prefer to use imported agricultural products as raw materials. In order to make a breakthrough to this situation, the dry zone agriculture need to be converted as early as possible into internationally competitive one by implementing the proposed project for which considerable amount of fund infusion is required.
116. The division of roles among government agencies related to agricultural development is quite-complicated in Sri Lanka as well as in the dry zone areas. Agricultural diversification would be difficult to achieve under such complicated situation. It is therefore recommended that these complicated arrangements need to be simplified so as to make efficient use of Sri Lanka's available resources such as development budget and human resources for agricultural diversification.
117. As an urgent countermeasure for the smooth implementation of the project, it is important to coordinate all the activities of concerned government agencies at the central, provincial, and local levels to maximize the project benefits. To this end, it is recommended to establish PMU to initiate this coordination as soon as possible. It is also recommended to organize PSC at the central government level and PCC at the provincial level.

THE PREPARATORY SURVEY ON THE PROJECT FOR IMPROVEMENT OF AGRICULTURAL PRODUCTION AND PRODUCTIVITY IN DRY ZONE AREAS IN DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

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Abbreviations

ADA	Agricultural Development Authority
ADA(Zone)	Assistant Director Agriculture (Zone)
ADB	Asian Development Bank
ADPA	Agricultural Development and Productivity Assistant
AEARP	Agricultural Extension and Adaptive Research Project
AGA	Assistant Government Agent
AI	Agricultural Instructor / Artificial Insemination
AO	Agricultural Officer
AP	Environmental Action Plan
ARS	Agricultural Research Station
ARPA	Agrarian Research and Production Assistant
ASC	Agrarian Service Centre
BC	Branch Canal
BIQ	Basic Information Questionnaire
BZ	Buffer Zones
CA	Catchment Area
CARP	Council of Agricultural Research Policy
CCB	Coconut Cultivation Board
CCC	Community Co-ordinating Committee
CCD	Coast Conservation Department
CDO	Community Development Officer
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CF	Conservation Forests
CFC	Ceylon Fertiliser Corporation
COD	Chemical Oxygen Demand
CP	Central Province
CRI	Coconut Research Institute
CTMU	Coconut Triangle Milk Union
CWE	Co-operative Wholesale Establishment
DA&DDP	Draught Animal and Dairy Development Project
DAP&H	Department of Animal Production and Health
DAD	Department of Agrarian Development
DATC	District Agriculture Training Center
DC	Distributary Canal
DD	Deputy Director of Agriculture
DEA	Department of Export Agriculture
DEC	Dedicated Economic Center
DFAR	Department of Fisheries and Aquatic Resources
DFC	Department of Forest Conservation
DM	Department of Meteorology
DO	Divisional Officer
DOA	Department of Agriculture
DS	Divisional Secretary / Divisional Secretariat
DWLC	Department of Wildlife Conservation

EA	Environmental Assessment
EC	Electricity Conductivity
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EP	Eastern Province
EPL	Environmental Protection License
ERD	Department of External Resources
FA	Field Assistant
FAO	Food and Agriculture Organization of United Nations
FC	Field Canal
FCRD	Field Crops Research and Development Division
FMA	Fisheries Management Area
FMTC	Farm Mechanization Training
FO	Farmers' Organization
FR	Forest Reserves
FSWL	Full Supply Water Level
GA	Government Agent
GCFRA	Greater Colombo Flood Retention Areas
GDP	Gross Domestic Product
GOSL	Government of Sri Lanka
GSMB	Geological Survey and Mines Bureau
HARTI	Hector Kobbekaduwa Agrarian Research and Training Institute
HD	Health Department
HEC	human-elephant conflict
HIB	Human Inhabited Zone
HORD	Horticultural Crop Research and Development Division
HORDI	Horticultural Crop Research and Development Institute
HRDU	Human Resource Development Unit
HUZ	Human Inhabited or sparsely Inhabited Zone
ID	Irrigation Department
IDU	Institutional Development Unit
IE	Irrigation Engineer
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
IWMI	International Water Management Institute
ILDC	Indian Livestock Development Co-operation
IMD	Irrigation Management Division
INMAS	Integrated Management of Major Irrigation Schemes
IPEU	Inter Provincial Extension Unit
IUCN	International Union for Conservation of Nature and Natural Resources
JC	Jungle Corridors
JICA	Japan International Cooperation Agency
LB	Left Bank
LDD	Livestock Development Division
LDI	Livestock Development Instructor
LDO	Land Development Ordinance

LHG	Low Humic Gley (soils)
LO	Labour Officer
MANIS	Management of Irrigation Systems
MASL	Mahaweli Authority of Sri Lanka
MC	Main Canal
MCM	Million cubic meters
MDTD	Management Development & Training Department
MPAHA	Ministry of Public Administration and Home Affairs
MPCS	Multi Purpose Co-operatives
MPPI	Ministry of Planning and Policy Implementation
MR	Marine Reserves
NAITA	National Apprentice and Industrial Training Authority
NAQDA	National Aquaculture Development Authority
NCP	North Central Province
NHWA	National Heritage Wilderness Area
NLDB	National Livestock Development Board
NP	Northern Province
NPD	Department of National Planning
NR	National Reserve
NWP	North Western Province
NWPEA	North Western Provincial Environmental Authority
NWSDB	National Water Supply and Drainage Board
NYSC	National Youth Service Council
O&M	Operation and Maintenance
OFC	Other Field Crops, meaning all field crops other than paddy
PA	Protected Area
PAA	Project Approving Agency
PBME	Project Benefits Monitoring and Evaluation
PCs	Provincial Councils
PDAPH	Provincial Department of Animal Production & Health
PDOA	Provincial Department of Agriculture
PMB	Paddy Marketing Board
PMC	Project Management Committee
PMO	Project Monitoring Officer
PMU	Project Management Unit
PP	Project Proponent
PRDD	Provincial Rural Development Department
PWRA	Parliamentary Water Retention Area
RaP	Re-awaking Project
RARDC	Regional Agricultural Research and Development Centres
RARS	Regional Agricultural Research Station
RB	Right Bank
RBE	Reddish Brown Earth
REAP	Rural Economic Advancement Programme
RDO	Rural Development Officer
RPM	Resident Project Manager

RRD	Rice Research and Development Division
RRI	Rubber Research Institute
RRS	Rice Research Stations
Rs.	Sri Lanka Rupee
RTWG	Regional Technical Working Group
S	Sanctuaries
S/W	Scope of Works
SADA	Sri Lanka Aquaculture Development Authority
SAEP	Second Agricultural Extension Project
SER	Supplemental Environmental Report
SLRDC	Sri Lanka Land Reclamation and Development Corporation
SNR	Strict Natural Reserves
SRI	Sugarcane Research Institute
TA	Technical Assistant
TOR	Terms of Reference
TRI	Tea Research Institute
VS	Veterinary Surgeon
VSC	Veterinary Service Centre
WHO	World Health Organisation
WS	Work Supervisor

Ande	Share cropping arrangements in which smallholders without animals herd and manage a flock on behalf of a larger farmer and in return retain half the offspring.
Anicut	A diversion weir to abstract water from a natural channel
Attam	Labour exchange between farmers
Asswedumized	Bunded and puddled (of land for paddy cultivation)
Chena	Slashing, burning, and shifting cultivation
Ganga	River
Grama Niladhari (GN)	Village-level government officials
Maha	North-east monsoon season (appox. Oct -Mar.)
Oya, Ara	River
Pola	Weekly fair
Pradeshiya Sabha	Local elected council (at divisional level)
Purana	Old or ancient
Shramadana	Self help / shared labour
Tank	A reservoir storing water for irrigation
Wewa	Water tank
Yala	South-west monsoon season (approx. Apr. - Sept.)
Yaya	Paddy field

Measurement units

Extent

cm^2 = Square-centimeters (1.0 cm x 1.0 cm)

m^2 = Square-meters (1.0 m x 1.0 m)

km^2 = Square-kilometers (1.0 km x 1.0 km)

dunum = Dunum (0.1 ha)

ha = Hectares (10,000 m^2)

ac = Acres (4,046.8 m^2 or 0.40468 ha.)

Volume

cm^3 = Cubic-centimeters (1.0 cm x 1.0 cm x 1.0 cm or 1.0 m-lit.)

m^3 CM = Cubic-meters (1.0 m x 1.0 m x 1.0 m or 1.0 k-lit.)

lit l = Liter (1,000 cm^3)

Length

mm = Millimetres

cm = Centimetres (cm = 10 mm)

m = Meters (m= 100 cm)

Km = Kilometres (Km = 1,000 m)

Inch = 2.54 cm

ft = foot (0.3048 m)

mile = 1,609.34 m

Weight

gr = Grams

kg = Kilograms (1,000 gr.)

ton = Metric ton (1,000 kg)

MCM = 1,000,000 cu-m = 810.68 acre-ft

ac-ft = 1,233.83 m3

Time

sec. = Second

min. = Minutes (60 sec.)

hr. = Hours (60 min.)

yr. = Year

Others

°C = degree Celsius

R = Right angle

kPa = Kilopascal (1,000 Pa)

Currency

US$ = United States Dollar

US$ 1.00 = Rs. 132

US$ 1.00 = Yen. 79

JPY = Japanese Yen

Rs. = Sri Lankan Rupees

Chapter 1 INTRODUCTION

1.1 General

This is the final report on the preparatory survey on the project for improvement of agricultural production and productivity in dry zone areas in Democratic Socialist Republic of Sri Lanka (hereinafter referred to "the Survey") prepared in accordance with the minutes of meetings agreed upon between the Government of Sri Lanka and Japan International Cooperation Agency (JICA) on 10th October 2011. The report presents the outputs of the Survey undertaken for the period from January to October, 2012.

1.2 Background

Agriculture plays an important role in the economy of Sri Lanka. However the share of the agriculture sector in Gross Domestic Product (GDP) has been decreasing in recent past and it has dropped to 13% by 2010[1]. On the other hand, 33% of the total labor population of the country is engaged in agriculture and 82% of those are poor and live in rural areas[2]. This indicates that there is an urgent need to remove the disparity between the agriculture sector and other sectors, as well as the inequality between rural and urban areas. The National Development Plan of "Mahinda Chintana Vision for a New Sri Lanka" emphasizes correction of the regional gap as one of the high priority issues for national development.

The overview of agriculture production in Sri Lanka shows that the self-sufficiency rate on Other Field Crops (OFC) and dairy products are low, while almost 100% of food crop of paddy are produced domestically. The state economy needs to shoulder the burden of expense for the import of these products with insufficient domestic supply. In addition to the burden of import of these insufficiently supplied products, the diversified domestic demand on agriculture products has intensified the need to improve agriculture production through selective expansion and diversification of those products.

Sri Lanka has two major different ecological zones categorized based on the amount of rainfall, namely wet zone covering south-western area and dry zone for the other areas. A total of 63% OFC cultivated land in the country is in dry zone while 37% is in wet zone. Also, 82% of the total cattle in the country are herded in the dry zone while 18% are in the wet zone. Agricultural diversification is more promoted in the dry zone and therefore dry zone of the country has high potential for crop diversification.

Considering those situation, a Yen Loan Project was planned for the improvement of agricultural production and diversification in the dry zone areas of the Eastern Province, Northern Province, North Central Province, North Western Province and Uva Province in Sri Lanka.

1.3 Objectives of the Survey

The objective of the Survey is to formulate a Yen Loan project for improving agricultural production and productivity in dry zone areas through collection of necessary information on current situation of agriculture-related infrastructure, such as minor irrigation system and farm roads, product distribution

[1] Department of Census and Statistics 2010
[2] Department of Census and Statistics 2010

system, market linkage and extension service and technologies practiced in the identified survey area.

1.4 Survey Area

The survey area covers five provinces such as North, North Central, North West, East and Uva Province mainly located in dry zone in Sri Lanka. The total area is about 45,000 km^2, which is 70 percent of total land of Sri Lanka. About 7.7 million people live in the survey area and it is 32% of total population of Sri Lnaka.

1.5 Execution of the Survey

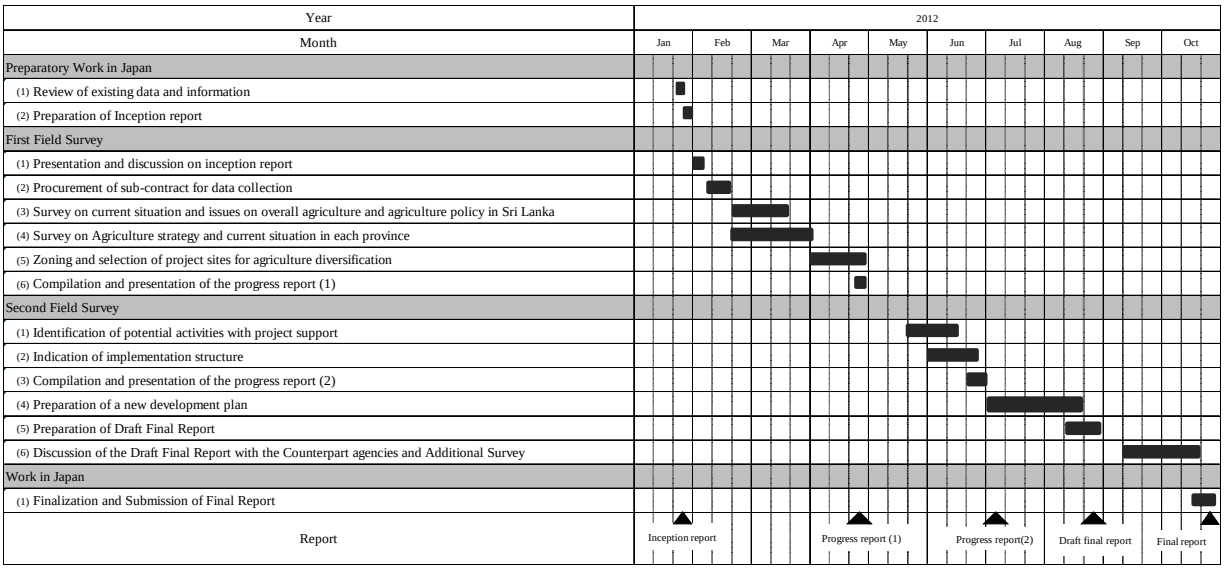
The Survey is carried out for about 10 months from January 2012 to October 2012. The work items of the Survey are shown in Table 1.1.

Table 1.1 Work Items of the Survey

Work Period	Work items
Preparatory work in Japan （late Jan 2012）	(1) Review of existing data and information (2) Preparation of inception report
First Field survey （late Jan to late Apr 2012）	(1) Presentation and discussion on inception report (2) Procurement of sub-contract for data collection (3) Survey on the current situation and issues on the overall state of agriculture and agricultural policies in Sri Lanka (3-1) National and regional situations, perspective of dry zone area in Sri Lanka (3-2) Compatibility of agricultural development policy with national development plan. Review of current situation of agriculture (3-3) Clarification of administrative structure of the agriculture sector. (demarcation and cooperation among states and provincial governments) (3-4) Government Programmes and their budget (3-5) Donor-funded programmes (4) Survey on agriculture strategy and current situation in each province (4-1) Provincial agriculture development plan, implementation structure, budget (4-2) Function and staffing of provincial administration (4-3) Agro-ecological conditions (4-4) Socio-economic conditions (4-5) Situation of agriculture (including livestock) (4-6) Involvement of private sector in agriculture (5) Zoning and selection of project sites for product diversification (6) Compilation and presentation of the progress report (1)
Second Field Survey （Jun to mid Oct 2012）	(1) Identification of potential activities with project support (2) Indication of implementation structure (3) Compilation and presentation of the progress report (2) (4) Preparation of a new development plan (4-1) Project Objectives (4-2) Project plan (4-3) Selection criteria of project sites (4-4) Project component (4-5) Executing agencies, implementation structure and coordination mechanism (4-6) Procurement (4-7) Project impact (4-8) Social and environmental consideration (4-9) Prevention of dispute in the project site (4-10) Project budget (5) Preparation of Draft Final Report (6) Discussion of the Draft Final Report with the Counterpart agencies
Work in Japan （Mid to late Oct 2012）	(1) Finalization and Submission of Final Report

Source : Prepared by Survey Team

The scheduled work flow is shown in Figure 1.1.



Source: Prepared by Survey team

Figure 1.1 Work Flow of the Survey

Chapter 2 NATIONAL BACKGROUND

2.1 National Socio-economy

2.1.1 Land and Population

Sri Lanka covers a total land area of 62,705 km^2 (excluding inland waters). It has an irregular and dissected topography dominated by a central massif in the south. A coastal belt, situated at less than 100 m above mean sea level (amsl), succeeded by rolling plains (100 m – 500 m amsl) of varying width, extends from the seashore to the foothills of the central massif. About 52% of the land area is considered to be farmland including sparsely used cropland and home gardens as shown in Table 2.1.

Table 2.1 Land Use Types in Sri Lanka

Type	Area (Sq. km)	Proportion (%)	(%)
Paddy	8,780	27.0	14.0
Tea	1,887	5.8	3.0
Rubber	1,531	4.7	2.4
Coconut	4,428	13.6	7.1
Mixed crops (including subsidiary crops)	2,955	9.1	4.7
Sparsely used cropland	3,952	12.2	6.3
Home gardens	8,994	27.6	14.3
Farmland including sparsely used cropland	32,527	100.0	51.9
Grassland	2,987		4.8
Natural forest (only closed canopy natural forest)	2,902		4.6
Forest plantation	1,309		2.1
Built up lands (roads, industrial, housing)	4,049		6.5
Scrub, barren lands, and lands excluding inland waters	18,930		30.2
Total land area	62,705		100.0

Note: Data were compiled from land use maps updated during the period of 2000–2005.
Northeastern data was not updated.
Source: Agricultural Profile 2006, HARTI

Sri Lanka's total population in 2010 was estimated at 20,653,000. The annual population growth slowed down from about 1.2% in 2004 to 1.0% in 2010, mainly because of declining birth rate and stable death rate. Sri Lanka's population density was 329 persons/km^2 in 2010. The density was comparatively higher in wet and intermediate zones and lower in dry zone.

Total labor force was estimated at about 8.1 million in 2010. Of these, 7.7 million or 95.1% were employed. The unemployment rate was thus estimated at 4.9%. The agriculture sector shared 2.5 million or 32.7% of the total labor force employed in 2010 (see annexed Table A 2.1).

2.1.2 National Economy (GDP)

The GDP amounted to US$49.5 billion in 2010 contributing a per capita GDP of US$2,399. The annual growth of GDP between 2005 and 2010 was 6.4% per annum (p.a.) with a considerably higher growth in 2010 (8.0% p.a.). The growth of agriculture sector including forestry and fishery was 5.5% p.a. during 2005-2010. This growth was 0.9% lower than that of GDP during the same period. The share of agriculture sector in GDP fluctuated within a range from 11.3% in 2006 to 13.4% in 2008 during 2004-2010 (see also annexed Table A 2.1)

2.1.3 Agriculture Sector in National Economy

The agriculture sector (including fishery and forestry) is still the mainstay of Sri Lanka's economy, accounted for 12.8% of GDP, 24.6% of merchandise exports, and 31.1% of the active labor force in 2010. Roughly 75% of the country's population lived in rural areas and engaged in agriculture-related activities. In addition, much of the manufacturing, transport, and service sector activities were related to the supply of agricultural input and to the marketing and processing of agricultural output.

The growth of agricultural sector was rather stable during 2005-2010, although it was lower than the industry sector (6.8% p.a.) and service sector (6.3% p.a.). As shown in Table 2.2, however, such a stable growth was largely brought by the fishery subsector (18.5% p.a.). Other subsectors which performed higher growth than GDP during 2005-2010 were minor export crops, rubber, paddy, livestock, firewood and forestry. On the other hand, the average growth rate of tea and coconut subsectors was much lower than GDP during 2005-2010.

Table 2.2 Growth of Agricultural GDP, 2005-2010

Sector	2005 Value (Rs. Million)	2005 Share (%)	2010 Value (Rs. Million)	2010 Share (%)	Ave. Growth 2005-10 (%)	
1) Agriculture, Livestock and Forestry	228,006	94.3	283,237	89.7	4.4	
- Tea	27,544	11.4	28,592	9.1	0.7	
- Rubber	4,773	2.0	6,983	2.2	7.9	*
- Coconut	27,204	11.2	28,883	9.2	1.2	
- Minor export crops	9,966	4.1	15,177	4.8	8.8	*
- Paddy	36,541	15.1	48,377	15.3	5.8	*
- Livestock	16,644	6.9	22,397	7.1	6.1	*
- Other food crops	79,587	32.9	99,994	31.7	4.7	
- Plantation development	5,413	2.2	6,895	2.2	5.0	
- Firewood and forestry	12,081	5.0	15,832	5.0	5.6	*
- Other agricultural crops	8,253	3.4	10,107	3.2	4.1	
2) Fishery	13,846	5.7	32,407	10.3	18.5	*
Total Agriculture	**241,852**	**100.0**	**315,644**	**100.0**	**5.5**	
Industry	545,981		760,219		6.8	
Services	1,153,839		1,569,569		6.3	
GDP	**1,941,671**		**2,645,432**		**6.4**	

Note:GDP values are based on 2002 constant prices.
**: Agriculture subsector with growth rate higher than that of total agriculture (5.5%).*
Source: Economic and Social Statistics of Sri Lanka, 2011, Central Bank of Sri Lanka

Sri Lanka is divided into three agro-ecological zones, i.e.: dry, intermediate and wet, based on climate, soil and vegetation. The dry zone covers the north, east and southeast parts of the island, occupying three quarters of the total land area. In the dry zone, rainfall is less than 1,900 mm annually or less than 500 mm during the *Yala* season. The wet and intermediate zones cover the central mountain region and southwest part of the country. In the wet and intermediate zones, rainfall exceeds the above limits. In the dry zone, major crops are paddy, sugarcane, and other subsidiary food crops grown mostly by small landholders. In the wet zone, tree crops or plantation crops such as tea, rubber and coconuts are predominant. These are cultivated widely by large estates, although smallholders are now increasing their share in the production. Animal husbandry is practiced in both the dry and wet zones in an extensive manner.

2.1.4 Agriculture Import and Export

(1) Agriculture Import

As seen in Table 2.3, Sri Lanka's total imports amounted to Rs. 1,526.6 billion in 2010 with an annual increase rate of 11.4% during 2005-2010 period. Of the total imports, "Food and Beverages" (Rs. 156.7 billion) accounted for 10.3% of the total imports in 2010, although it accounted only for 6.9% of the total imports in 2005. Annual increasing rate of "Food and Beverages" was remarkably higher at 20.6% p.a. (or 2.6 times) during the same period.

Table 2.3 Imports by Major Categories, 2005-2010

Item	2005		2006		2007		2008		2009		2010		2005-10 Increase
	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	Rate (% p.a.)
Food and Beverages	**61,410**	**6.9**	**78,855**	**7.4**	**92,303**	**7.4**	**123,203**	**8.1**	**113,329**	**9.7**	**156,673**	**10.3**	**20.6**
Rice	1,554	0.2	576	0.1	4,621	0.4	4,785	0.3	2,616	0.2	6,741	0.4	34.1
Flour	3,200	0.4	321	0.0	321	0.0	111	0.0	195	0.0	61	0.0	-54.7
Sugar	13,303	1.5	23,256	2.2	17,055	1.4	22,350	1.5	25,119	2.1	41,117	2.7	25.3
Milk and Milk Products	13,401	1.5	17,761	1.7	20,688	1.7	32,042	2.1	19,013	1.6	29,235	1.9	16.9
Fish Dried	3,769	0.4	5,482	0.5	6,274	0.5	6,275	0.4	7,869	0.7	7,607	0.5	15.1
Fish Others	3,220	0.4	4,165	0.4	5,741	0.5	6,348	0.4	6,103	0.5	7,071	0.5	17.0
Food Others	22,963	2.6	27,294	2.6	37,603	3.0	51,292	3.4	52,414	4.5	64,841	4.2	23.1
Other Consumer Goods	**89,611**	**10.1**	**106,607**	**10.0**	**103,627**	**8.3**	**113,369**	**7.4**	**83,388**	**7.1**	**138,531**	**9.1**	**9.1**
Intermediate Goods	**549,005**	**61.6**	**640,811**	**60.1**	**747,478**	**59.8**	**943,750**	**61.9**	**681,260**	**58.1**	**875,992**	**57.4**	**9.8**
Fertilizer	13,552	1.5	17,036	1.6	21,422	1.7	62,420	4.1	22,215	1.9	27,175	1.8	14.9
Petroleum	166,562	18.7	215,168	20.2	276,889	22.1	364,284	23.9	248,959	21.2	341,307	22.4	15.4
Chemical Elements and Compounds	24,988	2.8	27,122	2.5	31,127	2.5	39,132	2.6	35,900	3.1	44,057	2.9	12.0
Dyeing, Tanning & Colour Materials	6,360	0.7	7,433	0.7	8,560	0.7	9,324	0.6	8,725	0.7	11,101	0.7	11.8
Paper and Paper Boards	21,853	2.5	25,685	2.4	31,131	2.5	34,667	2.3	29,096	2.5	38,111	2.5	11.8
Wheat and Meslin	14,200	1.6	20,679	1.9	25,891	2.1	40,563	2.7	29,769	2.5	29,120	1.9	15.4
Textiles	153,957	17.3	160,987	15.1	180,689	14.4	184,404	12.1	165,717	14.1	195,549	12.8	4.9
Others	147,533	16.6	166,701	15.6	171,769	13.7	208,956	13.7	140,879	12.0	189,572	12.4	5.1
Investment Goods	**188,061**	**21.1**	**233,637**	**21.9**	**297,266**	**23.8**	**330,272**	**21.6**	**281,441**	**24.0**	**335,410**	**22.0**	**12.3**
Unclassified Imports	**3,272**	**0.4**	**6,781**	**0.6**	**10,152**	**0.8**	**15,111**	**1.0**	**13,198**	**1.1**	**19,999**	**1.3**	**43.6**
Total	**891,359**	**100.0**	**1,066,691**	**100.0**	**1,250,826**	**100.0**	**1,525,705**	**100.0**	**1,172,616**	**100.0**	**1,526,605**	**100.0**	**11.4**

Source : Sri Lanka Customs and Central Bank of Sri Lanka

By commodity, in 2010, import of "Sugar" alone amounted to 41.1 billion or about 26% of the imports of "Food and Beverages" followed by "Milk and Milk Products" (Rs. 29.2 billion or 19% of the same). Imported amount of "Rice" which was considered to be high-value Basmati rice was small at Rs. 6.7 billion, if compared with that of "Sugar" and "Milk and Milk Products". However, its annual increasing rate was high at 34.1% p.a. during 2005-2010 period. It can be evaluated that consumption of imported high quality rice is increasing in Sri Lanka. It is noteworthy that Sri Lanka imported Rs. 29.1 billion of "Wheat and Meslin (flour)" as an intermediate good in 2010 with annual increasing rate of 15.4% p.a. during 2005-2010 period. The imported amount of "Wheat and Meslin" was about 1.9% of the Sri Lanka's total import in 2010.

Of the category of "Food Others" (Rs. 64.8 billion in 2010), considerably large proportion of 52.2% was performed by OFCs' net imports (Rs. 33.8 billion) as shown in Table 2.4. Of the net imports of OFCs in 2010, "Lentils-red" (Rs. 13.8 billion) showed the highest amount, followed by "Big onion" (Rs. 6.6 billion), and "Chilli" (Rs. 5.0 billion). Other categories imported more than one billion rupees in 2010 were potato (Rs. 4.3 billion) and greengram (Rs. 1.7 billion).

Table 2.4 Net Imports Volume and Value of OFCs, 2009 and 2010

	2009						2010					
	Exports		Imports		Net Imports		Exports		Imports		Net Imports	
	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)
Chilli	272	83,207	36,054	4,887,761	35,782	4,804,554	100	34,089	37,720	4,997,227	37,620	4,963,138
Big onion	12	1,208	143,274	4,687,649	143,262	4,686,441	53	5,120	158,086	6,649,347	158,033	6,644,227
Red onion	1	60	16,207	1,082,713	16,206	1,082,653	2	137	11,907	641,286	11,905	641,149
Potato	4	1,207	100,632	2,754,301	100,628	2,753,094	83	3,727	130,892	4,262,496	130,809	4,258,769
Maize	0	21	28,034	984,527	28,034	984,506	250	12,672	10,506	581,557	10,256	568,885
Kurakkan	2	333	3,272	92,674	3,270	92,341	3	329	2,052	59,704	2,049	59,375
Gingelly	1,406	186,243	23	2,739	-1,383	-183,504	8,407	1,003,437	26	3,513	-8,381	-999,924
Soyabean	21	7,084	1,790	85,118	1,769	78,034	36	8,121	1,611	94,548	1,575	86,427
Greengram	40	4,349	14,183	1,224,584	14,143	1,220,235	607	96,964	11,515	1,755,909	10,908	1,658,945
Cowpea	3	421	429	31,563	427	31,142	0	41	45	2,568	45	2,527
Groundnut	1	167	4,005	334,743	4,004	334,576	1	148	4,604	459,624	4,603	459,476
Lentils-red	0	0	95,232	11,527,451	95,232	11,527,451	0	0	126,816	13,814,218	126,816	13,814,218
Lentils-yellow	0	0	12,645	1,388,276	12,645	1,388,276	0	0	6,533	689,070	6,533	689,070
Blackgram	9	2,702	3,348	310,817	3,339	308,115	47	3,764	1,500	194,097	1,453	190,333
Sorghum	0	0	22,818	556,768	22,818	556,768	0	0	2,257	64,496	2,257	64,496
Chickpeas	5	896	20,025	2,034,034	20,020	2,033,138	4	681	8,291	833,815	8,287	833,134
Peas	160	8,722	0	0	-160	-8,722	2	427	0	0	-2	-427
Sweet potato	4	352	1	77	-3	-275	7	531	0	61	-6	-470
Manioc	3,434	235,034	0	0	-3,434	-235,034	3,396	175,218	0	0	-3,396	-175,218
Total		532,006		31,985,795		31,453,789		1,345,406		35,103,536		33,758,130

Source: External Trade Statistics, Sri Lanka Customs

(2) Agriculture Exports

Sri Lanka's total exports amounted to Rs. 937.7 billion in 2010 with an annual increase rate of 8.0% p.a. during 2005-2010 periods as seen in Table 2.5. Of the total exports, "Total Agricultural Exports" (Rs. 230.6 billion) accounted for 24.6% of the total exports in 2010 with the annual increase rate of 14.7% p.a. during the same period. Sri Lanka's traditional agricultural exports are tea (Rs. 155.4 billion in 2010), rubber (Rs. 19.3 billion in the same) and coconuts (Rs. 19.6 billion in the same), and these three commodities had proportion of 84.2% to the "Total Agricultural Exports". Sri Lanka's exports are still dependent on these traditional plantation crops.

Table 2.5 Exports by Major Categories, 2005-2010

Item	2005		2006		2007		2008		2009		2010		2005-10 Increase
	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	(Rs. Mn.)	Share (%)	Rate (% p.a.)
Total Agricultural Exports	**116,045**	**18.2**	**134,481**	**18.8**	**166,945**	**19.7**	**200,739**	**22.9**	**194,205**	**23.9**	**230,586**	**24.6**	**14.7**
Tea	81,482	12.8	91,667	12.8	113,565	13.4	137,600	15.7	136,171	16.7	155,376	16.6	13.8
Rubber	4,724	0.7	9,674	1.4	12,089	1.4	13,538	1.5	11,327	1.4	19,256	2.1	32.4
Coconut products	11,400	1.8	12,898	1.8	15,636	1.8	18,532	2.1	19,091	2.3	19,593	2.1	11.4
Others	18,439	2.9	20,242	2.8	25,655	3.0	31,069	3.5	27,616	3.4	36,361	3.9	14.5
Total Industrial Exports	**497,695**	**78.0**	**562,450**	**78.5**	**660,389**	**78.1**	**667,186**	**75.9**	**609,512**	**74.9**	**696,653**	**74.3**	**7.0**
Textiles and garments	291,088	45.6	320,829	44.8	369,463	43.7	376,024	42.8	376,146	46.2	395,403	42.2	6.3
Petroleum products	13,169	2.1	19,580	2.7	18,693	2.2	27,551	3.1	15,484	1.9	24,403	2.6	13.1
Others	193,438	30.3	222,041	31.0	272,233	32.2	263,611	30.0	217,882	26.8	276,847	29.5	7.4
Gems	**12,088**	**1.9**	**10,714**	**1.5**	**11,665**	**1.4**	**8,260**	**0.9**	**7,912**	**1.0**	**7,945**	**0.8**	**-8.1**
Others	**12,448**	**2.0**	**8,934**	**1.2**	**6,684**	**0.8**	**2,312**	**0.3**	**2,280**	**0.3**	**2,526**	**0.3**	**-27.3**
Total	**638,276**	**100.0**	**716,579**	**100.0**	**845,683**	**100.0**	**878,497**	**100.0**	**813,909**	**100.0**	**937,710**	**100.0**	**8.0**

Source : Sri Lanka Customs and Central Bank of Sri Lanka

Nevertheless, Sri Lanka exports some non-traditional products like OFCs and fruits. The total exports of OFCs amounted to Rs. 1.3 billion in 2010 as shown in Table 2.4. Regarding fresh fruit exports, its total amount was Rs. 683 million in 2010 as seen in Table 2.6. Of these exports, the largest export was performed by cashew nuts (Rs. 246 million) followed by banana (Rs. 213 million), pineapple (Rs. 117 million) and papaw (Rs. 83 million). However, fresh fruit exports are still small both in quantity and value, and Sri Lanka is a net importer of fresh fruits with a negative balance of Rs. 1,882 million as shown in Table 2.6.

Table 2.6 Net Exports Volume and Value of Fresh Fruits, 2009 and 2010

	2009						2010					
	Exports		Imports		Net Exports		Exports		Imports		Net Exports	
	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)	Q'ty (ton)	Value ('000 Rs)
Banana	2,649	114,792	0	0	2,649	114,792	5,048	212,545	0	0	5,048	212,545
Pineapple	1,254	139,149	0	0	1,254	139,149	798	116,990	0	0	798	116,990
Avocado	0	0	0	0	0	0	0	144	0	0	0	144
Mango	47	12,227	0	0	47	12,227	89	16,301	0	0	89	16,301
Mangosteen	52	8,953	0	0	52	8,953	0	0	0	0	0	0
Orange	13	1,699	4,305	225,255	-4,292	-223,556	54	7,552	4,500	261,692	-4,447	-254,140
Mandarin *	6	870	7,409	235,984	-7,403	-235,114	5	555	10,874	366,482	-10,869	-365,927
Lemon	237	12,021	14	2,760	223	9,261	5	448	0	0	5	448
Watermelon	0	33	0	0	0	33	1	135	0	0	1	135
Papaw	454	53,601	0	0	454	53,601	783	82,831	0	0	783	82,831
Guava	2	252	0	0	2	252	2	272	0	0	2	272
Cashew nuts	194	126,136	250	112,826	-56	13,310	318	245,611	279	181,239	39	64,372
Dates	0	0	529	14,462	-529	-14,462	0	0	523	14,418	-523	-14,418
Grapefruit	0	0	5	365	-5	-365	0	0	6	259	-6	-259
Grapes-fresh	0	0	3,419	363,866	-3,419	-363,866	0	0	4,258	476,079	-4,258	-476,079
Grapes-dried	0	0	1,549	140,450	-1,549	-140,450	0	0	1,574	160,691	-1,574	-160,691
Apple	0	0	20,138	885,048	-20,138	-885,048	0	0	22,385	1,090,023	-22,385	-1,090,023
Pears & Quinces	0	0	364	14,015	-364	-14,015	0	0	345	14,332	-345	-14,332
Total		469,733		1,995,031		-1,525,298		683,384		2,565,215		-1,881,831

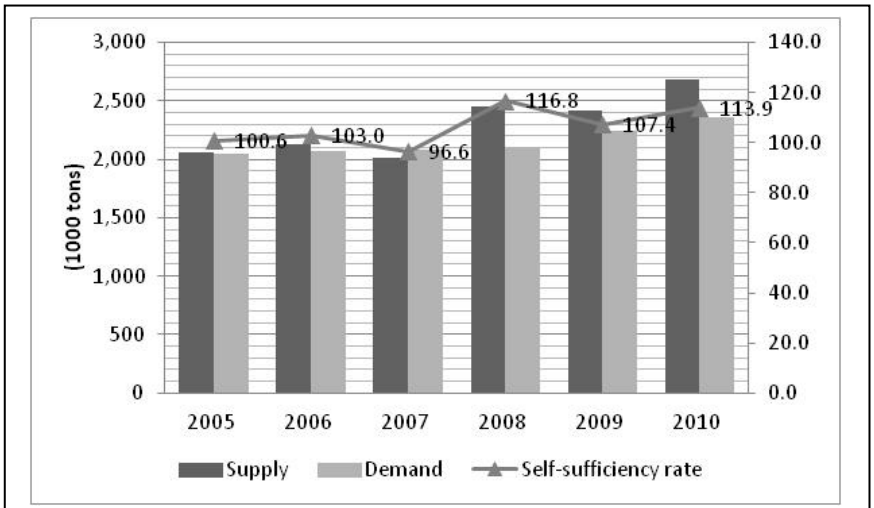
Note *: Exports of mandarin are all re-exports.
Source: External Trade Statistics, Sri Lanka Customs

2.2 National Food Balance

2.2.1 Food Balance

Annexed Table A 2.2 shows Sri Lanka's food balance in 2002 and 2007, prepared based on FAOSTAT data. According to the Table, Sri Lanka imported a wide variety of agricultural products. Between 2002 and 2007, imported agricultural products with an increasing trend were rice, millet, potato and peas, due mainly to increase in domestic demand for food consumption. Millet, potato and peas were domestically consumed for food, with comparatively higher growth rate at 10.8% p.a., 1.0% p.a., and 5.9% p.a., respectively. On the other hand, the increase of production of these crops was recorded at 8.5% p.a. for millet and -2.9% for potato. The above result of analysis indicated that more production would be required for these crops, although there was no production record on peas in FAOSTAT (see also annexed Table A 2.2).

In case of rice, Sri Lanka achieved self-sufficiency in recent years (except in 2007) according to the Agriculture and Environmental Statistics Division, Department of Census and Statistics (see Figure 2.1).



Source: Agriculture and Environmental Statistics Division, Dept. of Census and Statistics

Figure 2.1 Self-sufficiency Rate of Rice in Sri Lanka, 2005-2010

During 2002-2007, maize and soybean were increasingly produced at remarkably higher rate of 16.6% p.a. and 38.0% p.a., and import quantities of these crops were decreased -2.3% p.a. and -24.2% p.a., respectively. In terms of food consumption, however, these products showed a negative rate of -20.9% p.a. and 0.0% p.a., respectively. These trends indicated that maize and soybeans were increasingly consumed by the livestock subsector as animal fodder at considerably higher rate.

Vegetable oils and vegetables (such as tomato and onion) were also imported due to the rapid increase of domestic consumption for food. Fruits, however, showed a decreasing trend both in terms of import and domestic consumption. This was probably because of the conflict over fruit production areas, e.g., banana and papaw in Klinochchi, mango and orange in Mutative, and lime in Ampara. It is noteworthy that Sri Lanka is exporting fruits, though small in scale.

Regarding livestock products, all major products such as meat, animal fat and milk were imported at an increasing rate, which is higher than the population growth rate, during 2002-2007. The same trend was also shown in their domestic consumption during the same period. In case of poultry meat, the growth rate was very high at 3.1% p.a. in domestic production, 14.9% p.a. in import and 2.5% p.a. in domestic consumption.

2.2.2 National Trend of Food Demand

The national trend of food demand can be evaluated based on the analysis made in the above section as follows:

(i) The importance of paddy/rice would continuously be the same for the Sri Lankan people, and increase of production, at least at the same pace as the population growth, would be required. In addition, a certain amount would be needed as buffer stock so as to ensure the country's food security;

(ii) The demand for forage crops such as maize and soybean would increase more from the livestock subsector;

(iii) The demand for other food crops beside maize and soybean would also increase. At present, however, considerable proportions of these crops are imported in order to fill the domestic demand (see annexed Table A 2.2);

(iv) The consumption of millet (kurakkan) and peas would be increased particularly by health-conscious people in urban areas;

(v) The consumption of vegetables and fruits would expand more rapidly because of the recent strong economic growth, which generally has a relationship to the increase of demand of these crops; and

(vi) Livestock products would have similar tendency as vegetables and fruits. The increase in the demand of meat, milk and egg, and the supply of feedstuff on a sustainable basis are becoming an important issue.

2.3 Agriculture and Livestock Related Ministry in Central Government

There are 14 Ministries are involved in agriculture and livestock in central Government. There mandate and objectives are shown in the Table 2.7.

Table 2.7 Mandate and Objectives of Central Ministry Related to Agriculture and Livestock

	Ministry	Mandate/Objectives
1	Agriculture	To achieve national prosperity by formulating and implementing policies and legislation, providing guidance and coordination of the stake holders in a timely and professional manner for efficient and effective performance of the food and allied crop sector.
2	Minor Export Crop promotion	Planning and Implementation of an appropriate Research and Development Program with the prime objective of earning more foreign exchange through enhancement of quality and quantity of Export Agricultural Crop Production for sustainable development of economic and social standards of all the stakeholders of the Export Agricultural Crop(EAC) sector while ensuring the safeguards to environment"
3	Agrarian Services &Wild Life	Formulation and timely implementation of Institutional, Facilitator, Legal and Management Services for optimum productivity of all agriculture lands as well as sustainable development of Farming Community of Sri Lanka Formulation and implementation of Agrarian Law to safeguard tenancy as well as land owner rights. Strengthening and development of farmer's institutions. Water Resource Management. Agriculture Land Management.
4	Irrigation & Water Resources management	Formulation of policies and implementation of programs to fulfill the needs of the community through water resource management, drainage and flood protection ,prevention of water pollution in water bodies , Engineering consultancy services and construction, Matters relating to Mahaweli development.
5	Livestock and Rural Community Development	Initiate appropriate measures to ensure sustainable development among rural community and in the livestock sector through efficient management of resources.
6	Fisheries and Aquatic Resource Development	Directing the utilization of fisheries and aquatic resources for the benefit of the current and future generations.
7	Coconut Development and Janatha State Development	Enhancing the productivity, profitability and sustainability of the Coconut Industry.
8	Economic Development	Regional and rural development, poverty alleviation and empowerment of poor , promoting investments to Sri Lanka , travel and tourism industry development and nature & wild life conservation.
9	Cooperatives and Internal Trade	Promotion of competitive and fair trade in the market while securing the interests of local manufacturer and consumer, promotion of co-operative services and contribution to the development of human resources in order to create a knowledge based economy.
10	Land and Land Development	Formulation and implementation of State land policies conserve lands, land settlement, acquisition of lands for public purposes with in the country.
11	Plantations Industries	Enhancing the productivity, profitability and sustainability of the plantation industry through economically, socially and environmentally established plantation sector
12	State Resources and Enterprise Development	Supervision of 26 institutions along with their related functions, that were under the purview of earlier Ministries of Public Estate Management and Development, Supplementary Plantation Crops Development & Industrial Development
13	Provincial Agricultural Ministries and Departments	Agriculture and livestock extension work under provincial level
14	Non Cabinet Senior minister of food security.	Supervision of food security of the country

Ministry of agriculture, Ministry of, Agrarian Services &Wild life, Ministry of Irrigation and Water

Resources Management, Ministry of Livestock and Rural Community Development, Ministry of Cooperative and Internal trade and provincial ministries of agriculture and livestock are mainly involved in the production and marketing of other field crops, fruits and milk in the country.

Ministry of Agriculture is the core ministry which is responsible for the performance of the food and allied crop sector in the country. The Department of Agriculture under Ministry of Agriculture has the national mandate in Agricultural Research & Development and Regulation of agricultural acts (seed act, plant protection act, control of pesticide act, Soil conservation act). Provincial Ministries of Agriculture and provincial departments of agriculture have close link with the central ministry and the department in respect of above three activities.

Agricultural Technology Transfer is a devolved subject for provincial governments under the present constitution of the country and therefore all the agricultural extension activates in the provincial areas are handled by the provincial departments of agriculture under the Provincial ministries of Agriculture. Although regulation of seed act is done by the central department of agriculture provincial department of agriculture has the liberty to involve in seed production.

Agrarian Services and wild Life Ministry plays an important role in providing services to peasant community. Its main mandate is the formulation and implementation of Institutional, Legal, and Management services for the benefit of them. The Departments of Agrarian Development (DAD) and Department of wild life conservation are the two arms of the ministry. Department of Agrarian Development involves in the formation and strengthening of farmer organizations and other institutions, supply of inputs and services (seeds, fertilizer, machinery etc.). In addition the management of minor irrigation systems (commanding area is less than 80 ha) is also comes under the purview of the DAD. The Department of Wildlife Conservation (DWC) is the principle government institute responsible for the protection of wildlife resources of the country and its involvement in minimizing wild animal damage in crop production is very much important.

The Ministry of Irrigation and Water Resources Management of Sri Lanka committed to manage the Irrigation Sector and the Water Resources of the country, maintaining the equilibrium between the economic development and sustainable use of water resource base. It gains from the support of the implementation agencies under the Ministry- Department of Irrigation, Mahaweli Authority, Water Resources Board and Central Engineering Consultancy Bureau.

The mission of Ministry of Cooperatives and Internal Trade is the Promotion of competitive and fair trade in the market while securing the interests of local manufacturer and consumer. In line with this the ministry is involved in agricultural marketing. Paddy Marketing Board under the ministry directly involves in purchasing paddy from the farmers and releasing them to the market when prices are going up. As means of implementing marketing development strategy to provide marketing facilities for producers in the rural areas the Dedicated Economic Centers (DEC) have been established and the coordination and supervision of all DECs are done by this Ministry.

The Ministry of Livestock Development and Rural Community Development has three public institutions under its purview for the development of the livestock sector in the country.(Mainly dairy).They are Department of Animal Production and Health , National Livestock Development Board and Milco (Pvt) Limited. The Department of Animal Production & Health under the ministry has the national mandate in livestock research, breeding and regulation of livestock acts. Being livestock development is also a devolved subject the provincial governments have separate ministries for it and

provincial Departments of Animal Production and Health involves mainly in development activities including technology transfer and prevention of diseases. National Livestock Development Board has a major role in breeding and supplying livestock animal to the farmers. Milco (Pvt) limited mainly involves in processing marketing of milk and milk products.

2.4 Agriculture and Livestock Development Plan and Policy

2.4.1 National Development Plan

(1) Government Policy in Agriculture

"The Mahinda Chinthana, Vision for the Future", the government's policy framework from 2010 to 2016, aims to achieve multiple goals in the agriculture sector including: (i) achieving food security of people, (ii) ensuring higher and sustainable income for farmers, (iii) ensuring remunerative price for agricultural produce, (iv) uninterrupted access to competitive markets both in Sri Lanka and abroad, (v) farm mechanization, (vi) expanding the extent under cultivation, (vii) reducing wastage in transit, (viii) ensuring environmental conservation, (ix) introducing efficient farm management techniques, and (x) using high yielding seeds and improved water management. In this context, high priority was placed in achieving a broad-based shift from low-value added products to high-value added agriculture products accompanied by sustained improvements in productivity and competitiveness in international markets. Also, as mechanization of agricultural activities will lead to a significant shift of labor from agriculture to other economic sectors, the improvement of labor productivity and satisfying of labor requirements are vital in the future.

(a) Paddy – the National Crop

The government policy aims at further raising production to a sustainable level over the next decade. This will be performed by raising the average yield and expanding the cultivable extent through new land, particularly in the north and east. The average yield will be increased through cultivation of improved varieties, improvement of quality seed production, adoption of advanced water management systems, and comprehensive cultivation and harvesting techniques. The policy targets are presented in Table 2.8.

Table 2.8 Statistics on Production of Paddy

Key Indicator	2005	2009	Anticipated Targets		Growth Rate (% per annum)		
			2015	2020	2005-2009	2009-2015	2015-2020
Land use - Sown extent during *Maha* season ('000 ha)	581	631	700	730	2.1	2.1	0.8
Sown extent during *Yala* season ('000 ha)	357	345	480	540	-0.9	6.8	2.4
Extent of abandoned paddy lands ('000 ha)	150	100	30	No	-9.6	-21.4	-
Productivity of paddy lands (tons/ha)	2.06	4.3	5.5	6.5	20.2	5.0	3.4
Annual production of paddy (million tons)	2.24	3.64	6.5	8.2	12.9	12.3	4.8
Provision of quality seed paddy	24%	35%	60%	100%	9.9	11.4	10.8

Note: Increase rate of each category is calculated by the survey team.
Source: Mahinda Chintana, 2010

Further policies for paddy production are summarized as follows:

(i) To commence supporting the production of more and more value added

products from rice which will be popularized in the local market at first and then directed to international markets. For this purpose, the presently idle resources of government research institutions and local universities will be harnessed fully;

(ii) To continue the fertilizer subsidy to reduce the cost of production and the maintenance of a floor price for paddy through government's periodic market interventions;

(iii) To facilitate the provision of adequate water for cultivation during the off-monsoon periods and support new arable land for paddy cultivation by expanding irrigation areas, rehabilitating the existing schemes, and providing modern water management techniques; and

To establish rice flour processing factories in several districts including Hambantota, Anuradhapura, Polonnaruwa and Ampara to encourage rice flour consumption as a substitute for wheat flour.

(b) Other Field Crops (OFCs) – Achieving Self-sufficiency

The government gave high priority for further expansion of OFCs such as onion, chili, cowpea, maize, green gram, kurakkan, etc. so as to achieve Sri Lanka's self-sufficiency for these crops. To accelerate the production growth, research and development initiatives will be directed towards the development of high-yielding varieties, good quality seeds, and advanced cultivating practices. By moving toward self-sufficiency in these crops, opportunities will be provided for Sri Lankan farming communities to enhance their incomes and generate rural-based employment. To safeguard the farmers from seasonal price declines, forward market contracts will be popularized for almost all these crops.

Table 2.9 Present Productions, Imports and Production Targets of OFC

OFC	Production		Growth Rate	Imports		Growth Rate	Production Targets		Growth Rate	Import Target
	2005 (tons)	2009 (tons)	2005-09 (% p.a.)	2005 (tons)	2009 (tons)	2005-09 (% p.a.)	2015 (tons)	2020 (tons)	2009-15 (% p.a.)	2015 (tons)
Big onion	55,550	81,707	10.1	110,713	143,237	6.7	240,570	250,300	0.7	1,000
Red onion	53,730	46,232	-3.7	10,233	16,208	12.2	56,500	60,750	1.2	500
Dried chili	11,749	10,318	-3.2	27,260	36,015	7.2	52,500	60,850	2.5	2,000
Maize	41,800	129,769	32.7	146,930	27,200	-34.4	270,320	350,000	4.4	2,000
Kurakkan	6,450	6,433	-0.1	1,380	3,272	24.1	27,150	44,600	8.6	100
Green gram	9,000	9,258	0.7	9,320	14,183	11.1	45,170	66,900	6.8	200
Black gram	6,920	7,071	0.5	4,641	3,349	-7.8	18,590	26,760	6.3	150
Cowpea	11,180	13,480	4.8	195	429	21.8	20,000	35,000	9.8	50
Soya bean	4,990	6,050	4.9	1,310	1,790	8.1	14,600	19,250	4.7	50
Ground nut	9,040	13,077	9.7	4,880	3,950	-5.1	21,920	26,760	3.4	0
Ginger	6,160	8,523	8.5	27	23	-3.9	17,650	26,760	7.2	0

Note: Increase rate of each category is calculated by the survey team.
Source: Mahinda Chintana 2010

At present, the Government nominated national level promoter of each major OFC listed on Table 2.9. The Government has started the provision of fertilizer and seed to the farmers for OFC cultivation with subsidized price for further production of OFC.

(c) Fruits and Vegetables – Explore the Full Potential

The policy of the government on fruits and vegetables is to increase the production to attain near self-sufficiency level by 2020 as indicated in Table 2.10.

Table 2.10 Present Productions, Imports and Production Targets of Potato, Vegetables and Fruits

Crops	2009		Target 2015		Target 2020		Production Growth Rate	
	Produc-tion (tons)	Export/ (Import) (tons)	Produc-tion (tons)	Export/ (Import) (tons)	Produc-tion (tons)	Export/ (Import) (tons)	2009-15 (% p.a.)	2015-20 (% p.a.)
Potato	61,700	(95,000)	105,500	(60,000)	150,000	(25,000)	9.4	7.3
Vegetables	840,450	(260)	1,200,000	200,000 (30)	1,500,000	350,000 (5)	6.1	4.6
Banana	378,336	20	440,000	20,000	491,000	40,000	2.5	2.2
Pineapple	59,550	1,290	95,000	27,000	120,000	45,000	8.1	4.8
Papaw	21,138	321	33,000	8,000	45,000	15,000	7.7	6.4
Mango	70,418	63	110,000	18,000	150,000	40,000	7.7	6.4

Note: Growth rate of each category is calculated by the survey team.
Source: Mahinda Chintana 2010

By expanding the irrigation facilities, farmers will be productively engaged in cultivating fruits and vegetables during the off seasons in existing lands in Moneragala, Hambantota, Matale, Kurunegala and Puttalam districts, and in the newly opened area in the northern and eastern provinces. The cultivation of fruits and vegetables in home gardens will also be promoted by directly linking the marketing network to the producers. SMEs will also be encouraged to invest in cultivation, providing necessary inputs (e.g., land) and creating a conductive environment for investment. Vegetable and fruit packing crates will be introduced to reduce the post harvest losses by a significant amount.

(d) Floriculture – Best Quality Products

Sri Lanka will be recognized as one of the best quality production centers for floriculture products in the world. In cut flower production, high quality new hybrid varieties imported from overseas will be used as mother plants and a number of nurseries will be modernized with tissue culture apparatus. About 1,500 floriculture villages will be established in the western, northwestern and central provinces. Around 30,000 jobs will be generated in the rural and sub-urban areas. With that, the share of exports of cut flowers and foliage will increase significantly during this decade.

(e) Herbal Farms for Better Health

About 25,000 ha of herbal farms will be established in the eastern and northern provinces under the supervision of the Ministry of Indigenous Medicine. In addition, 20,000 ha of land will be newly cultivated with ginger, turmeric and citronella in Kilinochchi, Ampara, Hambantota and Trincomalee districts. Approximately 200,000 ha of lands will be cultivated with pulses, tubers and cereals countrywide.

(f) Strengthened Input Delivery System

1) Seed Farms for Quality Inputs

The government seed farms at Kundasale, Aluththarama, Malwatta, Kajadiyanaru, Kantalai, Mahailuppallama, Peedru, Kandapola, Meepilimana, Udaradella, Rahangala, Polonnaruwa, Paranthan and Jaffna will be developed with modern technology aimed at increasing the yield. Buffer stocks of certified seeds will be maintained ensuring an uninterrupted supply of seeds.

There is also the necessity for developing a competitive and regulated seed industry by involving the private sector in seed production and distribution. Strict quarantine regulations will be put in place when importing seeds by enacting the Seed Act in order to protect and safeguard domestic agriculture.

2) Farmer-friendly Agriculture Lending

The traditional role of bank credit in agriculture to fund seasonal production will be reversed with the budgetary decision of 10% mandatory lending to the agriculture sector by commercial banks. The Central Bank will also promote refinance schemes with a view of supporting agricultural development in several districts. In order to further strengthen this sector, new credit schemes will be introduced to the farmers in addition to the 10% mandatory lending requirement.

3) Better Breeding for Higher Yield

Agricultural biodiversity will be strengthened by accelerating the conventional breeding of the agricultural sector to ensure higher yield.

4) Research and Development for Agriculture

Research and development relating to agriculture will be expanded for problem identification and productivity improvement in the sector. Research institutes will be developed, providing necessary infrastructure facilities and new technological equipment. Human development will also be strengthened by linking the knowledge hubs. Extension approaches will be developed using social marketing concepts to add value through information and communication technology. In addition, awareness programs will also be arranged to disseminate research findings among farmers and potential farmer community.

5) Links between Producers and Consumers

Facilities will be further developed to support connectivity between consumers and producers, reducing the transport cost and saving time. The integration of the economy will result in opening backward areas for development. The bar code system will be established with producer details which would enable traders or consumers to directly contact the producers. This will provide opportunities for producers to receive orders directly.

6) Crop Diversification through Multiple Cropping and Intercropping

Crop diversification will be promoted to ensure continuous farmer incomes and mitigate natural and manmade risks. In addition, multiple cropping and intercropping will be promoted aiming at ensuring the efficient use of cultivable land.

(g) New Areas for Interventions

1) Agro-tourism to Attract Tourists

Large-scale orchards with entertainment facilities for relaxation and enjoyment will be set up at locations to which tourists are attracted.

2) Low-cost Locally Produced Fertilizer

Manufacturing of fertilizer will be promoted using locally available raw materials such as Eppawala rock phosphate, etc. Organic manure production will be popularized among farmers by disseminating technical know-how and ensuring a higher price for organic products.

3) Collaboration between Farmers and Entrepreneurs

The joint collaboration of farmers with private entrepreneurs will be accelerated to establish ten orchards of 200 ha each in several districts including Jaffna, Anuradhapura, Kilinochchi, Polonnaruwa, Badulla, Moneragala, Puttalam, Vavuniya, Hambantota and Kalutara – e.g., Anuradhapura – mango, Jaffna – grapes, Moneragala – passion fruit, and Hambantota – dragon fruit.

4) Promote Natural Drinks

It is planned to popularize fruit juices instead of carbonated soft drinks among the people. Modern fruit processing factories will be established in this regard in eight locations – Gampaha, Anuradhapura, Polonnaruwa, Hambantota, Badulla, Kilinochchi, Kandy and Kalutara.

5) Export of Bottled Fruits and Vegetables

Bottled tropical fruit (rambutan, melon, mango, pineapple and papaya), dried tropical fruit (pineapple, mango, banana, papaya, jackfruit and breadfruit), and vegetables (carrots, beans, leeks and onion) will be exported in different forms.

6) Strengthen Institutional Collaboration

Institutional collaboration is very necessary when achieving a common goal. Therefore, existing institutional mechanisms with intra-regional cooperation in core areas of agriculture and livestock will be further strengthened. In addition, training, harmonizing of knowledge and practice, sharing and capacity building will also be in place.

7) Economies of Scale

Small farms face serious constraints in adopting modern technology and in marketing their produce. Their unit costs remain comparatively high because of the high overhead costs. Therefore, farmers will be encouraged to go for large-scale cooperative farming to get the benefit of economies of scale.

8) Waste Management in Agriculture

Organic fertilizer production using agricultural waste will be promoted through public-private partnerships. The production of bio-energy in the form of ethanol and bio-diesel could be promoted through this intervention.

9) Use of ICT in Agriculture

The ICT-mediated engagement in the research-education extension continuum will be promoted in enhancing greater technology exchange among relevant agencies and farmers while improving farmers' opportunities for improved income and livelihood security.

New bio-tech crops with developed drought-tolerant varieties will be grown on marginal lands thereby reducing the need to use inputs and water unnecessarily and unproductively.

The above-stated policy is compiled in the Activity Output Matrix as presented in annexed Table A 2.3.

The investment program for Agriculture sector stated in the Ministry's Corporate Plan for the Mahinda Chinthana is summarized in annexed Table A 2. 4.

(2) Government Policy in Livestock

The *Livestock Master Plan - a Strategy for Livestock Development towards Self-sufficiency (2011)* is a policy document based on the "Mahinda Chintana – Vision for the Future". As an overview, the livestock sector consists mainly of dairy and poultry subsectors, which are considered as priority areas for future growth, employment generation and increasing income of rural farmer. Developing the livestock sector is also a very cost effective way of decreasing under nutrition among rural families. As policy direction, the dairy sector will be especially considered as the priority sector for public investment recognizing its contribution to the national economic development process.

The livestock sector accounted for nearly 1% of GDP in Sri Lanka. About 670,000 smallholders were engaged in the sector and between 30% and 60% of their farm income was generated from livestock activities. Since there is a vast potential for further development of this sector, the demand for livestock produce, as a source of animal protein, is increasing. Livestock population consists of 1.13 million cattle, 370,000 buffaloes, 380,000 goats and sheep, 813,000 pigs, and 13.61 million chickens. These livestock are raised under different environments which are defined in the agro-climatic zone and management systems.

The major sources of animal proteins of the islanders are dairy products, poultry and fishery. A slight increase in per capita availability of proteins was computed at 18.2 g/day in 2008 and 18.3 g/day in 2009. In this context, livestock is recognized as one of the key areas of animal protein supply. Traditions, cultural practices and religion restricted the economic opportunities available to the farmers in the livestock sector and at the same time represented a drain on available resources. These issues were important in the design of livestock-based programs intended to achieve an improvement in human nutrition.

Infrastructure was mentioned as being a problem on number of occasions. The availability of veterinary drugs and staff to administer vaccines, transport and handling facilities, cold storage facilities, slaughtering and processing facilities was one of the infrastructure problems that have been identified. Inadequate market infrastructure facilities such as a roads and transport, storage and chilling facilities, packaging and processing facilities; bias towards production in the provision of institutional credit resulting in limited loans for marketing purposes; non-implementation of proper grading and standards; and the need for improved animal genetics and health are indicative of the degree of difficulty in resolving these problems.

The strategy for livestock development aimed to influence the living standards of people in rural communities by:

(i) Increasing the nutrition, income and employment of the people through improved productivity of the livestock sector in an environmentally sustainable and socially equitable manner; and
(ii) Enhancing the capacity of the people to manage an on-going process of development.

The strategy is dependent on the long-term policy support from government and donor agencies and requires the strengthening of institutional capabilities needed to facilitate a people-centered development.

Stated below are the three main policy objectives and five strategic pillars.

The main policy objectives are:

(i) Spell out clearly the development goals of the livestock sector and the role of the public sector in livestock development activities in the country;
(ii) Facilitate the private sector and other interested agents to identify the scope and possibilities for their activities in production, processing and marketing of livestock and livestock produce; and
(iii) Rationalize investments on livestock sector provided from the consolidated fund through the national budget and avoid crowding out of private sector investment.

The five strategic pillars are based on the relevant policy goals as follows:

(i) National self-reliance and food security;
(ii) Smallholders to be commercial entrepreneurs;
(iii) Food chain to deliver affordable livestock products to consumers;
(iv) Ensure safer and quality livestock products; and
(v) National acceptance of multifaceted benefits of smallholder livestock production.

These five strategic pillars have many targets, and its targets are categorized into specific projects according to the purpose of activity concerning each livestock and so on.

The master plan identified five key sub-sectors, namely: dairy, poultry, swine, goat and livestock, to be developed into self-sufficient levels by 2015, since they have promising economic potentials in the future. The summary of master plan including focused projects in each sector is shown in annexed Table A 2.5.

(a) Dairy Sector

Among all livestock sub-sectors, the dairy sector would be considered as the first priority for public investment recognizing its contribution to the national economic development process. As of 2009, local milk production covered only 33% of the national consumption and 63,876 metric tons of milk and milk products valued at over Rs 30 billion have been imported and represented 2.1% of Sri Lanka's food imports. Hence, with the aim of (i) reducing the drain of country's foreign exchange resources and (ii) supporting employment generation and family income, dairy industry will be promoted as

complementary economic activity across the wide section of the population by introducing a strategic plan which covers policy support, social issues, industrial development production drive, research on human development, institutional development and development of other services. It has to increase milk production by 300% by the end of 2015 for the achievement of self-sufficiency level. The strategies and programs of dairy industry and some important indicators as target levels are indicated in Table 2.11.

Strategies to develop fresh milk production are:

- Salvage the present herd;
- Improve the present milk yield of cow;
- Import high yielding cows for continuous upgrading;
- Encourage and facilitate commercial farming;
- Improve healthcare, herd management and breeding;
- Expansion of milk collection network;
- Enhance government and private sector support service to dairy farmers;
- Expand milk processing facilities; and
- Identify and improve animal feed resources.

Table 2.11 Key Targets of the Livestock Sector: Dairy Industry

Indicator	2005	2009	2015	2020
Self-sufficiency in milk (%)	15	33	55	100
Milk Production (million L)	193	233	500	750
Import of milk and milk products (t)	68,100	63,800	33,375	500
Import value of milk and milk products(US$ million)	133	295	0	0
No. of cattle with high production capacity (million)	1	2	2	3
Chilling centers	60	80	150	300
Collecting centers	0	2,542	5,000	10,000
Processing centers	0	2,563	5,000	10,000

Source: the Emerging World of Asia based on Mahinda Chintana

The investment program and annual milestone in the dairy sector are shown in annexed Table A 2.6 and A 2.7, respectively.

(b) Poultry Sector

Beginning as a backyard industry, the poultry sector in Sri Lanka had shown a phenomenal growth and emerged as a dynamic industry within a short span of time. Per capita availability of chicken meat and eggs had increased from 0.84 kg and 49 eggs in 1990 to 5.19 kg and 67 eggs in 2008, respectively. The local poultry industry, however, will have to face severe competition not only from domestic sources but also from cheap imports due to the high cost of production. The poultry sector master plan suggested reduction of cost of production, availability of chicken meat and eggs at affordable prices to consumers, bio-security improvements in the whole poultry production chain, productivity improvement in breeder and commercial farms, and quality improvement of poultry products.

(c) Goats Sector

Although the goat industry has a substantial market share, it remained an underdeveloped industry

which is mostly confined to smallholders. The goat industry appeared to be the most neglected sector since neither the government nor the private sector showed special interest to boost goat farming. There is good potential for mutton and milk in the consumer markets. The total importation of goat and sheep meat was 269.66 metric tons valued at Rs 58.32 million. The main focus areas of the goat sector plan are availability of goat breeding materials for farmers and increase of breedable she-goat population and number of farms in the country.

Private sector investment is expected to expand farming operations, housing and facilities improvements in breeder and commercial sector, quality improvement in breeding, marketing improvement in the goat sector, and production and consumption promotion programs.

On the other hand, investment is needed in the goat sector to strengthen regulatory back-up services and establish a management development and technical auditing system for bio-security improvements; strengthen disease control; strengthen veterinary services, research and development; and develop human resources required by the industry.

It was also suggested to introduce incentive schemes to improve goat marketing system, loan scheme for small-scale farms, subsidy programs for small-scale slaughter houses, facilitation in importing goat for milk and meat, and institutional arrangement for the goat industry.

(d) Swine Sector

The pig industry in Sri Lanka plays an important role in the national meat industry by producing 1,115 metric tons of pork per year. The importation of pork meat to the country was comparatively low at 0.3 metric tons in 2009, a slight increase from 0.21 metric tons in 2008. The main focus areas of this plan are reduction of cost of production and availability of swine products at affordable prices to consumers, bio-security improvements in the whole swine production chain, productivity improvements in breeder and commercial farms, improvement of living standards of pig farmers, introduction of eco-friendly swine farming system, and quality improvement of swine products.

Private sector investment is proposed in the swine industry to expand pig farming and agriculture integration; improve housing and facilities in breeder and commercial sector; improve quality of swine products; improve marketing in the swine sector, production and processing of animal feed ingredients (swills, agriculture by-products and market wastes) and consumption promotional programs; and prevent inbreeding by implementing breed policy.

Investment is also needed in the swine sector to strengthen regulatory backup services and establish a management improvement and technical auditing system for bio-security improvements; strengthen pig disease control; strengthen veterinary services, research and development; develop human resources required by the industry; and strengthen swine information network. By implementing the proposed interventions in this master plan, 40% self-sufficiency will be achieved in swine products in 2016.

(e) Livestock Sector

The main focus area is the introduction of new livestock and avian species as alternative to animal protein supply at affordable prices to the people. Private sector investments are proposed in the *Non-conventional Livestock Animals with a Promising Economic Future* to expand hatchery/breeder operation; improve farming and facilities in breeder and commercial sector; improve quality of meat and other value additions; and improve marketing in the non-conventional meat sector, production and

processing of non-conventional meat and consumption promotional programs. Investments are also needed in the livestock sector to strengthen regulatory backup services and establish a management improvement and technical auditing system for bio-security improvements; strengthen disease control; strengthen veterinary services, research and development; develop human resources required by the industry; and strengthen management information network.

Policy initiatives are suggested in this plan to introduce facilitation schemes to initiate new operations, loan schemes for small-scale farms, export rebate program, and an institutional arrangement for non-conventional livestock and avian industry monitoring committee/body at the national level to facilitate the expansion of these new animal husbandry practices in the country.

(3) Government Policy in Irrigation Sector

At present, over 80% of the surface water in the country is used by the irrigation sector and the remaining 20% is used by other stakeholders. Therefore, the new national water policy of the country aimed to reduce the level of water usage by the irrigation sector to around 60%. This will create pressure on the irrigation sector to develop efficient water use and allow the other sectors to expand and meet the emerging needs of the economy.

Keeping in line with the national water policy, the irrigation policy will provide water in adequate quantities to lands which are going to be newly cultivated and ensure water availability for existing lands to enable cultivation throughout the year.

The irrigation development plan of the country will achieve the irrigation policy through five main pillars, namely (a) water resources development and management, (b) improvement and modernization of irrigation infrastructures, (c) watershed management, (d) institutional reforms, and (e) research & development, as outlined in the following:

(a) Water Resources Development

The water resources development plan of the country aimed to expedite the completion of large-scale development projects which have already been started and to undertake a number of new projects to provide water for agriculture and other water uses. Annexed Table A 2.8 shows the details of on-going irrigation projects and annexed Table A 2.9 shows the details of new projects to be undertaken under the Ministry of Irrigation and Water Resources Management.

(b) Rehabilitation and Modernization of Irrigation Infrastructures

The rehabilitation and modernization of irrigation infrastructure program planned to expedite the rehabilitation and upgrading of head works and water conveyance systems in order to increase water use efficiency and ensure the effectiveness of water usage to achieve better efficiency and reduce water losses. Out of 80 major dams in the country, 32 are being rehabilitated under the Dam Safety and Water Resources Management Project while the rehabilitation and modernization of the remaining 48 dams will be done by 2020.

Under the main system rehabilitation works, it will be planned to line all main canals and selected branch canals without affecting the groundwater table. Further, water conveyance canals will be equipped with modern gauging equipment to measure and update water usage and flow level.

The sub-systems rehabilitation of irrigation schemes will be undertaken with the participation of farmer communities. Under this program, it will be planned to rehabilitate the canal system including: (i) cleaning and de-silting, (ii) lining, and (iii) installation of measuring equipment.

This will also lead to minimizing water-related risks (dam failure) and giving guaranteed early warnings on sudden threats such as floods, rise in water level, etc. This work is expected to be completed in six years from 2011. The operation and management expenses of head works and water conveyance systems will be financed by the government and the private sector. Private-public partnerships will also be encouraged in areas where there is high return on investment. For minor schemes, farmers will make a meaningful contribution in the form of labor, with major proportion of the finances being provided by the government or other agencies such as NGOs and the private sector.

(c) Watershed Management

To ensure the integrity of the ecosystems through good water resources management, it is essential to maintain the sustainability and development of water resources. Deforestation, agricultural and aquaculture activities and unplanned construction were the main reasons for the degradation of watersheds.

Watershed management program aimed to give priority for the conservation and protection of ecosystems and to be implemented with the participation of relevant line agencies. Under this program, it will be planned to establish green environmental friendly ecosystems in each basin/cascade to protect water resources on a sustainable basis.

(d) Institutional Reforms

At present, there are several state agencies dealing with water-related activities in Sri Lanka which operate with little coordination. Further, there are several acts of parliament concerning water sector. These laws were administered by several agencies with a wide range of responsibilities, and there were overlaps and gaps. The Irrigation Department (ID), Mahaweli Authority of Sri Lanka (MASL), Water Resources Board (WRB), National Water Supply and Drainage Board (NWS&DB), Department of Agrarian Development (DAD) and Ceylon Electricity Board (CEB) are some of the state agencies dealing with surface water and groundwater of the country. Hence, the importance of a single institutional body with a mandate for the development and management of surface and groundwater resources was emphasized.

Under the institutional reforms, it will be planned to merge the existing national level agencies, which are mandated for any sort of activity related to irrigation and water management, to a single national body with a mandate for the development and management of the surface and groundwater resources in the country.

(e) Research and Development

Under the research and development program, it will be planned to carry out research through many agencies such as national, provincial, private and international in collaboration with the rural societies for the formulation of national policies in the irrigation sector.

Researches will mainly focus on the development and exploitation of surface water and groundwater, maintenance of water quality, and the supply of water for social, economic and environmental needs on

a sustainable basis.

Outline of above programs are summarized in Table 2.12.

Table 2.12 Outline of Irrigation Related Program

	Name of Program		Department In Charge	Period of Program	Donor Support
1	Water Resources Development	Moragahakanda - Kaluganga Project	MASL	Ongoing and continue 2012 onwards	KFAED/ SFD/ OFID/ CDB
		Uma Oya Multipurpose Development Project	ID		EDBI
		Yan Oya Reservoir Project	ID		CDB
		Cabinet of Ministers has approved a 10 Year Water Resources Development Plan	ID/MASL	2012 onwards	
2	Rehabilitation and Modernization of Irrigation Infrastructures	DSWRPP	MI&WRM	2009 - 2013	World Bank (IDA)
		Major and Medium Irrigation Schemes Rehabilitation	ID/MASL	2011 - 2014	JICA
		Emergency Natural Disaster Rehabilitation	MI&WRM/ID	2011 - 2014	Local Funding
3	Water Shed Management	Mahaweli Consolidation Project	ID/MASL	2009 - 2012	Local Funding
		ID Machinery Purchasing Program			
4	Institutional Reforms	Recruitment of Technical Staff, where shortage exists	MI&WRM/ID/MASL	Ongoing and continue	Local Funding
		Human Resources Training (Strengthen the GITI & Establishing new training institute, KITI)			
		Management Reforms (Restructuring of ID, MASL & Ministry Technical Dev. Division)			
5	Research and Development	Researches in Ground Water Development	WRB	Ongoing and continue 2012 onwards	Local Funding

MI&WRM - Ministry of Irrigation and Water Resources Management
ID - Irrigation Department
MASL - Mahaweli Authority of Sri Lanka
WRB - Water Resources Board
GITI - Galgamuwa Irrigation Training Institute
KITI - Kotmale Irrigation Training Institute
DSWRPP - Dam Safety and Water Resources Planning Project
MCP - Mahaweli Consolidation Project
JICA - Japan International Cooperation Agency
IDA - International Development Agency
KFAED - Kuwait Fund for Arab Economic Development
SFD - Saudi Fund for Development
OFID - OPEC Fund for International Development
EDBI - Export Development Bank of Iran
CDB - China Development Bank

2.4.2 Provincial Development Policy and Programs

The document which presents the provincial development policy and programs has been collected from the respective provinces by the sub-let consultant. From North-Western province, however, no document has been collected, because such policy and programs had not been established/ prepared by this province. Moreover, the document has not been available from Uva province. In this province, the development plans/programs have been prepared by two subordinate districts (i.e., Badulla and

Monaragala). Including the plans/programs from these two districts, the provincial development policy and programs are compiled as shown in the annexed Table A 2.10.

(1) Northern Province

The Five-Year Investment Program during the period from 2009 to 2013 is on-going in this province. In the program, the development priorities are being firstly given to reconstruction, rehabilitation and reactivation of social infrastructure and services. Then the province is giving the second priorities to economic infrastructure and production sector development. As for individual program, the largest budget allocation has been made to irrigation subsector followed by livestock subsector.

(2) Eastern province

Eastern province also has the Five-Year Development Plan during the period from 2012 to 2016. In terms of allocated budget, the province is giving the highest priority to the development of tourism sector, followed by improvement of road, and rehabilitation and improvement of irrigation facilities and strengthening of their management system.

(3) North Central province

This province has the Ten-Year Development Plan during the period from 2003 to 2012. Among 19 strategic projects/programs listed in the plan, 10 projects/programs are agriculture and rural area development related projects/programs. The biggest budget is allocated to rural road network maintenance followed by irrigation system maintenance.

(4) Badulla district, Uva province

Badulla district has the Seven-Year Development Plan during the period from 2010 to 2016. The highest priority is being given to rehabilitation and upgrading of existing road network in terms of allocated budget, followed by livelihood development to alleviate poverty and plantation sector improvement by developing infrastructure and other facilities.

(5) Monaragala district, Uva province

Monaragala district has Two-Year Development Program during 2011-2012 periods. Similar with Badulla, this district also gives the highest priority to road network improvement. For agriculture sector, this district is planning to promote crop diversification particularly in plantation subsector such as coconut, rubber and sugarcane.

2.4.3 Roles of Central and Provincial Government in Agriculture, irrigation, Road and Market Facilities Development

The division of roles among government agencies related to agricultural development is quite-complicated in Sri Lanka as well as in the Survey area as presented in Table 2.13. Although such situation is described in relevant sections later, this section tries to give clear understanding to the readers making a summary in advance.

As seen in the table, agricultural extension (for food and horticulture crops) is considered to be the most

complicated ones among many services provided by the government. PDOA is principally responsible for the extension service by deploying the provincial government staff of AIs. In the Mahaweli command area, however, the extension service is being provided by Field Assistant from MASL. The field assistant's roles in the extension service are basically the same with AIs in other areas. Moreover, DOA directly staffs his AIs in inter-provincial areas of six districts (Ampara, Anuradhapura, Polonnaruwa, Monaragala, Hambantota, and Kandy).

The extension service for livestock subsector has similar complication with the above mentioned agricultural extension service. However, the services of subsector are simpler than the above, because there is no special district supported directly by the central government (DAPH).

The irrigation subsector is more difficult to understand, because the supporting agencies are different depending on location and size of irrigation command area. For example, the construction of major scheme is carried out by ID for a scheme in inter-provincial river basins, by PDOI in provincial river basins, and by MASL in the Mahaweli command area. Meanwhile, the construction of minor scheme which command area is less than 80 ha is carried out by PDOI or DAD.

The demarcation of the responsibility on road and market are also shown in Table 2.13.

Table 2.13 Roles of Central and Provincial Government in Agriculture Development

Agriculture - Food and horticulture crops	Central	Provincial	Mahaweli Command Area
Research	DOA	-	-
Training and Extension	DOA*	PDOA	MASL
Plant Quarantine	DOA	-	-
Registration of pesticide	DOA	-	-
Seed production and certification	SPMDC, DOA	-	-

**: Only for six districts of Ampara, Anuradhapura, Polonnaruwa, Hambantota, Moneragala and Kandy*

Livestock	Central	Provincial	Mahaweli Command Area
Research	DAPH	-	-
Breeding	DAPH	-	-
Training of trainers	DAPH	-	MASL
Disease control	DAPH	-	-
Animal Quarantine	DAPH	-	-
Farmer training & extension	-	PDAPH	MASL
Animal hygiene	-	PDAPH	-
Artificial Insemination (AI)	-	PDAPH	-

Irrigation- Major Scheme	Central	Provincial	Mahaweli Command Area
Construction	ID[*1]	PDOI[*2]	MASL
Rehabilitation	ID[*2]	PDOI[*3]	MASL
Operation & Maintenance	ID	PDOI	MASL
OF development	IMD/DAD	-	MASL

**1: Inter provincial river basins by central level, provincial river basins by provincial level*
**2: Situation changes for special projects*

Irrigation- Minor Scheme	Central	Provincial	Mahaweli Command Area
Construction	-	PDOI/DAD	-
Rehabilitation	-	PDOI/DAD	-

Operation & Maintenance	-	PDOI/DAD	PDOI
OF development	DAD	-	-

Road	Central	Provincial	Rural
Construction	RDA	PRDA	PS
Rehabilitation	RDA	PRDA	PS
Operation & Management	RDA	PRDA	PS

Market	Dedicated Economic Center	Town Market	Pola
Construction	MoC&IT	UC	PS
Rehabilitation	MoC&IT	UC	PS
Operation & Management	MoC&IT	UC	PS

DAD: Department of Agrarian Development
DOA: Department of Agriculture
FO: Farmers' Organization
ID: Irrigation Department
IMD: Irrigation Management Division
MASL: Mahaweli Authority of Sri Lanka
PDAPH: Provincial Department of Animal Production and Health
PDOA: Provincial Department of Agriculture
PDOI: Provincial Department of Irrigation
SPMDC: Seed & Planting Material Development Centre
RDA: Road Development Authority
PRDA: Provincial Road Development Authority
PS: Pradesiya Saba
MoC&IT: Ministry of Cooperative and Internal Trade
UC: Urban Council
Source: Information obtained from relevant agencies Market Agriculture

Chapter 3 PRESENT CONDITIONS AND ISSUES IN THE SURVEY AREA

3.1 Local Administration

3.1.1 Existing Setup and Budget of the Local Administration

The local administrative structure in Sri Lanka has four levels, namely, province, district, division/local authority, and *grama niladhari*. Also, two governance systems, "public governance system" and "deconcentrated governance system", are being operated in the local administration. The functions of these two systems overlap at the district and division levels in some cases.

There are 14 district secretariats, 181 divisional secretariats, and more than 6000 *grama niladhari* divisions in the survey area, as shown in Table 3.1 and the annexed Figure A 3.1.

Table 3.1 Local Administration in the Survey Area

Province	District Secretariat	Divisional Secretariat (nos.)	Grama Niladhari (nos.)
Northern	Jaffna	15	435
	Kilinochchi	4	95
	Mannar	5	153
	Vavunia	4	102
	Mullaitivu	6	127
	Subtotal	**34**	**912**
Eastern	Batticaloa	14	345
	Ampara	20	503
	Trincomalee	11	230
	Subtotal	**45**	**1078**
North Western	Kurunegala	31	1610
	Puttalam	16	548
	Subtotal	**47**	**2158**
North Central	Anuradhapura	22	694
	Polonnaruwa	7	295
	Subtotal	**29**	**989**
Uva	Badulla	15	567
	Moneragala	11	381
	Subtotal	**26**	**948**
Total		**181**	**6085**

Source: Data collected in each province

The outline of major local administration bodies is described below.

(1) Provincial Councils

There are differences in the administrative structure of the Provincial Council between the Northern Province and other provinces, as shown in the annexed Figure A 3.2 and Figure A 3.3. In the absence of an elected Provincial Council in the Northern Province, the functions of the Northern Provincial Council (NPC) have been taken over by the Governor. A number of institutions, such as the Chief Minister's Secretariat, the Provincial Public Service Commission,, and the Provincial Cooperative Employees Commission, function directly under the Governor.

The Chief Secretary's office is the focal point of provincial administration. Apart from his own Secretariat, the Chief Secretary directly carries out three main functions at the provincial level such as planning and monitoring, finance, and administration.

The main provincial subjects and functions are now organized under the following provincial ministries:

- Ministry of Agriculture, Livestock Development, Lands, Irrigation, and Fisheries,
- Ministry of Local Government, Relief and Rehabilitation, Co-operative, Rural Development, Social Services and Probation and Childcare,
- Ministry of Education, Cultural Affairs and Sports,
- Ministry of Infrastructure Development and Reconstruction, and
- Ministry of Health and Indigenous Medicine.

Each of these ministries again has a number of departments under them, as shown in the annexed Figure A 3.3.

Although the Provincial Department of Agriculture, Department of Animal Production and Health and Department of Small Industries could be valuable resources for project implementation, these departments are weak in extension activities, especially in the north. The Department of Cooperative Development and the Provincial Department of Local Government both suffer from the same problem.

The Provincial Department of Industries has a role to play in the development of resource-based small and medium industries. It has a substantial number of textile/small industry demonstrators/supervisors which offer as good training resources for the project. These officers can also be used to assist small businesses in developing business plans.

Out of more than 30 provincial departments, four production oriented departments (departments of Agriculture, Animal Production and Health, Small Industries and Fisheries) and supportive departments dealing with community organizations (departments of Rural Development, Cooperative Development and Local Government), could be valuable resources for a project with a livelihood component. Such departments, jointly or individually, can play a vital role in providing Livelihood Enterprise Development Services (LEDS). Because of the importance of these seven departments, the NPC has brought all of them under one umbrella organization called the Centre for Enterprise Development Services (CEDS) for the purpose of coordinating and integrating livelihood related activities in the province. This setup is to be brought at the district level for coordination regarding LEDS activities by arranging a coordinating committee to be convened monthly under the chairmanship of the Government Agent (GA). Unfortunately all these production oriented departments suffer from weak extension services and a high number of staff vacancies. Any future projects can assist the departments to overcome these constraints.

The Provincial Department of Finance handles the province's financial activities. In Sri Lanka, fund transfer from the central government to the provincial councils takes the form of grants. There are currently three types of central government grants to the provincial councils and the local government bodies under their purview. The following are the three types of grants:

- Block grant: allocated for meeting recurrent expenses.
- Matching grant: an incentive measure to stimulate local revenue generation. These are non-existent in the Northern Province since the NPC does not generate any revenue.
- Criteria based grant (CBG): a formula based grant intended to achieve a more balanced regional development. It is meant for capital works.

- Apart from these sources of income, the provincial councils can also draw upon:
- Province specific development grant (PSDG): started in 2000 when it replaced the earlier Medium-term Investment Program which was funded by the central government line ministries. PSDG is released directly by the General Treasury to the provincial councils following the recommendation of the Finance Commission.
- Bilateral and multilateral projects.

The allocations of PSDG to each province from 2005 to 2010 are shown in the annexed Table A 3.1.

(2) District Secretariat

The present District Administration System has been established according to the Administrative District Act No. 22 of 1955 in which the district came to be recognized as the pivotal unit of administration. A GA was appointed to each district as its head with wide range of responsibilities. Since 1987, the province supersedes the district as the unit of subnational administration. The district administration is mainly responsible for backstopping and for coordinating provincial and central program implementation at the district level, whereas implementation of programs and delivery of services has been further decentralized to the division level administration. Supervising the work of the divisional secretariats is one of their main functions.

In addition, the district secretaries function as the secretaries of the various coordinating committees in the districts. As secretaries of the District Coordination Committee (DCC) they also have a crucial voice in the allocation and monitoring of the decentralized budget and major government programs. The GA is the key person for project implementation at the district level. Each District Secretariat has a District Planning Secretariat to support the abovementioned functions.

(3) Divisional Secretariat (DS)

As mentioned, the DS Division (formally the AGA Division) is the implementation and operational base within the existing decentralization framework. The DSs are headed by divisional secretaries, who were called divisional revenue officers (DROs)/assistant government agents (AGAs) in the past. After the 13th Amendment came into force, management tasks, staff, and equipment moved from the district level to the DS. This major change was effected by the Transfer of Powers (Divisional secretaries) Act No. 58 of 1992 which provided for the transfer of powers, functions and duties exercised, performed and discharged by the GAs under the various laws to the DSs.

The main functions of the DS include revenue collection, implementation of the Samurdhi programme, operation of the divisional planning units, data collection, coordination of rural development societies and small industries, and implementation of various government development initiatives.

The approved staff of DSs is around 100 including *grama niladharis*. Several other officers from the central and provincial ministries are attached to the DS. However they are not regularly part of the DS. They perform specialized functions, i.e., assistant director for planning, development officers, rural development officers, cultural officers, environmental officers, sports officers, social service officers, probation officers, land officers, technical officers, textile demonstrators, etc., as given in Table 3.2.

Table 3.2 Staff of DSs

Central Government	Provincial Government
Divisional Secretary	Rural Development Officer
Assistant Divisional Secretary	Technical Officer
Accountant	Social Service Officer
Assistant Director for Planning	Probation Officer
Development Officer	Sports Officer
Samurdhi Manager and Field Officers	Land Officer
Child Rights Promotion Officer	Development Officer/Program Officer
Elders Rights Promotion Officer	Textile Demonstrator
Women Development Officer	
Disabled Assistance Officer	
Cultural Officer	
Youth Service Officer	
Environment Officer	

(4) Grama Niladhari (GN)

The *Grama Niladhari* Division (GND) is the lowest administrative level. There is one GN in charge of each GND, commonly consisting of two or three villages. The population limit of a GND is generally set around 250 families. The GN maintains various statistics records, including registry of births and deaths, exercises police duties, and provides emergency relief assistance. The GN is appointed by the central government after passing a competitive examination. Most GNs are selected from the respective GND itself and continue to be posted there, sometimes up to ten years.

Aside from the GN, teachers and Samurdhi development officers (two per GN) are the only government staff present at the GND and the village level. The Samurdhi development officers are responsible for selecting which families are entitled to food stamps and for distributing such.

3.1.2 Agriculture Extension Services and Ongoing Programs

A major issue in agriculture development is the multitude of government agencies, many of which have been organized along crop lines. They are individually responsible for the promotion of crops including research and extension services. While the latter services have been decentralized and are under the authority of provincial governments, the issue of having multiple service providers remains as diversified farming systems continue to rely on the services of several different agencies for technical advice. Government support to private marketing, except for export crops, is focused on cooperative development. Private extension services are also provided by input suppliers, processors, wholesale buyers, and exporters. Many of them also supply inputs under buy-back agreements, where the costs of the inputs are deducted from the producer's sales revenues.

(1) Department of Agriculture (DOA)

The DOA, with its head office in Kandy, is responsible for research and extension, agribusiness support, seed and planting material production, and regulatory services, namely, plant quarantine, soil conservation and registration of pesticides. The DOA has established the Agribusiness Enterprise Development and Information Service (AgEDIS), which provides services as a "one stop shop" under the Extension and Training Centre.

The service provided by the DOA is the most extensive as far as the food sector is concerned. The Extension and Training Division of the DOA is well supported by three specialized research institutes (Horticultural Crop Research and Development Institute, Rice Research and Development Institute, and Field Crops Research and Development Institute), as well as the Seed Certification and Plant Protection Centre, Seed and Planting Material Development Centre, and Socio Economics and Planning Centre. The organization structure of the DOA and Ministry of Agriculture are shown in the annexed Figure A 3.4 and A 3.5 respectively.

Following the devolution of extension function from the central government to the Provincial Council in 1989, the agricultural extension service of the DOA was confined to the interprovincial major irrigation areas of Ampara, Anuradhapura, Polonnaruwa, Hambantota, Moneragala, and Kandy districts. The district interprovincial offices are headed by assistant directors (ADs) as assigned by segment agriculture officers (AOs) and a team of subject matter officers (SMOs). The segment AOs are assisted by agricultural instructors (AIs) placed at ranges as field level officers, and the Divisional Officer (DO) and agriculture research and production assistants (ARPAs) attached to Agrarian Development Centres (ADCs) as village level officers. Besides the extension in interprovincial areas, the division is vested with related duties of national interest, namely, i) coordination and collaboration of national extension programs with other extension agencies, ii) supporting the extension system by collection, management, and dissemination of information, iii) training of extension staff, agricultural entrepreneurs, and farmers, and iv) engaging in the provision of vocational and technical education in agriculture to the youth.

The AI's main role covers agricultural extension and training at the field level. The roles of the AI also include collection of agricultural information for planning purposes, establishment of agricultural demonstrations, and assistance to field trials and seasonal planning.

Representing the Commissioner General of Agrarian Development, the DO is the authorized person at the field level in exercising powers of the Commissioner General under the Agrarian Development Act No.46 of 2000. The main duties of DOs include implementing the said act and related legal activities, providing services such as supply of fertilizers, seeds, agrochemicals, etc., facilitating O&M of minor irrigation schemes, attending activities of farmers banks, attend activities of the Agrarian Development Council of the agrarian development area, management of the Agrarian Service Centre, guiding and supervising ARPAs, auditing farmers organizations (FOs), and assisting FOs toward their objectives.

The ARPA is under the supervision of the DO. The ARPA shall assist the Commissioner General of Agrarian Development in exercising powers of the said act at the field level. The list of duties of the ARPA is very long and it could be divided into several sections, namely, institutional development and village planning, management of agricultural lands, provision of inputs and services, agriculture and livestock development extension activities, minor irrigation management, and promotion and marketing of agricultural products. Although the ARPA, which is attached to the ADC, is of administrative line under the Department of Agrarian Development (DAD), he/she has to work with the AI three days a week according to the guidelines issued by the Commissioner General. However at both Northern and Eastern provinces, no ARPAs are assigned at present (as of April 2011). This was because of the previous conflict situation particularly in these provinces. At that time, an appointment of ARPA was not possible. After settlement of the situation, interviews have been conducted to recruit ARPA in 2011. New appointments are expected to be placed very soon. The ARPA areas were published in the government gazette dated December 9, 2011.

There is no particular division to handle the entrepreneurship of farmers. The Agriculture Enterprise Division of the DOA of the central government is mandated on agriculture enterprise development and information. It has been carrying out trading programs with the Food and Agriculture Organization (FAO) for trainers of district extension staff and interprovincial agriculture staff to promote commercial farming in 12 areas. Among them, Puttalam, Kurunegala, Pollonaluwa, Badulla, and Moneragala are in the survey target area. This program will terminate in April 2013, and the DOA has not yet decided whether to continue on with this program (refer to the P3-8 "Farm Business School Program").

(2) Provincial DOA

Agricultural extension services in areas outside the major and medium irrigation schemes are provided by the provincial administration under the DOA in the Provincial Ministry of Agriculture and Animal Production. At the district level, the Provincial DOA is headed by deputy directors who are supported by assistant directors (ADs) assigned to cover segments, based on agro-ecology and farming systems, and a set of SMOs. As in the Central DOA, the AIs placed under the ADs are the front line extension agents and situated at the Agricultural Service Centres (ASCs). Depending on the needs of the area, one or more AIs may operate from one ASC. The organizational structure of the Provincial DOA and Department of Animal Production and Health (DAPH) under the Provincial Ministry of Agriculture and Animal Production is shown in the annexed Figure A 3.6.

(3) Agriculture Extension Officers Available in the Survey Area

The availability of extension officers assigned under the government lines, i.e., DOA (central), Provincial DOA, and DAD (Central) are presented in Table 3.3.

Table 3.3 Agriculture Extension Officers Assigned in the Survey Area

Province / District	Extension Officers*				Coverage of One AI	No. of Smallholders**
	AI (No.)	DO (No.)	ARPA (No.)	Total (No.)	(No.)	
Northern	**53**	**52**	**0**	**105**	**3,092**	**163,862**
Jaffna	15	15	0	30	6,124	91,855
Kilinochchi	8	8	0	16	2,208	17,665
Mannar	10	10	0	20	1,467	14,666
Vavunia	8	7	0	15	2,690	21,522
Mullaitivu	12	12	0	24	1,513	18,154
Eastern	**77**	**61**	**0**	**138**	**3,574**	**275,163**
Batticaloa	36	16	0	52	2,760	99,373
Ampara	22	26	0	48	5,618	123,600
Trincomalee	19	19	0	38	2,747	52,190
North Western	**130**	**64**	**1,606**	**1,800**	**3,662**	**476,001**
Kurunegala	94	48	1,325	1,467	3,641	342,215
Puttalam	36	16	281	333	3,716	133,786
North Central	**45**	**36**	**797**	**878**	**5,533**	**248,970**
Anuradhapura	35	29	518	582	5,066	177,322
Polonnaruwa	10	7	279	296	7,165	71,648

Province / District	Extension Officers*				Coverage of One AI	No. of Smallholders**
	AI (No.)	DO (No.)	ARPA (No.)	Total (No.)	(No.)	
Uva	**63**	**35**	**692**	**790**	**3,511**	**221,219**
Badulla	42	21	428	491	3,093	129,902
Moneragala	21	14	264	299	4,348	91,317
Total of the Five Provinces	368	248	3,095	3,711	3,764	1,385,215
Other Provinces	712	267	6,167	7,146	2,618	1,864,304
Sri Lanka Total	1,080	515	9,262	11,507	3,023	3,264,678

*Note: **Agricultural holdings excluding estate sector*
*Source: *Data collected in each province and DOA.*
***Census of Agriculture 2002, Department of Census and Statistics*

According to statistics, one AI supports an average of about 3760 smallholders in the five provinces. The coverage in the other provinces is much lower than in the survey area. The average coverage is relatively large in Jaffna, Ampara, Anuradhapura, and Polonnaruwa. Since the data on smallholders are based on the census in 2002, the situation has been considered to have changed to a certain extent at present.

(4) Ongoing Government Programs

(a) National Campaign to Motivate Domestic Food Production (*Apiwawamu Rata Nagamu* Program)

This program has been implemented by the Ministry of Agriculture since 2006. Its objectives include increasing the production of essential food crops, enhancing contribution of agriculture to the gross national product, and ensuring food and nutrition security of the people. Under the national food production campaign, the following crops have been selected to increase the production: paddy, maize, finger millet, chili, big onion, red onion, green gram, cowpea, soybean, ground nut, black gram, banana, pineapple, grapes, mango, pomegranate, avocado, mangosteen, rambutan, beans, brinjal, wing bean, tomato, long bean, green leaves, potato, sweet potato, and kiri ala. The major activities of the program are promotion of home gardening, production and utilization of organic manure, promotion and dissemination of environment-friendly agro-technologies, marketing and promotion of seeds and planting material production, dissemination of post-harvest technology, coordination of inputs and services, optimum use and conservation of natural resources, and organizing farmers and ensuring their active contribution.

(b) Rice Export Program (2012- 2016)

Sri Lanka has reached self-sufficiency in rice. The Government of Sri Lanka started a project to export the surplus of paddy production to earn foreign exchange and to minimize price fluctuation. The districts of Mannar, Polonnaruwa, Ampara, and Hambantota have been selected for the implementation of the project. The project initially expects to focus on niche markets of Sri Lankans and other Asians living in other countries. Rice quality improvement through technology transfer, improvement of rice mills, and export subsidies are the main strategies of the rice export program.

(c) Other Field Crops (OFCs) Development Program (2012-2015)

The main objective of the OFCs Development Program is to minimize the importation of crops such as chili, big onion, red onion, maize, finger millet, soya bean, green gram, cowpea, groundnut, black gram, and ginger. The focus of such program is given to Northern and Eastern provinces.

(d) Production and Application of Organic Manure Program

The aim of this program is to popularize the Integrated Plant Nutrition System in farmer's fields. The major activities of the project include training of farmers and officers, green manure cultivation, field days, media exposure (TV, radio, and printed), provision of inputs such as rock phosphate to farmers, soil testing and crop cutting surveys. In 2011, 3320 farmers were involved in this program. The DOA has allocated Rs50 million for the implementation of the program in 2012.

(e) Community-Based Seeds and Planting Material Production

The objective of this program is to develop sustainable seeds and planting material production in villages with small farmer groups. This project has already formed around 100 farmer groups consisting of 600 farmers. Farmer's training, distribution of basic seeds at 50% subsidized price, seed certification and market coordination are the main activities of the project. The total fund allocation for the project for 2012 is Rs10 million.

(f) Big Onion Seed Production Program

The low availability of good quality seeds for big onion cultivation is a major constraint in increasing the production of big onions. Very often the quality of seeds imported from India and other countries is unsatisfactory. Efforts to produce big onion seeds locally have shown successful results and the Ministry of Agriculture has started a program to promote local big onion seed production. The activities under this program are identification of suitable areas, training of farmers, provision of high quality seeds and necessary inputs, vernalization and storage for marketing.

(g) Farmer Business School Program

In order to be competitive and take advantage of the new opportunities that are arising, farmers increasingly have to adapt their farm business to market changes and improve efficiency, profitability and income. The Farm Business School (FBS) approach developed by FAO to help farmers learn how to make their farming enterprises and overall farm operations profitable and able to respond to market demands is now being introduced in Sri Lanka by DOA as a FAO funded project. The learning takes place at the village level and the farmer's capacity in entrepreneurial and management skills is built via a "learning by doing" approach. Extension officers and lead farmers are trained as facilitators. Seasonal training courses are then organized, wherein farmers work in small groups at their own place using materials that have been specially designed for the schools. Initially the project will cover Anuradhapura, Polonnaruwa, Badulla, Kurunegala, Kandy, Nuwara Eliya, Moneragala, Puttalam, Ampara, and Matale districts.

(h) Sustainable Organic Farming Project

The Asian Network funds this project for Sustainable Organic Farming Technology (ANSOFT) to

introduce organic farming technologies in rural villages. At present ten villages are involved in the program. The DOA handles the farmer training sessions, crop clinics, and provision of seeds and planting materials.

(5) District Agriculture Training Centre and In-Service Training Centre

There are eight District Agriculture Training Centers (DATCs) and two In-Service Training Centres (ISTCs) in the survey area. Some of the eight DATCs are operating with very poor facilities and in need of urgent improvement. Some buildings are damaged and the training rooms lack furniture and training equipment. Table 3.4 shows the present situation of DATCs and ISTCs in the survey area.

Table 3.4 Present Situation of DATCs and ISTCs in the Survey Area

No.	Province	District	Total Area	Farm Area	Staff numbers			Facilities			Remarks
					Training staff	Others	Total	No. of Lecture room/hall	No. of trainees possible to stay	Availability of Kitchen	
			(ha)	(ha)	(prn)	(prn)	(prn)	(No.)	(No.)		
DATC											
1.	Northern	Jaffna	4.8	4.0	2	18	20	1	35	Available	Very old facilities and need rehabilitation
2.	Northern	Kilinochchi	10.0	7.2	2	6	8	2	50	Not available	Damaged facilities and need rehabilitation
3.	Northern	Mannar	2.4	2.4	1	2	3	1	70	Not available	Two hostels are under construction.
4.	Northern	Vavunia	9.7	7.7	4	12	16	1	50	Available	
5.	Eastern	Trincomale	8.0	6.0	2	26	28	2	50	Available	
6.	Eastern	Batticaloa	3.2	3.2	4	11	15	2	62	Available	
7.	Eastern	Ampara	2.0	1.2	1	2	3	1	25	Available	Very old facilities and need to be repared
8.	Uva	Moneragala	10.0	6.0	3	43	46	2	50	Available	There is the potential to produce OFC seed but facilities such as water are not available
In-service Training Centre											
1.	North Central	Anurathapura	4.0	2.0	10	39	49	4	80	Available	
2.	Uva	Badulla	80.0	3.5	9	57	66	3	52	Available	Water for field demonstration is not available Demonstration plot should be prepared.

Source: Each Provincial Department of Agriculture

Note: No centers are available in Kilinochchi, Mullaitiva, Polonnaruwa, Kurunegala, and Puttalam.

3.1.3 Livestock Extension Services and Ongoing Programs

(1) Extension System

Technical leadership in many aspects of livestock development including research, extension, animal health management, and breeding services, such as artificial insemination inputs for the dairy sector, are provided by the DAPH. The DAPH is the principal state organization functioning under the Ministry of Livestock and Rural Community Development (MLRD). However, since livestock development is a devolved subject under the constitution of Sri Lanka, livestock development programs have been implemented by nine provincial DAPH, through its network of 257 veterinary offices located in the nine provinces.

The livestock development inspectors (LDIs) are primarily responsible for provision of extension and AI services to farmers but they are also the personnel providing almost all of the DAPH AI services to farmers. The number of veterinary surgeons (VSs) employed by the DAPH has risen significantly in recent years, but on the contrary the number of livestock officers (LOs) and LDIs has stagnated. While these two roles are somewhat synergistic it is apparent that the lack of LDIs dictates that the breeding service is prioritized and extension services are provided on an ad hoc basis. It is highly needed to train extension providers in extension methodology as well as on various aspects of animal husbandry.

The organizational structure of the MLRD is shown in the annexed Figure A 3.7.

(2) Ongoing Government Programs

The following ten government programs in the livestock sector are ongoing at present:

(a) Livestock Breeding Program [Duration from 2012 to 2014: Budget Rs696.0 Million]

This program facilitates the expansion and smooth operation of artificial insemination through production of semen and quality bull calves and distribution of inputs to the field AI units and breeder farms in the country, which is vital in the improvement of breeds and breeding towards increase in milk production.

(b) Program for Control of Contagious Diseases of Animals in Sri Lanka [Duration from 2012 to 2014: Budget Rs232.0 Million]

Control major economically important livestock diseases such as HS, FMD, and BQ by regular preventive vaccination.

(c) Program for Establishment of Veterinary Hospitals [Duration from 2012 to 2013: Budget Rs380.0 Million]

Strengthening of service delivery system by means of providing animal health services with well-equipped veterinary hospitals.

(d) Goat Breeding Program (Thelahera and Imbulandanda) [Duration from 2012 to 2014: Budget Rs24.5 Million]

The program aims to maintain Jamnapari Elite herd and produce male and female offsprings and to prevent inbreeding of elite goat herds. It also aims to improve the local goat breed by introduction of Jamnapari male offsprings born to Jamnapari Elite herd, and to uplift the income of the farmers, thereby alleviating poverty which is the long-term objective.

Photo 3.1 View of Goat Rearing

Photo 3.2 Stables for Goats

Table 3.5 Closing Stock Position by December 31, 2010

Farm	Adults (>12 months)		Young Stock (4-12 months)		Kids (0-4 months)		Total
	Male	Female	Male	Female	Male	Female	
Thelahera	3	206	16	61	35	63	384
Imbulandanda	5	94	4	40	32	40	215
Total	8	300	20	101	67	103	599

Source: Department of Animal Production and Health

(e) Program to Increase Availability of Breedable Heifer Calves (HCR) [Duration from 2012 to 2014: Budget Rs1,403.3 Million]

The overall objective is to increase local milk production to reach 50% level in 2015 by increasing the availability of breedable heifer calves in Sri Lanka and ensure higher calf yield and milk production. The major input of the project (animal feed) is given under 50% subsidized rate.

(f) Program for Improvement of Service Delivery System of Government Veterinary Offices [Duration from 2012 to 2014: Budget Rs2,401.0 Million]

Public sector institutions have a unique role in this endeavor, and the government veterinary office is the key field unit of undertaking most of responsibilities pertaining to livestock development at field level. The objective of this project is to equip them with minimum diagnostic, extension, communication and transport facilities at the end of 2015 (commencing year 2008).

(g) Program for Implementation of Livestock Statutes [Duration from 2012 to 2013: Budget Rs24.0 Million]

Regulations of the Animal Disease Act, Animal Feed Act, Veterinary Practitioners Act, and Animal Act are effectively implemented in this project. Necessary regulations have to be implemented for livestock sector development. Accordingly, all livestock farms in Sri Lanka are to be registered with respective government veterinary offices.

(h) Research Projects to Improve Livestock Production and Health [Duration from 2012 to 2013: Budget Rs9.30 Million]

The government's policy on increasing food security through livestock production may encounter problems due to the scarcity of imported inputs, quality of local agricultural by-products, low productivity of livestock, disease impediments, and consumer preference.

(i) Self-Employment Training Program (Peradeniya) [Duration from 2012 to 2013: Budget Rs18.5 Million]

This project provides practical training on livestock farming and entrepreneurship development for livestock farmers and potential farmers in order to acquire necessary skills and knowledge on managing their farms efficiently and profitably (200 trainees per year, 250 follow-up trainings per year, and development of entrepreneurships).

(j) Program for Strengthen Animal Quarantine and Inspection Service [Duration from 2012 to 2014: Budget Rs7.60 Million]

This program assists in increasing the quarantine surveillance of imported animals and animal products.

3.2 Population and Employment

The survey area has a total population of 7,212,000. The male-to-female ratio is 99%. Among the 14 districts in the survey area, the population density is comparatively high in Jaffna (653 persons/km^2) followed by Kurunegala (335 persons/km^2), and Badulla (309 persons/km^2). On the other hand, the

density is relatively low in Mannar (55 persons/km^2) followed by Mullaitivu (64 persons/km^2) and Moneragala (79 persons/km^2). On the average, the population density is 177 persons/km^2 in the five provinces or in the survey area, and 680 persons/km^2 in the other provinces. Since most parts of the other provinces are categorized as wet and intermediate zones, the people are densely populated (see Table 3.6).

Table 3.6 Land Area and Population in the Survey Area

Province / District	Estimated Population in 2009						Land Area			Share in Sri Lanka
	Male ('000)	Female ('000)	Total ('000)	Share in Five Provinces	Share in Sri Lanka	Density (persons /km^2)	Whole Area (km^2)	Land Area (km^2)	Share in Five Provinces	
Northern	**577**	**610**	**1,187**	**16.5%**	**5.8%**	**143**	**8,884**	**8,290**	**20.4%**	**13.2%**
Jaffna	288	319	607	8.4%	3.0%	653	1,025	929	2.3%	1.5%
Kilinochchi	78	76	154	2.1%	0.8%	128	1,279	1,205	3.0%	1.9%
Mannar	54	49	103	1.4%	0.5%	55	1,996	1,880	4.6%	3.0%
Vavunia	83	86	169	2.3%	0.8%	91	1,967	1,861	4.6%	3.0%
Mullaitivu	74	80	154	2.1%	0.8%	64	2,617	2,415	5.9%	3.9%
Eastern	**570**	**601**	**1,171**	**16.2%**	**5.7%**	**171**	**7,269**	**6,832**	**16.8%**	**10.9%**
Battikaloa	259	278	537	7.4%	2.6%	206	2,854	2,610	6.4%	4.2%
Ampara	311	323	634	8.8%	3.1%	150	4,415	4,222	10.4%	6.7%
Trincomalee	183	185	368	5.1%	1.8%	146	2,727	2,529	6.2%	4.0%
North-Western	**1,151**	**1,169**	**2,320**	**32.2%**	**11.3%**	**309**	**7,888**	**7,506**	**18.4%**	**12.0%**
Kurunegala	768	782	1,550	21.5%	7.6%	335	4,816	4,624	11.4%	7.4%
Puttalam	383	387	770	10.7%	3.8%	267	3,072	2,882	7.1%	4.6%
North Central	**630**	**595**	**1,225**	**17.0%**	**6.0%**	**126**	**10,472**	**9,741**	**23.9%**	**15.5%**
Anuradhapura	418	402	820	11.4%	4.0%	123	7,179	6,664	16.4%	10.6%
Polonnaruwa	212	193	405	5.6%	2.0%	132	3,293	3,077	7.6%	4.9%
Uva	**656**	**653**	**1,309**	**18.2%**	**6.4%**	**157**	**8,500**	**8,335**	**20.5%**	**13.3%**
Badulla	434	440	874	12.1%	4.3%	309	2,861	2,827	6.9%	4.5%
Moneragala	222	213	435	6.0%	2.1%	79	5,639	5,508	13.5%	8.8%
Total of the Five Provinces	**3,584**	**3,628**	**7,212**	**100.0%**	**35.3%**	**177**	**43,013**	**40,704**	**100.0%**	**64.9%**
Other Provinces	**6,564**	**6,674**	**13,238**		**64.7%**	**680**	**19,870**	**19,472**		**31.1%**
Part of Colombo District	1,289	1,232	2,521		12.3%	3,729	699	676		1.1%
Sri Lanka Total	**10,148**	**10,302**	**20,450**		**100.0%**	**326**	**65,610**	**62,705**		**100.0%**

Source: Statistical Abstract 2010, Department of Census and Statistics

In the annexed Table A 3.2 presents the employment status in the survey area based on the results of the Sri Lanka Labor Force Survey 2004. Although the situation may have changed significantly after the conflict, the total labor force was estimated at about 3.0 million. Out of 3.0 million, 2.7 million or 92% were employed. The unemployment rate was comparatively higher in the districts of Northern and Eastern provinces, e.g., 11.5% in Ampara, 11.3% in Mullaitivu, and 11.1% in Vavunia. The employees engaged in agriculture was considerably high at nearly 70% in Badulla and Moneragala districts, and low at less than 30% in Vavunia and Kurunegala districts. In Vavunia, the service sector employed nearly 60% of the total labor force. In Kurunegala, the employment rates of both industry and service sectors were relatively higher at about 30% and 40%, respectively. Female employment was 0.8 million or about 31% of the total employment in the survey area. Out of 0.8 million, 49% were engaged in agriculture. Meanwhile, male employment was 42%.

3.3 Poverty and Socioeconomic Situation

3.3.1 Ethnic Balance

According to the Population Census 2001, 82% of the entire national population were Sinhalese people. Though the second majority were the Tamil people (Sri Lankan Tamil and Indian Tamil), they occupied only 8.4% of the population. However, the ethnic balance differs from region to region. Generally, the percentage share of the Tamil population is larger than Sinhalese in the northern and the eastern part of the island.

Table 3.7 shows the percentage share of population by ethnicity in Northern Province and Eastern Province. Tamil people were the majority in all the districts of Northern Province, and they shared around 95.7% of the whole population of the said province. Almost the entire population was composed of Tamils in Jaffna (99.9%) and Mullaitivu (100.0%), whereas a small share of Muslim can be observed in Manner (14.0%), Kilinochchi (6.5%), and Vavunia (5.2%), though the majority were Tamils as in Jaffna and Mullaitivu. There is only quite a small number of Sinhalese people living in the districts in Northern Province except Vavunia District where the share of Sinhalese was 7.8% of the population.

Table 3.7 Percentage Share of Population by Ethnicity by District in Northern Province and Eastern Province

Province / District	Sinhalese		Tamils		Muslim		Others		Total	
	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)
North*1	**16,240**	**1.6%**	**943,312**	**95.7%**	**26,304**	**2.7%**	**0**	**0.0%**	**985,856**	**100.0%**
Jaffna	26	0.0%	623,841	99.9%	777	0.1%	0	0.0%	624,644	100.0%
Kilinochchi	1	0.0%	22,099	93.5%	1,525	6.5%	0	0.0%	23,625	100.0%
Mannar	36	0.0%	80,781	86.0%	13,144	14.0%	0	0.0%	93,961	100.0%
Mullaitivu	0	0.0%	36,741	100.0%	0	0.0%	0	0.0%	36,741	100.0%
Vavuniya	16,177	7.8%	179,850	86.9%	10,858	5.2%	0	0.0%	206,885	100.0%
East*2	**334,906**	**21.8%**	**630,783**	**41.0%**	**568,936**	**37.0%**	**4,643**	**0.3%**	**1,539,268**	**100.0%**
Batticaloa	2,397	0.5%	381,984	74.0%	128,964	25.0%	2,512	0.5%	515,857	100.0%
Ampara	228,938	37.5%	112,006	18.3%	268,630	44.0%	1,145	0.2%	610,719	100.0%
Trincomalee	103,571	25.1%	136,793	33.1%	171,342	41.5%	986	0.2%	412,692	100.0%

*Note: *1 Estimated figures of 2009 *2 Estimated figures of 2007*
Source: Eastern Provincial Council Staristical Information - 2009, and Northern Provincial Council Staristical Information – 2010

In Eastern Province, the Tamils were the majority in Batticaloa (74.0%), followed by Muslim (25.0%), and then a small share of Sinhalese people. On the other hand, Muslims were the majority in Ampara and Trincomalee with percentage shares of 44.0% and 41.5%, respectively. The second major population in Ampara were the Sinhalese (37.5%) and then followed by the Tamils (18.3%), while the second major population in Trincomalee were composed of Tamil group (33.1%) and then followed by Sinhalese (25.1%). The ethnic share of the entire Eastern Province consists of Tamils (41.0%) as the majority, followed by Muslims (37.0%), and then Sinhalese (21.8%).

Since the present statistics are not available, Table 3.8 shows the figures from 2001 regarding North Western, North Central, and Uva Provinces. The categories of ethnicity are different from that of Table 3.7. Unlike in Eastern Province and Northern Province, the Sinhalese were the majority in these three provinces. The share of Sinhalese was 85.9% in North Western Province, 90.6% in North Central Province, and 79.9% in Uva Province. The share of Sinhalese was relatively small in Puttalam (73.7%) and Badulla (72.4%), though the share was more than 90% in other districts. Sri Lankan Moor were the second major population in North Western Province (10.5%) and North Central Province (8.1%), whereas the Tamils were the second major population in Uva Province though its share was only 15.8%

(Sri Lankan Tamil and Indian Tamil).

It was estimated that around three-fourths of the population of the entire country (74.5%) were Sinhalese, and 15.5% were Tamils (Sri Lankan Tamil and Indian Tamil). However it should be noted that the ethnic balance differs from community to community and the populated are clearly divided by ethnicity.

Table 3.8 Percentage Share of Population by Ethnicity by District in North Western, North Central, and Uva Provinces

Province / District	Sinhalese		Sri Lankan Tamil		Indian Tamil		Sri Lankan Moors		Others		Total	
	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)	Number (person)	Share (%)
North-Western	**1,864,353**	**85.9%**	**65,657**	**3.0%**	**5,199**	**0.2%**	**227,678**	**10.5%**	**7,005**	**0.3%**	**2,169,892**	**100.0%**
Kurunegala	1,341,237	91.9%	17,585	1.2%	2,972	0.2%	94,544	6.5%	3,877	0.3%	1,460,215	100.0%
Puttalam	523,116	73.7%	48,072	6.8%	2,227	0.3%	133,134	18.8%	3,128	0.4%	709,677	100.0%
North Central	**1,000,476**	**90.6%**	**12,107**	**1.1%**	**637**	**0.1%**	**89,064**	**8.1%**	**2,393**	**0.2%**	**1,104,677**	**100.0%**
Anuradhapura	676,073	90.7%	5,073	0.7%	443	0.1%	61,989	8.3%	2,115	0.3%	745,693	100.0%
Polonnarwa	324,403	90.4%	7,034	2.0%	194	0.1%	27,075	7.5%	278	0.1%	358,984	100.0%
Uva	**940,443**	**79.9%**	**35,296**	**3.0%**	**151,028**	**12.8%**	**46,598**	**4.0%**	**3,993**	**0.3%**	**1,177,358**	**100.0%**
Badulla	564,752	72.4%	29,542	3.8%	143,535	18.4%	38,798	5.0%	3,356	0.4%	779,983	100.0%
Moneragala	375,691	94.5%	5,754	1.4%	7,493	1.9%	7,800	2.0%	637	0.2%	397,375	100.0%
Sri Lanka Total	**14,011,734**	**74.5%**	**2,233,624**	**11.9%**	**859,052**	**4.6%**	**1,561,910**	**8.3%**	**130,937**	**0.7%**	**18,797,257**	**100.0%**

*Note: *As of 2001, **Figures for Eastern and Northern Provinces are not available*
****Others includes Burger, Malay, Srikankan Chetty, Bharath, and others.*
*****Figures for Sri Lanka Total are estimates.*
Source: Statistical Abstract 2010, Department of Census and Statistics

3.3.2 Poverty

Table 3.9 shows the poverty head count index (P0), percentage share of poor household, poverty gap index (P1 and P2) and Gini coefficient (household income, per capita income, and income receiver's income) by province and district. The figures of three districts in Northern Province, namely Kilinochchi, Mannar, and Mullaitivu, are missing.

Concerning the poverty head count index (P0), which presents the percentage share of the total population of people who live under the poverty line[1], the entire country's share is 8.9%. Compared with the entire country's share, only North Central Province shows a lower rate (5.7%), while the other four provinces show higher rates exceeding 10%. Eastern Province has the highest share (14.8%) among them. It may be possible to say that this is related to the fact that there is a large number of returnees in the area which are forced to live in hard conditions even though there is support from the government. Comparing the share at the district level, it can be found that Batticaloa District has the highest share at 20.3% followed by Jaffna District (16.1%), and Moneragala (14.5%). The other districts also show comparatively high rates exceeding 10% except for Anuradhapura (5.7%) and Polonnaruwa (5.8%) in North Central Province, and Vavunia (2.3%) in Northern Province. As a whole, it can be said that a comparatively large share of the people in the survey area, excluding North Central Province, are living under the poverty line.

[1] Official poverty line is announced by the Department of Census and Statistics. The official poverty line is set by the national level and also by the district. The official poverty line at the national level for July 2012 is Rs3,571.

Table 3.9 Poverty Index and Gini Coefficient by Province and District

Province / District	Head Count Index (P0) (%)	Poor households (%)	Poverty gap index (P1) (%)	Squared poverty gap index (P2) (%)	Gini coefficient		
					Household income	Per capita income	Income receivers income
North	**12.8%**	**10.0%**	**2.1%**	**0.6%**	**-**	**0.41**	**0.47**
Jaffna	16.1%	12.4%	2.6%	0.8%	0.37	0.35	0.43
Kilinochchi	-	-	-	-	-	-	-
Mannar	-	-	-	-	-	-	-
Vavuniya	2.3%	2.0%	0.3%	0.1%	0.45	0.43	0.50
Mullaitivu	-	-	-	-	-	-	-
East	**14.8%**	**12.4%**	**3.2%**	**1.1%**	**0.42**	**0.41**	**0.47**
Batticaloa	20.3%	17.0%	5.1%	1.9%	0.44	0.41	0.47
Ampara	11.8%	10.0%	2.3%	0.7%	0.42	0.42	0.36
Trincomalee	11.7%	9.0%	1.8%	0.5%	0.39	0.38	0.40
North-Western	**11.3%**	**8.2%**	**2.4%**	**0.8%**	**0.54**	**0.54**	**0.58**
Kurunegala	11.7%	8.6%	2.6%	0.9%	0.56	0.56	0.60
Puttalama	10.5%	7.5%	2.0%	0.6%	0.49	0.49	0.50
North Central	**5.7%**	**4.6%**	**1.0%**	**0.3%**	**0.44**	**0.44**	**0.51**
Anuradhapura	5.7%	4.6%	1.0%	0.3%	0.45	0.45	0.52
Polonnaruwa	5.8%	4.5%	1.0%	0.3%	0.42	0.42	0.49
Uva	**13.7%**	**12.0%**	**2.4%**	**0.7%**	**0.47**	**0.46**	**0.53**
Badulla	13.3%	10.9%	2.2%	0.6%	0.49	0.49	0.56
Moneragala	14.5%	13.9%	2.8%	0.8%	0.39	0.37	0.45
Sri Lanka Total	**8.9%**	**7.0%**	**1.7%**	**0.5%**	**0.49**	**0.49**	**0.55**

*Note: *Data of Kilinochchi, Mannar, and Mullaitivu Districts in Northern Province are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

A similar situation can be observed with the share of poor households. Only North Central Province (4.6%) shows a lower rate than the national share (7.0%), while the other provinces show relatively higher shares. More than 10% share is reported in Eastern, Uva and Northern Provinces. At the district level, Batticaloa (17.0%), Jaffna (12.4%), and Moneragala (13.9%) show relatively higher rates as that of their head count indexes (P0). Particularly, the share of Eastern Province (12.4%) and Uva Province (12.0%) are the most among the five provinces.

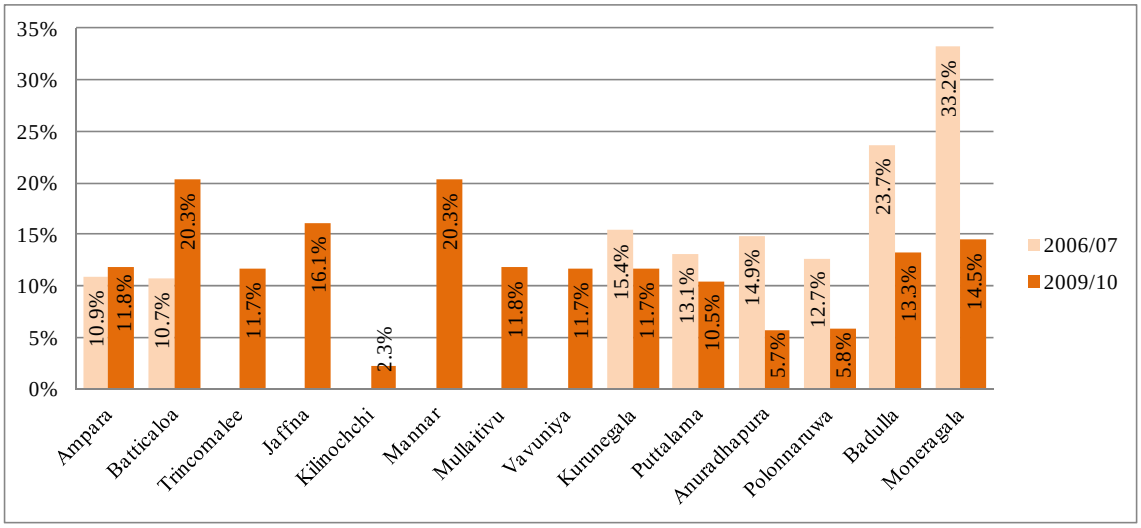
Poverty gap index (P1) provides us information on the depth of poverty. That is, the larger the value of P1, the farther the person is below the poverty line. At the province level, all provinces except North Central Province show a higher share than the entire country's share (1.7%). As observed at the district level, Batticaloa notably has the highest value at 5.1%, followed by Moneragala (2.8%), Jaffna (2.6%), and Kurunegala (2.6%). It is assumed that the high value of P1 of Batticaloa is due to the hostile internal conflict and destruction of social infrastructure in the area.

Severity of poverty is represented by the squared poverty gap index (P2). Only Batticaloa (1.9%) shows a figure of more than 1.0%. The other districts show figures less than 1.0%, but they are still larger than the country's rate (0.5%), except for two districts in North Central Province, i.e., Anuradhapura (0.3%) and Polonnaruwa (0.3%), and Vavunia (0.1%) in Northern Province. Same as poverty gap index (P1), the most severe situation of the five provinces is reported in Eastern Province where a large number of returning people are on their way for restoration, though it should be considered that some districts of Northern Province have no available data on poverty.

The depth of inequality on income distribution among the population is measured by the Gini coefficient – inequality becomes more severe as the coefficient comes closer to one. Table 3.9 provides also the

three kinds of Gini coefficient, namely, household income, per capita income, and income receiver's income.

It should be noted that three districts in Eastern Province have relatively lower figures for all three kinds of Gini coefficient. It is assumed that even though poverty situation is severe in Eastern Province, the gap between the rich and the poor is not that large in the said province as compared with other provinces or the entire country. On the other hand, inequality is relatively severe in North Western Province but the poverty situation is relatively better than the other provinces.



*Note: *2006/07 Data of Trincomalee, Jaffna, Kilinochchi, Mannar, Mullaitivu, and Vavunia District are not available.*
Source: Poverty Indicators, Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

Figure 3.1 Poverty Head Count Index by District (2006/07 and 2009/10)

As a whole it may be able to say that the people in the survey target provinces except North Central Province is relatively in poor conditions according to the number, depth, and severity of the poor.

Figure 3.1 shows the poverty head count index of each district in 2006/07 and 2009/10. The 2009/10 data of the districts in Northern Province and Trincomalee District in Eastern Province are missing. Notable improvements are shown in Anuradhapura and Polonnaruwa districts of North Central Province, and in Badulla and Moneragala districts of Uva Province – the ratio of 2009/10 is less than the half of 2006/07. Kurunegala and Puttalam of North Western Province also showed improvement. On the other hand, the poverty head count ratios of two districts of Eastern Province, Ampara and Batticaloa, in 2009/10 are rather worse than in 2006/07. The ratio of Batticaloa in 2009/10 is almost double the ratio in 2006/07. This must be the influence of aggravated tension in these areas during that period. Above analysis dose not include the Northern province since data is not available.

3.3.3 Income

Table 3.10 shows the per capita income, income of income receivers (monthly mean and median), number of income receivers, and household size by province and by district. However, the data of Kilinochchi, Mannar, and Mullaitivu of Northern Province are missing. The mean and median per capita income of Sri Lanka are Rs9104 and Rs5803, respectively. Observing the median per capita income at the province level, Eastern Province shows Rs4202, which is only about 70% of the entire country's amount. Uva Province (Rs4961) and North Western Province (Rs5295) also show lower amounts. Observing at the district level, Jaffna District (Rs3,426), three districts of Eastern Province –Batticaloa

(Rs4167), Ampara (Rs4120), and Trincomalee (Rs4528) –, and Moneragala District (Rs4391) in Uva Province show relatively smaller amounts. On the other hand, Anuradhapura District and Polonnaruwa District of North Central Province show larger amounts than the entire country's amount. Concerning the median income of income receivers, relatively smaller amounts are reported in Northern Province and Eastern Province. In general, monthly earnings from the agriculture sector are smaller than earnings from the industry or service sectors. However, the share of the population engaged in the agriculture sector in these areas is not necessarily large as compared with other areas. Therefore, one possible reason for the lower income receiver's income in Northern Province and Eastern Province may be due to the productivity of farmers. The figures of North Western and North Central provinces are slightly larger than the figure of the entire country.

Table 3.10 Per Capita/Income Receiver's Income (Monthly Average), Number of Income Receivers, and Household Size by Province and District

Province / District	Per Capita income		Income of income receivers		No. of income receivers	Household size
	Mean (Rs.)	Median (Rs.)	Mean (Rs.)	Median (Rs.)	(person)	(person)
North	**5,515**	**3,857**	**11,500**	**14,936**	**1.6**	**4.3**
Jaffna	4,434	3,426	10,500	12,539	1.5	4.3
Kilinochchi	-	-	-	-	-	-
Mannar	-	-	-	-	-	-
Vavuniya	8,988	6,248	15,950	21,475	1.8	4.4
Mullaitivu	-	-	-	-	-	-
East	**5,663**	**4,202**	**12,390**	**15,739**	**1.5**	**4.2**
Batticaloa	5,642	4,167	11,527	14,723	1.6	4.1
Ampara	5,722	4,120	12,307	16,515	1.5	4.3
Trincomalee	5,590	4,528	14,086	16,102	1.5	4.4
North-Western	**9,352**	**5,295**	**12,000**	**21,566**	**1.6**	**3.8**
Kurunegala	9,866	5,372	11,892	22,187	1.6	3.7
Puttalama	8,375	5,008	12,001	20,318	1.6	3.9
North Central	**9,280**	**6,340**	**14,837**	**21,803**	**1.6**	**3.8**
Anuradhapura	9,836	6,449	15,000	23,144	1.6	3.8
Polonnaruwa	8,170	5,824	13,864	19,133	1.7	3.9
Uva	**7,343**	**4,961**	**10,900**	**17,112**	**1.7**	**3.9**
Badulla	8,313	5,354	10,900	18,671	1.7	3.9
Moneragala	5,605	4,391	10,783	14,048	1.6	4.0
Sri Lanka Total	**9,104**	**5,803**	**12,500**	**20,427**	**1.8**	**4.0**

*Note: *Data of Kilinochchi, Mannar, and Mullaitivu Districts are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

Though the average number of income receivers is 1.8 persons as observed at the national level, the number is smaller in all the five provinces – 1.5 persons in Eastern Province, 1.6 persons in Northern, North Western, and North Central Provinces, and 1.7 persons in Uva Province. This may be related to the opportunity of finding a job. There may be less job opportunities in conflict affected areas such as Eastern Province. On the contrary, the average household sizes are relatively larger than the entire country's average (4.0 persons) in the districts of Northern Province (4.3 persons) and Eastern Province (4.2 persons), while the household sizes are less than the entire country's average in North Western Province (3.8 persons), North Central Province (3.8 persons), and Uva Province (3.9 persons).

Table 3.11 Percentage Share of Income by Province and District

Province / District	Richest 20% (%)	Poorest 20% (%)	Middle 60% (%)	Poorest 40% (%)
North	**49.2%**	**4.9%**	**45.8%**	**15.4%**
Jaffna	44.1%	6.2%	49.7%	18.3%
Kilinochchi	-	-	-	-
Mannar	-	-	-	-
Vavuniya	49.4%	4.2%	46.5%	14.0%
Mullaitivu	-	-	-	-
East	**47.5%**	**4.8%**	**47.7%**	**15.2%**
Batticaloa	48.6%	4.7%	46.7%	14.8%
Ampara	47.2%	4.8%	47.9%	15.0%
Trincomalee	44.5%	5.3%	50.1%	16.5%
North-Western	**58.7%**	**4.0%**	**37.3%**	**11.9%**
Kurunegala	60.6%	3.7%	35.8%	11.1%
Puttalama	54.5%	4.6%	40.8%	13.6%
North Central	**50.2%**	**5.5%**	**44.3%**	**13.6%**
Anuradhapura	51.4%	5.6%	43.0%	15.4%
Polonnaruwa	47.7%	5.4%	47.0%	15.7%
Uva	**51.9%**	**4.7%**	**43.3%**	**13.8%**
Badulla	54.5%	4.5%	41.0%	13.0%
Moneragala	44.6%	5.8%	49.6%	16.4%
Sri Lanka Total	**54.1%**	**4.5%**	**41.4%**	**13.3%**

*Note: *Data of Kilinochchi, Mannar, and Mullaitivu Districts are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

It is also useful to observe how the income is distributed among the people by income group in order to recognize the existence of inequality in the area. Table 3.11 shows the percentage share of income by income group. There are four income groups, namely, richest 20%, poorest 20%, middle 60%, and poorest 40%. Compared with the percentage share of Sri Lanka, it may be able to say that the situation of income inequality among the people is relatively better in Eastern Province, Northern Province, North Central Province, and Uva Province. However, it should be noted that only 20% of the richest people dominate about 50% of the income, and the share of 20% of the poorest is only around 5%. Two districts of North Western Province (Kurunegala and Puttalam) and Badulla District of Uva Province show relatively higher percentages of the share of the richest 20%. Smaller percentages of the poorest 20% and the poorest 40% are reported in Kurunegala District. It may be able to say that the inequality among the people is relatively worse in North Western Province.

3.3.4 Expenditure

Table 3.12 shows the average monthly household expenditures on food and drink, and on non-food items by province and by district. Compared with the entire country's figure (Rs31,331), the figures are smaller for all five provinces. Uva Province has the smallest amount (Rs23,547), while North Central Province has the highest amount (Rs29,480). The other three provinces, Eastern, North Western, and North Central, have amounts at around Rs25,000. Expenditure on food and drink is larger in Northern Province (Rs15,102) and Eastern Province (Rs14,512), while the entire country's average is Rs13,267. Thus the food ratio – the share of the expenditure on food items in the total expenditure, which is called also as "Engel's Coefficient", becomes relatively larger in these provinces – 59.0% in Northern Province and 57.0% in Eastern Province. The ratio of North Western Province (47.0%) and Uva Province (46.0%) is also larger than the entire country's food ratio (42.0%), though

the ratio of North Central (41.0%) is slightly less than the national ratio. In any case, the fact that the food rate is more than 40% may indicate that people have barely extra money to spend for other purposes except for food. On the other hand, in North Western, Uva, and North Central Provinces, the actual expenditures on food and drink are less than the entire country's average (Rp13,267). As for the reason why the share of expenditure on food items in the total expenditure is relatively larger in Northern Province and Eastern Province, it may need to take into consideration that the average household size is relatively larger in these provinces (refer to Table 3.10).

Table 3.12 Average Monthly Household Expenditures on Food and Drink and on Non-Food Items by Province and District (2009-2010)

Provinc District	Total expenditure (Rs.)	Expenditure on food & drink (Rs.)	Food ratio (%)	Expenditure on non food items (Rs.)	Non-food ratio (%)	Gini coefficient	
						Mean household expenditure	Per capita expenditure
North	**25,656**	**15,102**	**59.0%**	**10,553**	**41.1%**	-	-
Jaffna	22,725	14,787	65.0%	7,938	34.9%	0.26	0.24
Kilinochchi	-	-	-	-	-	-	-
Mannar	-	-	-	-	-	-	-
Vavuniya	35,391	16,149	46.0%	19,242	54.4%	0.35	0.29
Mullaitivu	-	-	-	-	-	-	-
East	**25,265**	**14,512**	**57.0%**	**10,753**	**42.6%**	**0.24**	**0.20**
Batticaloa	23,508	13,799	59.0%	9,709	41.3%	0.28	0.20
Ampara	26,699	14,956	56.0%	11,743	44.0%	0.21	0.22
Trincomalee	25,623	14,906	58.0%	10,717	41.8%	-	-
North-Western	**25,927**	**12,183**	**47.0%**	**13,744**	**53.0%**	**0.37**	**0.37**
Kurunegala	25,201	11,618	46.0%	13,582	53.9%	0.38	0.36
Puttalama	27,376	13,310	49.0%	14,066	51.4%	0.33	0.36
North Central	**29,480**	**12,073**	**41.0%**	**17,407**	**59.0%**	**0.40**	**0.39**
Anuradhapura	29,065	11,795	41.0%	17,271	59.4%	0.42	0.42
Polonnaruwa	30,315	12,635	42.0%	17,680	58.3%	0.34	0.32
Uva	**23,547**	**11,877**	**46.0%**	**13,706**	**53.6%**	**0.34**	**0.31**
Badulla	24,873	10,865	44.0%	14,008	56.3%	0.38	0.35
Moneragala	21,131	11,331	54.0%	9,800	46.4%	0.26	0.23
Sri Lanka Total	**31,331**	**13,267**	**42.0%**	**18,064**	**57.7%**	**0.39**	**0.38**

*Note: * Data of Kilinochchi, Mannar, and Mullaitivu districts are not available. Gini coefficient data for Batticaloa and Trincomalee are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

Contrary to food items, the expenditure on non-food items and its ratio in Northern Province (Rs10,553, 41.1%) and Eastern Province (Rs10,753, 42.6%) are relatively smaller than the others. It seems that this is due to the burden of the expenses on food items. The national average of expenditure on non-food items is Rs18,064 and the ratio is 57.7%. The Gini coefficients of mean household expenditure and per capita expenditure in Eastern Province are relatively small. According to the Gini coefficients for income shown in Table 3.9, it may be able to say that even though the total amount of expenditure is small, there is less inequality among the population in Eastern Province.

3.3.5 Education

Table 3.13 shows the percentage distribution of population by level of education by province and by district. The percentage share of people with no schooling is 7.9% in Uva Province, which is almost double of the share of the national average of 4.2%. Notable characteristics concerning the tendency of the situation of each district cannot be observed, except that it seems that the percentage share of the

people who passed Grade 6-10 is relatively smaller in Eastern Province – only 35.1% reached up to Grade 5. The share of the people who completed higher education such as "Passed General Certificate of Education (GCE) Ordinal Level (O/L)" or "Passed GCE Advanced Level (A/L)" are generally smaller in all five provinces as compared with the national average.

Table 3.13 Percentage Distribution of Population by Level of Education by Province and District (2009-2010)

Province / District	Educational attainment					
	No Schooling (%)	Up to Grade 5 (%)	Passed Grade 6 - 10 (%)	Passed G.C.E.(O/L) (%)	Passed G.C.E.(A/L) (%)	Special Education (%)
North	**1.4%**	**28.9%**	**52.0%**	**10.5%**	**7.0%**	**0.2%**
Jaffna	0.9%	28.7%	52.9%	10.1%	7.2%	0.2%
Kilinochchi	-	-	-	-	-	-
Mannar	-	-	-	-	-	-
Mullaitivu	-	-	-	-	-	-
Vavuniya	2.9%	29.4%	49.2%	11.7%	6.5%	0.2%
East	**4.3%**	**35.1%**	**41.2%**	**11.9%**	**7.4%**	**0.1%**
Batticaloa	4.7%	39.0%	37.9%	10.5%	7.7%	0.1%
Ampara	5.3%	32.3%	41.9%	11.7%	8.8%	0.1%
Trincomalee	1.8%	34.0%	45.2%	14.4%	4.3%	0.1%
North-Western	**4.1%**	**26.8%**	**46.3%**	**13.3%**	**9.4%**	**0.0%**
Kurunegala	3.4%	24.6%	45.2%	16.3%	10.5%	0.1%
Puttalama	5.3%	31.2%	48.6%	7.7%	7.2%	0.0%
North Central	**2.9%**	**25.4%**	**51.4%**	**12.5%**	**7.5%**	**0.1%**
Anuradhapura	2.6%	24.7%	52.4%	13.9%	6.3%	0.0%
Polonnaruwa	3.6%	26.9%	49.3%	9.7%	10.0%	0.1%
Uva	**7.9%**	**28.3%**	**44.7%**	**12.0%**	**7.0%**	**0.1%**
Badulla	9.1%	28.4%	42.4%	12.8%	7.3%	0.0%
Moneragala	5.8%	28.2%	48.9%	10.5%	6.6%	0.1%
Sri Lanka Total	**4.2%**	**25.1%**	**44.6%**	**14.7%**	**11.2%**	**0.1%**

*Note: * Data of Kilinochchi, Mannar, and Mullaitivu Districts are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

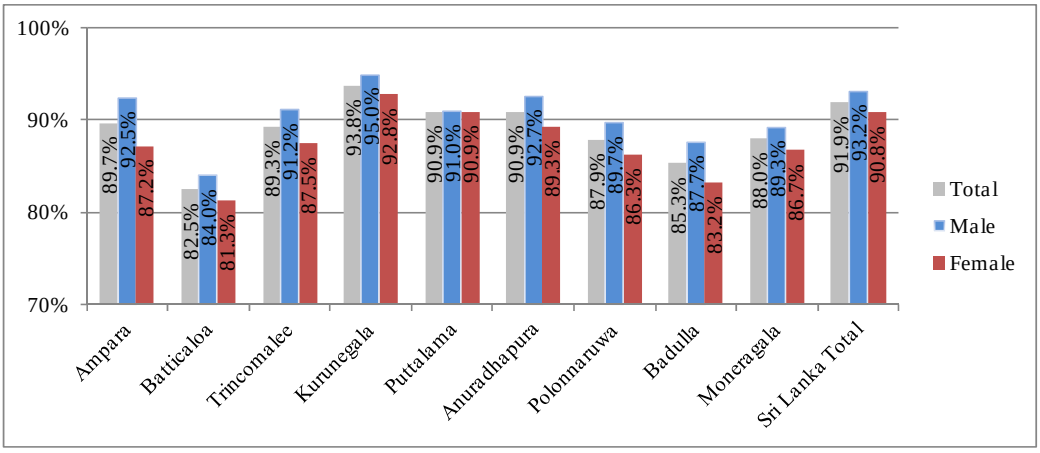
Table 3.14 shows the percentage distribution of population by school attendance, by people aged 5 to 20 and people aged 5 to 14. As it can be seen, in all the districts, nearly 100% of the population aged 5 to 14 are currently attending school. Regarding the case of people aged 5 to 20, more than 80% of the population are currently attending school in all districts (with data) except Puttalam.

Table 3.14 Percentage Distribution of Population by School Attendance

Province / District	School attendance aged 5 - 20 years			School attendance aged 5 - 14 years		
	Currently attending school (%)	Never attended school (%)	Attended school in the past (%)	Currently attending school (%)	Never attended school (%)	Attended school in the past (%)
North	**85.3%**	**2.5%**	**12.2%**	**97.5%**	**1.3%**	**1.2%**
Jaffna	85.2%	2.8%	12.0%	96.7%	1.7%	1.6%
Kilinochchi	-	-	-	-	-	-
Mannar	-	-	-	-	-	-
Mullaitivu	-	-	-	-	-	-
Vavuniya	85.5%	1.5%	13.0%	100.0%	0.0%	0.0%
East	**86.0%**	**2.5%**	**11.3%**	**98.1%**	**0.9%**	**1.0%**
Batticaloa	82.3%	1.4%	16.3%	97.5%	0.4%	2.1%
Ampara	88.7%	3.9%	7.3%	98.3%	1.1%	0.5%
Trincomalee	87.3%	1.6%	10.4%	98.8%	1.1%	0.1%
North-Western	**81.5%**	**4.0%**	**14.5%**	**98.0%**	**0.9%**	**1.1%**
Kurunegala	85.5%	3.4%	11.1%	99.2%	0.6%	0.2%
Puttalama	75.3%	5.0%	19.7%	96.2%	1.4%	2.5%
North Central	**83.7%**	**3.5%**	**12.7%**	**98.0%**	**1.3%**	**0.6%**
Anuradhapura	85.5%	2.9%	11.4%	97.5%	1.8%	0.5%
Polonnaruwa	80.1%	4.7%	15.2%	98.9%	0.4%	0.7%
Uva	**82.7%**	**3.2%**	**14.1%**	**98.0%**	**1.2%**	**0.8%**
Badulla	82.0%	3.2%	14.8%	98.1%	0.8%	1.0%
Moneragala	84.0%	3.2%	12.7%	97.7%	1.8%	0.3%
Sri Lanka Total	**83.9%**	**3.5%**	**12.5%**	**98.2%**	**1.0%**	**0.8%**

*Note: * Data of Kilinochchi, Mannar, and Mullaitivu Districts are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics

Figure 3.2 shows the literacy of the total population, also by male and female populations, by district. The data of Northern Province is missing. The entire country's average is 91.9%, male is 93.2%, and female is 90.8%. Kurunegala has the highest rate at 93.8% (total for both sexes), while Batticaloa has the lowest rate at 82.5% (total for both sexes). Observing the literacy by sex, the male's rate is higher than the female's in all the districts. Batticaloa has the lowest literacy rate for both sexes, with 84.0% for male and 81.3% for female. The existence of the illiterate population should be carefully taken into account should the project consider collaborating with the rural people, especially females, in implementing the project activities.

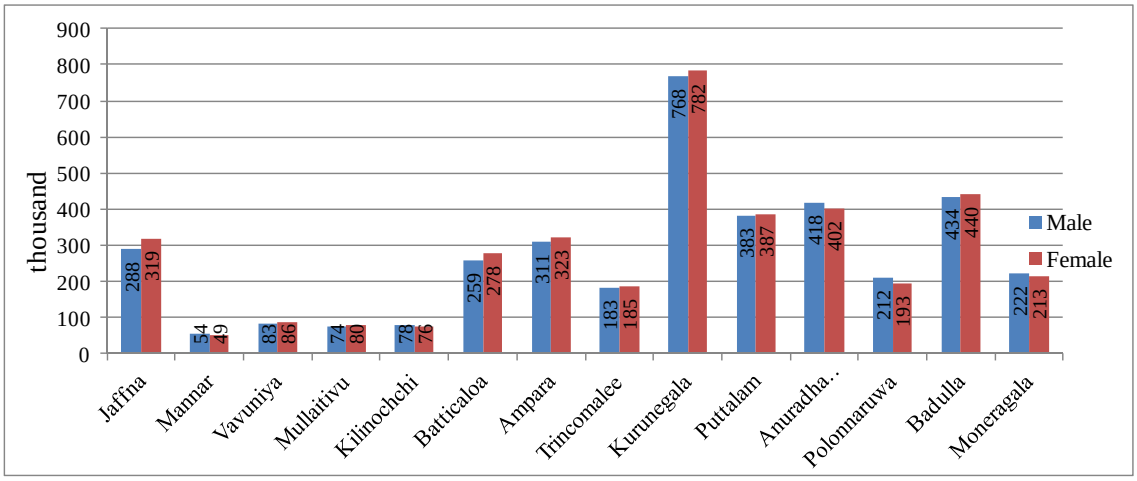


*Note: *Data of Northern Province is not available.*
Source: Labor Force Survey, Annual Report - 2010, Department of Census and Statistics

Figure 3.2 Literacy Rate by District

3.3.6 Gender

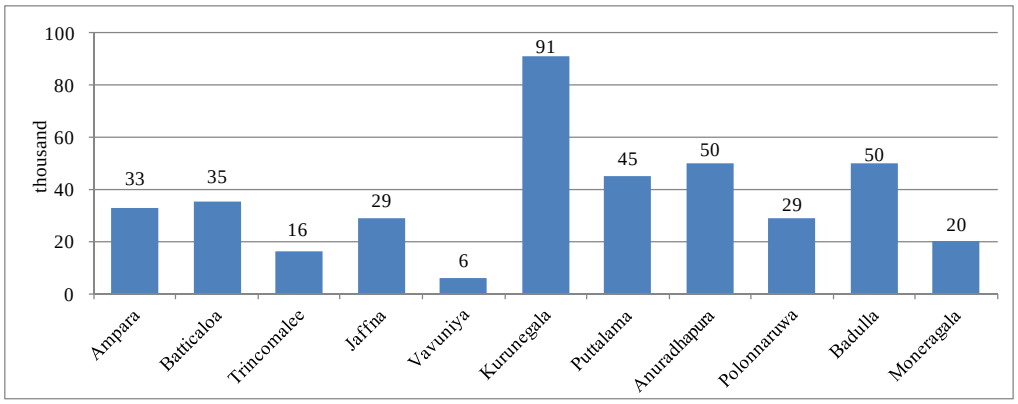
It was estimated that the population of Sri Lanka in 2009 was 20,450,000. Out of the total population, there were 10,148,000 (49.6%) males, and 10,302,000 (50.4%) females. The estimated total female population in the survey area was around 3,813,000, which accounted for 37.0% of the total female population of the country. Figure 3.3 shows the estimated population of male and female by district. It can be seen that there is no big difference between the male and female populations in each district.



Source: Department of Census and Statistics

Figure 3.3 Estimated Population by Sex by District (2009)

In Sri Lanka, 23.2% of households are headed by female. It is generally considered that female headed households are relatively economically and socially vulnerable than male headed households because of the limitation of the means of earning and social participation. Therefore, it may be useful to examine the situation of female headed households to recognize the gender related issues. Figure 3.4 shows the number of female headed households by district, however such information are missing for Mannar, Mullaitivu, and Kilinochchi districts. It seems that the number of female headed households is in proportion to the number of females in each district, and there is no particular tendency for a certain district. Among the districts in the survey area, Kurunegala has the largest number with 91,000 female headed households.



Source: Department of Census and Statistics

Figure 3.4 Number of Female Headed Household by District (2009)

According to *Poverty in Sri Lanka*[2] which was based on Household Income and Expenditure Survey 2006/07, the poverty situation in female headed households was not significantly different from male headed households at the national level. The poverty head count index of female headed households was higher than male headed households in the urban sector. Especially, the index of the rural sector showed no big difference[3] contrary to the general assumption. Even though, it should be noted that special attention should be given to female headed households in the planning and implementation of the project component.

Table 3.15 shows the percentage share, marital status, and age group of female headed households. Regarding the percentage share of female headed households, it can be observed that almost one-fourth (23.2%) of the households in Sri Lanka are headed by females. Among the female headed households, around 60% of females are widows or separated, 20-40% are married, and the remaining have never been married. The percentage share of widows or separated is relatively higher in Northern Province, 78.4% in Jaffna, and 69.4% in Vavunia. The past internal conflict in this area may have caused the loss of their husbands. The female headed households are divided into three age groups, "less than 25", "25 to 39", and "40 and above". The age group of 40 years old and above occupies around 65% to 80%. Its percentage share differs by district. The share is relatively high in Kurunegala (84.5%), while a lower share is reported of Eastern Province (provincial average is 66.7%). The percentage share of the younger generations is relatively larger in Eastern Province.

Table 3.15 Percentage Share, Marital Status and Age Group of Female Headed Households by District (2009-2010)

Province / District	Percentage share of female headed household (%)	Marital status of female headed household			Age group (years) of female headed household		
		Never married (%)	Married (%)	Widowed/Separated (%)	Less than 25 (%)	25 - 39 (%)	40 and above (%)
North	**20.9%**	**1.9%**	**21.4%**	**76.7%**	**0.8%**	**19.2%**	**80.1%**
Jaffna	22.3%	0.5%	21.1%	78.4%	0.0%	20.0%	80.0%
Kilinochchi	-	-	-	-	-	-	-
Mannar	-	-	-	-	-	-	-
Vavuniya	16.4%	7.9%	22.8%	69.3%	4.2%	15.7%	80.1%
Mullaitivu	-	-	-	-	-	-	-
East	**23.7%**	**1.4%**	**35.5%**	**63.2%**	**2.9%**	**30.4%**	**66.7%**
Batticaloa	26.1%	1.9%	36.3%	61.8%	4.2%	25.9%	70.0%
Ampara	23.1%	0.0%	39.6%	60.4%	1.8%	35.8%	62.3%
Trincomalee	20.8%	3.0%	25.4%	71.6%	2.3%	29.1%	68.6%
North-Western	**21.3%**	**5.2%**	**28.8%**	**66.0%**	**2.0%**	**16.7%**	**81.3%**
Kurunegala	21.4%	4.3%	29.3%	66.4%	1.6%	13.9%	84.5%
Puttalama	21.2%	7.0%	27.8%	65.3%	2.8%	22.4%	74.8%
North Central	**24.3%**	**3.0%**	**41.5%**	**55.5%**	**2.0%**	**27.3%**	**70.8%**
Anuradhapura	23.0%	3.0%	46.7%	50.3%	2.3%	32.0%	65.7%
Polonnaruwa	27.0%	3.1%	32.6%	64.3%	1.4%	19.2%	79.4%
Uva	**20.6%**	**0.8%**	**39.8%**	**59.3%**	**2.4%**	**26.8%**	**70.8%**
Badulla	22.9%	1.2%	39.5%	59.3%	2.3%	26.9%	70.8%
Moneragala	16.5%	0.0%	40.5%	59.5%	2.7%	26.5%	70.7%
Sri Lanka Total	**23.2%**	**3.4%**	**32.3%**	**64.3%**	**1.4%**	**17.8%**	**80.8%**

*Note: *Data of Kilinochchi, Mannar, and Mullaitivu Districts are not available.*
Source: Household Income and Expenditure Survey 2009/10, Department of Census and Statistics (partially modified)

[2] Issued by the Department of Census and Statistics and the Ministry of Finance and Planning in 2009
[3] 15.8 % (male headed households), whereas 15.2% (female headed households)

3.3.7 Internally Displaced Persons (IDPs) or Returnees

Table 3.16 shows the number of IDPs in Northern and Eastern provinces as of April 2012. There are 9272 IDP families and 30,085 individuals in Northern Province. More than three-fourths of the IDPs are in Vavunia District of Northern Province, and around 20% are in Mullaitivu District. In Eastern Province, there are 2459 IDP families and 7914 individuals. Most of them are in Ampara and Trincomalee districts, and some in Batticaloa District.

According to the UNHCR Trincomalee Office, though ongoing efforts to send back the IDPs to their original place are being carried out by the government with the help of several international NGOs, there are still some IDP camps in Northern and Eastern provinces.

Table 3.16 Number of IDPs in Northern and Eastern Provinces by District as of April 2012

Province District	Families	Individuals	Location of IDPs Transit Sites
North	**9,272**	**30,085**	
Jaffna	1,711	6,421	-Pulavar, Addaki, Kaddudai, Kolankamam, Kaddudai, GTMS Copanypulam, Kathiveduvan (Sandilipai DS Division) -Samuthira, Kampanai, Kappanda, Thoppu, Odakkarai, Neethavan (Chankanai DS Division) -Neethavan, Alady, Elanththayady, Madakachchi, Sinthu, Inuvil Station, InuvilMill, Sabavathypallai, Kannaki, Chunnakam Statoin, Periyamathavaddy, Thalier, Pilaiyar, Ikkiranai (Uduvil DS Division) -Coir Industry, Neethanan Illam, Konatpulam, Urani, Alaveddy East, Pillayar Kovilady, Kuruvalai, Barathy, Sivanatha (Tellippalai DS Division) -Krishnan Kovil, Illupaiyaddy, Hind College, Selvapyram, Yokapuram (Kopay DS Division) -Annai Kuddy Camp, Theniyamman, Nilavan, Palavi, Sinnavalai, Sakkoddai, Senthankulam, Kankesanthurai, St.Lourds (Point Pedro DS Division)
Kilinochchi	38	75	Kanagapuram and Unionkulam (Karachchi DS Division)
Mannar	0	0	N/A
Mullaitivu	206	667	Kombavil (Chettikilam DS Division)
Vavuniya	7,317	22,922	-5,192 families: Host families in Cheddikulam DS Divisions -325 families: IDP welfare centers at Poonthottam and Sithamparapuram (Vavuniya DS Division)
East	**2,459**	**7,914**	
Batticaloa	29	96	Aliyarodai (Kiran DS Division)
Ampara	1,040	3,380	Kanchikudichcharu (Thirukkovil DS Division)
Trincomalee	1,390	4,438	Kilivetty, Paddithdal, Manalchenai (Muthur DS Division)

Source: UNHCR Trincomalee Office, Jaffna Dsitrict Secretary Office, Mannar District Secretary Office

Table 3.17 shows the number of resettled families and persons in Northern and Eastern provinces as of January 31, 2012. Around 146,000 families and 482,000 individuals have resettled in Northern Province, while 72,000 families and 255,000 individuals have resettled in Eastern Province. Having 985,000[4] total number of population in Northern Province about half of it were resettled individuals.

[4] Estimated figure of 2009, sourced from the Northern Provincial Council, Statistical Information 2010

Table 3.17 Number of Resettled Families and Persons in Northern and Eastern Provinces by District as of January 31, 2012

Province / District	Families	Individuals
North	**145,830**	**482,326**
Jaffna	37,625	117,439
Kilinochchi	38,447	122,855
Mannar	24,211	93,775
Mullaitivu	33,865	108,039
Vavuniya	11,682	40,218
East	**72,023**	**255,401**
Batticaloa	37,185	126,600
Ampara	337	1,175
Trincomalee	34,501	127,626

Source: Ministry of Resettlement

In the planning and implementation of the project components, special attention should be given to these resettled individuals so that they would be able to receive benefits from the project.

3.3.8 Farming System in Rural Society (Land Use System and Labor Use Pattern)

In formulating the project approach and its activities, it is required to properly recognize the inherent custom of the farming system in rural society. It can be said that the farming system in a rural society in Sri Lanka is characterized by complex land use systems and labor use patterns.

(1) Land Use System

There are several types of land use systems applied in Sri Lanka. Firstly, land ownership is classified into two, that is, joint ownership and single ownership. Though single ownership is more popular in Sri Lanka, diversified and complex joint ownership of land still exists. Joint ownership of land is called "*Havul*". under joint ownership, no single person has sole ownership of the land property, but instead shared by some individual farmers. Thus any decision concerning the jointly owned land needs to be agreed by all the owners, and no one can make any decision without mutual agreement of the owners. Table 3.18 below summarizes the characteristics of the various types of the joint ownership system.

Table 3.18 Types of Joint Ownership of Land

	Type of Joint Ownership	Description
(a)	Tenancy Rotation (*Thattumaru* System)	Under the *thattumaru* system, one small holding belongs to a number of farmers, and the land is rotated among them in different years. For example, a paddy field is owned by three farmers, A, B, and C. Farmer A may take the opportunity to cultivate the paddy field and harvest it alone in the first year. Farmer B does the same to the land in the second year, and is then rotated to farmer C in the following year. All the conditions on rotating the land among themselves have been mutually agreed upon.
(b)	Benefit Rotation (*Kattumaru* System)	Under the *kattumaru* system, various individuals share ownership of multiple plots of land at different locations under different facilities. Such plots of lands are rotated among the holders at agreed periods to balance the benefits from the lands. For example, farmers A, B, and C own lands X, Y, and Z, and the supposed utilization of these lands have been agreed to by yearly rotation basis. This means that one farmer would operate a particular land (X, Y or Z) each year. In three years, each farmer would have operated all three lands.
(c)	Situational Cropping (*Bethma* System)	This type of sharecropping prevails where tank water is used for cultivation. When shortage of water supply is expected, farmers gather and hold a meeting, and make a mutual agreement regarding such. Firstly they consider the presently available water in the irrigation source, and discuss how many or what paddy fields can be cultivated. Then the farmers cultivate only the selected paddy fields, in which the harvest is shared by all.

	Type of Joint Ownership	Description
(d)	Land Leasing System (*Badu*)	*Badu* is the Sri Lankan term for leasing. Under the *badu* system, a farmer can lease land and use it for a defined period according to an initial agreement. For the usage of land, the lessor (farmer) has to pay the lease amount, monthly or annually. Whether the farmer gets any profit or loss is not considered.
(e)	Land Mortgage System (*Ukas*)	*Ukas* is the Sri Lankan term for mortgage. Under this system, the person to whom property is mortgaged to can enjoy the benefits of the land until the mortgagor releases his land. If the mortgagor fails to release the land with the agreed person, title is transferred to the mortgage.

Source: "Land and Labor Use Pattern of Paddy Farming Practices in Sri Lanla Peasant Farm Sector" (Lal Thilakarathne et.al, Gifu University, Res. Bull. Fac. Age.Gifu Univ. (62) :33-43. 1997)

In the case of single ownership, there is an agreement of "sharecropping" between land owner and tenant. The land owner may rent out to a tenant for a certain period and the cultivated harvest from the land is shared by the land owner and tenant based on such agreement. The rent is payable either in cash or in paddy based on the agreed condition. This kind of relationship is called *ande*.

The abovementioned practices of joint ownership of farmland and sharecropping can still be observed in rural society. However, majority of farmland are owned individually at present. Single ownership of land is more common in the dry zone than in the wet zone, because population pressure is higher in the wet zone and thus land tend to be held by a group of farmers (joint ownership)[5], though the situation may be different by each area.

It seems that one of the significant and key issues in the planning and implementation of the project is the identification of the beneficiaries of the project activities. Since the above cases of joint ownership may exist and be practiced in the selected sites, the project should be careful in identifying the actual land owners or actual cultivators of the land. There is a possibility that a farmer who cultivates a certain land may not necessarily be the sole owner of that land. In a community where a land leasing system (*badu*) and/or a land mortgage (*ukas*) system exist, the cultivator of land may not be the land owner. For instance, if project components include the provision of farming equipment to farmers, the project has to carefully examine and consider who should be the recipient of such equipment.

(2) Labor Use Pattern

Several types of labor use patterns can also be observed in Sri Lanka. The labor use pattern present in a community may vary depending on the custom, season, availability of labor, and type of crops of each area. Table 3.19 shows the types of labor use patterns.

Table 3.19 Types of Labor Use Patterns

	Type of Labor Use Pattern	Description
(a)	Exchange of labor with responsibility (*Attam* labor)	*Attam* is the traditional term used for exchange of labor. This kind of labor concept is unique to Sri Lanka. In the village level, when some work is to be done, neighbors communicate, mutually agree and do the work.
(b)	Shared labor in group basis (*Kaiya* labor)	*Kaiya* labor is similar to *attam* labor. The land owner invites other people to participate or help in harvesting his paddy lands. Whoever is available and willing to work comes to help the land owner on an agreed date. All the participants eat specially prepared meals on that day. This is also called *kaiya*.

[5] "Land and Labour Use Pattern of Paddy Farming Practices in Sri Lanla Peasant Farm Sector" (Lal Thilakarathne, Youkichi Yanagita and Ken Imai, Gifu University, Res. Bull. Fac. Age. Gifu Univ. (62) :33-43. 1997)

Type of Labor Use Pattern		Description
(c)	Informal contract (Ad hoc labor)	Ad hoc labor is an informal type of labor. Anyone who is available to work may just meet a labor supplier without any prearrangement and agree immediately to provide the labor necessary on a given date.
(d)	Formal agreement (Contract labor)	A contract labor is informally organized by a labor supplier. The labor supplier discusses and agrees with a labor demander to do specific work for a specific price. The labor supplier is responsible for finishing the specific work in an agreed period of time. The labor supplier hires laborers from a labor market to finish the work as agreed, with profit.
(e)	Hired labor	Hired labor is open market labor. Workers come to an agreement with those who hire and decide to supply their labor at an agreed wage. The wage is decided on hourly or daily basis or for a specified duration. Most of this kind of labor is seasonal type hired labor, meaning labor is hired only for the peak days of the cultivation season. It is necessary to note that some of the hired workers in the informal labor market migrate to the urban sector in the off-season and work there until the next cultivation season.
(f)	Family labor	Members of peasant families themselves provide necessary labor for their own farm. If their labor is not enough, they hire outside workers or utilize some type of labor described above.

Source: "Land and Labor Use Pattern of Paddy Farming Practices in Sri Lanla Peasant Farm Sector" (Lal Thilakarathne et.al, Gifu University, Res. Bull. Fac. Age.Gifu Univ. (62) :33-43. 1997)

Though the abovementioned labor use patterns had been commonly practiced before, these types of labor use patterns such as *attan* labor have become increasingly rare at present. Hired labor and family labor are the more popular labor patterns which can be observed in the field currently. As one of the reasons for the diminishing trend of mutual cooperation in farming in rural society, modernization and unification of the farming system during the colonial era by common way in the entire country might be pointed out.

In the planning and implementation of the project, it should be noted that mutual cooperation and collective work have been common practices for a long time in rural communities in the country. Therefore such traditional and social relationships among people in a community should be considered in the project and be utilized for the smooth implementation of the project activities. It is expected that it should strengthen the connection of people in a village and reinvigorate communities for further social and economic development of rural areas.

3.4 Agro-ecological Zone

An agro-ecological zone represents a particular combination of the natural characteristics of climate, soil, land use, and vegetation. Sri Lanka has two main rainy spells and, based on the amount of rain receives, the island is divided into three main climatic zones: the "wet zone" in the southwestern region including the central areas of the country, the "dry zone" covering predominantly the northern and eastern parts of the country, and the "intermediate zone" running between the other two zones.

The northeast monsoon (October to February) brings rain to all parts of the island, whereas the southwest monsoon (May to August) brings rain only to the southwest part. The area that receives rain from both monsoons demarcates the wet zone, which receives relatively high mean annual rainfall over 2500 mm without pronounced dry periods. The area that does not get rain from the southwest monsoon demarcates the dry zone, which receives a mean annual rainfall of less than 1750 mm with a distinct dry season from May to September. The area in between these two zones, the intermediate zone, receives a little rain from the southwest monsoon. The intermediate zone receives a mean annual rainfall between 1750 to 2500 mm with a short and less prominent dry season. Since low temperature is an important climatic factor affecting plant growth in the wet and intermediate zones of Sri Lanka, a subdivision

based on altitude takes into account the temperature limitations in these two climatic regions. In this subdivision, "low-country" is demarcated as land below 300 m elevation, "mid-country" as land with elevation between 300 to 900 m, and "up-country" as land above 900 m elevation. Both the wet and intermediate zones spread across all three categories of elevation while the dry zone is confined to low-country resulting to seven agro-climatic zones covering the entire island. The climatic zones and agro-ecological regions of Sri Lanka are shown in the annexed Tables A 3.3 and A 3.4, and the annexed Figure A 3.8.

According to the climatic zones of the country, about 78% of the survey area belongs to the dry zone, about 21% belongs to the intermediate zone, and only about 1% belongs to the wet zone. Furthermore, about 95% of the survey area is situated in the low-country agro-ecological region of the country and only about 3% and 2% of the survey area are situated in mid-country and up-country, respectively. Annexed Table A 3.4 shows the areas by district belonging to each climatic zone and agro-ecological region.

3.5 Soils

The soil map of the survey area is as shown in the annexed Figure A 3.9. Taking reference from the National Atlas of Sri Lanka, the major soil groups are as follows:

3.5.1 Reddish Brown Earth Soil

This soil group is prominent in the dry zone. The main feature of this soil group is their reddish brown color. Generally there is a layer of gravel, which is a mixture of quartz, ironstone, iron-manganese nodules, and feldspar. The texture may vary from sandy loam to sandy clay. These soils are suitable for a range of crops both annual and perennial. They are best used for rainfed agriculture or for farming with highly controlled irrigation.

3.5.2 Noncalcic Brown Soil

This soil group occurs in the dry zone in the east, and also in the intermediate zone in the districts of Moneragala and Kurunegala. The topsoil is dark brown to dark grayish brown. The subsoil is brown or yellowish brown. The topsoil can be loamy sand to sandy loam, while the subsoil is usually sandy loam or sandy clay loam. Although poor in nutrients, these soils are easy to work with in almost any moisture condition and are recommended for a variety of fruit crops and sugar cane, with highly controlled irrigation and frequent application of fertilizer in small quantities.

3.5.3 Red-Yellow Latosol

This soil group occupy a belt of land in the northwestern, northern, and northeastern coastal regions. In the Jaffna region, such have developed on limestone. The red latosols are dark reddish brown to dark red in color, while the yellow latosols are yellowish brown to yellowish red. The texture is mostly sandy loam. They are very deep soils, and their profile is uniform. They are easily workable and can support a wide variety of annual and perennial crops with controlled irrigation.

3.5.4 Low Humic Gley Soil

This soil group are composed of greyish soils found in the valley bottoms of undulating topography. Soils are deep and moderately fine textured. Its water percolation rate remains at 2-4 mm/day after six to ten years of continuous paddy cultivation with puddling. Due to the low percolation rates, these soils are suitable for intensive wetland paddy cultivation.

3.5.5 Red-Yellow Podzolic Soil

This soil group is the most widely spread soil group in the wet zone of Sri Lanka. They also occur in the semi-wet and semi-dry intermediate zones. They are characterized by a grey brown to yellowish brown topsoil and mostly yellow or yellowish red subsoil. These soils are used for perennial plantation crops including tea, and for vegetable cultivation. However, strict soil conservation measures are recommended.

3.5.6 Immature Brown Loam

This soil group are found in the wet and intermediate zones. The color of the topsoil is dark brown to dark grey brown. The subsoil is dark yellowish brown to brown. The textures are mostly sandy loam or loam. These soils invariably have minerals such as mica and feldspar clearly visible in the profile. These are widely used for growing a variety of deep-rooted perennial crops, and support very productive home gardens.

3.5.7 Reddish Brown Latosolic Soil

Restricted to the wet and intermediate zones, this soil group is mostly found in the districts of Kandy, Matale, Kurunegala, and Kegalle. The textures vary from sandy clay loam to clay loam. The distinct features of these soils are their well-developed structure and their friable consistence in a wide range of moisture conditions making them very productive, particularly if used for perennial corps as in traditional Kandyan home gardens where a variety of deep-rooted tree crops are grown.

3.5.8 Alluvial Soil

These are the soils that have developed on flood plains, stream- and riverbanks, and associated valleys. They are found in the wet, dry, and intermediate zones. They are potentially very productive soils that can support a wide range of crops.

The distribution of suitable soil for OFC and fruits cultivation in the survey area is shown in the annexed Figure A 3.10.

3.6 Surface Water and Groundwater Resources

Surface water together with groundwater make up the total water resources of a country. These two forms of water resources exist in a state of dynamic balance, with surface water infiltrating into groundwater, which may seep out as springs and fountains to the surface. Sri Lanka is usually considered to be very rich in water resources. Sri Lanka lies in the path of the two monsoons and receives rainfall from both.

3.6.1 Surface Water Resources

As an island country, Sri Lanka receives all its water from rainfall. The latest estimate of the total annual rainfall over the island is about 109 km^3. Part of the rainfall evaporates back to the atmosphere, while another part infiltrates in to the ground and adds to the groundwater, while the remainder entire streams as runoff. A relatively high percentage of the rainfall is converted to runoff since over 90% of the island is underlined by Precambrian crystalline rocks of low primary porosities that reduce infiltration. The runoff from the wet zone catchments can be in excess of 70%, while for the dry zone catchments it can be from 20% to 30%. The runoff from the entire island has been estimated to be about 45%.

Sri Lanka's radial network of rivers and streams begins from the central highlands. There are 103 distinct river basins covering 90% of the total land area of the island. The Jaffna peninsula and the residual coastal areas of little hydrological importance comprise the balance area. Most of the river basins in Sri Lanka are small, with the median size being 159 km^2. Only 17 of the 103 basins exceed 1000 km^2. The Mahaweli is the largest river basin covering 10,237 km^2, which is 16% of the land area of the country. The total annual discharge to sea in Sri Lanka is estimated at 28,000 MCM.

Out of the 103 river basins in Sri Lanka, there are 81 river basins covering the survey area. Except Jaffna District, all other 13 districts of the survey area are covered with some of these 81 river basins. Details of the river basins covered in each district of the survey area are shown in the annexed Figure A 3.11. The annexed Table A 3.5 shows the names of the river basins covered in each district and the annual estimated discharge volume to sea from catchment areas of river basins covered within the district. The total annual discharge to sea from the survey area was estimated at 13,600 MCM, which is about 50% of the total annual discharge to sea in Sri Lanka.

3.6.2 Groundwater Resources

In Sri Lanka, seven main types of groundwater aquifers have been identified and characterized according to studies carried out over the last 50 years. The geomorphological and hydrogeological setting of these seven types has been adequately characterized and their distribution patterns mapped. Each of these aquifers has distinctive characteristics. Shallow aquifers play an important role in providing domestic supplies from traditional wells between 6 to 9 m depths, and also in discharging water to rivers and other water bodies during low flow periods.

The general description and characteristics of each of the seven types of aquifers are given in Table 3.20.

Table 3.20 Groundwater Aquifers in Sri Lanka

Type	Aquifers/Characteristics
T1	Shallow Karstic Limestone Aquifers The shallow aquifer of the Jaffna peninsula is found in channels and cavities (karsts) in Miocene limestone. A large volume of rainwater and other surface water infiltrate into these spaces during the rainy periods. Of this amount, possibly 50% eventually drains to sea outlets, while the remainder becomes the most intensively utilized groundwater resource of the country, mainly for agriculture and domestic purposes. Thickness of the fresh water bodies range from 20 to 30 m below ground level in the Puttur, Pannikudduwan, and Urali areas. The groundwater table is located at 0 to 3 m below ground level, and the conductivity of water is very high.
T2	Coastal Sand Aquifers Shallow and moderately developed aquifers are found in unconsolidated sand, which occur along a major part of the country's coastlines. These aquifers consist of 'lenses' of freshwater floating above saline water. The volume of freshwater in these aquifers usually expands during the rainy season and contracts during dry seasons, with fluctuating brackish and saline boundaries. Infiltration rates and lateral movement of water through these sand aquifers are relatively high.

Type	Aquifers/Characteristics
T3	Deep Confined Aquifers A number of distinct and confined aquifers exist mainly in the limestone formation of the northwestern and northern coastal plains. These are relatively deep aquifer and have relatively high recharge rates. The limestone is highly faulted and segregates the aquifer into a series of isolated blocks forming a number of groundwater basins. This aquifers dips towards the sea, and the depth of the aquifer is around 70 to 90 m in some places close to the sea.
T4	Laterite Aquifers The laterite or '*kabook*' of southwestern Sri Lanka has considerable water-holding capacity, depending on local depths. Because of the high infiltration rate of the upland higher level laterite, the groundwater drains off quickly into the adjacent board valleys. The deeper aquifers that occur below the laterite aquifers have close interconnections.
T5	Alluvial Aquifers A number of river and streams, which cross the coastal plains, have associated alluvial aquifers, practically along their lower reaches. These aquifers are generally shallow and are directly connected to the surface water in rivers or streams. Even in periods of low surface flow, these alluvial aquifers are therefore quickly recharged and constitute a considerable source of water. Groundwater withdrawals will have a corresponding impact on river flow; and contamination of either the surface or groundwater will affect the other.
T6	Shallow Regolith Aquifers Shallow regolith (weathered and residual overburden) aquifer is mainly confined to the narrow inland valley systems of the undulating mantled plain landscape located within the hard metamorphic rock regions, especially in the north central, and northwestern regions of the country. The thickness of the aquifers can vary from site to site in proportion and scale, and is usually not more than 12 m, with the shallow water table within 6 to 8 m, fluctuating widely from season to season.
T7	Deep Fractured Zone Aquifers Throughout several parts of the metamorphic hard rock areas in each of the climatic zones, deep aquifers can be found. These are present in joints, fractures, and fissures and are therefore discontinuous and sporadic, and can be exploited only through deep tube wells.

All seven types of aquifers identified in Sri Lanka are present in the survey area. However, 76% of the survey area is covered with shallow regolith aquifers, and the other six types of aquifers are distributed in the remaining 24% of the area. District wise distribution of groundwater aquifers in the survey area is shown in Table 3.21.

Table 3.21 Summary of District Wise Distribution of Groundwater Aquifers in the Survey Area

Province	Total Area	Area Under Each Aquifer Type (Ha)						
District	(ha)	T1	T2	T3	T4	T5	T6	T7
North	**893,743**	**146,986 (16%)**	**26,238 (3%)**	**683 (0.1%)**	**212,410 (24%)**	**0**	**468,549 (52%)**	**26,261 (3%)**
Jaffna	100,996	20,710 (21%)	15,294 (15%)	0	36,780 (36%)	0	0	26,261 (26%)
Kilinochchi	135,089	38,097 (28%)	221 (0.2%)	0	74,309 (55%)	0	16,705 (12%)	0
Mannar	199,756	20,166 (10%)	0	0	98,423 (49%)	0	81,167 (41%)	0
Vavunia	200,428	15,032 (7%)	0	683 (0.1%)	0	0	184713 (92%)	0
Mullaitivu	257,474	52,981 (21%)	10,723 (4%)	0	2,898 (1%)	0	18,5964 (72%)	0
East	**962,242**	**121,055 (13%)**	**42,797 (4%)**	**14,364 (1%)**	**8,307 (1%)**	**0**	**77,1857 (80%)**	**0**
Batticaloa	248,329	35,697 (14%)	18,471 (7%)	0	8,307 (3%)	0	18,4901 (74%)	0
Ampara	449,551	248,669 (6%)	11,255 (3%)	2,239 (0.5%)	0	0	408,281 (91%)	0
Trincomalee	264,362	60,492 (23%)	13,071 (5%)	12,125 (5%)	0	0	178,675 (68%)	0
North West	**806,426**	**169,154 (21%)**	**13,851 (2%)**	**14,383 (2%)**	**60,261 (7%)**	**12,876 (2%)**	**533,068 (66%)**	**0**
Kurunegala	490,450	76,635 (16%)	0	14,383 (3%)	0	12,744 (3%)	386,689 (79%)	0
Puttalam	315,976	92,519 (29%)	13,851 (4%)	0	60,261 (19%)	132 (0.03%)	146,379 (46%)	0

Province / District	Total Area (ha)	Area Under Each Aquifer Type (Ha)						
		T1	T2	T3	T4	T5	T6	T7
North Central	**1,065,857**	**74,723 (7%)**	**0**	**48,842 (5%)**	**0**	**0**	**942,293 (88%)**	**0**
Anuradhapura	721,225	35,526 (5%)	0	35,305 (5%)	0	0	650,394 (90%)	0
Polonnaruwa	344,632	39,197 (11%)	0	13,537 (4%)	0	0	291,899 (85%)	0
Uva	**766,567**	**46,875 (6%)**	**0**	**28,116 (4%)**	**0**	**0**	**691,575 (90%)**	**0**
Badulla	287,208	0	0	24,618 (9%)	0	0	262,590 (91%)	0
Moneragala	479,359	46,875 (10%)	0	3,498 (1%)	0	0	428,985 (89%)	0
Total of the Five Provinces	**4,494,835**	**558,793 (12%)**	**82,886 (2%)**	**106,388 (2%)**	**280,978 (6%)**	**128,76 (0.3%)**	**3,407,342 (76%)**	**26,261 (1%)**

3.7 Agricultural Production

3.7.1 Agricultural Land Use

The total survey area under the five provinces is 45,907 km^2. According to the annexed Table A 3.6, the total area of paddy is 6,529 km^2 or 14.2% of the survey area. The proportion of paddy is high, at more than 20% of the respective areas of Kilinochchi, Batticaloa, and Kurunegala districts, while it is low at less than 10% in Mullaitivu, Badulla, and Moneragala districts. The land use category of garden is the second largest among the farm lands occupying 5167 km^2. In the garden, rainfed agriculture is widely practiced for production of OFCs, vegetables, and fruits. This extent is comparatively of higher proportion in Jaffna (38.5%), Kurunegala (18.7%), and Badulla (17.9%) districts, and of lower proportion in Mannar (3.5%), Mullaitivu (5.1%), and Batticaloa (7.0%). *Chena* cultivation, or slash and burn technique has relatively wider practice in Moneragala (13.2%), Puttalam (8.2%), and Anuradhapura (8.2%). Among the plantation crops, rubber and tea are cultivated mainly in Uva Province, whilst coconut is densely cultivated in North Western Province.

3.7.2 Land Tenure and Holdings

There are two different land holding systems in the survey area, i.e., small holdings and estates. According to the Census of Agriculture 2002, about 13% of agricultural land in the survey area was occupied by the estate sector. The number of estate holdings, however, accounted only for 0.2% of the total holdings. The percentage of lands belonging to the estate sector was comparatively small at less than 1% in Northern and Eastern provinces. Meanwhile, this percentage was relatively large at more than 20% in Uva and North Western provinces. The average holding size excluding estates was smaller in Northern (0.43 ha) and Eastern (0.46 ha) provinces, and larger in North Central (0.85 ha) and Uva (0.69 ha) provinces. The average holding size of the small holdings sector was smaller than that of the national average (0.47 ha) in Jaffna (0.18 ha), Batticaloa (0.33 ha) and Trincomalee (0.43 ha) (see the annexed Table A 3.7).

The other characteristics of land holdings and land tenure prevailing in the survey area according to the Census of Agriculture 2002 are summarized as follows:

(i) The number of landless farmers categorized as “not owning any land” were considerably large in North Central (9.8% of the total small holdings) and Uva (7.4% of the same) provinces. Most of them were probably chena cultivators or encroachers (see the annexed Table A 3.8).

(ii) The percentage of small holdings owning less than or equal to 0.1 ha was very high at 66% in Eastern Province, and at 58% in Northern Province. These small holders produce agricultural output mainly for home consumption according to the Census of Agriculture (see the annexed Table A 3.8).

(iii) About 16% of the small holdings own only home gardens in the survey area in general. This percentage was higher at 24% in North Central Province, and at 21% in Uva Province.

3.7.3 Cropped Area and Crop Production

The crop production situation in the survey area is based on data from the Department of Census and Statistics on paddy and OFCs, and data from the Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) on vegetables and fruits. The data are summarized as follows and shown in the annexed Tables A 3.9 to A 3.11. Distribution of the major OFC, vegetable, and fruit production in the survey area are shown in the annexed Figures A 3.12, A 3.13, and A 3.14.

(1) Paddy

The survey area can be classified as Sri Lanka's paddy production area, because more than 70% of the national paddy production is produced from the survey area. Meanwhile the share of the survey area population is about 35% of the national population.

The total paddy production in the 2008/09 crop year accounted 2,693,000 tons, of which 1,842,000 tons or 68% were produced during *Maha* season 2008/09, and 851,000 tons or 32% were during *Yala* season 2009. Due to the rainfall pattern in the survey area, paddy production during *Maha* season is larger than during *Yala* season in all five provinces. In general, the availability of irrigation water is less during *Yala* season than *Maha* season, and also rainfed paddy production is larger during *Maha* season than *Yala* season.

The average paddy yields in the survey area were estimated at 4543 kg/ha in *Maha* season 2008/09 and 4340 kg/ha in *Yala* season 2009. These yields were slightly higher than the national averages. The yield was highest in Mahaweli "H" area (6036 kg/ha in *Maha* season), followed by Polonnaruwa District (5223 kg/ha in *Maha* season), and Ampara District (5158 kg/ha in *Maha* season). On the other hand, the lowest yield was recorded in Jaffna District (2506 kg/ha in *Maha* season), followed by Kurunegala District (3534 kg/ha in *Yala* season), and Batticaloa District (3639 kg/ha in *Maha* season). Paddy is not a principal product in Northern Province, and more OFCs, such as sorghum and ginger (which are drought-tolerant crops) and red onion, are widely cultivated therein.

(2) OFCs

A range of cereals, grain legumes, and root crops as well as chili and onion are cultivated in the survey area. OFCs with production share in the national production exceeding the percentage of the survey area population in the national population (about 35%) are listed as follows (the percentage in the parenthesis indicates the production share in the national production):

(i) Cereals: maize (96%), kurakkan (67%), meneri (*Panicum milliaceum* 65%), and sorghum (47%)

(ii) Grain legumes: cowpea (91%), groundnut (89%), and green gram (73%)

(iii) Root crops: potato (78%), manioc (56%), and sweet potato (53%)

(iv) Chili, onion and others: red onion (95%), ginger (93%), mustard (80%), chili (75%), and big onion (36%)

As seen in the above list, a considerably large proportion of OFCs are produced in the survey area.

(3) Vegetables

Low-country vegetables are mainly produced in the survey area which is part of the dry and intermediate zones. These include ash pumpkin, ash plantain, cucumber, ladies finger, bitter gourd, red pumpkin, brinjal, and beans. The production share of each of all these vegetables exceeds more than 50% of their respective national production. On the contrary, the production of up-country vegetables is small both in extent and volume. In recent years, however, the production of up-country vegetables in the survey area, such as cabbage, carrot, tomato and radish, show an increasing trend. The use of imported hybrid seeds makes it possible to produce up-country vegetables in the dry zone.

(4) Fruits

Both tropical and temperate fruits, such as banana, papaw, pineapple, mango, orange, lime, and passion fruit, are produced in the survey area. However, fruit production is not as significant in the survey area as compared with the production shares of paddy, OFCs and low-country vegetables. As a common practice, farmers grow several fruit trees (usually with coconut trees) in their home gardens mainly for home consumption. Nevertheless, some fruits are commercially produced to a limited extent. These include bananas in Uva Province (mainly in Moneragala District), pineapples and mangoes in North Western Province (mainly in Kurunegala District), and papaws in North Central Province. It is noteworthy that Kilinochchi District alone produces a comparatively larger amount of bananas and papaws in terms of production per farmer basis than other districts in Northern Province.

3.7.4 Farm Input Supply

(1) OFCs and Vegetable Seeds

Seed supply in Sri Lanka is carried out both by the government and private sectors, and consists of both imported and local seeds. Regarding OFC seeds, part of the requirement of maize, chili, and onion are imported by the private sector, while the remaining part and other OFC seeds are locally produced. For local production of seeds, the contribution of the DOA has varied from 6% to 30%, while the remainder has come from private sector farms or farmers own seeds.

A major portion of vegetable seed supply is carried out by the private sector, while the DOA also supplies a limited amount of seeds ranging from 4% to 20% of the total need in the country. The main countries supplying vegetable seeds to Sri Lanka are Thailand, the Netherlands, Pakistan, France, India and Japan.

The Seed and Planting Material Development Centre (SPMDC) of the DOA is the lead agency in the seed industry that is responsible for ensuring adequate production and supply of quality seeds and planting material of cultivars developed by the DOA. SPMDC is currently involved in the production of foundation and registered seeds of paddy (22 varieties); foundation, registered, and certified seeds of OFCs (11 crops, 31 varieties); and basic and standard seeds of vegetables (17 crops, 42 varieties), in state farms by using breeder seeds produced by DOA research stations.

There are seven provincial seed farms situated in the survey area, as shown in Table 3.22.

Table 3.22 Location and Present Conditions of Provincial Seed Farms

Province	Name	Extent and Current Operations	Assistance Required
Uva	Okkampitiya Farm, Moneragala	・ 110 ac covering 85 ac for paddies, 5 ac for OFCs, 5 ac for mangoes and pineapples, and 5 ac for oranges. ・ All crops are for seed and planting material production. ・ OFC seeds annual production is 4000 kg. ・ Planting material production is 7500 kg per year.	・ Irrigation canal coming from Okkampitiya. Irrigation system has to be rehabilitated. ・ Water storage facility for use as backup when canal water operation is stopped. ・ Sprinkler and drip irrigation systems for irrigation of crops. ・ Repair of farm buildings.
Uva	DATC Farm Bibile	・ 25 ac covering 10 ac of buildings and roads, 10 ac for mother plants of oranges and mangoes, and 5 ac for OFCs. ・ Produce 20,000 seedlings per year. ・ Produce 5000 budded plants per year. ・ Produce 2500 kg of OFC seeds per year.	・ A new available water source and its delivery system need to be constructed. ・ Repair of farm buildings. ・ Farm machinery.
NWP	Wariyapola Seed Farm PDOA Wariyapola	・ 160 ac including roads and buildings. Many areas are fallow due to lack of resources, including assured water supply. Currently consist of only 10 ac for paddies and 5 ac for OFCs, and fruit and vegetable nurseries. ・ Produce 40,000 seedlings and planting materials per year. ・ Produce 1500 kg of OFC seeds per year. ・ Expansion of area up to 50 ac for OFC cultivation and seed production is possible with assured water supply.	・ Repairs and capacity improvement of the existing minor tank. ・ Several agro-wells or deep wells are needed. ・ Nursery improvements such as construction of greenhouses, and provision of an irrigation system such as drip irrigation. ・ Repair of farm office. ・ Basic machinery for land preparation.
NWP	Galgamuwa Seed Farm PDOA Galgauwa	・ 80 ac including roads and buildings. Many areas are fallow due to lack of water. Currently cultivates 12 ac of paddy and 5 ac for OFCs, and fruit and vegetable nurseries. ・ Produce 30,000 seedlings and planting materials per year ・ Produce 1000 kg of OFC seeds per year. ・	・ Establishment of an irrigation system within the farm. ・ Assure water supply to the farm by providing a small canal from a nearby irrigation tank. ・ Staff quarters for the farm manager and other staff. ・ Nursery improvements such as construction of greenhouses, and provision of an irrigation system such as drip irrigation. ・ Basic machinery for land preparation. ・ High capacity water pump and accessories.
NP	Vaunia Farm PDOA Vavunia	・ 71 ac covering 40 ac for paddies, 10 ac for vegetables, 10 ac for OFCs; all are for seed production. ・ Only one farm under the PDOA in the north for providing seeds and planting materials. ・ Annually produce 200 kg of vegetable seeds, 800 kg of OFC, 75,000 papaya seedlings, 5000 mango plants, 15,000 lime plants, 20,000 jackfruit plants, and 10,000 mango plants.	・ Three phase electricity. ・ Water supply system within the farm. ・ Different irrigation systems such as drip and sprinkler. ・ Farm machinery for land preparation. ・ 2W tractor 01 with accessories. ・ Deepening of existing wells, and construction of several deep wells. ・ Deep well water pumps.
EP	Kantale Farm PDOA Kantale	・ Total area covers 80 ha: 53 ha for paddies, 8 ha for OFCs, and 8 ha for coconuts. ・ Fruit plant nursery and vegetable nursery ・ Produce 800 kg of OFC seeds per year. ・ Produce 6000 mango plants per year. ・ Has not achieved production targets in the past several years due to lack of resources, mainly water.	・ Farm machinery for land preparation. ・ Development of an irrigation system within the farm. ・ Improvements to staff quarters and other farm buildings. ・ Water browser with pumping unit. ・ Mobility for farm manager. ・ Sprinkler irrigation unit.

Contract growers of seed are operating under both the government and private sectors. Contract growers of seeds are selected considering their approaches, skills, and other factors such as soil condition, irrigation facility, and damages in the area. The private sector and the DOA provide assistance in different levels to contract growers of seeds. In the case of the private sector, it provides extension service to producers, and employs the buy-back system in general.

The seed producers should be registered as seed producer under the “Seed Act No 22 of 2003”. The Director General of Agriculture is in charge of general administration of the act and shall discharge the functions assigned to him under this act.

All seed handlers (means producer, importer, distributor, conditioner, re-packager, agent, or retailer) in

the country should be registered with the Director General of Agriculture. To apply for registration under this act, the seed handler should give a written application addressed to the Director, and pay the registration fee.

Even after producing seeds under the supervision of the DOA, a necessary certificate should be obtained from the DOA to make the product as "certified seed". under the Seed Act, the Director General of Agriculture established the "Seed Certification Service" under the DOA, and he shall exercise the exclusive right on the certification of seeds and planting materials grown in Sri Lanka.

(2) Fertilizer and Agrochemicals

Fertilizers are marketed through 15 registered importers and the ASCs. Most farmers obtain their fertilizer needs from private traders, dealers, and agents of fertilizer importers in the village and town. Since May 2011, fertilizers have been available to farmers at subsidized prices, not only for paddy but also for other crops, as shown in Table 3.23.

Table 3.23 Subsidized Unmixed Fertilizer Prices for Paddy and Other Crops

Type	After May 2011 (Rs/kg)	Before May 2011 (Rs/kg)
Paddy	7	7
Other crops	26	70

Source: Colombo Page - Sri Lankan Internet Newspaper (http://www.colombopage.com/archive)

Agrochemicals are marketed through a chain of importers/packers, distributors and local agents. There has been more and more competition as the agrochemical prices have been frequently discounted. According to local agents, they usually give technical guidance to farmers who encounter problems in their crop production particularly on pests and diseases.

(3) Farm Mechanization

There is no statistical data available on farm mechanization in Sri Lanka, even at the national level. However, the use of tractors mainly for ploughing purposes can be estimated by major crops based on study results made by the Socio Economics and Planning Centre of the DOA. The results are summarized in Table 3.24.

Table 3.24 Tractor Use in Land Ploughing by Major Crops in *Maha* Season 2009/10 and *Yala* Season 2010

Crop	District	2009/10 Maha Tractor (%)	Others (%)	Total (%)	Crop	District	2010 Yala Tractor (%)	Others (%)	Total (%)
Coarse Grains					**Coarse Grains**				
- Maize	Anuradhapura	84	16	100	- Maize	System H	66	34	100
- Kurakkan	Anuradhapura	0	100	100	**Average of Coarse Grains**		**66**	**34**	**100**
Average of Coarse Grains		**42**	**58**	**100**					
Pulses					**Pulses**				
- Black gram	Anuradhapura	60	40	100	- Black gram	System H	100	0	100
- Cowpea	Anuradhapura	32	68	100	- Cowpea	Trincomalee	90	10	100
Average of Pulses		**46**	**54**	**100**	- Soybean	Anuradhapura	100	0	100
					Average of Pulses		**97**	**3**	**100**
Chilli and Onion					**Chilli and Onion**				
- Chilli	Anuradhapura	0	100	100	- Chilli	System H	82	18	100
- Red onion	Puttalam	84	16	100	- Red onion	Puttalam	88	12	100
Average of Chilli and Onion		**42**	**58**	**100**	**Average of Chilli and Onion**		**85**	**15**	**100**
Oil Crops					**Oil Crops**				
- Groundnut	Moneragala	34	66	100	- Gingelly	Anuradhapura	58	42	100
- Gingelly	Anuradhapura	66	44	110	**Average of Oil Crops**		**58**	**42**	**100**
Average of Oil Crops		**50**	**55**	**105**					
Vegetables					**Vegetables**				0
- Brinjal	Anuradhapura	100	0	100	- Capsicum	Kurunagala	58	42	100
- Pumpkin	Anuradhapura	100	0	100	- Pole bean	Badulla	70	30	100
- Capsicum	Badulla	64	36	100	- Tomato	Badulla	18	82	100
- Tomato	Badulla	18	82	100	**Average of Vegetables**		**49**	**51**	**100**
Average of Vegetables		**71**	**30**	**100**					
Paddy					**Paddy**				0
- Irrigated	Whole island	100	0	100	- Irrigated	Whole island	100	0	100
- Rainfed	Whole island	94	6	100	- Rainfed	Whole island	100	0	100
Average of Paddy		**97**	**3**	**100**	**Average of Paddy**		**100**	**0**	**100**

Source: Cost of Cultivation of Agricultural Crops 2009/10 Maha and 2010 Yala, Socio-economics Planning Centre, DOA

According to the study results, nearly 100% of ploughing has been carried out mechanically for paddy production during both *Maha* and *Yala* seasons, and a very small proportion at only 4% used buffaloes during *Maha* season. The use of a two-wheel tractor attached with a rotary beater is widely practiced in ploughing. The use of a four-wheel tractor has also been gaining popularity nowadays for ploughing of larger areas. These tractors are also utilized for threshing purposes not only for paddy but also for OFCs. Moreover, tractors are important transportation means in rural areas. Since nearly 100% of ploughing is mechanized for paddy and this crop alone occupies about 60% of farm land, it was considered that the accessibility of tractors to small holders is relatively well in the survey area.

However, as shown in Table 3.24, the percentages of mechanized ploughing for OFCs and vegetables are lower. This is probably due to the following reasons:

- Accessibility of tractors is difficult during the peak season of land preparation to some farmers with no tractors and thus have to hire one,
- The farm size is too small to use a tractor, and the human labor (mainly of family members) is cheaper than using a tractor, and
- Particularly for vegetable cultivation, human labor is usually required for careful work is necessary for total land preparation, which consists of weeding, ploughing, leveling, and ridging.

Due to the above situation, in the project formulation, additional supply of tractors would be considered at target areas where the accessibility of tractors is difficult especially during the peak season of land preparation.

3.7.5 Agriculture Logistics and Marketing

The recent trends of cultivation extent and production of OFCs, vegetables, and fruits in the target areas from 2007 to 2009 are described in the annexed Tables A 3.12 to A 3.16. The effect of conflict in areas, especially in Northern Province, is low cultivation and production. There are some particular features by cultivation area and season. Generally cultivation of OFCs is higher in *Maha* season than in *Yala* season. However, some types of onion have higher yields in *Yala* season, and for some types of grain, tubers, and chili, there is no significant difference in yields between seasons. Badulla District is the only potato producer in the survey area, and it shares a large portion of the country's potato production. Soya beans are cultivated in limited areas only, such as in Kurunegala and Anuradhapura districts, and the main season for soya beans is in Anuradhapura during *Yala* season. Vegetable cultivation during *Maha* season is also larger by 30 to 40% than during *Yala* season.

The production features such as cultivation area and season affect the formation of marketing and transportation channels and market prices. Sufficient quantities to meet market demands and effective capacity of transportation should be considered in commercial cultivation and effective marketing.

Productive commercial production areas, such as highland vegetable cultivation areas, banana production in Udawalawe, and red onion production in Thelulla and Karupitiya, have established mutual cooperation with respective market channels, such as the Colombo Central Market (manning market), DECs, supermarket chains, processors and exporters, through their continuous business relations which benefit both parties and their mutual roles in agriculture marketing systems.

Most of the other areas have unstable production and market supply, and are not familiar with marketing. Misunderstanding occurs in the producer side, in which the farmer does not accept the prices offered by the buyer due to lack of information regarding supply conditions and there is no clear understanding on the production cost and actual profit of the farmer's production.

(1) Marketing Channel of Agriculture Products (OFCs, Vegetables, and Fruits)

Traditional marketing channel consists of producers, collectors, middlemen, and traders to formal types of markets as wholesalers or retailers. Marketing margin is formed based on the transportation costs at each stage. Marketing losses also occur due to increase in the stages of transportation (see the annexed Figure A 3.15).

A new type of marketing channel of wholesale system called the Dedicated Economic Centre is aimed at simplifying these stages. A supermarket collection system is more simplified from producers to retailers. There are some differences in the collection system between large-scale supermarkets and smaller ones. A large-scale supermarket has its own collection system and own distribution centers, while others collect at traditional marketing channels (see the annexed Figures A 3.16 and A 3.17).

The forward contract and buy-back system provides direct business from producers to final users of processing or exporters and supermarket distribution centers.

A simplified marketing channel is beneficial for both producers and consumers by removing the marketing margin.

(2) Market Price and Profit at Respective Marketing Stages

Market prices in the selected districts of the survey area were studied based on the "Bulletin of Selected

Retail and Producer Price 2007-2010" and database of HARTI.

The price of vegetables basically depends on the supply and demand in the country. However, OFC prices are not only affected by local supply and demand but also by the supply of the import market. Prices from the import market affect not only the CIF prices but also the import tariff to the wholesale price. The government imposes an import tariff for OFC commodities (C.P. Hathurusinghe et al, Production and Marketing of Other Field Crops: A Review, 2012 HARTI). The duty and charges for OFCs are shown in the annexed Table A 3.17.

(3) Seasonal Price Changes

The prices of agriculture products vary according to the cultivation and harvesting seasons, and by year. The seasonal average wholesale prices of producers in districts, wholesale prices at major markets, and retail prices in districts are shown in the annexed Figure A 3.18.

(4) Marketing Margin

The average marketing margins at respective market channels from 2007 to 2010 on selected OFCs and vegetable crops are compared based on data from "Bulletin of Selected Retail and Producer Price" for retail and producer prices, and data from the Department of Census and Statistics and database of HARTI for wholesale prices.

The producer's share in OFC commodity is over 70% of the retail price of five types of crops, and 12% and 15% share for the wholesaler and retailer, respectively.

The producer's share in 18 types of vegetable crops is 45%, and 14% and 41% for wholesaler and retailer, respectively. The highest share of producers is on capsicum at 74%, while the lowest share is on knoh-kohl at 16.8%. The highest shares of wholesalers and retailers are on red pumpkin at 64.5% and knoh-kohl at 69.2%, while the lowest shares are on red pumpkin at 2.5% and on cucumber at 15%, respectively. The marketing margins on commodities and marketing channels vary according to type of commodity, type of business, and volume of trade.

In general, perishable commodities such as fresh vegetables and fresh fruits are imposed with high margins due to the short period required for selling them. Wholesalers deal with smaller margins for commodities which sell out to retailers in a short time and they deal with large volumes. As retailers are the final sellers to consumers, they deal with smaller volumes as compared with wholesalers and impose higher margins due to more risk on sales.

According to the study, an average of more than 40% of the retail price goes to producers, which is quite a high return in general. Also, it is considered that producers are expected to increase productivity and yield, and lower the production cost in order to increase their income as competitiveness intensifies in the future.

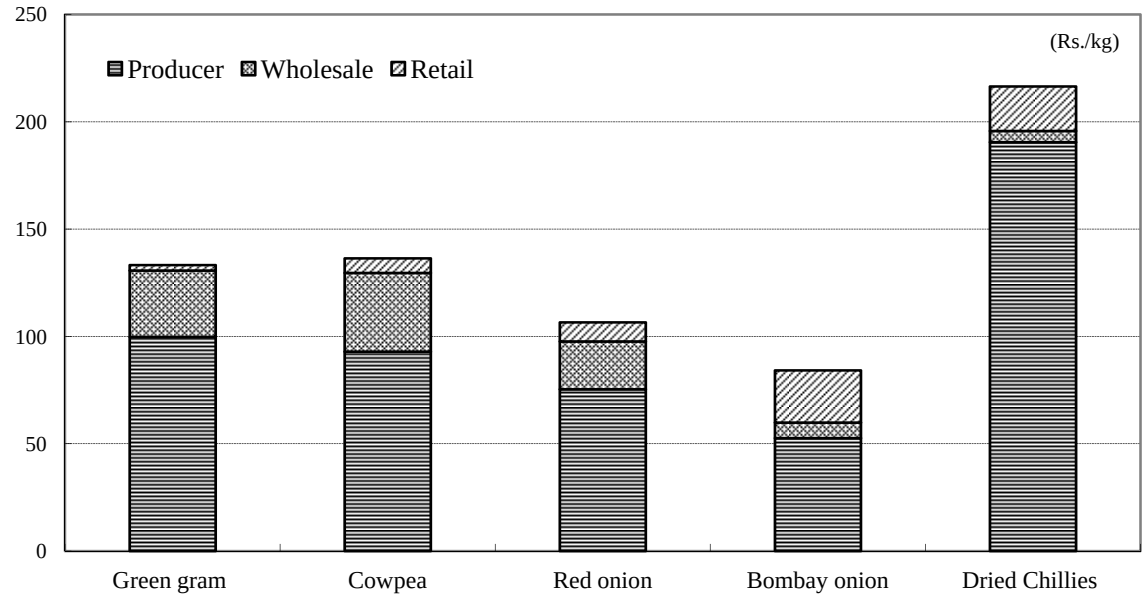


Figure 3.5 Average Price Share of OFCs at the Marketing Stage in the Target Area in 2009

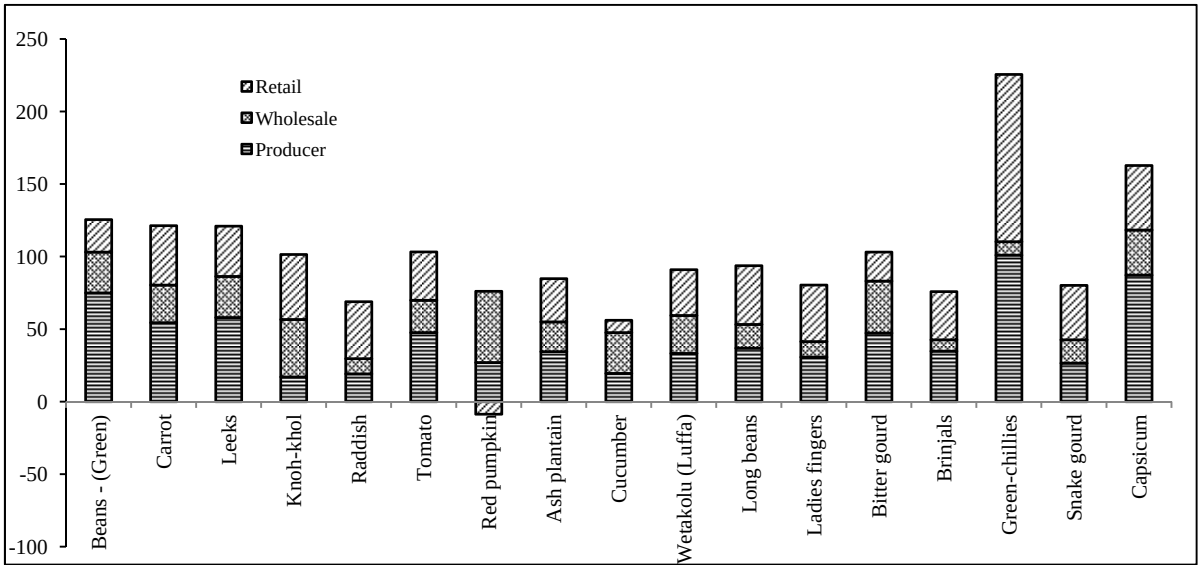


Figure 3.6 Average Price Share of Vegetables at the Marketing Stage in the Target Area in 2009

The price sharing of imported OFCs from 2000 to 2007 were provided in the HARTI report. It was mentioned that the CIF, wholesale and retail prices of dried chilies shared 68%, 14%, and 18% respectively; while for locally dried chilies they were 71%, 9%, and 20%, respectively (refer to Figure 3.5 and Figure 3.6). As compared with the share for imported dried chilies, the share of wholesalers for local ones was extremely lower, while that of producers and retailers were higher. The price sharing of imported and local OFCs from 2000 to 2007 is shown in Table 3.25. Similar trends were also observed in the price sharing of big onions.

Table 3.25 Price Sharing of Imported and Local OFCs (2000-2007)

(Unit %)

Year	Share of Imported Dried Chilies			Share of Local Dried Chilies		
	CIF Share	Wholesale Share	Retail Share	Producer Share	Wholesale Share	Retail Share
2000	70.97	8.89	20.13	75.46	2.41	22.12
2001	75.38	6.08	18.54	78.55	1.45	20.00
2002	74.77	9.19	16.04	79.73	7.06	13.21
2003	72.85	13.29	13.86	69.39	18.37	12.24
2004	72.91	7.98	19.11	68.10	4.67	27.23
2005	65.95	12.43	21.63	71.76	1.03	27.20
2006	53.28	34.88	11.85	63.19	24.08	12.73
2007	60.26	21.72	18.02	65.49	9.80	24.72
Avg	**68.30**	**14.31**	**17.40**	**71.46**	**8.61**	**19.93**

Year	Share of Imported Big Onion			Share of Local Big Onion		
	CIF Share	Wholesale Share	Retail Share	Producer Share	Wholesale Share	Retail Share
2000	37.05	35.52	27.43	58.71	13.86	27.43
2001	42.57	31.06	26.37	56.26	17.37	26.37
2002	42.82	31.48	25.70	55.24	19.07	25.70
2003	43.29	34.47	22.24	63.79	13.96	22.24
2004	44.34	34.02	21.64	59.73	18.63	21.64
2005	36.31	43.44	20.24	53.08	26.67	20.24
2006	35.51	42.18	22.31	58.49	19.20	22.31
2007	52.84	24.24	22.92	87.15	-10.08	22.92
Avg	**41.84**	**34.55**	**23.61**	**61.56**	**14.84**	**23.61**

Source: MFPAD/HART from the report of C.P. Hathurusinghe et al, Production and Marketing of Other Field Crops: A Review, 2012 HARTI

(5) Marketing Channels of Local Agriculture Products

(a) Boutique

Boutiques are the smallest conventional marketing system at the village level which deals with surplus home garden and farm products with neighbors in the community and roadside passers.

(b) Weekly market (pola)

Polas are the most popular commercial market in villages and small towns. Polas sells locally produced items, foods from wholesale markets, and all kinds of consumer items. Traders are not only local traders but also mobile traders and these traders play a role as a collector to the wholesale market. This market is managed by the Pradeshiya Sabha and charges a fee for cleaning stalls and management.

(c) Public market

Public markets are open every day for consumers requiring daily consumable items located in medium and large townships and commercial areas. Traders mostly supply commodities coming from wholesale markets or producers and collectors of local products. Some traders collect local products and supply it to wholesale markets at the production area. The urban council or municipal council is in charge on the collection of stall fees and parking fees for management and maintenance of facilities.

(d) Dedicated Economic Center

The setting up of Dedicated Economic Centers (DECs) has started in 1998, as a means of implementing marketing development strategy to provide marketing facilities for producers in the rural areas.

The subject of establishing DECs which was carried out by the Ministry of Rural Employment Promotion was assigned to the Ministry of Trade Marketing Development, Cooperatives and Consumer Services in 2007 and to the Ministry of Cooperatives and Internal Trade at present. Accordingly, coordination and supervision on the operation of all DECs are under this said ministry. DECs were established in 12 locations, six centers in production area and six centers in consumer areas at present (annexed Table A 3.18).

The objectives of setting up economic centers are to:

- Ensure and obtain reasonable prices for the crops of agriculture producers by providing targeted market.
- Provide opportunities to small-scale producers by reducing their transport costs and wastage in transportation.
- Provide opportunities for the wholesale traders to purchase fresh fruits and vegetables, directly from the producers.
- Encourage business communities by providing a competitive market environment for wholesale traders.
- Create opportunities to distribute area specific agricultural products among people in all parts of the island.
- Provide facilities for consumers to purchase food items at cheaper prices.

In the case of the Dambulla Economic Center (DDEC), it functions as a wholesale and retail market for vegetable and fruits. Agriculture commodities are supplied by farmers, collectors, and traders at DDEC. The commodities go through various channels to different markets, i.e., wholesaler, retailer, pola retailer, wholesaler/retailer, Colombo manning market, supermarket, hotel/restaurant, exporter/export supplier, and armed forces.

(6) Commodity Inflow of DDEC

Individual farmers account as the largest suppliers from the Matale District and surrounding districts but the quantity supply depends on the cropping season. A survey on the quantity supply for a limited period was done by HARTI in the report entitled, “Agricultural Marketing Information Systems-A Case Study in Matale District. (Table 3.26)

In the same study, five districts namely Nuwara-Eliya, Anuradhapura, Matale, Colombo, and Kandy contributed 80% of the supply to DDEC as shown in Table 3.27)

Table 3.26 Market Inflow by Type of Suppliers 20– 26 January 2001

Types of Suppliers	Quantity	
	Kg.	% Total
Farmers	952,316	36.44
Collectors	1,200,607	45.94
DDEC Traders	460,510	17.62
Total	**2,613,433**	**100.00**

Source: HARTI Field Survey

Table 3.27 Commodity Supply District to DDEC, 20–26 January 2001

Districts	Quantity	
	kg	% Total
1. Nuwara-Eliya	591,355	22.63
2. Anuradhapura	588,560	22.52
3. Matale	421,234	16.12
4. Colombo	310,460	11.88
5. Kandy	212,750	8.14
6. Kurunegala	170,350	6.52
7. Badulla	84,950	3.25
8. Puttalam	84,000	3.21
9. Ampara	57,350	2.19
10. Moneragala	50,600	1.94
11. Polonnaruwa	15,445	0.59
12. Rathnapura	7,557	0.29
13. Hambantota	6,750	0.26
14. Gampaha	6,715	0.26
15. Kegalle	5,357	0.20
Total	**2,613,433**	**100.00**

Source: HARTI Field Survey

(7) Commodity Outflow of DDEC

In the same study, HARTI surveyed the quantity of outflow by type of buyers in DDEC in a limited time period. (Table 3.28)

Table 3.28 Market Outflow by Type of Buyers, 20–26 January 2001

Types of Buyers	Quantity	
	kg	% Total
1. Wholesalers only	**498,200**	**19.50**
2. Retailers	**1,199,187**	**46.93**
a) Pola retailers	893,955	35.00
b) Retailers –Roadside	57,110	2.20
c) Retailers - Other	248,122	9.70
3. Wholesalers cum retailers	**798,020**	**31.23**
a) Wholesalers and retailers- Other	434,028	16.98
b) Wholesalers and Pola retailers	324,892	12.71
c) Wholesalers and armed force supplier	22,900	0.90
d) Wholesalers and retailers roadside	16,200	0.63
4. Armed forces	**47,500**	**1.86**
5. Hotel/restaurant/supermarket	**8,630**	**0.34**
6. Exporters/exporter suppliers	**3,100**	**0.12**
7. Commission agents	**400**	**0.02**
8. Consumers	**436**	**0.02**
Total	**2,555,473**	**100.00**

Source: HARTI Field Survey

Table 3.29 shows the commodity outgoing from DDEC by district. The commodity going to Jaffna, Kilinochchi, and Mullaitivu are less due to the conflict.

Table 3.29 Commodity outgoing from DDEC by District, 20 – 26 January 2001

Districts	Quantity	
	kg	% Total
1. Kurunegala	343,762	13.45
2. Kandy	315,072	12.33
3. Anuradhapura	262,254	10.26
4. Trincomalee	229,750	8.99
5. Kegalle	225,700	8.83
6. Polonnaruwa	214,652	8.4
7. Matale	170,390	6.67
8. Gampaha	164,750	6.45
9. Colombo	150,103	5.87
10. Batticaloa	89,300	3.49
11. Kalutara	82,000	3.21
12. Puttalam	78,400	3.07
13. Vavunia	45,500	1.78
14. Ampara	44,300	1.73
15. Galle	37,200	1.46
16. Matara	33.040	1.29
17. Badulla	21,000	0.82
18. Nuwara-Eliya	18,800	0.74
19. Rathnapura	17,500	0.68
20. Mannar	12,000	0.47
Total	**2,555,473**	**100.00**

Source: HARTI Field Survey

(8) Traders of DDEC

The commodity specialization among traders is practiced in DDEC. The largest number of traders in DDEC specialized in low country vegetables. This was followed by other traders specializing on both up and low country vegetables, up country vegetables, and potatoes, onions, and other related imported items. There are only two fruits traders as shown in Table 3.30.

Table 3.30 Commodity Specialization in DDEC

Type of Commodity	Number of Traders	% Total
Low country vegetables	76	53.2
Both low & up country vegetables	30	21.0
Up country vegetables	15	10.5
Potato, onion, and related import items	13	9.0
Grains	01	0.7
Dried fish	02	1.4
Areca nut/betel nut	02	1.4
Bags and Coconut	02	1.4
Fruits	20	1.4

Source: HARTI Field Survey

(9) Supermarket Collecting Center

Supermarkets were established in Sri Lanka during the 1980s. Since then, retail outlets expanded rapidly after 2000. Outlets of major supermarkets and hypermarkets in 2010 are summarized in Table 3.31.

Table 3.31 Major Supermarket and Hypermarkets in Sri Lanka, 2010

Markets	Name	No. of Outlets in the Country	No. of Outlets in Colombo District
Supermarket	Cargills	139	53
	Keels Super	62	39
	Laugf Sun Up	28	24
Hypermarkets	Cargills Bigcity	01	01
	ARPICO Supercenters	10	06

Source: "Marketing of Vegetables through Supermarkets: Implication of Procurement Practice for Farmers", HARTI, 2011

Cargills and Keels Super are leading supermarkets and they were established in 1983 and 1991, respectively.

Cargills started infrastructure for purchasing farm products directly from farmers in 1999. It operates seven regional collection centers in Nuwara 'Eliya, Bandarawela, Hanguranketha, Thambuttegama, Thanamanwila, Jaffna, and a distribution center in Wattala at present. The collection centers operate seven days a week and conduct cleaning, grading, and packing into plastic crates for transport to the distribution centers. The center procures products from farmer associations and individual farmers.

Keels Super also operates two collection centers in Nuwara Eliya, Thambuttegama, and a distribution center in Peliyagoda. The collection centers purchase goods thrice a week and carry out cleaning, washing, grading, and packing to plastic crates. The center purchases vegetables from farmers in Thambuttegama and independent procurement agencies in Nuwara Eliya.

The Laugfs Sunup Supermarket operates a distribution center in Madiwela. However, vegetable procurement is carried out by preferred suppliers. The company has two preferred suppliers in Nuwara Eliya for the supply of up-country vegetables, and low country vegetables are procured from Colombo wholesale market before and the DDEC at present. Vegetable supply is carried out by preferred suppliers directly to the retail outlets while the distribution center supplies only 10%.

(10) Constraints of the System of Supermarket

According to HARTI, following constraints exist in the system;

- Quality inconsistency,
- Quality sub-standard,
- Unstable supply,
- Low turnover,
- High operation cost,
- Seasonality of production,
- Price volatility,
- Occasional inability of supermarket to fully absorb the supply,
- Non-conformity to quality standards,
- Inability to supply the volume requirements, and
- Delay deliveries to initial linkage with small-scale farmers.

(11) Fruit Marketing:

Fruits are generally cultivated in small-scale at home gardens or homestead. A small number of relatively larger systematic cultivation is practiced by the private sector. Accordingly, products are marketed mainly through collectors. Small-scale producers sell their product at the boutique in polas or

at roadsides.

Fruit collectors gather during harvesting season by moving to production areas and sell the gathered fruits to wholesalers or larger markets at DECs, Colombo Central Market, processing factories, and supermarket collecting centers and distribution centers.

When mangoes are in season, many collectors buy the entire tree. Others buy quality selected fruit (matured and non-damaged) and sell it at a higher price. Cultivators of large plantations of pineapples sell directly to wholesalers, exporters, and processing factories.

(12) Marketing of Input Material

Agriculture inputs such as fertilizer, agro-chemical, planting materials, and machinery and equipment are distributed and sold in the local market. Fertilizer, agro-chemical, and seeds are distributed through a local agent or dealer in commercial towns and distributed to retailers in small towns or villages. Planting materials such as fruits nursery are registered under DOA and the plants are sold as DOA certified planting material.

Table 3.32 shows the data and information of inputs supply and agriculture enterprises in North Western Province.

Table 3.32 Status of Agricultural Inputs Sales Outlets and Agro Enterprises in NWP

Assistant Director Of Agriculture Zone	Agro Chemical / Fertilizer Outlets	Seeds Outlets	Registered Nurseries	Private Agro Enterprises			
				Processing	Exporters	Manufacturers	Producers
Kurunegala	54	36	17	27	5	7	27
Maho	40	3	5	6	No	1	1
Galgamuwa	46	11	24	11	No	No	2
Kuliyapitiya	29	17	21	10	5	20	15
Wariyapola	70	66	16	34	1	1	9
Dambadeniya	20	10	5	8	2	No	5
Ibbagamuwa	20	20	12	22	No	No	No
Puttalam	50	37	2	2	2	No	25
Anamaduwa	32	25	No	71	2	No	13
Madampe	42	55	19	4	1	2	No
Total	**403**	**280**	**121**	**195**	**18**	**31**	**97**

Source : DOA, NWP

Many seed outlets, fruits and ornamental plants nurseries are registered at the Department of Agriculture operating in the province. Active agricultural area such as provinces that are active for supplying inputs are seen in some parts of north-, central, and Uva provinces but not much active in areas of the northern and eastern part though detail information was not obtained.

(13) Present Government Support Activity in Agricultural Marketing

The government supports the marketing of agricultural products by publicizing market prices of food items and consumer items. Market price information is mainly collected by two organizations, namely, the Department of Census and Statistics (DCS) and Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI).

DCS collects information of producer price or wholesale price, if available in the area, and retail prices including consumer items through their own staff are detailed at the district level. These prices are

printed in the publications.

HARTI was established in 1972 in collaboration with UNDP/FAO and it functions under the Ministry of Agriculture. The institute has developed into a premier national institute in the field of socio-economic research relating to the use of land and water in Sri Lanka and has also developed the requisite skills and infrastructure for providing relevant trainings to farmers, field workers, and managers in both the state and non-state sectors. The objectives and responsibilities are as follows:

- To undertake, coordinate, and foster research in the agrarian sector;
- To coordinate agrarian research undertaken by government departments, local authorities, public corporations, and other institution;
- To investigate the social, economic, and institutional factors basic to the development of agriculture;
- To undertake investigations, research, and studies relating to economic use of land for agricultural purposes;
- To conduct research in the area of agricultural and rural development;
- To provide related training for public officers, members of voluntary and other private organizations, and of the farming community;
- To sponsor and hold conferences, seminars, and workshops at local, regional, and international level; and
- To carry out such research relating to problems of agrarian structure in cooperation with Asian countries in order to serve their regional needs and provide a center for collection and dissemination of information on agrarian problem.

The institute is administrated by a Board of Governors, that includes representatives from ministries, departments and other organizations concerned in the country.

The Board of Governors is responsible for the overall policy and management of the institute. The Secretary to the Minister in charge of the subject of agriculture is the Ex-officio Chairman of the Board. The board is assisted by a Research and Training Committee in planning and monitoring the research and training programs of the institute. This committee is chaired by the Director of the Institute and includes senior researchers and persons of eminence from the outside who have distinguished themselves in the management of research and training in the field related to agricultural and rural development. They are all senior research scientists drawn down from universities, the Central Bank and from other institutions that are engaged in policy related research. There are four divisions available, namely; Research Division, Training Division, Statistics and Data Development Division, and Administration Division. HARTI also publishes the Sri Lanka Journal Agrarian Studies (biannual), Weekly Food Commodities Bulletin, Quarterly Newsletter, Diyawara (irrigation management and related issues), and Govijanathava, Kamanalam (for needs of farmers, extension workers, and students). HARTI is also giving consultancy services to the government, NGOs, and international organizations assignments of feasibility studies and policy analysis.

HARTI field staffs collect information at major commercial markets and publicize it on the daily and weekly base information through broadcasting, website, publications, and others. The website of the Ministry of Agriculture uses HARTI information. Other price information from the DECs is provided in the site by the Ministry of Cooperatives and Internal Trade.

3.7.6 Agriculture Processing

(1) Agriculture Processing

Processing of agricultural products is traditionally carried out at home as dried foods, powdered spices, legume, and cereal flour, and it is used for mixing confectionaries and preparing juice.

These traditional processing and exporting are carried out entirely by the private enterprises. The Export Development Board (EDB) has categorized processed food items of agriculture products and registered them. The EDB information is shown in Table 3.33 Supply, demand, and prices of raw material for processing is shown in Table 3.34.

Table 3.33 Category of Products and Number of Registered Company on Agro Food Processor in EDB

	Category of Agro Food Processing, EDB	No. of Registered Company, 2006/07
1.	Canned Vegetable/Fruits	15
2.	Dried/Dehydrated Fruits/Vegetable	28
3.	Gherkins Fresh in Brine/Vinegar	7
4.	Confectionary & Bakery Products, Biscuits	20
5.	Fruits Juice, Cordials, Instant Drinks	26
6.	Jams, Jellies, Pickles, Chutneys, Fruits Pulp	30
	Total	**126**

Note: Plural Counts of Companies
Source: Processed from Sri Lanka Directory of Exporters, 2006-2007

Table 3.34 Supply, Demand, and Prices of Raw Material for Processing

Raw Material	Present Supply (MT/year)	Demand (MT/year)	Price (Rs/kg)	
			High	Low
Passion fruits	339	400	60	45
Pineapple	1,000	1,000	45	20
Papaya	300	300	55	8
Lime	250	250	35	10
Green chilies	50	50	125	25
Ash Pumpkin	300	300	20	9
Brinjal	20	20	40	10
Big onion	2	2	85	40

Source: Lanka Canarries (Pvt) Litd.

(2) Import and Export of Agricultural Products

Agricultural food commodities which are imported to the country include onion, chilies, pulses, and fruits. A considerable amount of foreign currency is spend for importation of these commodities. However, the country exports food commodity to Maldives, Middle-East, and European countries.

Chilies and onions are imported from major production country mainly coming from India and Pakistan, while pulses are coming from Australia, Canada, and India. Some of these imported items are re-exported in relatively small quantity to Maldives, UK, and other European countries such as Germany, France, Netherlands, Italy, and others.

Temperate zone fruits such as apples, grapes, and oranges are imported from Australia, India, Pakistan, South Africa, China, and other countries.

Traditional food oil used in the country is coconut oil, which is an export item of Sri Lanka. However, a considerable quantity of palm oil and other cooking oils are being imported.

Sri Lanka's fruits are also being exported to Maldives, Middle East, and European countries while the vegetables are exported to the Middle East, UK and other European countries.

Selected import and export commodities sourced from available data of FAOSTAT from 2000 to 2009 except 2006 and 2007 are summarized in annexed Table A 3.19. The table shows that number country traded, number of year data available, average annual quantity (MT), average amount of trade ($'000) and import (CIF) and export (FOB) price ($/MT).

The table further shows some trade features of Sri Lanka. Importers and exporters of Sri Lanka have trade relations with many countries all over the world, even trading in small quantity. Sri Lanka re-exports some items that are imported to other countries. Sri Lanka exports many kinds of local or traditional food items to UK and other European countries, Australia, Canada, and USA, where Sri Lankan nationals reside.

Singapore and UAE are not agricultural countries therefore Sri Lanka mainly exports pulses and other agricultural products to these countries.

In order to promote Sri Lankan exports in the future, there is a possibility to increase items and quantities not only to where Sri Lankan expatriates live, but also to ordinary markets such as supermarkets and local markets in the countries where exporters have connections if the production in Sri Lanka meets the demand type, quality, and quantity. At present, export destinations include countries where Sri Lankan expatriates live. Its limitation considers an increase or expansion of the business. Therefore, it is necessary to consider expanding the export market by tapping ordinary markets in the country of destination.

The Lanka Fruit and Vegetable Producers, Processors and Exporters Association (LFVPPEA) was established in 1986 to create a single platform for all stakeholders involved in the supply chain for the export of fruits and vegetables, both fresh and processed. Membership at present is 34 with 16-member committee.

According to the association, fruits and vegetable export sector has recorded an earnings of US$5 billion in 2010. The association plans to focus on doubling export revenues in 2015. The plan is about the "Agriculture Zone Project" with technical cooperation of the university to achieve the objective. Import and export information of selected commodities are shown in annexed Table A 3.19.

3.7.7 Cost and Profit per Crops

Crop budget analysis has been made for major crops as presented in annexed Tables A 3.20 and Table A 3.21. In the analysis, the following data were used:

- Crop yield; Crop production data (area, yield, production) during 2008-2010 period prepared by the Department of Census and Statistics;
- Crop yield, production cost, prices of farm outputs and inputs; Cost of Cultivation of Agricultural Crops, 2009/10 Maha and 2010 Yala prepared by the Socio-economic and Planning Center, DOA; and
- Crop yield and production cost; 2009 Data from Field Crop Research and Development Institute, DOA, Maha Illupallama.

Financial farm-gate prices of farm inputs and outputs converted into 2012 prices are presented in annexed Table A 3.22. An annual increase rate of prices during 2010-2012 was estimated to be 5% p.a. based on the CCPI (Colombo Consumers' Price Index) and information obtained through field survey

incorporated in this Survey.

3.8 Livestock Production

3.8.1 Overview of Livestock Production

This area has cattle, buffaloes, goat, swine, broiler chicken, and a sizable population of native chickens but cattle rearing is the major income provider for the people. The ruminant stock density per rural family is 1.37, 0.63, 1.20, 0.91, 0.95, and 0.60 for the Eastern, North Western, North Central, Uva, Survey area, and Sri Lanka, respectively. Milk producing herds consist of around 52%, whereas, 48% of the cattle herds are breed for beef consumption.

Limited arable land is a major drawback in shifting some of the population towards a semi-intensive or intensive production system. Cattle, buffaloes and goat herding are usually carried out in available natural pastures and forest margins during cultivation period, but during off-season they are allowed to return to the crop farming area for a very brief period of time.

Present natural pastures and off season (Yala) cultivation land, utilized by cattle owners, can provide only 40-50% of the total dry matter requirement under current production. It is apparent that most of the agricultural by-products go unutilized and wasted as herd owners have no effort to collect, process, and utilize the items for ruminant feeding. Hence, this nutritional problem contributes to the late age maturity, short lactation periods, low milk production, and longer calving intervals which lead to an increase in the number of non-producing ruminants within the herds.

This includes minimal integration with the crop production sector through utilization of crop by-products. Most crop products and by-products are transported to Colombo for feed manufacturing especially for the poultry sector. There is a high potential market for broiler chicken, and the sector survives through transported feeds coming from feed manufactures in Colombo. The swine population used for meat production is not profitable as compared to broiler chickens but with the increase in trend of the tourism sector in the east coast, this industry too can create an impact. Finally, the native chickens provide a strong assurance against malnutrition since these are available in the backyard, as well as contributes to women empowerment.

Other areas outside the survey area are presently highly saturated and will have very little impact on meeting the targets set by “Mahinda Chinthana: Vision for the Future” (2010). Hence, it is in the dry zone that has not been given much attention in the livestock production endeavor. This area may be considered for further exploration with minimal interventions of the livestock sector. It needs gradual changes and might be able to utilize produce as by-products for high quality nutritional food products that can help the country to be self sufficient in milk and other livestock production instead of throwing it away or laid to waste.

(1) Cattle

The number of cattle in the survey area is shown in Table 3.35. Approximately, 60% of the cattle population are indigenous types not suited for milk production but are reared for multifaceted reasons, such as natural asset, draught, fertilizer production, and lastly, milk for home consumption. An extensive system of management dominates the cattle sector. Indigenous cattle needs to be conserved in a sustainable manner and requires the reduction of the population to a manageable level without upsetting the meat production process. There has no obvious change in the numbers of cattle at the national level.

The target is to increase the number of milking cows as well as substitute non-dairy cows into milking cows. Nutrition plays an important role in reducing the age at first calving, increase lactation lengths, and reduce the calving intervals so that non-dairy cows reduce in numbers. Animals not responding to better nutrition should then be changed with better animals by genetic improvement through artificial insemination (AI) or natural mating (NM) through bulls from cross-bred cows and indigenous female cattle in order to produce more milk.

In the survey provinces, the number of cattle is about four-fold than in other provinces. Five provinces play an important role in milk and meat production. The main problems encountered are low composition rate of cross bred cattle per total number and high rate of indigenous cattle in the herd as a result of extensive feeding style and scarcity of nutritive fodder supply from grazing pasture.

Table 3.35 Number of Cattle in the Survey Area

Year	2003	2004	2005	2006	2007	2008	2009	2010
Northern	163,503	176,285	166,790	177,090	186,210	189,505	109,120	180,390
Eastern	166,300	175,000	175,100	182,230	186,910	214,810	163,570	211,090
North Western	251,367	244,920	256,070	224,190	226,420	214,260	207,980	209,700
North Central	177,700	182,300	187,550	194,840	194,050	191,455	192,440	186,710
Uva	146,500	144,300	147,730	144,400	150,460	139,290	142,020	140,180
Total of Five Provinces	**905,370**	**922,805**	**933,240**	**922,750**	**944,050**	**949,320**	**815,130**	**928,070**
Total in the National	**1,148,370**	**1,166,905**	**1,188,110**	**1,184,710**	**1,206,490**	**1,195,610**	**1,136,860**	**1,169,670**

Source: Agriculture and Environmental Statistics Division, Department of Census and Statistics

(2) Buffaloes

The number of buffaloes in the survey area is shown in Table 3.36. Raising buffaloes is faced with a crisis due to the increase in numbers of non-dairy buffaloes and bull buffaloes. This is attributed to the ban on slaughtering of buffaloes which is strictly implemented in the country. Although the calving rate of male and female is the same, bull buffaloes are increasing but cannot be used for milk production. Thus, this is an impediment to the growth of the buffalo sector.

Table 3.36 Number of Buffaloes in the Survey Area

Year	2003	2004	2005	2006	2007	2008	2009	2010
Northern	5,740	8,700	8,750	8,750	8,390	7,900	1,790	7,990
Eastern	27,190	39,000	39,800	40,500	41,450	51,110	75,210	80,450
North Western	78,030	80,400	81,100	83,100	83,400	70,160	69,460	57,840
North Central	46,970	47,500	48,500	49,600	51,800	51,390	74,600	83,020
Uva	15,410	16,000	16,900	15,826	15,070	18,220	33,440	48,400
Total of Five Provinces	**173,340**	**191,600**	**195,050**	**197,776**	**200,110**	**198,780**	**254,500**	**277,700**
Total in the National	**280,480**	**301,500**	**307,650**	**314,076**	**318,310**	**318,530**	**371,790**	**422,650**

Source: Agriculture and Environmental Statistics Division, Department of Census and Statistics

(3) Goats and Sheep

The number of sheep/goats in the survey area is shown in Table 3.37. The number of goats is gradually decreasing owing to the lack of establishing a clear goat breeding policy for a long time and a consumer's demand of mutton has been higher than its supply capacity. The slaughtering of goats may be done easily without any limitation to the traditional habit. Numbers of sheep and swine are not so

many and are raised in limited areas. In the future, it is essential to increase the number for meat production based on meat demand and higher prices in the markets. Furthermore, goat has not been used for milk production which is the main thrust area. The dual purpose of goat population either be used for meat and milk production may address the negative growth observed in goats.

Table 3.37 Number of Sheep/Goats in the Survey Area

Year	2003	2004	2005	2006	2007	2008	2009	2010
Northern	90,910	102,570	106,250	106,820	107,970	102,910	98,890	93,780
Eastern	72,370	65,980	51,990	49,130	46,000	52,690	57,220	64,840
North Western	88,970	88,010	73,780	76,560	82,230	66,600	68,410	65,135
North Central	54,230	52,490	52,730	49,030	50,640	50,660	50,600	50,300
Uva	21,470	19,800	20,460	19,900	21,200	20,490	19,700	20,175
Total of Five Provinces	**327,950**	**328,850**	**305,210**	**301,440**	**308,040**	**293,350**	**294,820**	**294,230**
Total in the National	**423,880**	**416,870**	**405,250**	**395,320**	**405,080**	**387,240**	**385,460**	**381,375**

Source: Agriculture and Environmental Statistics Division, Department of Census and Statistics

The numbers of sheep and goats are decreasing gradually. It may be caused by low breeding knowledge of farmers, high demand for mutton, theft, etc.

(4) Poultry

The number of poultry in the survey area is shown in Table 3.38. Although the poultry industry is developing, it faces many obstacles as mentioned in the previous section (Livestock Master Plan). There is a severe competition between domestic sources and cheap imports due to high cost of production. The bulk of agricultural products and by-products are utilized by the poultry sector, hence, this can be a hindrance to the main thrust areas of milk production. Therefore, the improvement of efficiency in poultry production from parents to commercial operations is very important. The livestock development plan suggests reduction of production cost in order to afford rational prices to consumers. It includes the improvement of bio-security, productivity in breeder and commercial farms, and quality of poultry products.

The commercial poultry sector has yet to come a long way to these areas. Most families owned native or cross-reared chickens scavenging around their backyards that are essential to food security, poverty alleviation, and empowerment of women.

Table 3.38 Number of Poultry in the Survey Area

Year	2003	2004	2005	2006	2007	2008	2009	2010
Northern	820,900	803,900	880,420	868,050	787,210	746,210	645,570	706,520
Eastern	696,400	611,300	562,630	689,120	804,240	871,940	785,770	764,000
North Western	3,506,700	4,205,800	4,117,570	5,752,000	5,428,120	5,727,490	5,975,460	6,061,440
North Central	431,200	515,800	637,030	814,080	685,820	1,064,360	850,220	783,910
Uva	207,400	220,900	260,260	278,840	284,410	289,010	315,580	262,740
Total of Five Provinces	5,662,600	6,357,700	6,457,910	8,402,090	7,989,800	8,699,010	8,572,600	8,578,610
National Total	9,772,100	11,041,960	11,635,770	13,116,920	13,778,610	14,331,170	13,615,290	14,018,320

Source: Agriculture and Environmental Statistics Division, Department of Census and Statistics

3.8.2 Milk and Dairy Production

Annual milk production is shown in Table 3.39. Milk production is increasing gradually but not enough to meet the target levels. The average milk production of indigenous cows is less than 1 L/day whereas

cross bred cows produced 2-5 times more. The dairy cow productivity is highly dependent on the nutritional status. The introduction of improved breeds brings a significant improvement on the productivity and profitability for many smallholders, however, simultaneous improvement in nutritional management is required to achieve the targets. Poor level of feeding for young stocks causes prolonged maturity and calving interval. Minimizing nutritional deficiencies and improving farmer's knowledge on feeding and breeding can effectively help in increasing the number of superior quality animals for increase milk production.

Table 3.39 Annual Milk Production by District in the Survey Areas 2002-2009

Province	District	2002	2003	2004	2005	2006	2007	2008	2009
Northern	Jaffna	7,416	7,438	7,452	7,661	7,695	8,122	2,290	5,716
	Kilinochchi	3,118	3,190	3,308	3,120	3,594	3,712	1,214	0
	Mannar	2,369	2,491	2,484	3,436	2,618	2,934	1,428	2,429
	Vavunia	2,492	2,560	2,628	2,501	2,805	3,049	4,910	4,257
	Mullaitivu	2,843	3,247	3,294	2,681	3,505	3,971	1,529	0
Eastern	Batticaloa	7,511	9,414	10,260	3,356	10,525	11,185	11,996	12,984
	Ampara	3,110	4,810	4,950	10,210	5,184	5,598	13,987	16,792
	Trincomalee	3,970	5,386	6,120	5,038	6,222	6,354	6,944	8,033
North Western	Kurunegala	27,825	32,976	32,940	33,112	33,495	29,884	21,403	20,746
	Puttalam	5,500	6,530	6,786	6,108	6,970	8,032	8,175	7,622
North Central	Anuradhapura	27,825	32,976	32,940	33,112	33,495	29,884	21,403	20,746
	Polonnaruwa	5,500	6,530	6,786	6,108	6,970	8,032	8,175	7,622
Uva	Badulla	15,952	16,117	16,106	16,501	16,228	17,622	13,610	14,583
	Moneragala	4,067	6,034	6,048	5,000	5,829	6,512	7,037	12,693
Total	**Five Provinces**	**119,498**	**139,698**	**142,103**	**137,942**	**145,134**	**144,889**	**124,101**	**134,223**
National Rotal		**152841**	**152,841**	**186,804**	**190,296**	**192,742**	**196,623**	**202,009**	**208,093**
% from National Total		**78.2%**	**74.8%**	**74.7%**	**71.6%**	**73.8%**	**71.7%**	**59.6%**	**57.5%**

Source: Sri Lanka Livestock Statistics 2009, Ministry of Livestock &Rural Community Development

Table 3.40 shows the dairy milk production per head. As shown in the table, the ranges of milk production for neat cattle among the districts is so wide from 11.7 L/day to 1.19 L/day. The district with high percentage of cross bred cows produces quite large amount of milk. This indicates that there is a need for quick replacement of indigenous cows to cross bred cows in order to increase milk production rapidly.

Table 3.40 Average Milk Production per Head

Province	District	Neat Cattle			Buffalo		
		Milk (L)	Number	L/day	Milk (L)	Number	L/day
Central	Kandy	61,566	9,782	6.29	506	169	2.99
	Matale	29,229	7,321	3.99	1,084	633	1.71
	Nuwara Eliya	90,975	7,751	11.74	101	57	1.77
Southern	Galle	9,150	3,383	2.7	4,428	2,497	1.77
	Matara	6,889	2,850	2.42	2,776	1,755	1.58
	Hambantota	12,377	10,423	1.19	14,731	13,984	1.05
Western	Colombo	8,439	2,243	3.76	4,172	1,198	3.48
	Gampaha	28,420	8,145	3.49	3,463	1,322	2.62
	Kalutara	8,915	3,240	2.75	5,252	2,674	1.96
North Central	Polonnaruwa	18,042	10,170	1.77	2,975	3,515	0.85
	Anuradhapura	68,371	40,702	1.68	16,442	16,425	1
North Western	Kurunegala	103,048	31,533	3.27	6,044	4,338	1.39
	Puttalam	33,783	15,982	2.11	4,024	3,471	1.16

Province	District	Neat Cattle			Buffalo		
		Milk (L)	Number	L/day	Milk (L)	Number	L/day
Uva	Badulla	62,344	11,532	5.41	157	126	1.25
	Moneragala	16,463	8,225	2	15,459	8,565	1.8
Total	Sri Lanka	**558,011**	**73,282**	**3.22**	**81,614**	**60,729**	**1.34**

Source: Modified Department of Census and Statistic

The following are main issues in milk production:

- Substitution of indigenous cows with cross bred cows;
- AI for intensive and semi-intensive dairy farms;
- Low production of semen;
- Improved bulls for extensive dairy farms;
- Increasing of goat milk in informal market or self-consuming;
- Constraints at the national levels; and
- Lack of AI (LDIs) and mobility of AI (LDIs).

Project support is necessary for semen production and production of bulls in DAPH farms in Polonnaruwa for cross breeding.

3.8.3 Milk Collecting System and Marketing

Milco (Pvt) Ltd is engaged in milk collection, processing, and marketing of processed dairy products. The company holds a market share of about 54% of the total milk collected in the formal market. Milk collection is managed by nearly 2000 farmer managed societies (FMSs) spread throughout the country and established by the company. Nestle' Lanka Ltd. is also a major player and is a subsidiary of Nestle' in the dairy processing. It is the second largest milk processor next to Milco Ltd. and is engaged in producing a wide variety of dairy products including full cream milk powder. Kotmale Dairy Products, Lucky Lanka Dairies (Pvt) Ltd, Lanka Milk Foods (Pvt) Ltd, and Fonterra Brands (Pvt) Ltd are the other players of sizeable milk processing engagement. Also, there are several medium-scale and small-scale private sector organizations and cooperatives involved in milk collection and milk processing in the country. However, private corporate sector involvement in milk production is virtually absent with only Lanka Dairies Ltd. engaged in running two large farms in the up-country. The government actively promotes the involvement of the private sector in supplementing the public sector efforts for the development of the dairy sector.

The Table 3.41 shows the range of dairy products and production of milk.

Table 3.41 Dairy Products of Milco

Item	Unit	2003	2004	2005	2006	2007	2008	2009
Liquid Milk	1000 L	14,227	14,168	13,800	13,548	15,091	14,629	13,762
Milk Powder	ton	3,180	3,300	3,563	4,098	3,831	4,097	4,178
Butter	ton	548	539	573	627	405	611	604
Ghee	ton	26	44	43	102	217	76	41
Cheese	ton	35	32	37	42	39	40	33
Ice Cream	1000 L	1,429	1,470	1,975	2,369	2,962	2,918	2,782
Fermented Products	1000 L	2,406	2,857	3,243	3,606	3,886	4,297	4,519

Source: MILCO (Pvt) Ltd

The number of milk collecting centers and processing places for dairy products in five provinces are given in Table 3.42.

Table 3.42 Milk Collecting Centers and Places of Production

District	Number of Collecting Centers			Places of Production of Value Added Milk Products		
	2008	2009	2010	2008	2009	2010
Jaffna	17	33	31	2	8	7
Kilinochchi	na	na	na	na	na	na
Mannar	9	4	-	na	na	-
Vavunia	21	13	24	2	9	12
Mullaitivu	na	na	8	na	na	-
Batticaloa	12	14	17	1	1	9
Ampara	39	76	76	51	102	80
Trincomalee	28	37	44	14	16	22
Kurunegala	505	524	513	167	169	160
Puttalam	127	136	149	35	35	29
Anuradhapura	301	325	322	96	62	68
Polonnaruwa	119	126	162	86	105	89
Badulla	58	73	84	22	13	17
Moneragala	53	54	71	91	100	87
Total of Five Provinces	**1242**	**1365**	**1438**	**563**	**603**	**561**
National Total	**2,552**	**2,673**	**2,895**	**2,559**	**2,280**	**2,695**

Source: Department of Census and Statistic

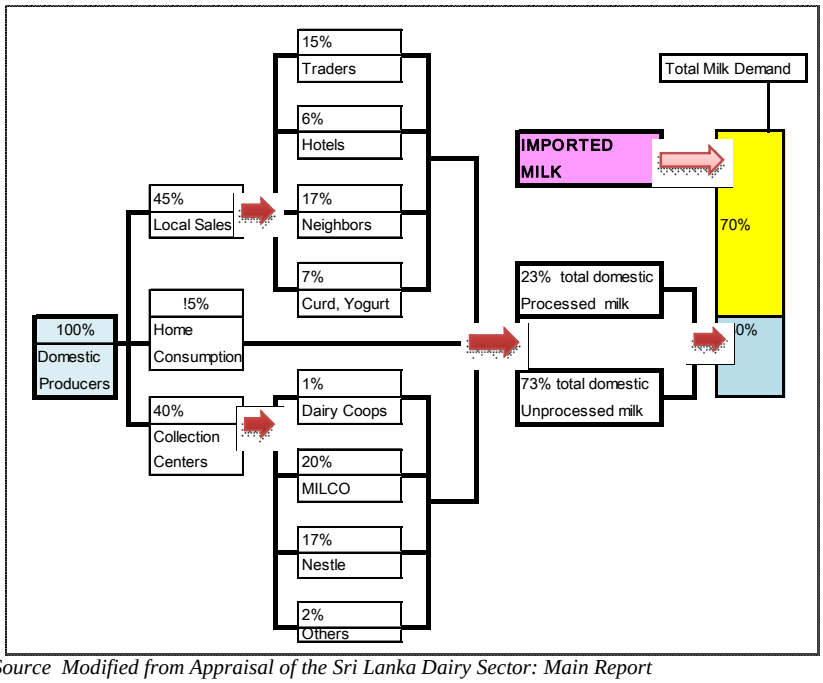
The number of collecting centers and places of production of value added milk products are increasing. Five survey provinces share about 50% of milk collecting centers although places of production of value added milk products are only 20%.

Marketing of milk in Sri Lanka is complex and varied. Domestic milk producers sell directly to processors, consumers, hotels, cafeterias, and canteens. They also provide some milk produce for home consumption. Cooperatives are organized primarily for the purpose of collecting and selling milk to either hotels or processors.

The dairy market consists of small primary dairy cooperatives, larger local cooperatives, district-level dairy cooperatives, dairy cooperative unions, and networks of collection points and milk chilling centers operated by cooperatives or main dairy processors.

Most farmers are not members of cooperatives or farmer societies. There are a few large scale processors who have organized farmers to sell their milk to them.

Contributions to the informal market are small private milk collectors, small local processors of traditional dairy products, retailers and dairy producers themselves, who sell directly to hotels and restaurants, or to consumers. Small local processors of modern dairy products also play a role.



Source Modified from Appraisal of the Sri Lanka Dairy Sector: Main Report

Figure 3.7 Dairy Market Channel Flow Diagram

3.8.4 Meat Production

Table 3.43 shows the number of slaughtered animals by type of livestock in the survey area.

Table 3.43 Slaughtered Animals by Type of Livestock in the Survey Area

Type of Livestock		2003	2004	2005	2006	2007	2008	2009	2010
Cattle	Total of Five Provinces	71,782	73,279	81,337	67,527	79,335	80,104	77,540	79,866
	National Total	**216,066**	**206,979**	**215,181**	**187,689**	**186,084**	**163,716**	**168,002**	**203,520**
Goat	Total of Five Provinces	48,027	50,715	52,221	48,942	45,436	45,581	49,598	49,283
	National Total	**70,449**	**71,605**	**74,601**	**68,171**	**64,283**	**58,288**	**62,635**	**68,351**
Swine	Total of Five Provinces	8,638	6,970	6,899	2,668	3,243	10,183	2,909	4,147
	National Total	**29,752**	**29,240**	**30,249**	**30,540**	**31,861**	**21,481**	**22,265**	**19,539**

Slaughter houses have an important role in providing a hygienic and quality meat for consumers. The real situation of slaughter houses at present are in poor standard or are in a rather critical condition.

FAO commented that “there is an old colonial-style city abattoir for cattle in Colombo and several small pig abattoirs in the suburb. All are hygienically obsolete, and new construction is urgently needed. (Source: Slaughterhouses for red-meat animals in APHCA-member countries/ FAO)”

Since the process of slaughtering is basically done on the floor, carcasses are also placed on the same floor, which can be easily contaminated with bacteria and other parasites. The slaughtering method is old fashioned and without any technical improvements. Needed activities in slaughtering up to the catering are not carried out properly.

Photo 3.3 Abattoir in Kandy

Photo 3.4 Abattoir in Trincomalee

The following are major findings in slaughterhouse:

- Improvement of present slaughter houses to fit acceptable standards;
- Construction of small scale slaughter houses in the districts;
- Proper training opportunities to the butchers on slaughtering techniques;
- No comprehensive slaughtering act;
- Lack of meat inspection and veterinarian; and
- Lack of inspection skill to suit present requirement.

3.8.5 Livestock Breeding and Management

Breeding services provided to the dairy farmers in the five provinces are needed to be improved significantly. AI coverage is limited due to limited funds and lack of sufficient human resources (LDI, PAIT etc.). There is a sizable population of indigenous cattle and buffaloes. These animals are kept for multifaceted purposes such as natural asset, draught, fertilizer, and lastly, milk and meat for home consumption. Some of these factors such as draught and partly fertilizer are now obsolete. Hence, a sizable number of these populations can be converted into food production, i.e., milk and meat, through crossbreeding. Maintaining the status quo on these livestock can be a burden on land, water, and environment. Therefore, it would be necessary to reduce this population to a sustainable conservation of indigenous cattle and buffalo in Sri Lanka and replace with dual purpose cross bred cows for more milk and meat.

Table 3.44 Semen Production, AI, PD, and Calves

Year	Semen Production (Production)	Artificial Insemination (AI)	Pregnancy Diagnosis (PD)	AI Calves (Calves)
2000	165,430	131,389	44,286	37,891
2001	214,945	134,919	51,715	41,372
2002	184,715	125,719	40,614	40,928
2003	137,915	127,101	38,275	41,410
2004	137,568	127,319	38,311	40,723
2005	137,804	142,220	34,449	34,272
2006	143,010	152,876	36,134	35,299
2007	155,076	160,246	39,471	40,636
2008	162,975	167,441	43,824	38,324
2009	139,388	182,053	48,612	51,581
2010	136,920			
2011	220,134			

Source: Department of Animal Production and Health Central Artificial Insemination Station

The conception rate for one artificial insemination is very low, having only a success rate of 22.8% in 2008 and 28.3% in 2009. Low conception rate of AI means four times of AI are needed to make a cow pregnant therefore, the semen center has to produce frozen semen four times more than the demand at present. The causes of low conception rate are attributed to the following; outdated AI techniques of Livestock Development Instructors (LDIs), insufficient LDIs in regions, low levels of feeding management and poor nutritive fodders, low detection of estrus (heat) cows by farmers, poor technical knowledge of farmers, poor mobility of LDIs, frequent long distance moving of indigenous herds, and so on. Consequently, farmers have resorted to utilize scrap bulls to overcome this weakness in the AI system. And for this reason, there is an urgent requirement to supply good quality bulls for natural mating in this system.

Table 3.45 shows the available staff and mobility to implement efficient and effective AI program but not adequate to meet the need.

Table 3.45 Number of Staff and Mobility

Province	DS	Area (ha)	Veterinary Surgeons	Number of LDI	Vehicles	Motorcycles
Eastern	45	962,242	54	70	13	11
NCP	29	1,065,857	39	71	20	32
NWP	47	806,426	37	104	26	71
Uva	26	862,480	28	37	15	15
Northern	34	893,743	38	124	8	48
Total	181	4,590,748	196	406	82	177

Source: The Provincial Director in Each Province

Annexed Table A 3.23 shows the number of vaccination for cattle, buffaloes, and goat. In view of eradicating hemorrhagic septicemia (HS), foot and mouth disease (FMD), and black quarter (BQ), it is required to continuously vaccinate 70% of the cattle, buffaloes, and goat population for five years. However, the vaccine supply is short with the target.

The following are major issues in livestock breeding and management:

- Support to operate full corporation of VSs and LDIs,
- Adequate provision of materials, vehicles, and motorcycles; and
- Adequate supply of medicine, equipment, vaccine, frozen semen etc.

3.8.6 Food Supply for Livestock

Table 3.46 shows the land use and pasture yield dry matter (DM). Each field gives a reasonable special rate to utilize according to the availability of DM. Total DM production in Sri Lanka would be assumed as 951, 200 MT.

Table 3.46 Dry Matter Production in Sri Lanka

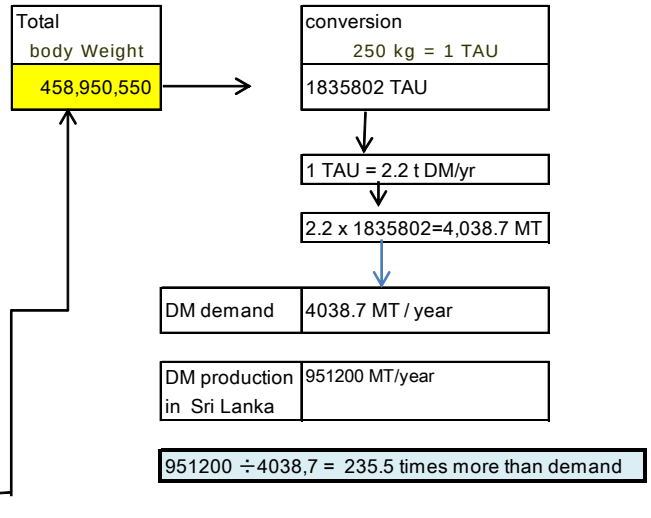
Land under pasture and estimate yield of pasture	Area (ha)	Dry matter availability (M.tons)	Percent utilization	Dry matter usage (MT)
Un-irrigated highland in the dry zone	325,000	325,000	40%	130,000
Villus in dry zone	50,000	200,000	30%	60,000
Land under coconut (30%)	140,000	560,000	60%	336,000
Hill country land under tea (5%)	4,500	31,500	80%	25,200
Patana lands in mountain regions	55,000	55,000	10%	5,500
Herbage from grazing land (2 months of	120,000	120,000	80%	96,000

Land under pasture and estimate yield of pasture	Area (ha)	Dry matter availability (M.tons)	Percent utilization	Dry matter usage (MT)
grazing between seasons)				
Roadside grasses	5,000	10,000	45%	4,500
Grazing land in the wet zone	20,000	40,000	35%	14,000
Fallow paddy land	150,000	300,000	50%	150,000
Improved pasture in farms	13,000	130,000	100%	130,000
Total	**882,500**	**1,771,500**		**951,200**

Source: JICA Survey Team

Table 3.47 Dry Matter Supply in Sri Lanka

Animals(head)		2010 **	Body Weight	Total weight
Milk Cows	Milking at Present	248,740	300	74,622,000
	Milking not at Present	275,610	300	82,683,000
Other Cows		206,260	250	51,565,000
Bulls		177,650	350	62,177,500
Calves		261,410	150	39,211,500
Milk Buffalo	Milking at Present	89,900	350	31,465,000
	Milking not at Present	80,230	350	28,080,500
Other Buffaloes		67,340	350	23,569,000
Buffalo Bulls		104,370	400	41,748,000
Buffalo Calves		80,810	200	16,162,000
Goats		373,465	20	7,469,300
Sheep		7,910	25	197,750
		Total Body Weight		458,950,550



Source: JICA Survey Team

Based on Table 3.47, it was indicated that the balance of DM and livestock demand conversion from total body weight into tropical animal unit (TAU) is utilized in many countries with dry area. Conversion factors are: 250 kg of body weight equals 1 TAU and 1 TAU requires 6.0 kg-DM/day. The TAU shows the demand for minimum body maintenance but not exclude production. It requires to add more nutritious food such as high protein food or concentrations to increase milk production or quick body weight growth.

Although the national production of DM is 230 times more than the yearly demand of livestock, it expressed a chronic food shortage of fodder for animals in the study areas. It seems that the distribution of total national DM production is highly unbalanced, and that there is a high production in southern wet area and in low dry zone. In addition to this fact, the grazing system in Sri Lanka has very short distance in a day, morning is used for grazing and evening to go back home. The one day grazing takes about a distance of about 20 km diameter. This short distance grazing causes heavy density of livestock population in limited pastures due to the overlapping of many grazing herds.

Table 3.48 shows the possible DM production in the survey area according to the fodder production based on the utilization of land. Some lands lost their capacity to produce fodder due to chena cultivation particularly done in government lands. Most lands dedicated to Rubber, Sand, and Tea plantations has scarcity of grasses for forage. Although forest land also has the capacity to produce forage, grazing is prohibited and it may be assumed that there is 10% fodder in marginal areas of the forests. Total DM productive capacity of five provinces is assumed at 1,441 MT and the table below indicates the total requirement of 3,000 MT of DM for all ruminant livestock in the five provinces. It can be said that target five provinces always experience chronic shortage of DM, and therefore, indigenous cattle is suitable to

rear in areas of scarce fodder supply.

Table 3.48 Production of Dry Matter (tons)

Province	Area (ha)	Coconut	Forest	Grassland	Home garden	Others	Paddy	Scrub
Eastern	962,242	6,119	288,304	1,034	81,346	122,373	189,099	257,981
North Central	1,065,857	958	381,473	9,842	99,860	108,571	172,550	231,914
North Western	806,426	268,052	95,614	1,612	121,071	76,589	130,138	70,436
Northern	893,743	11,164	413,950	1,090	86,716	97,738	117,085	135,531
Uva	862,480	60	271,334	13,849	127,715	73,057	44,060	190,765
Total	**4,590,748**	**286,353**	**1,450,675**	**27,427**	**516,708**	**478,328**	**652,932**	**886,627**
Forage Availability (MT) /hectare		4.0	2.0	1.0	0.1	0.5	2.0	0.5
Percetn Forage Utilization		50%	10%	25%	60%	25%	30%	20%
Dry Matter Production (MT)		572,706	290,135	6,857	31,002	59,791	391,759	88,663
Total								**1,440,913**

Source: JICA Survey Team (land use data from the Statistics Department)

Table 3.49 Total Demand of Dry Matter (DM) in the Survey Areas

Province	Species	Number	Total Body Weight (kg)	Total TAU (kg)	Total Dry Matter (MT)	Total Provincial DM Demand (MT)
Northern	Cattle	180,390	47,849,069	191,396	421.1	
	Buffalo	7,990	2,666,002	10,664	23.5	461.0
	Goat/Sheep	93,780	1,875,600	7,502	16.5	
Eastern	Cattle	211,090	55,992,350	223,969	492.7	
	Buffalo	80,450	26,843,537	107,374	236.2	740.4
	Goat/Sheep	64,840	1,296,800	5,187	11.4	
North Western	Cattle	209,700	55,623,648	222,495	489.5	
	Buffalo	57,840	19,299,319	77,197	169.8	670.8
	Goat/Sheep	65,135	1,302,700	5,211	11.5	
North Central	Cattle	186,710	49,525,471	198,102	435.8	
	Buffalo	83,020	27,701,062	110,804	243.8	688.4
	Goat/Sheep	50,300	1,006,000	4,024	8.9	
Uva	Cattle	140,180	37,183,228	148,733	327.2	
	Buffalo	48,400	16,149,499	64,598	142.1	472.9
	Goat/Sheep	20,175	403,500	1,614	4	
Total						**3,033.5**

Source: JICA Survey Team (Land use data from the Statistics Department)

The year round scarcity of good quality forage and fodder is a serious problem in the genetic potential of improved cattle and buffaloes. During dry season, additional supply of forage and fodder is needed to meet the levels of maintenance requirements.

At the same time, the livestock industry is highly dependent on fodder supply from farming crop residues, agricultural by-products, etc. Livestock industry can also provide valuable organic fertilizer which is cheaper than other commercial chemical fertilizers. Since there is a strong relationship between crop farming and livestock industry, an integration of both is the key to increase future productivity and profit in each sector.

The following are major issues in food supply to livestock.

- Integration in livestock and agriculture;

- Production of silage with rice straws;
- Production of organic manure;
- Increased nutritive forages production;
- Introduction of new varieties of fodder grasses and fodder trees; and
- Study to grow these grasses and trees at the national, provincial, and farmers levels.

3.8.7 Overall Issues in the Livestock Sector Development

The following are constraints for Livestock Sector Development:

- High cost of cattle feed (60% of the local coconut meal production is exported while local farmers faced higher price).
- Non-availability of quality pasture/fodder and shortage of improved grasses, pasture seed and lands for grass cultivation.
- No efficient breeding services. AI coverage is limited due to inadequate funds and lack of sufficient human resources (LDI, PAIT etc.).
- Illegal slaughter of dairy animals.
- Higher number of animals slaughtered annually which is almost similar to number of AI born calves and hence the cattle population growth rate is negative.
- No ambulatory mobile system of services at the district level (treatment/training etc.)
- Less attention for calf care program.
- Unsatisfactory evening milk collection system in rural areas.
- Inefficient extension services for the development of livestock production.
- Poor breeding efficiency of cows due to longer calving intervals and age at 1st calving.
- Even though the large proportion of herd is upgraded with exotic animals the potential yield is not achieved due to poor management and low nutritional levels.
- Inadequate incentive and attention for integration of dairy farming with crop cultivation.

3.9 Irrigation and Rural Infrastructure

3.9.1 Major and Minor Irrigation Schemes

Irrigation development in Sri Lanka began way back 2500 years ago. Initially, irrigation development started with small village tanks and simple canal systems. Later, these were developed so that river flow across shallow valleys could be intercepted to build large reservoirs. Water flowing down perennial rivers was diverted by weirs and conveyed through long earth canals to be impounded in large reservoirs at appropriate locations to irrigate large areas of land in dry zones. However, most of these irrigation systems were abandoned after the 13th century with the shift of kingdoms and drift of population towards the south west. In the 19th century, some of the tanks such as the Kalawewa Tank, Tissawewa Tank, and Kantale Tank, were restored. In 1952, Gal Oya, a large multipurpose scheme was launched followed in the 1960s by the Mahaweli Project, the largest multipurpose scheme. The Mahaweli Project envisaged the development of above 365,000 ha of irrigable lands in dry zone and generation of about 508 MW of hydropower. In addition to Mahaweli Scheme, there are about 542 major and medium irrigation schemes and about 24,199 working minor irrigation schemes in Sri Lanka. The extent of the command area in each major or medium scheme exceeds 80 ha while the extent of command area in each minor scheme is less than 80 ha.

Of the 542 major and medium irrigation schemes, 322 are reservoirs, 112 are anicut, 96 are drainage, flood protection and salt-water exclusion, and 12 are lift irrigation schemes. The extent of cultivated land under these schemes is 365,000 ha, which is 57% of the irrigated area under major, medium, and minor schemes. In addition, about 172,500 ha are cultivated under the Mahaweli Scheme. Of the 24,199 minor irrigation schemes, 11,257 are village tanks and 12,942 are anicuts. The extent of cultivated land under these schemes is 243,685 ha or about 43% of the irrigated area under major, medium, and minor schemes.

There are 65 major irrigation schemes including parts of the Mahaweli Scheme, 283 medium irrigation schemes and 15,145 working minor irrigation schemes in the survey area. The extent of cultivated land under major (including Mahaweli Scheme) and medium schemes is 331,934 ha, which is 67% of the total irrigated extent of the survey area. Table 3.50 shows the district-wise summary of major and medium irrigation schemes in the survey area.

Of the 15,145 working minor irrigation schemes in the survey area, 10,270 are village tanks and 4875 are anicuts. The extent of cultivated land under these schemes is166, 514 ha or about 33% of the total irrigated area of the survey area. Table 3.51 shows the district-wise summary of minor irrigation schemes in the survey area.

Table 3.50 Summary of Major and Medium Irrigation Schemes in the Survey Area

Province	Major Schemes		Medium Schemes		Total Extent (ha)
District	No of Schemes	Extent (ha)	No of Schemes	Extent (ha)	
North	**4**	**15,011**	**57**	**29,527**	**44,538**
Jaffna	0	-	0	-	-
Kilinochchi	0	-	9	13,831	13,831
Mannar	2	12,461	9	2,407	14,868
Vavunia	1	1,674	19	2,854	4,528
Mullaitivu	1	876	20	10,435	11,311
East	**21**	**103,109**	**56**	**23,210**	**126,319**
Batticaloa	7	20,868	15	5,861	26,729
Ampara	9	66,907	20	13,103	80,010
Trincomalee	5	15,334	21	4,246	19,580
North – West	**12**	**19,406**	**40**	**6,502**	**25,908**
Kurunegala	9	15,476	21	3,639	19,115
Puttalam	3	3,930	19	2,863	6,793
North Central	**18**	**101,050**	**91**	**14,317**	**115,367**
Anuradhapura	12	47,854	82	9,904	57,758
Polonnaruwa	6	53,196	9	4413	57609
Uva	**10**	**11,180**	**39**	**8,622**	**19,802**
Badulla	4	4,159	13	4,335	8,494
Moneragala	6	7,021	26	4,287	11,308
Total	**65**	**249,756**	**283**	**82,178**	**331,934**

Source: Department of Irrigation (Central and Province), MASL and DAD

Table 3.51 Summary of Minor Irrigation Schemes in the Survey Area

Province	No of Irrigation Schemes				Extent (ha)		
	Working		Abandoned		Working		
District	Tank	Anicut	Tank	Anicut	Tank	Anicut	Total
North	**1,638**	**18**	**156**	**7**	**26,053**	**361**	**26,414**
Jaffna	771	0			7,679	0	7,679
Kilinochchi	224	0			3,896	0	3,896
Mannar	61	3	51	6	1,164	25	1,189

Province	No of Irrigation Schemes				Extent (ha)		
	Working		Abandoned		Working		
District	Tank	Anicut	Tank	Anicut	Tank	Anicut	Total
Vavunia	453	12	101	1	10,429	224	10,653
Mullaitivu	129	3	4	0	2,885	112	2,997
East	**741**	**50**	**393**	**51**	**16,605**	**330**	**16,935**
Batticaloa	132	4	110	14	3,075	213	3,288
Ampara	181	46	87	37	3,539	117	3,656
Trincomalee	428	0	196	0	9,991	0	9,991
North – Western	**4,935**	**720**	**252**	**137**	**41,906**	**8,435**	**50,341**
Kurunegala	4,192	657	77	104	33,152	7,047	40,199
Puttalam	743	63	175	33	8,754	1,388	10,142
North Central	**2,412**	**139**	**701**	**18**	**48,919**	**4,801**	**53,720**
Anuradhapura	2,333	8	665	1	46,355	161	46,516
Polonnaruwa	79	131	36	17	2,564	4,640	7,204
Uva	**544**	**3,948**	**279**	**120**	**4,104**	**15,000**	**19,104**
Badulla	259	3623	128	73	1,946	12,813	14,759
Moneragala	285	325	151	47	2,158	2,187	4,345
Five Provinces Total	**10,270**	**4,875**	**1781**	**333**	**137,587**	**28,927**	**166,514**

Source: Department of Irrigation (Central and Province), MASL and DAD

Irrigation schemes are managed by three main institutions. All the major or medium irrigation schemes situated under the interprovincial river basins are managed by the Central Irrigation Department and all the major or medium irrigation schemes situated under the provincial river basins are managed by the respective provincial irrigation departments. Operations and management (O&M) of the head works and main canal system (main and branch canals) of these irrigation schemes are done by the Irrigation Department or its respective provincial irrigation departments, and O&M of sub-systems (D–canals and F-canals) are done by farmer organizations. The Mahaweli Authority of Sri Lanka manages reservoirs and irrigation schemes in the Mahaweli areas. All minor irrigation schemes are under the purview of the Department of Agrarian Development, and O&M of these schemes are done by respective farmer organizations.

The organization chart of the Central Irrigation Department, Irrigation Management Division, Mahaweli Authority of Sri Lanka, and Provincial Department of Irrigation are given in the annexed Figures A 3.19, A 3.20, A 3.21, and A 3.22 respectively.

After the country's independence in 1948, the government increased its investment to the irrigation sector in order to increase the production of rice, which is the staple food of the people in the country, with the ultimate aim of reaching self-sufficiency in rice. Irrigation development was accelerated with the commencement of the Mahaweli Development Program in the early 1970s. In 2010, the total irrigated land area of the country was 769,000 ha. Of this, about 70% is paddy and the remaining area is being used for other field crops. The self-sufficiency ratio was only 42% in 1950 and it increased to more than 100% in 2010 by the increased of irrigated area and improvement of cultivation technology as well as adopting high yield variety.

Irrigation development and management in the country have been predominantly the state activities. However, in the 1980s participatory approaches were incorporated in some irrigation rehabilitation projects. A program for the Integrated Management of Irrigation Schemes (INMAS) was launched in 1984 in 37 major schemes. This was the first attempt at the national level to involve farmers for participatory management in major irrigation schemes. In 1988, the government accepted the policy of participatory management with beneficiary involvement at all stages of decision making and in the

management of irrigation schemes.

The performance of several irrigation schemes has not yet reached its threshold therefore improving the performance of existing systems that has become a felt need.

On the other hand, ground water resources in Sri Lanka have been extensively used since ancient times for domestic purposes using shallow open wells in almost all parts of the country. Presently, groundwater resources are widely used for domestic, commercial and industrial purposes, small scale irrigation, water supply schemes, and other purposes. About 80% of the rural domestic water supply requirements are met from groundwater by means of dug wells and tube wells. Groundwater is a main water source for irrigation by small farmers, particularly during drought periods when tank storage is inadequate. Small farmers especially in the areas of north western and north central provinces use agro-wells. In coastal sand aquifer areas like Kalpitiya Peninsular, there had been intensive use of shallow groundwater for agriculture during the last two decades.

The quality of ground water is generally good and relatively constant throughout the year. However, due to agrochemical and fertilizer usage, in some parts of the country (north and northwestern coastal areas) excessive concentration of iron and nitrates have been reported. Furthermore, due to uncontrolled abstraction of ground water for domestic and agriculture purposes, brackish water intrusion has occurred in the coastal areas.

3.9.2 Road

The inventoried length of road network in Sri Lanka in 2007 was 96,346 km. This includes 11,760 km of national roads (Class A and B), 15,743 km of provincial roads (Class C and D), and 68, 843 km of other roads (minor roads and others). The estimated actual total length of road, however, is 113,000 km, with returning a road density of 1.72 km/km^2 of land area.

Total length of road network in the survey area is 56,696 km. This includes, 4,966 km of national roads, 6,214 km of provincial roads and 47,516 km of other roads. The average road density of the survey area is 1.31 km/km^2 of the land area. Table 3.52 shows the district wise road lengths and road densities in the survey area.

Out of the 14 districts in the survey area, The Jaffna District has the highest road density with 3.62 km/km^2 while Moneragala District has the lowest road density of 0.75 km/km^2. Furthermore, road densities in Mannar, Ampara, Polonnaruwa, and Moneragala districts are less than 1.0 km/km^2.

More than 90% of the other roads are unpaved and need upgrading.

Table 3.52 District Wise Road Length and Road Density in the Survey Area

Province	Road Length (km)				Land Area (km^2)	Road Density(km/km^2))			
District	National	Provincial	Other	Total		National	Provincial	Other	Total
North	**1,120**	**1,085**	**10,453**	**12,658**	**8,938**	**0.13**	**0.12**	**1.17**	**1.42**
Jaffna	491	535	2,634	3,660	1,010	0.49	0.53	2.61	3.62
Kilinochchi	127	134	2,132	2,393	1,351	0.09	0.10	1.58	1.77
Mannar	143	221	1,288	1,652	1,998	0.07	0.11	0.64	0.83
Vavunia	188	116	1,888	2,192	2,004	0.09	0.06	0.94	1.09
Mullaitivu	171	79	2,511	2,761	2,575	0.07	0.03	0.98	1.07
East	**801**	**838**	**9,529**	**11,168**	**9,623**	**0.08**	**0.09**	**0.99**	**1.16**
Batticaloa	225	194	2,802	3,221	2,483	0.09	0.08	1.13	1.30
Ampara	375	427	3,574	4,376	4,496	0.08	0.09	0.79	0.97
Trincomalee	201	217	3,153	3,571	2,644	0.08	0.08	1.19	1.35
North – Western	**1,153**	**2,076**	**10,788**	**14,017**	**8,065**	**0.14**	**0.26**	**1.34**	**1.74**

Province	Road Length (km)				Land Area (km^2)	Road Density(km/km^2))			
District	National	Provincial	Other	Total		National	Provincial	Other	Total
Kurunegala	760	1492	7,263	9,515	4,905	0.15	0.30	1.48	1.94
Puttalam	393	584	3,525	4,502	3,160	0.12	0.18	1.12	1.42
North Central	**861**	**1,087**	**10,239**	**12,187**	**10,658**	**0.08**	**0.10**	**0.96**	**1.14**
Anuradhapura	649	795	7,644	9,088	7,212	0.09	0.11	1.06	1.26
Polonnaruwa	212	292	2,595	3,099	3,446	0.06	0.08	0.75	0.90
Uva	**1,031**	**1,128**	**6,507**	**8,666**	**7,666**	**0.13**	**0.15**	**0.85**	**1.13**
Badulla	613	759	3,681	5,053	2,872	0.21	0.26	1.28	1.76
Moneragala	418	369	2,826	3,613	4.794	0.09	0.08	0.59	0.75
Five Provinces Total	**4,966**	**6,214**	**47,516**	**58,696**	**44,950**	**0.11**	**0.14**	**1.06**	**1.31**

Source: Department of Statistic

The organizational charts of the Central Road Development Authority and Provincial Road Development Department are given in annexed Figures A 3.23 and A 3.24.

Other than Central Road Development Authority and Provincial Road Development Department, Ministry of Economic Development and Ministry of Local Government and Provincial Council are also handling the rural development projects in general. The organizational charts for both ministries are given in Figures A 3.25 and A 3.26

3.9.3 Market Facilities

Conventional formal marketing channels consist of polas which are open weekly and being managed by public organizations of Pradeshiya Sabha. Permanent town market opens daily and being managed by the Urban Council or Municipal Council.

Existing public markets in DS division and population per market facilities are shown in Table 3.53 based on the Provincial Record and 2010 Population by the Department of Census and Statistics. Number of market varies by province and district though details of respective market size are not available. However, in North Central Province, the number of market is very high as compared to other provinces. It is considered that large market size absorbs consumers in each market. Large volume of production from agricultural production areas such as the North Central and North Western provinces are taken by other marketing channels outside the area.

Table 3.53 Public Market Facilities in the Target Areas

Province/District	Public (MU/UC) Market	Weekly Market (Pola)	Population/ Public Market	Population/ Weekly Market	Other Marketing Facilities
Eastern	**21**	**73**	**55,762**	**16,041**	
Batticaloa	10	28	53,700	19,179	
Ampara	6	25	105,667	25,360	
Trincomalee	5	20	73,600	18,400	
North Central	**5**	**51**	**245,000**	**24,020**	
Anuradhapura	3	28	273,333	29,286	DEC, 2 Collection center
Polonnaruwa	2	23	202,500	17,609	
North Western	**40**	**84**	**58,000**	**27,619**	
Kurunegala	27	59	57,407	26,271	
Puttalam	13	25	59,231	30,800	
Northern	**11**	**89**	**107,909**	**1,198**	
Jaffna	5	49	121,400	627.4	Collection center
Kilinochchi	0	14		225.4	
Mannar	1	4	103,000	353.0	
Mullaitivu	0	16		231.5	

Province/District	Public (MU/UC) Market	Weekly Market (Pola)	Population/ Public Market	Population/ Weekly Market	Other Marketing Facilities
Vavunia	5	6	30,800	320.7	
Uva	**34**	**57**	**38,500**	**22,965**	
Badulla	24	27	36,417	32,370	Collection center
Moneragala	10	30	43,500	14,500	

Note: Source of Provincial Department of Local Government and based on 2010 Population of Department of Census & Statistics. Collection center is of supermarkets, DEC: Dedicated Economic Center.

3.10 Community Based Organization

3.10.1 Overview of Community Based Organizations (CBOs)

Several types of community based organizations can be observed in the rural areas of Sri Lanka. Primary objective of CBOs is to improve the quality of life of the people in the communities through mutual help and collective action of the members, though main activities may differ from CBO to CBO. Usually, the main objective and focus of a CBO is stated in its constitution enacted when it was established. In rural communities, CBOs mainly function to manage and solve problems related to agriculture-related issues such as maintaining of irrigation systems, tanks, and agricultural land, or to share/exchange useful knowledge and information for the increase of productivity and production among members.

Generally, a farmer in the rural village belongs to some CBOs – not only one. It is common that a person has more than one CBO membership. Thus, there is an overlap of membership and people in the village are linked with each other through these multilayered CBOs. Some CBOs limit their membership only for the particular group of people such as women or the youth, so the position given to the person in a CBO may be different from his position in another CBO. CBOs have an organized structure and have a board whose members have titles such as president, secretary, and treasurer. Members pay membership fee regularly and participate in the meetings and activities as a member. They may be provided subsidies or other types of support from the government through the CBOs he/she belongs. Sizes of CBOs differ from CBOs to CBOs – there are CBOs with more than 100 members, while there may be CBOs with less than 20 members.

Some CBOs are established based on government acts and have official status, whereas some CBOs are established only by the initiative of the people in a village or from outside support such as NGOs. CBOs that have official background based on the government act are normally sponsored by the government where they receive financial, technical, and other assistances from the government, though its components are dependent on the government body that looks after the CBOs.

It should be noted that CBOs in rural communities are not necessarily functioning actively. In fact, there are many CBOs that do not function at all even though their names are registered intrusion the government's body according to the government act. It is also necessary to cooperate with CBOs in rural villages for improvement of agricultural production and productivity projects. However, careful study and examination is needed to identify the CBOs which can be counterparts of the project.

Firstly, in order to understand the general situation of CBOs in rural communities, the characteristics of typical types of CBO that are commonly observed in a rural village in the survey area are examined. Annexed Table A 3.24 shows overview of typical types of CBOs.

Among the CBOs shown in annexed Table A 3.24, the following types of CBO that are related to agriculture and livestock activities are taken up and examined hereafter.

(i) Farmers Organization (FO)
(ii) Rural Development Society (RDS)/Women Rural Development Societies (WRDS)
(iii) Farmers Producers Society (FPS), Young Farmers Society (YFS), and Women Farmers Society (WFS)
(iv) Cooperative Societies

3.10.2 Farmers Organization (FO)

Among the CBOs mentioned in annexed Table A 3.24, it seems that FOs can be one of the potential candidates for the counterpart of the project for the following reasons;

- Having official status under the Agrarian Development Act, No.46 of 2000
- Focusing on agricultural activities and irrigation management
- Observed in every rural area
- Most farmers are members of FO
- Regular monitoring and instruction is given by ADO (DO) and AI (technical aspect) and also by several government authorities

FOs function and organization are examined hereinafter.

(1) Background

Organizations registered under the Agrarian Development Act No.46 of 2000 are called Farmers FOs. FO was firstly given legal recognition under the amended Agrarian Service Act No.4 of 1991, which states the purpose of FO in Clause 33 (4) as stated in Table 3.54

Table 3.54 Overview of the FO Clause 33

(a)	Formulation and implementation of the agricultural program for the area.
(b)	Carrying out village level construction work and effecting repairs to irrigation works.
(c)	Marketing of produce and distribution of seed, fertilizer and agrochemicals.
(d)	Promoting of cooperation between, and co-ordination of agricultural activities of government organization and farmers of the area.
(e)	Engaging in any other activities approved by the Commissioner as being beneficial to the farming community.

Source: Agrarian Service (amended) Act No.4 of 1991

Generally, an FO has internal regulation, which mentions its specific purpose and function. In addition, the internal regulation may state other concerns, i.e., membership, manner of accounting and auditing, election of committee member, general meeting, and so on based on the respective situation and condition of the FO.

Part V of the Agrarian Development Act, No.46 of 2000 prescribes the institutional regulation, rights, and duties of an FO. The overview of an FO is summarized in Table 3.55.

Table 3.55 Overview of FO

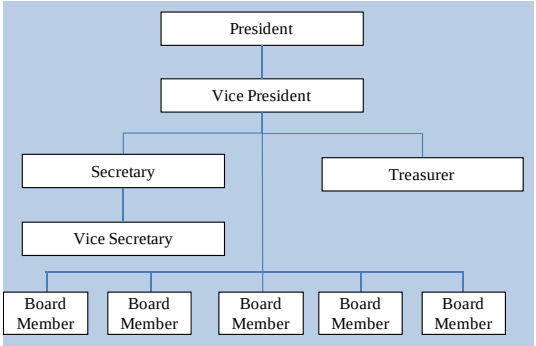
Legal status and capacity	FOs have the legal status of a corporate body, they may sue and be sued in its cooperate name.
Establishment	Voluntary. Each FO must include at least twenty-five owners or tenants of land, or one-fourth of all owners or tenants of land in the area. Procedure for establishment. FOs must register with the Commissioner of Agrarian Services, Notice of Registration is published in the Official Gazette. Financial viability of the FO is a requirement for registration.

Membership	1. Membership Every person whose livelihood is agriculture shall be eligible for membership, if (a) He is a citizen of Sri Lanka (b) He is not less than sixteen years of age (c) He is a resident of the area of authority of the Farmer's Organization in which he is seeking membership or he has been engaged in agricultural activities in that area of authority for a period exceeding two years. 2. Associate Membership (a) He is a citizen of Sri Lanka (b) He is not less than sixteen years of age (c) He is a resident of the area of authority of the Farmer's Organization in which he is seeking membership or he has been engaged in agricultural activities in that area of authority for a period exceeding two years.
Eligibility criteria	Owners and tenants of agricultural land in each area as identified by the government.
General meeting	General meeting of the members of the Farmers Organization shall be held every year. When an FO fails to convene a general meeting at least once in two years, the Agrarian Development Council of that area shall have the power to convene such meeting.
Examination of accounting	The Commissioner-General or a representative of the General is authorized and entitled to examine the accounts of every FO generally or specially.
Internal structure	Each FO can adopt its statute to regulate its structure and function. FOs must have a President – no specific provision on the election nor the functions and powers of the President. No specific provisions on the contents of the FO statute nor the structure of an FOs.
Rights	FOs that have taken over the operation and maintenance of a distribution system can request that lands in their area of jurisdiction be exempted from the payment of irrigation taxes.
Financing	Sources of income. Revenue from the collection of water charges imposed on members.
Government role	The government, through the Commissioner of Agrarian Services, adopts regulations on the election of office bearers of registered FOs, on procedures for the transaction of business and on the powers of FOs, and is responsible for auditing all accounts maintained by FOs. All regulations adopted by FOs are subject to the approval of the government. The government may direct any FO to discontinue the services of their agents who are guilty of misconduct or neglect of duty. The FO shall implement such directions.
Dissolution	The Commissioner can dissolve FOs that have been inactive for more than two years or for reasons of public interest. In this case, the Commissioner shall also appoint a liquidator to liquidate the FO. The law spells out the powers of the liquidator.

Source: International Network on Participatory Irrigation Management (partly modified)

(2) Organization and Related Government Body and Officials

Typical structure of an FO is shown in Figure 3.8. FO committee consist of the president, vice president, secretary, vice secretary, treasurer, and several board members. FOs may also appoint an external auditor who checks the accounting. General meeting is held once a year, and these committee members are elected or approved by the members of the FO. Regular committee meeting where daily management issues are discussed is held monthly.



Source: JICA Survey Team

Figure 3.8 Structure of an FO

Activities of the FOs are monitored mainly by the Agrarian Service Center (ASC). Several ASCs exist in one district. An ASC is the organization under the Department of Agrarian Development under the Ministry of Agrarian Service and Wildlife under the control of an Assistant Commissioner Agrarian Development (ACAD) positioned in each district.

The Agrarian Development Officer (ADO)[6] is attached to each ASC and works on monitoring FO's activities. Though ADO is officially responsible for monitoring the activities of an FO, other government agencies and officials are also related to FO, and sometimes cooperate with them. The Agricultural Instructor (AI) under the Provincial Department of Agriculture is one of the government officials who provide technical support to FO and regularly conduct visits. Table 3.56 shows the government agencies and government officials related to FOs, and the services being provided to FO.

Table 3.56 Government Agencies and Officials related to FO and Service Being Provided

Government Agency	Government Officials	Services Being Provided to FOs
Agrarian Service Center (Department of Agrarian Development, Ministry of Agrarian Service and Wildlife)	- ADO (Agrarian Development Officer) (DO (Divisional Officer)) - ARPA (Agriculture Research and Production Assistant)	- FO registration - Agricultural input - Micro credit support - Training - Auditing
Provincial and Central Department of Agriculture	- AI (Agricultural Instructor)	- Technical support (agriculture) - Training program
Department of Irrigation (Ministry of Irrigation and Water Management)	- IE (Irrigation Engineer) - EA (Engineer Assistant)	- Water management - Maintenance and rehabilitation works - Technical support (irrigation) - Monitoring (irrigation)
Irrigation Management Division (Department of Irrigation, Ministry of Irrigation and Water Management)	- RPM (Resident Project Manager) - IDO (Institutional Development Officer) - DA (Development Assistant)	- Water management - Assistance to solve farmer's problems - Administration support - Training
Divisional Secretary	- Divisional Officer - Land Officer - Colonization Officer - GN (Grama Niladhari)	- Land issue (Not much relation to the FOs)
Mahaweli Authority of Sri Lanka	-RPM (Resident Project Manager) -DRPM (Deputy Resident Project) Manager (Water Management) and IE (Irrigation Engineer) - DRPM (Deputy Resident Project Manager) (Agriculture) and Agriculture Officer (AO) -Deputy Resident Project Manager (Institutional Development) and -Institutional Development Officer (IDO) -Unit Manager -Field Assistant	-Coordination -Water management -Agriculture technical support -Training -Input supply coordination -Assist capacity building and support for FO administration -Administration support and facilitation -Agriculture support at field level

Source: JICA "The Study on Increasing the Capacity of Integrated Management in Irrigation Sector in Sri Lanka, Final Report"

Annexed Figure A 3.27 shows the structure of government agencies and officials related to FO and CBOs.

(3) Situation of FO in the Survey Area

Table 3.57 shows the number of FOs, agricultural holdings, and land area by district in the survey area. There are about a total of 8000 FOs in the five provinces of the survey area. Since the number of agricultural holdings and land area size differs district to district, the number of FOs in a district ranges

[6] ADO is also called as DO (Divisional Officer)

from 117 (Kilinochchi) to 2309 (Kurunegala). Table 3.57 also shows the number of agricultural holdings and the land area size of each district for reference.

Concerning the number of FO members, as observed in the case of Eastern Province for instance, it was found out that one FO has only 20 members, while the other FO has more than 500 members. It should be noted that the size of an FO differs from FO to FO, since the internal structure and function/activities of each FO may be different.

Table 3.57 Number of FOs, Agricultural Holdings, and Land Area by District

Province / District	Number of FOs (A) (No.)	Share in 5 Provinces (%)	Number of Agricultural Holdings (B) (No.)	(B / A) (No.)	Land Area (C) (ha)	(C / A) (ha)
North	**862**	**10.8%**	**163,862**	**190**	**70,437**	**82**
Jaffna	256	3.2%	91,855	359	16,876	66
Kilinochchi	117	1.5%	17,665	151	15,113	129
Manner	141	1.8%	14,666	104	8,792	62
Vauniya	211	2.6%	21,522	102	13,567	64
Mullaithivu	137	1.7%	18,154	133	16,089	117
East	**1,134**	**14.2%**	**275,163**	**243**	**126,716**	**112**
Batticaloa	292	3.6%	99,373	340	32,663	112
Ampara	596	7.4%	123,600	207	71,833	121
Trincomalee	246	3.1%	52,190	212	22,220	90
North-Western	**2,924**	**36.5%**	**476,001**	**163**	**287,089**	**98**
Kurunegala	2,309	28.8%	342,215	148	219,067	95
Puttalama	615	7.7%	133,786	218	68,022	111
North Central	**1,847**	**23.1%**	**248,970**	**135**	**210,959**	**114**
Anuradhapura	1,432	17.9%	177,322	124	145,543	102
Polonnaruwa	415	5.2%	71,648	173	65,416	158
Uva	**1,238**	**15.5%**	**221,219**	**179**	**153,142**	**124**
Badulla	719	9.0%	129,902	181	64,152	89
Moneragala	519	6.5%	91,317	176	88,990	171
5 provinces Total	**8,005**	**100.0%**	**1,385,215**	**173**	**848,343**	**106**

*Note: *Number of agricultural holdings and land size excluded estate sector*
Source: JICA Survey Team (Number of FOs), Census of Agriculture 2002, Department of Census and Statistics (Number of Agricultural Holdings, Land Area)

(4) FO as a Counterpart of Project Activities

It seems that the FO is the most potential candidate considering that CBOs implement projects recommended in the preparatory survey as a counterpart organization in the field. The participation of FO is necessary especially for projects such as rehabilitation of irrigation facilities since they are only the farmer's group that is entitled to maintain irrigation in the field[7]. Moreover, the Agrarian Development Act No.46 of 2000 states that any government department, public farmers corporation, person or body of persons that proposes to construct a tank, dam canal watercourse, or commence any

[7] Agrarian Development Act No.46 of 2000, Part IV Irrigation Work and the Management of Irrigation Water, Clause 81"*Every tank, dam, canal, water course, embankment reservation or other irrigation work, within the area of authority of any Farmers' Organization, shall be subject to the supervision of that Farmers' Organization"*

development has to inform the FO of the area about the project and deal with their comments[8]. Considering the FO as a counterpart organization of the project, careful consideration should be given to the following points:

(a) Focusing Mainly on Water Management

It should be noted that cultivation committees were originally formulated with the representatives of farmers in order to maintain irrigation works under the Paddy Land Act of 1958. Cultivation committees were replaced by FOs in line with the Irrigation Ordinance (Amendment) Act of No.13 (amended 1994) afterwards. Because of this background, the FO's main function still tends to be considered sorely as irrigation management by most of the members of FOs and government officers generally, though its function is not necessarily limited only to the irrigation management in the act. On the contrary, FO is expected to take initiatives to formulate and implement any agricultural and rural development programs for the area according to the Agrarian Development Act. Therefore, concerning diversification of agriculture, functions of the FO may be limited on to OFC and vegetable cultivation at the current situation, in general.

(b) Institutional Capacity

The institutional capacity is another concern for the FO. It is the fact that the institutional capacity of the FO may not be necessarily reasonably enough to function properly as the counterpart organization of the project. As for this reason, the following can be pointed out;

- Lack of farmer's knowledge on the role and responsibilities of the FO.
- Poor capability of FO leaders caused by lack of practical training.

There are several concerns regarding the organization and capacity of the FO itself. Through the study of some sample FOs and the interview with AI in the survey target areas, the following common practical concerns regarding the institutional capacity were identified.

- Poor participation of members at the general meeting and monthly meetings.
- Poor maintenance of accounting ledgers.
- Poor maintenance of minutes of the meetings and other documents
- Lack of participation of members in common works
- Lack of transparency
- Lack of financial resource

(c) Multi-layered Related Government Agencies

As shown in Table 3.56, there are several government agencies and officers that are related to the activities of the FO. Therefore, it should be noted that proper coordination and arrangement of these related agencies are needed based on the project activities.

Even though there are above concerns, it seems that the collaboration with FOs is necessary. Firstly, the challenge will be how the project motivates FOs toward the direction of agriculture diversification through creating awareness and taking advantage of the project and involve them in the project activities.

[8] Agrarian Development Act No.46 of 2000, Part IV Irrigation Work and the Management of Irrigation Water, Clause 82

Moreover, organization strengthening of FOs needs to be considered for the continuation of project activities by FO's own initiative. Since FO's roles and functions, or the institutional capacity may be different from area to area, careful examination of each counterpart FO is required in the initial stage of the project formulation.

(5) Case - FO as Project Counterpart

Several agricultural development projects have challenged the implementation of the project activities through FOs in Sri Lanka so far, e.g., "Mahaweli Upgrading Project (MPU)" (JICA), "Mahaweli Rehabilitation and Restructuring Project (MRRP)" (World Bank), "Mahaweli Consolidation Project (MCP)" (European Union), and "Pro-Poor Economic Advancement and Community Enhancement Project (PEACE)" (JICA). Out of these projects, PEACE was completed recently at the end of 2011 after five years of operation in the field, leaving valuable lessons in collaboration with FOs.

Box. 1 Case of Institutional Capacity Building of FO – PEACE Project

PEACE project prepared a sound Institutional Development Plan which gives priority to stakeholder awareness. Accordingly, commencing from awareness session, FOs have undergone various training and capacity building sessions. Farmers as an organization developed their capacity and engaged in rehabilitation activities of their irrigation system and agriculture activities. They were assisted by institutional development officers and agriculture officers attached to the government institutions and the project.

Through the project activities, it has been found that organizational standards, functionality, and financial status including transparency of FOs have improved. FOs have developed positive attitudes on sustainable irrigation system, and as a result, for instance, they have formed a separate fund ("maintenance fund") for maintenance activities. At the time of closing the project, the fund was Rs 6 million as indicated in PEACE completion report. Average collection of irrigation maintenance fee per year/FO has increased from approximately Rs 48 thousands to Rs 68 thousand. It has been revealed that farmers are motivated through the project activities, and consequently, gained plentiful knowledge in the field of construction activities related to irrigation system, and it has become a valuable asset for the future maintenance of irrigation system. Moreover, FO leaders have developed their leadership qualities and have realized clearly their roles and responsibilities as well through the awareness and various training capacity building sessions.

The PEACE project has used project activities, especially, rehabilitation process as a vehicle to strengthen FOs and it resulted in a positive attitude of leaders and members of FOs. The community participatory process used in the project implementation under the PEACE project is favorable in terms of strengthening FOs and assuring sustainability of the project outputs.

The experience of the PEACE project indicates that it is possible enough for FOs to be a counterpart organization of the project, and be motivated and developed their institutional capacity through community participatory process including awareness and training sessions for the direction toward the project objective. Thus, even though there may be concerns for FOs to be a counterpart organization of the project, FOs should be considered as the most potential counterpart organization in terms of irrigation system and agricultural activities.

3.10.3 Rural Development Society (RDS)/Women Rural Development Societies (WRDS)

RDS and/or WRDS[9] may also be considered as one of the candidates of a responsible organization for the implementation of the project in the field, though its main function is not necessarily related to agriculture only. RDS and WRDS were established under the Circular No. A/C/3/1/1 (dated September 18, 1978) by the Director of the Department of Rural Development (amended on October 31, 1978), and are commonly observed in all areas of the country. As it name implies, the activities of RDS/WRDS cover almost all aspects of people's life in a village for rural development. In this sense, RDS/WRDS also seems to function as a counterpart organization of the project at the field level.

(1) Background

Rural development activity was initially started by government initiative in the 1940s under the Department of Commerce and Industries, and then 70 Rural Service Center were established in 1947 to promote rural development activities. After the Rural Development Department was established in 1947, rural development activities were carried out by the Rural Development Societies formulated in each village in the country in order to function as the focal point to coordinate all the rural development activities at the village level. In line with the 13th Amendment to the 1978 Constitution, Provincial Council took over the responsibility towards rural development of its covering area concerned to registration and monitoring of RDS. Hereafter, the "Amended Rules for Registration and Functioning of Rural Development Societies and Women Rural Development Societies" approved by the Director of Rural Development of the North East Province[10] in 2006 was referred to examine the rules and functions of RDS and WRDS. The objective of RDS/WRDS covers almost all the aspects of rural life including agricultural development. Table 3.58 shows the 16 objectives mentioned in the rules.

Table 3.58 Objectives of RDS/WRDS

1.	Development Work Planned Activities Every society shall plan its work activities to create self employment opportunities from available resources in its locality, to increase income generation and skill training without doing any harm to its beneficiaries.
2.	Health Activities Every society has a duty to maintain good healthy conditions and habits of people and take preventive measures against the spread of any infectious diseases.
3.	Education Every RDS/WRDS should work for the improvement of pre-school education of children, making arrangement for evening classes, maintaining adult learning centers, and other educational activities in the village.
4.	Protection of the Environment Every RDS/WRDS must take steps to protect and improve the environment of the area by taking development activities of the land and its natural resources in order to derive maximum benefits especially from water resources, fisheries, and aquatic resources, wildlife, forestry resources, and soil conservation together with regulatory activities.
5.	Development of Women Welfare Woman development centers have to be organized in villages to help women in acquiring knowledge of vocational training, marketing, and allied women development activities.
6.	Vocational and Skills Training Activities Every society has to provide vocational and skills training to youth so as to enable them to find self employment.
7.	Agricultural Development

[9] Though the membership qualification may be limited only to female, the function of RDS and WRDS is similar.

[10] North East Province has been de-merged into two separate provinces; Northern Province and Eastern Province, in 2006.

	As members of the societies form villages, planned activities should be provided for the development of agriculture and farming in villages.
8.	Animal Husbandry With the advice of veterinary doctors, animal husbandry activities could be initiated to increase income and provide employment for the villagers.
9.	Cottage Industries With available resources on hand such as cane, coconut shells, and eackle and palmyrah products, cottage industries should commenced to increase self employment and marketing facilities for both women and men.
10.	Micro Credit Activities Micro credit facilities are to be provided by way of loans to start livelihood activities and to provide home for homeless people.
11.	Shramadana Activities Societies have a duty to organize shramadana (Sharing of labor) to keep village clean, to construct roads, and to do any other common work at the village level.
12.	Religious Development Activities Societies must encourage villagers to follow their religious activities and observances.
13.	Art and Cultural Development Activities Societies have a duty to develop cultural activities and encourage the activities of artists.
14.	Sport Development and Entertaining Activities Societies should encourage sport activities in well planned way and form musical group to provide entertainment and train others to participate.
15.	Development Ethical Activities Societies have to get support from governmental and nongovernmental sectors to eradicate narcotic and allied evil borne activities so as to build a healthy societies.
16.	Activities for Special Needs Beneficiaries Societies have a duty to identify the needs of special children, elders, women and disabled persons to help and train them to live healthy and comfortably.

Source: Amended Rules for Registration and Functioning of Rural Development Societies and Women Rural Development Societies (Department of Rural Development North-East Province Trincomalee)

It should be noted that agriculture development and animal husbandry were mentioned as one of the objectives of RDS/WRDS. Table 3.59 shows the overview of the institutional regulations and rights of RDS/WRDS.

Table 3.59 Overview of RDS/WRDS

Establishment	a) There shall be minimum of at least 30 families in a village/villages of one GN Division b) Two or three villages within one GN Division can unite to form one such society provided the number of families shall not exceed 250.
Registration	Application document is submitted to the Director of Rural Development Department through the Rural Development Officer of the area and the District Rural Development Officer. The Director of Rural Development has full powers and discretion in the matter of registration of any society.
Membership	Requirements for membership in a society are: (a) Be a citizen of the Democratic Socialist Republic of Sri Lanka; (b) Be a resident of the particular village; (c) Be qualified under the provisions of Article 14 (2) of the Constitution of Sri Lanka; (d) Be over 18 years of age; (e) Be of sound mind; and (f) Have paid a membership fee of not less than Rs120/annum.
Meetings	a) Inaugural Meeting b) General Meeting: at least once in every three months c) Special General Meetings: on request of the Executive Committee or the President or a written request of 51% of the members or the Rural Development Officer. d) Executive Committee Meetings: monthly e) Annual General Meeting: every year

Executive Committee	At the inaugural and annual general meeting of once in two years of the society, the following office-bearers shall be elected either unanimously or by voting. a) President b) Vice President c) Secretary d) Assistant Secretary e) Treasurer f) Eight committee members
Contract Works	Any societies can undertake to do any contract works with the government department or semi-government or non-governmental organization.
Government Role	The Rural Development Officer, District Rural Development Officer, and Divisional Secretary of the area are entitled to advise every society and its members as for the development activities and rights of the societies.

Source: Amended Rules for Registration and Functioning of Rural Development Societies and Women Rural Development Societies (Department of Rural Development North-East Province Trincomalee)

(2) Organization and Related Government Body and Officials

The structure of RDS/WRDS is almost the same as the structure of FO as shown in Figure 3.8. As for the FO, the Executive Committee of RDS/WRDS is supposedly consisted of a president, vice president, secretary, assistant secretary, treasurer, and eight committee members. Members of the Executive Committee are selected either unanimously or by voting at the inaugural and annual meeting held once in two years.

Activities of RDS/WRDS are monitored by the Rural Development Officer (RDO). RDO of the area is an official advisor to the society and he/she has the right to examine any documents and proceeding of the general body and committee. RDO is under the Director of Provincial Department of Rural Development. Under RDOs, there are Program Assistant and Needle Work Demonstrator.

According to the Administration Report of the Department of Rural Development of Eastern Province, their duties concerning RDS/WRDS are shown in Table 3.60.

Table 3.60 Duties of the Department of Rural Development Concerning RDS/WRDS

I.	Facilitation on the Establishment of Rural Development Societies (RDS) and Women Rural Development Societies (WRDS)
	Forming of Rural Development Societies in every villages, organize their inaugural meetings and to arrange for their registration with the Department of Rural Development.
	Ensure that all RDSS/WRDSS conduct their activities according to the stipulated rules and regulations, their annual general meetings are conducted in time and their accounts are audited regularly.
	Exercise administrative and financial control over the activities of the RDSS/WRDSS.
	Monitor Sharmadana activities in villages through the societies.
	Organize Sharmadana activities in villages through the societies.
II.	Assisting to women empowerment and their participation in development activities by providing Needle Work training through Women Development Centers.
	Establishment of Women Development Center
	Selection of trainees
	Providing machineries, equipment, and other materials for training
	Supervising and monitoring the Women Development Centers
	Conducting Diploma in Women Development exams yearly
	Awarding Diploma Certificates
	Organizing divisional/district/provincial level exhibitions
III.	Monitoring Small Scale Projects – Implemented by RDSS/WRDSS
	Identify the needs of the villages and prepare concept papers accordingly and submit to the NGO/ foreign funded project for financial assistance.
	Revolving funds – Distributing among society members and ensure the funds are properly utilized.

IV. Conducting Training Programs
- Identifying the type of training needed
- Organizing of training programs
- Selection of beneficiaries
- Selection of resource person
- Conducting programs in collaboration with other institutions

Source: Administration Report 2011, Department of Rural Development, Eastern Province

(3) Situation of RDS/WRDS in the Survey Area

Table 3.61 shows the number of RDS and WRDS in the survey target area by district. There are 6596 RDS, 2670 WRDS in the five survey target provinces. The total number of RDS and WRDS is 9266, and this number is larger than the number of FOs in the area (see Table 3.57). This indicates that RDS/WRDS is considered as an organization that represents the community in every rural area. Comparing the numbers of RDS and WRDS, though there is no big difference in numbers, RDS and WRDS are not evidently seen in areas of Northern, Eastern, and North Central Province, the number of WRDS is quiet smaller than the number of RDS in North-Western, and Uva Province. It is assumed that activities of NGOs and international organizations in the northern and eastern part of the country aimed for female social participation and income generation through the internal conflict period resulted in the formation of WRDS and certain number of WRDS as shown in Table 3.61.

Table 3.61 Number of RDS and WRDS

Province / District	Number of RDS (No.)	Number of WRDS (No.)	Total (No.)
North	**891**	**951**	**1,842**
Jaffna	266	337	603
Kilinochchi	138	130	268
Manner	160	162	322
Vauniya	207	184	391
Mullaithivu	120	138	258
East	**966**	**753**	**1,719**
Batticaloa	395	339	734
Ampara	280	235	515
Trincomalee	291	179	470
North-Western	**2,805**	**217**	**3,022**
Kurunegala	2,276	82	2,358
Puttalama	529	135	664
North Central	**729**	**723**	**1,452**
Anuradhapura	477	572	1,049
Polonnaruwa	252	151	403
Uva	**1,205**	**26**	**1,231**
Badulla	798	21	819
Moneragala	407	5	412
5 provinces Total	**6,596**	**2,670**	**9,266**

Source: JICA Survey Team

Generally, RDS/WRDS is more active in the Eastern and Northern provinces, contrary to the situation that RDS/WRDS is regarded as not so influential compared to FO in rural communities in other three provinces of North-Western, North-Central and Uva. In the eastern and northern provinces, the environment did not allow the government to carry out agricultural development activities or farmers

education through FO during the internal conflict period. Consequently, it is said that the function of FO in the eastern and northern province is still limited even after the conflict ended though the situation may be different from area to area. On the other hand, RDS/WRDS had regular communications with the government officers especially for welfare activities even in the period of internal conflict. Due to such background, RDS/WRDS still has certain extent of influence in rural communities especially in the eastern and northern provinces.

(4) RDS/WRDS as Counterpart of the Project Activities

Though the focus of its objective is not necessarily on agriculture, RDS/WRDS may also be considered as a counterpart organization of the project activities at the field level. The following points can be considered as advantages of RDS/WRDS to be a counterpart CBO of the project:

- Having official status under the Circular No. A/C/3/1/1 dated 18.09.1978 issued by the Director, Department of Rural Development (amended on October 31, 1978);
- Covers many aspects of life in the rural village including agricultural development;
- Commonly observed in every village; and
- Regular monitoring and instruction is given by RDO.

In considering RDS/WRDS as counterpart organization of the project, careful consideration should be given to the following points:

(a) Rural Infrastructure Development Project

In comparison, it seems that it is natural to consider FO as the counterpart organization for purely agriculture related project activities in the field, a RDS will not be considered an FO is functionally available in the community. However as for the rural infrastructure development projects such as the construction of farm access roads, RDS/WRDS may be more appropriate to undertake the responsibility instead of the FO, though the situation may depend on the community. For eastern and northern provinces where institutional capacity of the FO is said to be relatively weak, collaboration with RDS/WRDS should also be considered.

(b) Institutional Capacity

It should be noted that the organizational capacity of RDS/WRDS is not in a reasonable level. Similar problems concerning the institutional capacity of RDS/WRDS as well in general can be pointed out, though the situation of each RDS/WRDS must be different in every area. Hence, careful examination of institutional capacity of RDS/WRDS is necessary.

3.10.4 Farmers Producers Society (FPS), Young Farmers Society (YFS), and Women Farmers Society (WFS)

Farmers Producers Society (FPS), Young Farmers Society (YFS), and Women Farmers Society (WFS) [11]can be observed in the Eastern and a part of the Northern Provinces. However, they are not common in

[11] Since their function is almost the same though only member's criteria may be different. Hereafter they are referred together as "FPS".

the North-Western, North-Central, and Uva Provinces. FPS is established under a circular issued by the Ministry of Agriculture, Livestock, Land and Irrigation in 2004. Though the circular is still in effect, it seems that not so much attention is being paid to the promotion of the FPS activities recently. The organization and functions of FPS are much weaker compared with FO which is established under the government act. Originally, the FO is formulated in order to assure the proper irrigation management in rural areas among paddy farmers. Hence, it is said that major function of the FO still focus on paddy lands in most cases. On the other hand, the focus of FPS seems to be more on vegetables (or OFC) rather than paddy. Concerning agriculture diversification, it may be better to examine if FPS can also be a potential candidate as a counterpart organization of the project in the field especially in eastern and part of the northern provinces.

(1) Background

FPS is relatively a newly organized farmers group established in recent years based on the circular issued by the central government in 2004. Though the circular is still in effect, it seems that the government does not necessarily promote FPS except in parts of the eastern and northern provinces where FO capacity and function are not so strong as the FOs in other three provinces. According to the circular, five levels of FPSs[12] are to be formed under major irrigation schemes and minor irrigation schemes, separately. However, FPS can be observed only at the village level practically.

Though some FPS are officially recognized organization, their legal status is limited compared with other CBOs examined in the study. For instance, according to the government procurement guideline issued by the Department of Public Finance, FO, RDS, and cooperative societies are entitled to be entrusted with construction works whose contract amount is less than Rs2 million under the CBO's name. However, FPS is not allowed to undertake such construction work using its name.

Table 3.62 shows the objectives of FPS/YFS/WFS based on the Guideline for FPS issued by the Department of Agriculture, Eastern Province.

Table 3.62 Objectives of FPS /YFS/WFS

1.	Guide members to get maximum yield from their agriculture production.
2.	Increase agricultural production of the society members through assistance in getting agricultural inputs on time.
3.	Promote members to enhance agricultural production with their own efforts without being dependent on others and guide them to live without loans.
4.	Bring awareness to the members about the importance of saving and try to encourage them.
5.	Try to get assistance from institutions who are working for the benefits of farmers.
6.	Make the members aware to earn additional income through income generation activities in addition to agriculture.

Source: Guideline for FPS, Department of Agriculture, Eastern Province

Table 3.63 shows the overview of the institutional regulations and rights of FPS/YFS/WFS.

Table 3.63 Overview of FPS/YFS/WFS

Establishment	The minimum number of members is 10 and the maximum 20 (FPS) The minimum number of members is 10 and the maximum 30 (YFS) The minimum number of members is 10 (no statement for maximum number) (WFS)

[12] Yaya Level Agriculture Production Society (village level), Agriculture Production Farmers Council (covers 20-30 Yaya societies), Project Level Agriculture Production Council (covers 20-30 Agriculture Farmers Council), Zonal or District or District Agriculture Production Council (consists of the representative of Agriculture Production Farmers Councils)

Registration	Application document is submitted to Department of District Director of Agriculture through the Agricultural Instructor of the selected range.
Membership	Requirements for membership in a society are: (a) Be a citizen of Democratic Socialist of Sri Lanka; (b) Be a cultivator of the selected village; (c) Be an owner/tenant of agricultural land in a particular area; (d) Be over 18 years of age; and (e) The particular society can decide the membership amount, accepted membership amount must be paid by the member every month.
Meetings	(a) Inaugural Meeting/General Meeting (b) Annual General Meeting: at the end of the financial year (c) Special general meetings: on the request of the Director or the authorized person or one fourth members of the society. (d) Committee Meeting: Monthly
Executive Committee	-President -Vice President -Secretary -Vice Secretary -Treasurer -Three committee members For the purpose of auditing, the society members can select a suitable person from their members or non-members.
Capital and Financial Activities	The society can create fund for the following ways; -Membership amount -Special collection from members -Seasonal collection
Government Role	Agriculture Instructor (AI) attached to Agrarian Service Center (ASC) is entitled to advise every society and its members as to the development activities and rights of the societies.

Source: Guideline for FPS, Department of Agriculture, Eastern Province

(2) Organization and Related Government Body and Officials

Executive Committee of FPS consists of the president, vice president, secretary, vice secretary, treasurer, and three committee members. For the purpose of auditing, the society members can select a suitable person from their members or non-members.

Activities of FPS are supposed to be monitored by AI under the Provincial Department of Agriculture and Deputy Director of Agriculture (DDA) in each district. AI visits their respective FPS and gives the members advices on cultivation. This includes the provision of trainings to farmers, demonstration of improved agricultural technology, institutional capacity to FPS, and so on. AI is also expected to promote the formulation of new FPS in a community where no FPS is present.

(3) Situation of FPS, YFS, and WFS in the Survey Area

Table 3.64 shows the number of FPS, YFS, and WFS in the eastern and northern province, though in Northern Province, FPS can be observed only in the Jaffna District and Vavunia District. Though the circular that gives the official status to FPS is issued by the central government, no FPS can be found in other provinces of the survey target area.

Table 3.64 Number of Farmers Producers Society (FPS), Young Farmers Society (YFS), and Women Farmers Society (WFS) in the Northern Province and Eastern Province

Province / District	No.of FPS (No.)	No.of YFS (No.)	No.of WFS (No.)	Total
North	**10**	**0**	**27**	**37**
Jaffna	10	0	0	10
Kilinochchi	0	0	0	0
Manner	0	0	0	0
Vauniya	0	0	27	27
Mullaithivu	0	0	0	0
East	**213**	**101**	**30**	**344**
Batticaloa	14	39	20	73
Ampara	155	27	0	182
Trincomalee	44	35	10	89

Source: Department of Agriculture (Eastern Province) and Department of Agriculture (Northern Province)

According to the DDA in the eastern and northern province, since FPS is a newly organized CBO promoted and supported by the Provincial Department of Agriculture, their organizational capacity is still quite weak. Most of the FPS are not well confident to make their own initiatives for group activities. Therefore, most of FPS in the area are only functioning in identifying farmers and distributing seeds and farming equipment provided by the government. Moreover, it was noted that many FPS are inactive and activities are not conducted under the name of an FPS even though they are registered under the Department of Agriculture.

(4) FPS, YFS, and WFS as Counterpart of the Project Activities

The FPS is not recommended as a counterpart organization of the project because of its weak institutional capacity. Though the weak institutional capacity is of common concern for every type of CBO, the institutional capacity of FPS seems to be quite weaker compared with FO that has a longer history. Moreover, several government agency and officers are supporting its activity, in general terms. It seems that most FPSs are not conducting any activities at all, though their names are registered with the Department of Agriculture. Some FPSs are established just for the purpose that member farmers receive subsidy from the government (or support from NGOs) through the FPS. It is natural to consider no member activities are carried out by these FPSs. Other concerns are, firstly FPS are only observed in Eastern Province and a part of Northern Province, but not in other provinces. Secondly, FPS has less legal authority, and consequently, less institutional stability and reliability.

3.10.5 Cooperative Societies

Cooperative societies in Sri Lanka has a long history which can be traced to the beginning of the 20th century when the first cooperative credit society was formulated in 1906. Though when the first Cooperative Act was enacted in 1911, only credit societies were allowed to be registered under the act, subsequent amendments of the Cooperative Act have made it possible to establish other types of cooperative societies. In 1930, the Department of Cooperative Development was separated from the Agriculture Department and became an independent institution. In the 1980s, the responsibility of cooperative societies' activities was devolved to provincial councils.

At present, there are several types of cooperative societies in the country such as credit cooperative societies, agriculture cooperative societies, livestock cooperative society, industrial cooperative societies, fisheries cooperative societies, school cooperative societies, multipurpose cooperative societies and so on. In addition to this, there also are secondary cooperative societies, that is, federation and/or the union of groups of societies.

Especially for the livestock activities, it seems that it is preferable to collaborate with the cooperative societies such as dairy cooperative societies in the field.

(1) Background

The Department Cooperative Development defines cooperative society as "an independent entrepreneurial organization democratically controlled and aimed to achieve common economic, social and cultural needs of a group of individuals voluntarily gathered together and enjoying collective ownership". Cooperative societies have the following unique characteristics:

- Being an independent organization;
- A group of individuals voluntarily and collectively come together;
- Collective ownership of members;
- Expectations and needs of the members being common; and
- Entrepreneurship with democratic management.

Objectives of cooperative societies are shown in Table 3.65. Among the following objectives, what characterizes cooperative societies seems to be Item 7 which states that "Purchase the products of their members and store it and market at the appropriate time and help their members to get maximum profit." Though actual practice may be different from society to society, it should be noted that collective marketing is mentioned as one of the objectives of cooperative societies.

Table 3.65 Objectives of Cooperative Societies

1.	Enhance the members' social, cultural, and economic values based on cooperative policies.
2.	Motivate to improve saving habits, self-promotion, and help each other among cooperative members.
3.	Make arrangement to provide loan facilities to the members to improve their agricultural activities.
4.	Demonstrate model farming practices among their members and act as forward farmers to others.
5.	Take necessary action to provide training facilities to their members to introduce new farming technologies.
6.	Implement thrift saving habits among their members.
7.	Purchase the products of their members and store it and market at the appropriate time and help their members to get maximum profit.
8.	Advice members for the food processing activities.
9.	Facilitate and guide to get financial assistance to improve their members production capacity.

Source: Guideline for Cooperative Societies Rule and Regulations prepared by Assistant Commissioner Cooperative Development, Eastern Province

Table 3.66 shows the overview of the institutional regulations and rights of cooperative societies.

Table 3.66 Overview of Cooperative Societies

Establishment	a) There shall be minimum ten members who are engaging with common interest activities. b) The maximum number of members is 100.
Registration	Application document is submitted to the District Assistant Commissioner Cooperative Development through Cooperative Development Officer.

Membership	Requirements for membership in a society are: (a) Be a citizen of the Democratic Socialist Republic of Sri Lanka; (b) Be a resident of particular area; (c) Be over 18 years old; and (d) Have purchased at least one share (the value of one share is Rs100).
Meetings	(a) Inaugural Meeting/General Meeting (b) Annual General Meeting: at the end of the financial year (c) Special general meetings: on the request of the Commissioner or the authorized person. (d) Committee meetings: monthly
Executive Committee	At the Annual General Meeting held once in a year, the following office-bearers shall be elected either unanimously or by voting. a) President b) Vice President c) Secretary d) Four committee members from the members and other two from related departments.
Contract Works	Any societies can undertake to do any contract works with the government department or semi-government or non-governmental organization.
Government Role	The Cooperative Development Officer (CDO) under District Assistant Commissioner Cooperative Development of the area is entitled to advise every society and its members as to the development activities and rights of the societies.

Source: Guideline for Cooperative Societies Rule and Regulations prepared by Assistant Commissioner Cooperative Development, Trincomalee

(2) Organization and Related Government Body and Officials

Generally, the internal structure of cooperative society is almost the same as the structure of FO shown in Figure 3.8.

Cooperative societies are under the control of the Provincial Department of Cooperative Development, and their activities are monitored by the Cooperative Development Officer (CDO) under District Commissioner Cooperative Development. Statutory functions of the Department of Cooperative Development are[13];

- Registration, combining, de-combining, cancellation of registration, liquidation of cooperative societies;
- Annual auditing and inspection of cooperative societies; and
- Arbitration for settlement of disputes on claims between cooperative societies or between societies and members or employees and taking step to authorize court action.

The duties of the Department of Cooperative Development are as follows.

- Supervision of financial and cooperative activities of cooperative societies and providing necessary consultative services for the improvement of cooperative societies
- Provide development assistance and inspiration
- Provide guidance for development and coordination
- Training and development of cooperative development officers (CDOs), cooperative employees and cooperative via exhibition, training classes, short-term courses and publicity meetings, and conducting efficiency-bar examination.

The Commissioner of Cooperative Development is given the authority of auditing cooperative societies on the basis of annual work plan under the Cooperative Societies Act No. 05 of 1972. The authority is

[13] According to the Administration Report – 2010, Department of Cooperative Development, Eastern Province

delegated to the Assistant Commissioner Cooperative Development (ACCD) based in each district, and CDOs in the field. The Commissioner of Cooperative Development and Registrar of Cooperative Societies is empowered to mediate and settle dispute concerning of cooperative societies. Though the Department of Cooperative Development is given the duty to supervise the activities of cooperative societies, their daily activities are usually monitored by the officers of the department related to the cooperative's activities (e.g., AI for agriculture cooperatives, or Livestock Development Instructor (LDI) for dairy farmers cooperatives, Fishery Development Officer (FDO) for fisheries cooperatives, and Industry Development Officer (IDO) for industry cooperatives) in the field.

(3) Situation of Cooperative Societies in the Survey Area

Table 3.91 shows the number of cooperative societies in the five provinces of the survey area.

With respect to agro industries, only nine vegetable cooperative societies are seen in Northern Province. Though the category of "other agricultural" may include all other cooperatives that target different particular crops, its number is also quite small as compared with the number of FO for instance. According to the Provincial Department Cooperative Development of Eastern Province, any particular activities are not conducted by these vegetable and other agriculture cooperatives.

Though the number is not so big, it is noted that there are also dairy/livestock production cooperative societies. The Department of Cooperative Development is responsible for the registration of cooperative societies and it provides assistance mainly for their institutional aspect (e.g., annual auditing and inspection). However, their daily activities as a society are usually monitored and given advice and instruction by related departments and officers. It is a common practice that dairy and livestock production society is established in the form of a cooperative society under the Cooperative Act. Consequently, the activities of these cooperative societies are usually monitored by the Department of Animal Production and Health.

These societies usually have a milk collection center in the community for collecting milk every day from members. Collected milk is brought to district milk collection centers which are operated by private milk companies like Nestle or Milco. In the eastern and northern provinces, milk is collected through the network of LIBCO (Livestock and Breeders Cooperative Societies).

Table 3.67 Number of Cooperative Societies

Province / District	Agro Industries				Fisheries	Industries	Credit	MPCS	Total
	Coconut & Palmyrah (No.)	Vegetable (No.)	Dairy/ Livestock Production (No.)	Other Agricultural (No.)	(No.)	(No.)	(No.)	(No.)	(No.)
North	**39**	**9**	**32**	**2**	**222**	**21**	**527**	**47**	**899**
Jaffna	20	4	13	2	123	7	287	24	480
Kilinochchi	3	2	4	0	22	5	34	6	76
Manner	5	0	3	0	45	3	49	7	112
Vauniya	3	3	9	0	13	2	108	4	142
Mullaithivu	8	0	3	0	19	4	49	6	89
East	**2**	**0**	**26**	**9**	**335**	**26**	**463**	**44**	**905**
Batticaloa	2	0	8	0	112	5	116	16	259
Ampara	0	0	15	8	125	6	313	18	485
Trincomalee	0	0	3	1	98	15	34	10	161
North-Western	**272**	**0**	**86**	**66**	**158**	**283**	**1,040**	**33**	**1,938**
Kurunegala	238	0	65	61	13	249	896	21	1,543
Puttalama	34	0	21	5	145	34	144	12	395
North Central	**0**	**0**	**8**	**16**	**41**	**26**	**148**	**36**	**275**
Anuradhapura	0	0	7	10	30	23	111	24	205
Polonnaruwa	0	0	1	6	11	3	37	12	70
Uva	**7**	**0**	**41**	**75**	**31**	**31**	**640**	**17**	**842**
Badulla	0	0	23	52	14	2	379	12	482
Moneragala	7	0	18	23	17	29	261	5	360
5 provinces Total	**320**	**9**	**193**	**168**	**787**	**387**	**2,818**	**177**	**4,859**

Source: JICA Survey Team

(4) Cooperative Societies as Counterpart of the Project Activities

(a) Livestock Production and Dairy

Concerning projects related to livestock production, it seems natural that project activities are carried out through the collaboration of cooperative societies for livestock (milk collection). In case such kind of cooperative society is not available in the area, the formation of cooperative societies for livestock production should be considered. Though it is a common concern for every types of CBO, institutional capacity strengthening of cooperative societies is needed to be considered in cooperation with the Department of Animal Production and Health and also with the Department of Cooperative Development.

3.10.6 CBOs as Counterpart Organization of the Project

Based on the examination above, characteristics of each CBO are summarized in Table 3.68.

Table 3.68 Summary of the Characteristics of CBOs

CBO	Advantages	Remarks	Possibility as Counterpart
FO	・ Having official status under the Agrarian Development Act, No.46 of 2000 ・ Focusing on agricultural activities and O&M of irrigation system ・ Entitled to maintain irrigation system ・ Observed in every rural area ・ Regular monitoring and instruction is given by ADO/DO and AI and other related government officers ・ Most farmers are member of an FO	・ More attention is on irrigation management ・ Function and institutional capacity may be weak especially in Eastern and Northern Province	Yes (irrigation management and agriculture activities)

CBO	Advantages	Remarks	Possibility as Counterpart
RDS (WRDS)	・ Having official status under the Circular No. A/C/3/1/1 dated 18.09.1978 issued by the Director, Department of Rural Development (amended on 31.10.1978) ・ Covers many aspects of the life in rural village including agriculture development ・ Observed in every village ・ Regular monitoring and instruction is given by RDO	・ May undertake rural development projects (e.g. development of farm access road) ・ Possible organization if FO is not available especially in Eastern Province and Northern Province	Yes (Rural infrastructure development activities)
FPS (WFS ,YFC)	・ Focusing on non-paddy crops (Vegetables, OFC, and fruit)	・ Only observed in Eastern Province and a part of Northern Province ・ Most of FPS are inactive	No
Cooperative Society	・ Having official status under the Cooperative Act ・ Supervision is given by CDO ・ Monitoring and instruction are given by related government officers	・ Societies for livestock production and dairy is commonly available in a form of cooperative	Yes (Livestock activities)

Source: JICA Survey Team

In conclusion, FO is the only CBO the project can collaborate with as counterpart organization in the field related to agricultural projects including irrigation rehabilitation. Basically, though there may be a possibility that the project may identify RDS as the counterpart organization in some cases in the northern and eastern provinces, particularly for projects that aims for rural infrastructure development (e.g. farm access road). Depending on the situation of each FO, it is also suggested that the project supports to formulate sub-group(s) under the FO. A sub-group may undertake a particular task (e.g. development of irrigation maintenance plan), or it may be organized by crop base with the farmers who produce the crop for distribution of quality seed through the FOs.

Concerning livestock activities, cooperative societies such as livestock production cooperative societies and milk collection cooperative societies are the possible counterpart organization in the field. In case such kinds of cooperative societies are not available, the project may consider supporting the formation of those cooperative societies with the cooperation from the Department of Animal Production and Health.

As mentioned above, it is common that one person holds more than one CBO's membership. In this respect, it should be understood that it commonly happens that a member of a FO is also a member of another CBO farmer's group. In this sense, it should be noted that, for instance, taking up FO as the counterpart organization of the project does not necessarily mean the exclusion of other CBO members from the project. Since the situation of CBOs (existence of a particular CBO, role and function of the CBO, composition of members, etc) may differ from village to village in rural areas, it is recommended that the project identify the structure of the CBOs in the community at an early stage. It is preferable that the project firstly examines the roles and functions of each CBO in the community, and then considers the realistic and reasonable measure to collaborate with those identified CBOs in the community.

3.11 Environmental and Social Condition

3.11.1 Current Condition of the Natural and Social Environment

This section describes the current condition of the environment and social aspect in the project target five provinces, Northern Province, Eastern Province, North Central Province, North West Province, and Uva Province.

(1) Natural Environment

(a) Meteorology

Sri Lanka's tropical location and island status ensures uniform, year round temperatures of around 27 ^{o}C in the lowlands and lower temperatures at higher altitudes. Sri Lanka lies within the monsoonal system of the Indian Ocean. There are two monsoons, the south-west monsoon (May to September) and southeast (December to February). Between the two monsoons, two inter -monsoonal occur during March to April and October to November. The country is demarcated into wet, dry, and intermediate zones on the basis of the pattern of rain falls and its distribution. The target provinces of the project fall within the intermediate and dry zone areas as shown in Table 3.69.

Table 3.69 Climatic Zones and Annual Rain Falls

Climatic Zone	Annual Rainfall (mm)	Project Area
Wet zone	>2,500 mm	-
Intermediate zone	1,750 – 2,500 mm	Uva and part of North Western provinces
Dry zone	<1,250 mm	Eastern, Northern, North Central and part of North Western provinces

Source: Natural Resources of Sri Lanka (2000)

Table 3.70 shows the temperature and rainfall data as of 2010.

Table 3.70 Meteorological Observations in Project Areas

Province	Observation station	Average Temperature (^{o}C)	Rainfall (mm)
Northern	Jaffna	28.4	1,496.6
	Vavunia	28.4	1,359.6
Eastern	Trincomalee	28.0	1,419.5
	Batticaloa	28.5	1,760.6
	Potuvil	28.6	1,224.6
North Western	Puttalam	28.0	1,333.6
	Kurunegala	27.3	2,434.3
North Central	Anuradhapura	28.5	1,665.4
	Mahailuppallama	27.7	1,600.7
Uva	Badulla	23.5	2,176.0

Source: Statistical Hand Book (2011)

(b) Topographic Conditions

The general topography of Sri Lanka describes under three peneplains depending on the elevation of the land compared to the mean sea level. The lowest peneplain lies at the elevation between 0 and 125 m and the middle peneplain exist within 125 to 750 m. The project area located in the dry zone of the country is mainly within the lowest and middle peneplain where the elevation ranges between 0 and 150 m.

(c) Geology

The greater part of the island is made up of highly crystalline, non-fossil ferrous rocks of Pre-cambrian age belonging to one of the most ancient and stable parts of the earth crust. The dry zone area except the costal belt of the north eastern region, some parts of east coast such as Batticaloa and Jaffna Peninsula geologically belongs to Vijayan and Wanni complex. Wanni complex covers North Central Province and some parts of North Western Province which has a formation of low metamorphic graded rocks such as granite, gneiss, etc. Vijayab complex covers the Uva Province and known to have lot of minerals such as magnetite, serpentine, quartz, and popular to have hot springs. The northwest coast and Jaffna Peninsula

build up of limestone of the Miocene age.

(d) Ecological Profile

1) Northern Province

a) Forest

Northern Province still contributes 44.5% of forest cover in the area. That includes dry monsoon forests, mangroves, and riverine forests. There are about 391,184 ha dense natural forest in the Northern Province. While conservation efforts are being continued, clearing of forest resources for agriculture, settlements, and for illegal extraction of timber and fuel wood are common practices taking place in the province. Although the Forest Department had taken several measures to conserve and manage these forest resources in the past, efforts were disrupted during the period of civil war.

b) Rivers and Streams

The Northern Province does not have a single perennial river, and very limited seasonal streams and rivers.

c) Coastal and Marine Ecosystem

With 40% of the country's coastline, the province has large number of coastal ecosystems such as lagoons, bays, salt flats, wet lands, coral reefs, estuaries, etc. which play a very important ecological role in the province. Provision of habitat for wildlife, roosting grounds for birds, protection against tidal waves (especially mangroves, sand dunes, and coastal vegetation) etc. are the key environmental services rendered by these ecosystems. In addition, carbon assimilation, energy conversion and nutrient recycling are among other services.

d) Sensitive Conserved Areas

There were no studies conducted to identify or maintain the protected areas in the Northern Province due to prevailing ethnic conflict. After the liberation in 2009, the Central Environmental Authority with the help of the Department of Wildlife Conservation, Forest Department, and few other agencies joined efforts to conduct an Integrated Strategic Environmental Assessment of the proposed protected areas in the Northern Province after conducting a survey in 2011. Still, the studies and the documentation are in progress. The list of Forest Reserves in Northern Province within the project area is given in annexed Table A 3.25.

2) Eastern Province

a) Forests

The main forest types found in Eastern Province are dry monsoon forest, moist monsoon forest, and tropical savannah forests. In addition, damana and Villu grasslands, riverine vegetation and mangroves forests found in coastal areas are prominent in the Eastern Province. The distribution and extent of forest ecosystem in the Eastern Province are shown in Table 3.71.

Table 3.71 Distribution and Extent of Forest Ecosystem in the Eastern Province

Forest Type	Average Extent (ha)		
	Ampara	Batticaloa	Trincomalee
Brackish and salt water	439.36	56.18	1,045.82
Dry monsoon	67,921.18	82.03	80.37
Eucalypts	61.03	-	38.02
Fresh water	19,894.45	50.97	31.12
Mangroves	299	13.04	18.03
Moist monsoon	44,074.98	70.23	39.85
Non- forest	67,475.77	80.05	101.29
Riverine dry	7,534.49	-	140.28
Space and open	227,198.03	57.79	336.09
Teak	4,572.38	97.63	25.97

Source: Eastern province Biodiversity profile (2008)

b) Rivers and Streams

There are about 38 rivers flowing through the Eastern Province to the sea. Most of the areas in the Eastern Province are situated in the coastal plain, and most of the rivers are seasonal and drain only during the rain season or heavy rainfall within short period. Few rivers such as Kumbukkan oya and Mahaweli ganga are perennial which drain water from central highlands.

c) Coastal and Marine Ecosystems

Coastal and marine ecosystems are relatively more abundant and most prominent in the east, which include mangroves, salt marshes, sand dunes, beaches, sea grass beds, mud flats, corals, etc. Coastal agriculture includes the plantations of coconut, cashew, casurina, palmyrah, and vegetables such as onions, chilies, brinjal, and beetle.

d) Sensitive Conserved Areas

There are already many protected areas in the Eastern Province that are protected under DWLC and the Forest Department. Table 3.72 and Table 3.73, respectively shows the protected areas within the project area.

Table 3.72 Eastern Province Wildlife Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Trincomalee	Kuchchveli	Kokkilai lagoon	S	2,995.00
		Pigeon island	NP (marine)	5.00
	Town & Gravets	Naval head work sanctuary	S	About 12,000.00
		Great sober island	S	65.00
		Little sober island	S	5.00
Batticaloa	Koraaipattu North	Trikonomadu National reserve	NR	About 5,000.00

Note: S: Sanctuary, NP: National Park, NR: Nature Reserve
Source: Eastern Province Biodiversity Profile (2008)

Table 3.73 Eastern Province Forest Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Trincomalee	Town & Gravets	Kantalai	FR	18,688.00
	Morawewa		FR	3,584.00

District	DS Division	Name of Area	Category	Extent (ha)
	Morawewa	Pankulam	FR	9,216.00
	Town & Gravets	No name	SF	3,328.00
	Kuchchaveli	No name	OSF	27,648.00
	Kinniya	No name	SF	4,384.00
	Mutur	No name	SF	8,704.00
Batticaloa	Koralaipattu South	Baron's cap	PR	37,397.10
	Koralaipattu North	Koralai	FR	3,664.00
		Koralai	PR	1,102.40
	Eravur pattu	Nuwaragala	FR	4,200.00
		Nuwaragala	PR	154.60
		Rugam	PR	15,200.00
		Omunugala	FR	2,139.60
Ampara	Mahaoya	Omunugala	FR	15,740.00
	Padiyathalawa	Kokagala	FR	2,751.40

Note: FR: Forest Reserve, SF: State Forest, OSF: Other State Forest, PR: Proposed Reserve
Source: Statistical Information, Eastern Provincial Council (2008)

3) North Central Province

a) Forests

Majority of the province has a forest type of tropical dry mixed evergreen forest or monsoon forest. Occasionally, there are few patches of thorny scrub dwarf forests formations. Villus are found mainly in Wilpaththu National Park, Riverine Gallery forests along the river bank reservations, and grasslands in the abandoned and degraded lands.

b) Floodplains

A few flood plains are seen during heavy rainy seasons in the flat low-lying country and these are seen in Polonnaruwa District near Manampitiya.

c) Rivers and River Basins

There are a few rivers and canals found in the North Central Province. Kala oya, Mal wathu oya, Weli oya, and Padaviya wewa are some of the main rivers of Anuradhapura. Amban ganga flows through the Polonnaruwa District which starts from central hills. The Jaya ganga of Anuradhapura District is part of the Mahaweli scheme contributing the agricultural community in the area.

d) Sensitive Conserved Areas

Table 3.74 and Table 3.75 show protected areas under the Department of Forest and Department of Wildlife Conservation, respectively, within the project areas of the North Central Province.

Table 3.74 North Central Province Forest Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Anuradhapura	Galenbidunuwewa	Hurulu	FR	25,217.70
		Nuwaragam	FR	2314.60
	Galenbidunuwewa	Galkulama -Thirappane	OSF	450.00
	Thirappane			
	Thirappane	Labunoruwa	OSF	300.00
	Talawa	Galmaduwa	OSF	250.00

District	DS Division	Name of Area	Category	Extent (ha)
Anuradhapura	Galenbidunuwewa	Hurulu	FR	25,217.70
		Nuwaragam	FR	2314.60
	Galenbidunuwewa Thirappane	Galkulama -Thirappane	OSF	450.00
	Thirappane	Labunoruwa	OSF	300.00
	Kekirawa	Ritigala kanda	SNR	1528.20
	Nochchiyagama	Wilpattu	NP	54,953.20

Note: FR: Forest Reserve, OSF: Other State Forest, SNR: Strict Nature Reserve, NP: National Park
Source: Biodiversity Profile for NCP (2008)

Table 3.75 North Central Province Wildlife Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Anuradhapura	Galenbindunuwewa	Ritigala	SNR	1,528.20
	Mahawilachchiya, Horowpothana, Nochchiyagama	Wilpaththuwa	NP	131,693.00

Note: SNR: Strict nature reserve, NP: National Park, S: Sanctuary
Source: Biodiversity Profile for NCP (2008)

4) North Western Province

a) Forests

There are six types of forests found in the North Western Province such as dry mixed evergreen forests, moist mixed evergreen forests, dry riverine evergreen forests, spares and open forests, mangrove forests and dry deciduous thorn scrub forests. There is a prominent reduction of more than 9% closed canopy forest area in Puttalam District during 1992-2001. In contrast, the same study showed that the Kurunegala District recorded a steady increase in the forest covered over the same period. There are different types of vegetation types found in North Western Province categorized under four floristic regions as shown in Table 3.76.

Table 3.76 Floristic Regions in NWP and their Characteristic Vegetation Types

Floristic region	Vegetation types
Coastal and marine belt	Marine mangroves Salt march and sand dunes Stand vegetation
Dry and arid lowlands	Tropical dry mixed evergreen forests *Manilkara* community Mixed community Tropical thorn forests Damana and Villu grasslands Flood plain wetlands, Riverine and gallery forests
Northern intermediate lowlands	Tropical semi evergreen forests
Northern wet lowlands	Tropical wet evergreen forest

Source: North-western Province Biodiversity Profile (2008)

b) Inland Water Bodies and Streams

There are five major rivers, ten medium sized rivers, and six minor rivers located in the peneplains of the North Western Province. The ten rivers located in NWP cover a catchment area of 9690 ha which represents 16.4% of the total catchment area covered by all rivers in Sri Lanka. Kala oya, Mee oya, Deduru oya, and the Maha oya are the four major rivers with a drainage area of more than 1500 km^2.

c) Coastal and Marine Ecosystem

The three major brackish water bodies found in the North Western Province are the Puttlam lagoon, Mundal lagoon, and Chilaw lagoon. The coastal area of North Western Province is rich with coral reef, mangrove habitats, salt marshes, sea grass beds, and sand dunes. The bar reef sanctuary off Kalpitiya in the North Western coastline is one of the three marine sanctuaries in Sri Lanka.

d) Sensitive Conserved Areas

The land area designated as forest reserve in the North Western Province is about 8.1% from the total area of national forest reserves in Sri Lanka and 17.5% for the proposed reserves. Table 3.77 and Table 3.78 show the protected area under FD and DWLC respectively, in North Western Province within the project areas.

Table 3.77 North Western Province Forest Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Kurunegala	Nikaweratiya	Elawaka	PR	67.60
	Polpithigama	Galketiyagama	PR	1,208.70
	Nikaweratiya	Mawattagama	PR	2,178.80
	Kotavehera	Moragolla	FR	24.24
	Polpithigama	Pallekele	FR	74.30
		Pallekele	FR	15,173.10
		Pallekele	FR	9.93
		Pallekele	FR	35.13
		Pallekele	FR	71.89
	Mahawa	Panwewa	FR	247.94
		Potuwewa	PR	219.94
Puttlam	Karuwalagaswewa	Ipologama	PR	671.24
	Anamaduwa	Tonigala	PR	1,546.15
		Tonigala	FR	747.49

Note: FR: Forest Reserve, PR: Proposed Reserve
Source: Biodiversity Profile for NWP (2008)

Table 3.78 North Western Province Wildlife Conservation Areas within the Project Areas

District	DS Division	Name of Area	Category	Extent (ha)
Kurunegala	Polpithigama	Kahalla - Pallekele	S	21,690.00
Puttlam	Karuwalagaswewa	Tabbowa	S	2,193.00

Note: S: Sanctuary
Source: Biodiversity Profile for NWP (2008)

5) Uva Province

a) Forests

The Uva Province has the highest diversity of natural vegetation where 11 out of 14 major vegetation types are represented in the province. High geographical and climatic diversity existing in Uva Province support such high vegetation diversity as shown in Table 3.79.

Forest plantation in Uva Province has been increased under the categories defined by the Forest Department such as reforestation, rehabilitation of unsuccessful forest plantation, forestry in buffer zones, and agro forestry in agricultural lands to facilitate soil and water conservation and enrichment planting to improve the quality of existing forest plantations.

b) Rivers and River Basins

The river system located within the Uva Province mostly originates in the wet highlands and traverses the dry lowland zone. However, majority of the stream network undergoes seasonal dry up during water deficit periods as a major portion of the Uva Province is subjected to a drier climate. The major water surplus period is in the months of November to December while the minor water surplus period is in the months of March and April. Mahaweli ganga is the main river that is nourished by some of its main tributaries such as Uma oya, Badulu oya, Meda oya, and Loggal oya located in Uva Province.

Table 3.79 Vegetation Types in Uva Province

Vegetation Type	Extent (ha)	Proportion (%)
Dr mixed ever green forest	116,726	38.9
Moist mixed evergreen forest	79,421	26.5
Dry spares and open forest	76,709	25.6
Savanna grassland	9,086	3.0
Dry patina grassland	4,594	1.5
Dry riverine evergreen forest	4,445	1.5
Mid-elevational evergreen forest	4,038	1.3
Dry deciduous thorn scrub	2,424	0.8
Lowland wet evergreen forest	2,308	0.8
Montane evergreen forest	99	0.0
Wet patina grassland	7	0.0

Source: Uva Province Biodiversity Profile (2008)

c) Sensitive Conserved Areas

Protected areas within the Uva Province are administered by the central government, and the two main custodians are the Forest Department and Department of Wildlife Conservation (DWC) which hold administrative and management responsibilities of the relevant areas. The protected areas under Forest Department in the Uva Province are listed in Table 3.80 and there are no conservation areas under DWLC for the proposed project area.

Table 3.80 Uva Province Forest Conservation Areas within the Project Areas

District	DS Division	Name of the Area	Category	Extent (ha)
Moneragala	Bibila	Bibilihela	PR	610.00
	Siyambalanduwa	Guruhela	OSF	275.00
	Wellawaya	Randeniya	OSF	300.00

Note: PR: Proposed Reserve, OSF: Other State Forest
Source: Uva Province Biodiversity Profile (2008)

(e) Fauna and Flora and the Endemism

In the dry zone, the forest area being larger has the level of biodiversity and endemism which are substantially lower than in the wet zone. The adverse impacts of forest loss on biodiversity are not as severe, except for the effects on large mammals like the leopard, elephant, and primate species. For these species, the loss of forests due to expansion of settlements, irrigated agriculture, and chena have caused a reduction of contiguous geographic ranges.

Table 3.81 Species Richness of Flora and its Endemism

Group	No. of species	Number of Endemics
Angiospermae (Flowering plants)	3,771	926
Pterydophyta (Ferns)	348	48
Mosses	566	63
Liverworts	222	0
Lichens	661	0

Source: IUCN Red List (2007)

a) Dry Zone Endemic Flora

There are 71 endemic plant taxa (species, varieties or subspecies) which are more or less restricted to the dry zone. However, 29 of them extend into the intermediate zone especially the transition areas between two zones. Seven of the dry zone endemics survive only on isolated hills; a few being point endemics

(reported only from a single locality, e.g., Ceropegia parviflora, Fimbristylis zeylanica,Madhuca clavata, Plectranthus elongatus, Srobilanthes willisii, Thunbergia laevis var. parviflora and Wrightia puberula). Seventeen dry zone endemics are threatened according to the IUCN Sri Lanka (2007). Table 3.81 shows the species richness in Sri Lanka and their endemism as per IUCN Red List published in 2007.

b) Threatened Fauna

Similar to the threatened flora, necessary emphasis will be placed on the importance of the fauna by selecting suitable groups of threatened fauna in defining a portfolio of protected areas. Table 3.82 shows the summary of threatened fauna species as per IUCN Red List of 2007.

Table 3.82 Threatened Inland Indigenous Fauna and its Endemism

Taxon	Total Species	CR	EN	VU
Mammals	91 (16)	9 (2)	20 (8)	12 (4)
Birds	227 (33)	10	15 (6)	21 (10)
Reptiles	171 (101)	16 (12)	23 (16)	17 (9)
Amphibians	106 (90)	12 (12)	34 (34)	6 (5)
Freshwater fishes	82 (44)	10 (8)	7 (4)	11 (8)
Butterflies	243 (20)	21 (2)	29 (9)	16 (2)
Dragonflies	120 (57)	13 (13)	5 (5)	2 (2)
Freshwater crabs	51 (51)	23 (23)	8 (8)	6 (6)
Theraphosid spiders	7 (5)	0	0	1 (1)
Land snails	246 (204)	16 (15)	12 (12)	5 (5)

Note: CR: Critically Endangered, EN: Endangered, VU: Vulnerable
( ) Number of Endemic species
Source: IUCN Red List (2007)

(2) Social Environment

(a) Current State of Indigenous People in Sri Lanka

At the present state, indigenous people are known to be a group of people referred to as “Vedda” in Sri Lanka with indigenous ancestry, confined to isolated pockets extending from the eastern and north eastern slopes of the hill to the eastern and north central parts of the country.

It is estimated that there was a total of 7,350–7,500 families living in Sri Lanka as indigenous community which is less than 0.005% of Sri Lankan national population (Ministry of Culture and Arts, 2011). The male to female ratio in the indigenous community recorded to be 1.05 (males/female) which is higher than the national population.

The indigenous people in Sri Lanka are traditionally hunters and gatherers while paddy cultivation and chena cultivation are the main economic engagement. Table 3.83 shows the present status of economic engagement among indigenous people in Sri Lanka. Majority of the Vedda people work in their native villages (82 %) while others work within(6%) or out (11%) of the DS divisions. About 1% of the population recorded to be working in overseas.

It has been identified that settlements of indigenous people has been restricted mainly to Ampara, Batticaloa, Trincomalee, Polonnaruwa, Anuradhapura, Badulla, Moneragala districts in Eastern, Uva and North Central provinces of Sri Lanka. According to recent literature sources (Ministry of Culture and Arts, 2011), current Veddas resettlements are located in the Grama Niladhari divisions (GNDs) in the project areas, as shown in Table 3.84.

Table 3.83 Current Economic Activities of Vedda People

Economic Activity	% Out of the Total Population
Paddy cultivation	37
Chena cultivation	22
Manual labor	19
Fishing	6
Army/Police	5

Source: Prepared by JICA Survey Team based on "Socio-Anthropological Research Project on Vedda Community in Sri Lanka", Ministry of Culture and the Arts, 2011

Table 3.84 Veddas Resettlements in the Project Areas

Province	DS	GND
Eastern	Mahaoya	Pollebedda
	Koraleipattu North	Mathurankernikulam, Kugnamkulam, Kirimichchi, Kathiraveli,
	Dehiattakandiya	Hennanigala
	Seruvila	Uppooral
North central	Dimbulagala	Ellewewa, Dalukana, Yakkure, Kudawewa
	Welikanda	Sewanapitiya, Mahawewa, Ginidamana
Uva	Madulla	Rathugala - Henebedda
	Mahiyanganaya	Dambana

Source: Prepared by JICA Survey Team based on "Socio-Anthropological Research Project on Vedda Community in Sri Lanka", Ministry of Culture and the Arts, 2011

(b) Archaeological Heritage

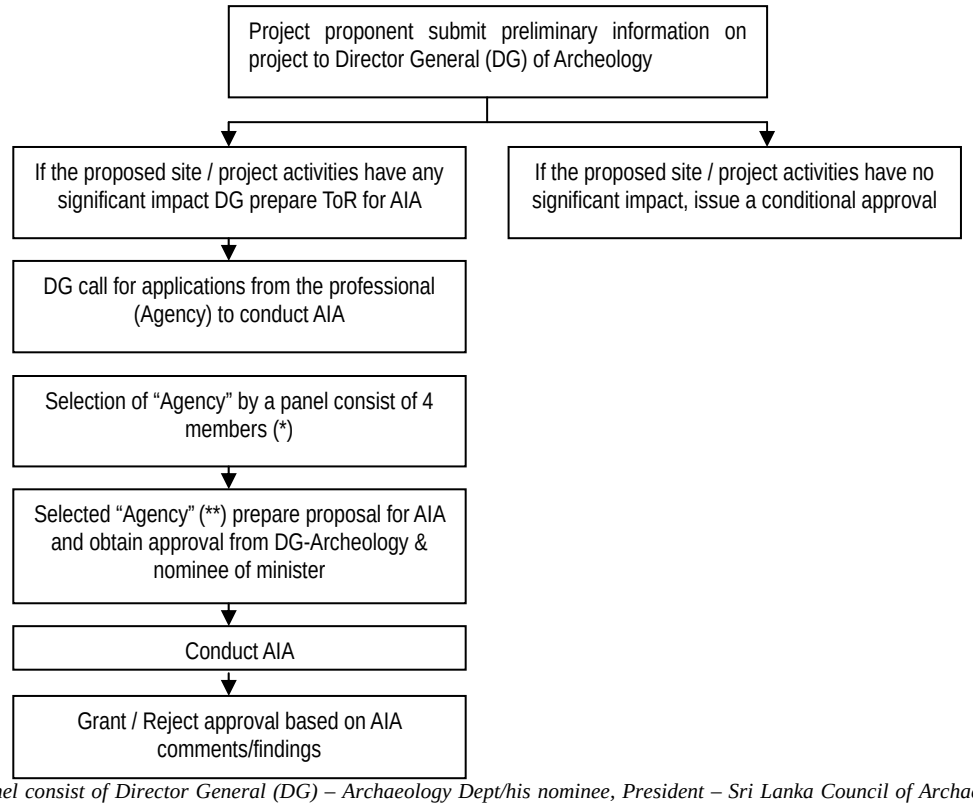
The Department of Archaeology, has declared about 118 archaeological reserves and over 2000 protected monuments in Sri Lanka. Table 3.85 gives a summary on archaeological reserves found in the project area.

Table 3.85 Summary of Archaeological Reserves in the Project Area

Province	Division	Number of Reserves
Eastern	Trincomalee	11
	Ampara	2
	Batticaloa	3
North	Jaffna	3
North central	Anurahapura, Polonnaruwa	17
Northwestern	Kurunegala	11
	Putlam	2
Uva	Badulla	3
	Moneragala	4

Source: Prepared by JICA Survey Team based on the information provided by the Archaeological Department

Project proponents must submit an application for attending to the evaluation survey of archaeological damages (preliminary information) to the Director General of the Department of Archaeology to confirm if the project area is located in the archaeological reserves or not. If the Director General of the Department considers that the project will have significant impact on archaeological reserves, they will prepare the terms of reference for an Archaeological Impact Assessment (AIA) and call for the conduct of AIA by professionals. The Director General of the Department of Archaeology will review and approve the AIA Report. All this process will be taken about six weeks. Figure 3.9 shows the process of the AIA.



Note: (*) Panel consist of Director General (DG) – Archaeology Dept/his nominee, President – Sri Lanka Council of Archaeologists / his nominee, DG of Central Cultural Fund /his nominee and Director – Post graduate Institute of Archaeology
(**) Project Director of the selected Agency shall be a member of Sri Lanka Council of Archaeologists
Source: Prepared by JICA Survey Team based on the Antiquities Ordinance

Figure 3.9 Process of Archaeological Impact Assessment

3.11.2 Main Environmental and Social Considerations Issues Related to Agricultural Sector Projects in Sri Lanka

In this section, the main environmental and social issues related to the agriculture sector project in Sri Lanka are as follows; human-elephant conflict (HUC), over extraction and pollution of ground water, soil pollution, and soil erosion. These issues should be considered with special attention in the planning stage of the project component.

(1) Human-Elephant Conflict

(a) Overview

Development process and incompatible policy actions have aggravated the Human Elephant Conflict and have caused a significant problem for the agriculture practice in particular areas in Sri Lanka.

As the human population grows and agricultural areas expand at the expense of forests, elephant habitat reduces continually. As a consequence, the DWC recognizes that about 70% of the elephant's range lies outside the system of national parks and nature reserves. As both humans and elephants have similar ecological requirements, when both species inhabit the same area, conflict between them is inevitable. Elephants destroy crops, damage houses, and at times even kill people. Irate farmers in return retaliate by shooting, wounding, or killing elephants with home-made weapons. Hence, the tolerance traditionally shown to the elephant appears to be gradually weakening in farming communities when the elephant interferes with agriculture. Farmers and elephants coming into conflict over agricultural areas result to death either one or both of them. Chronic crop damage by elephants, if left unchecked,

will have a serious impact on the livelihood of subsistence farmers. Table 3.86 describes the status of human elephant conflict in wildlife areas in Sri Lanka managed by DWC.

Table 3.86 Human Deaths and Elephants Deaths due to HEC in 2010

Province	Wildlife area	Human Deaths	Elephant Deaths
North Western	North Western	34	66
Uva, North Central, Eastern	Mahaweli	14	74
Southern	Southern	9	35
Eastern	Eastern	14	42
Central	Central	4	2
Southern	Yala/Bundala	6	8

Source: Interview with DWC Officer, May 2012

According to the information received from DWC, the human elephant conflicts recorded to be the highest in Northwestern Province while Mahaweli areas, especially in Trincomalee and Polonnaruwa areas recorded to be the second highest. After resettling in the community, it was recorded an increasing conflict in Batticaloa and Ampara areas of Eastern Province.

(b) Measures Taken to Minimize Conflicts and Crop Damage

DWC set the National Policy on Elephant Conservation and Management to manage the HEC. In addition to the legislative measures, there are a multitude of traditional methods that have been developed through the ages to reduce and prevent crop raiding by elephants in conflict prone areas. These have been categorized as physical, biological, and psychological barriers to control elephant attacks on crops in Sri Lanka.

As for physical barriers, the following methods were used:

(i) Wire fences: Fences built with regular fencing material but has little effect on elephants;
(ii) Log fences and stone walls: Log and stone barriers are more effective than wire fences but not widely used and have very little practical applicability; and
(iii) Ditches: The construction of elephant proof trenches (Commonly used dimensions of about 2 m deep, 2 m wide at the top and 1.5m wide at the base).

There are some biological barriers being practiced in Sri Lanka, but very few had been successful. A number of thorny plant species such as agave, cacti, and bougainvillea have been tried as 'biological fences'.

Electrified fences are commonly employed as psychological barriers by individuals and private companies to protect farmlands from elephants and by governments and conservation agencies to restrict elephants to particular areas. They do not cause physical harm to elephants but gives a powerful and unpleasant electric shock upon contact. The supply is given through an energizer (12,000 W and 12 V) battery charged using solar power.

(c) Other Human-Animal Conflict

According to the information received from the Department of Wildlife Conservation in Sri Lanka, in addition to elephants, monkeys have become a main threat on crops in Sri Lanka and DWC planned to distribute air rifles to control the damage caused by monkeys on the crops. This is known to be significant in Kurunegala area of North Western Province.

(2) Over Extraction and Pollution of Groundwater

(a) Overview of the Problem

1) Over extraction of groundwater

Groundwater use is largely limited to domestic water supply and small-scale irrigations. However, there is a growing demand for groundwater that is facilitated by low-cost drilling and pumping technologies. A government subsidy for groundwater development for small-scale agriculture was introduced in the early 1990s. Its spread has been very rapid in minor irrigation schemes situated in the northwestern part of the dry zone[14]. The North Western Province is an important example of an agricultural region, which exploited groundwater through 130 tube wells and finally suffered because of the intrusion of salt water in Puttlam, Mannar, Paranthan, Kilinochchi, and Mulathivu (UNEP, 2001).

2) Groundwater pollution

It is recorded that in 79% of the well runoffs have fertilizer and agrochemicals which resulted in nitrate concentrations being well above the levels advocated by the World Health Organization (WHO) for safe drinking water, with recorded concentrations of over 200 mg/L (UNEP, 2011). In the Northern Province especially in Jaffna islands off the peninsula, 50% of the wells reported to have nitrates of above 10 mg/L as per the studies done by CEA. Leaching agrochemicals from intensively cultivated soil is responsible for elevated concentrations of chloride, nitrates, and potassium observed in many irrigation wells in the Northwestern Province, with nitrate concentrations of up to 40 mg/L. Increase in level of fluoride and heavy metals such as iron has been reported in the North Central Province (Disanayake, 2005). In Sri Lanka, metal mining did not take place and the heavy metal pollution is mainly recorded due to industrial waste disposal.

Problems related to groundwater in the dry zone area is summarized in Table 3.87.

Table 3.87 Groundwater Distribution within the Project Areas and Problems

Aquifer Type	Location-Distribution	Problem	
		Groundwater Extraction	Groundwater Pollution
Shallow Karstic	Jaffna Peninsula and some outer islands of Northern Province	・ Most intensively used aquifer in the country. ・ Approximately 80% of the ground water is used for high value agriculture and remaining 20% is used for domestic purposes.	・ Enhance level of nitrate pollution recorded in portable ground water (exceeding WHO standards).
Deep confine	North western region including Puttlam, Mannar, Mullaitivu districts coastal plain	・ Safe abstraction rates have been recorded except Mannar District (Murukkan basin). ・ Mannar District is over exploited for irrigating paddy through individual tube wells.	・ In Puttlam District (Vanathavillu basin) ground water is overburden due to leaching salts from cultivated soil.
Dry zone metamorphic hard rock	North Central, North Western provinces and some locations in Northern Province	・ There are over 10,000 agro-wells operating in Anuradhapura District, which has been developed in an unauthorized manner without proper assessment. ・ Around 15,000 deep tube wells drilled by many foreign agencies for water supply projects.	・ Excessive concentration of fluorides found in many deep wells in Anuradhapura and Polonnaruwa districts. Also excessive quantities of manganese, iron, and nitrates recorded.

[14] In addition, industrial zones and development of tourist hotels are collectively leading to unprecedented groundwater extraction.

Aquifer Type	Location-Distribution	Problem	
		Groundwater Extraction	Groundwater Pollution
Shallow to moderately deep on unconsolidated coastal sands	North western coastal plain (Puttlam), Mannar Island of Northern Province, and western coastal plain of Kalkudah, Batticaloa, Potuvil, Nilaveli, etc.	・ North western coastal plain aquifers are over exploited for prawn culture ponds, thus saline water intrusion into aquifer. ・ Eastern coastal plain exploitation is increased due to tourism industry and intensive agriculture. Also pollution is increasing.	

Source: Panabokke C.R. (2007)

(b) Management of the problem

There is no single agency responsible for groundwater development and use. There is also no legislation or administrative procedures in place to regulate groundwater use. The Water Resources Board Act (No. 29) of 1964 provides for the establishment of the Water Resources Board to advice the minister on various facets of water resources management and also mainly to groundwater development. However, so far it has not put any legislation to control groundwater over-extraction. At present, the Central Environment Authority (CEA) is responsible for all ecological aspects of water development including water quality, and grand water extraction has been controlled through CEA Environmental Guidelines (IEE/EIA process).

(3) Soil Pollution

(a) Overview of the problem

Land degradation due to frequent exposure of lands for soil erosion looses the fertile top soil. The reduction of soil fertility encourages farmers in using more chemical fertilizers to enhance their production. In the dry zone, farmers manage water scarcity and unfavorable climatic factors by applying chemical fertilizers. The continuous use of land for agricultural purposes has degraded its soil fertility. Therefore, phosphate fertilizers are widely used in agricultural activities in Sri Lanka to supply crops with adequate amounts of phosporus for growth and development. Depending on their origin, inorganic fertilizers such as superphosphates and rock phosphates contained different quantities of potentially toxic heavy metals such as cadium, uranium, mercury and lead (Disanayake and Chandrajith 2009). The application of such fertilizer caused heavy metal pollution in the soil. This is a more common problem in the Anuradhapura and Vavunia areas.

Apart from heavy metal contamination, there are other problems of uncontrolled chemical fertilizers usage in agriculture field. Long-term use of inorganic fertilizes has made agricultural lands more saline, especially in the Vavunia area[15]. Fertilization coupled with irrigation can cause substantial changes in the hydrology and chemistry of groundwater in agricultural areas.

(b) Current management of the problem

According to the Sri Lanka National Agriculture Policy, the Ministry of Agriculture promotes the production and utilization of organic and bio-fertilizers in order to gradually reduce the use of chemical

[15] Interview with Northern Provincial Agriculture officers in May 2012.

fertilizers through an Integrated Plant Nutrition Systems (IPNS). Although there is no regulation to manage the application of chemical fertilizers, the National Fertilizer Secretariat that operates under the Ministry of Agriculture is responsible in issuing license for fertilizer import. At the same time, the Secretariat does continuous checking and analysis of sample with the help of Sri Lanka Standard Institute to confirm that all imported fertilizers are up to the required quality and standard.

The agriculture field officers in each irrigation system have developed plans to encourage farmers to use organic fertilizers. They have introduced programs in production of organic fertilizers in their areas using materials found in the surrounding environment. However, the conversion is not that easy as most farmers are reluctant to use organic fertilizer on their crops due to the slow performance rate and long preparation time[16].

(4) Soil Erosion

(a) Overview of the problem

The major source of environmental damage associated with agriculture is land degradation, particularly soil erosion. At present, 44% of Sri Lankan agricultural lands are facing problems of soil erosion (Bandara and Thiruchelvum, 2008). Soil erosion has become a major challenge that encounters tank sedimentation in dry zones of Sri Lanka, though mid country wet zones are identified as the region that is most prone to soil erosion due to the terrain profile. Clearance of forests from reservoir catchment areas has dramatically increased tank siltation rates. Owing to the variation in flow velocity inside the tank, the coarser particles deposits first at the downstream of the storm water inlet and finer particles are deposited along the flow path up to the dam. This results in the continuous reduction of gross storage capacity of the tank and greater rate of reduction, varying the reflecting rise in the rate of soil erosion.

In the dry zone area, the elevation and land slope are not the cause of land degradation but by incorrect agricultural practices. For example, rain fed chenna cultivation remains the most destructive practice that is estimated at 30–50% of soil loss (Panabokke, 1999). In addition to illegal encroachment, landless farmers are often resettled in such degradation prone lands further increasing the problem. In the low country dry zone, excessively high soil erosion rates of 20-25 t/ha/year from the land cultivated with sorghum and cotton was reported.

(b) Management of the problem

The Ministry of Agriculture is the responsible agency in controlling soil erosion under Soil Conservation Act No 24 of 1994, No 25 of 1951, and No 29 of 1953. One of the major needs is to amend the present Soil Conservation Act to prevent new cultivation in lands higher than 30% slope as well as above the 1500 m contour line.

In relation to agriculture practices that operates in village levels, there has no such attention in minimizing erosion. There is no proper monitoring scheme operating under the Department of Agriculture to control land degrading activities related with agriculture practices. The agriculture officers in field levels are mostly engaged with paddy farming and rest on OFCs mainly concern on crop varieties and farming methods. Nevertheless, there is inadequate resources for trained staff allocated to

[16] Interview with the officers of the Agriculture Department in May 2012.

work on soil conservation practices. However, the practices shown in Table 3.88 have been promoted through several donor-funded projects in dry zone area through community participation.

Table 3.88 Type of Measures Against Soil Erosion

Type of Measures	Description
Mechanical conservation	Mostly field extension workers or trained farmers demarcate bunds on sloping lands with simple tools, and land user is asked to do soil works with or without incentives.
Tree and grass hedges	*Gliricidia, vetiver,* or *citronella* hedges are introduced to control soil erosion and restore the already degraded lands. Purpose of this practice was to improve the physical tilth of the soil, maintenance of the soil nutrients level, suppress weeds, which are difficult to control, and reduce the evaporative demand by creating a low temperature and high humid micro-climate at the ambient crop layer.
Watershed management approach	Reforestation of small tank catchments, soil conservation in homesteads and rain fed farming areas, reservation by planting bamboo and diversifying to perennial tree farming etc.
In situ rainwater harvesting	A micro-scale rainwater harvesting system referred to as 'eyebrow bund and pitcher system' is established for the cultivation of fruit trees in the dry zone rain fed areas.

Source: Dharmasena (2003)

In addition to the above activities, with the establishment of the Soil Research and Development Center in 2001 by the Ministry of Agriculture under Natural Resources Management Center in wet zone areas where land degradation is high.

The management of tank sedimentation is generally done through the expansion of tank capacity such as raising and lengthening the tank bund. However, this has to be done in a careful manner. Management decisions like raising the tank bund can affect flooding in downstream areas.

Tank desiltation is another practice use to manage the sedimentation issue. However, most of the irrigation engineers had objected on this as the use of machinery on the removal of silt in the tanks beds resulted on the damage of hardpan of the tank that ultimately weakened the water retention capacity of the tank bed[17]. It is recommended by most of the irrigation engineers to prevent sedimentation by stopping the forest clearance in catchment areas for agriculture purposes. Removal of aquatic vegetation in the tanks in a careful manner will also helpful minimize the sedimentation levels in irrigation tanks.

3.12 Major Interventions from Other Agencies

There are a large number of ongoing donor assisted programs that develop irrigated agriculture sector and infrastructure sector of Sri Lanka. Some of the major interventions from other agencies are given in Table 3.89. Closed interaction with these programs is necessary in planning a new project to realize the maximum benefit of the area as a whole

Table 3.89 Major Intervention from Other Agencies

Project	Location	TEC (US$.M)	Fund.	Implementing Agency	Project Period
Eastern and North Central Province Road Project	EP & NCP	71.72	ADB	M/LG & PC	2009-2014
Local Government Infrastructure Improvement Project	EP & NCP	50	ADB	M/LG & PC	2006-2012
Road Sector Assistant Project - Rural Road Component	NCP, UP & SP	10.04	World Bank	M/LG& PC	3 years
Conflict Affected Area Rehabilitation Project	NP & EP	90.31	ADB	M/LG& PC	2005-2011

[17] Interview with Eng. N.A.I.U.K. Nissanka – Deputy Director, Dept of Irrigation in May 2012.

Project	Location	TEC (US$.M)	Fund.	Implementing Agency	Project Period
Improving Connectivity to Support Livelihood and Gender Equality Project	NCP & EP	Rs353 million	ADB	M/LG& PC	2011 - 2013
National Highways Project	NCP, EP & UP	150	ADB	M/Ports & Highways	2007-2012
Northern Road Connectivity Project (N)	NP	130	ADB	M/Ports & Highways	2010-2015
Northern Road Connectivity Project (PC)	NP	25.42	ADB	M/LG& PC	2010-2015
Dry Zone Urban Water Supply Project	Dry Zone	85	ADB	M/Water Supply & Dr.	2009-2014
Jaffna and Killinochchi Water Supply and Sanitation Project	Jaffna & Killinochchi	90	ADB	M/Water Supply & Dr.	2011-2017
Secondary Towns & Rural Community Based Water Supply & Sanitation Project	NCP,EP & SP	132.5	ADB	M/Water Supply & Dr.	2007-2012
Conflict Affected Region Emergency Proj.	NP & EP	150	ADB	M/Economic Developm.	2010-2013
Sri Lanka Road Sector Assistance Project.	All Island	342.2	World Bank	M/Ports & Highways	Up to-2014
Re-Awakening Project.	NP, EP & adj. Districts	76.7	World Bank	M/Economic Development	Up to-2014
Second Community Development and Livelihood Improvement Project (Gamidiriya Project)	NCP, UP, CP, SGP & SP	75	World Bank	M/Economic Development	Up to-2014
Provincial Roads Project	UP, EP & NP	105	World Bank	M/Economic Development	Up to-2015
Emergency Northern Recovery Project (ENReP)	North/East	65	World Bank	M/Economic Development	Up to-2012
PEACE Project	NCP, NWP, EP & NP	Rs5040 million	JICA	M/I&WRM & M/Econ. Dev.	2006 - 2012
Dry Zone Livelihood Support and Partnership (DLSP) Program	Anuradhapura, Kurunegala, Badulla & Moneragala Districts	26	IFAD	M/Agriculture	2005 - 2012
Rehabilitation and Improvements of 67 km length of Navatkuli-Karaitivu-Mannar Road Package 2	NP	48.37	China	M/Ports & Highways	
Rehabilitation and Improvements of 113 km length of Puttalum-Aracchchikade- Mannar Road Package 3	NWP & NP	73.2	China	M/Ports & Highways	
Lighting Sri Lanka, Uva Province	UP	24.9	China	M/Power & Energy	
Project on small Scale Farming Improvement through Genetic and Feeding Management Improvement in Sri Lanka	NW & CP	-	JICA	M/Livestock	2009-2014
Dairy Cattle and Buffalo Improvement Project	NW & CP	-	FAO	-	
EU support to reconstruction and development in selected district in North and East	NP & EP	5.1	FAO	-	2011-2014

Source : JICA, FAO and Ministries in Sri Lanka

Chapter 4 BASIC APPROACHES AND PROJECT RATIONALE

4.1 Selection of Potential Site

4.1.1 Selection Criteria and Scoring Method

High potential sites for project implementation were selected as candidate project sites considering the available natural resources, present agricultural practices, available infrastructure, available market facilities and agriculture logistics, socio economic conditions, present government activities, etc.

After close discussions with related ministries in the central government and respective provincial government, the project sites were selected on the basis of the Divisional Secretariat (DS) division's fair and objective criteria. The following five criteria were employed for selecting candidate projects sites.

Criteria 1: Suitability of soil
Criteria 2: Appropriateness of water resource
Criteria 3: Farmer's needs and ability
Criteria 4: Marketability
Criteria 5: Adequateness of government extension services

In case of Criteria 1 on the "suitability of soil", availability of the suitable group of soils for OFC, vegetable, and fruit cultivation, namely, reddish brown earth and non-calcic brown soils with other types of soil were considered.

With regards to the above Criteria 2 on the "appropriateness of the water resources", two aspects such as adequacy of available surface water and accessibility to the ground water were considered. In order to evaluate the adequacy of surface water availability for each DS division, the average cropping intensity of available irrigation schemes within the DS division was estimated based on past cultivation records, catchment area of tank, tank capacity, and climate data. A low score was given when the estimated cropping intensity was determined to be low since the water supply is inadequate in the area to meet the indicated water needed for OFC and vegetable cultivation. On the other hand, a low score was also given to the DS divisions which have very high cropping intensity since there is less opportunity for change in motivating farmers to enhance their cultivation pattern. The highest score was given to the DS division which has cropping intensities between 1.0 to 1.4.

Criteria 3 on "farmers needs and ability" was estimated based on the latest cultivation area of OFC and vegetable during Yala season since the project will focus mainly on Yala cultivation.

In terms of the above Criteria 4 on the "marketability", two aspects, namely, accessibility to main road from the farm and accessibility to major market from main road were considered. It was considered that the Dedicated Economic Center is to be a major market.

In the selection process of priority DS division, the poverty level, agro-ecological conditions, and available workforce were to be considered as selection criteria. However, these were not employed as selection criteria since these will give either an advantage or disadvantage for site selection.

The potential for milk production was given less priority in the selection of sites since milk production cannot be achieved without further integration of livestock farming with crop farming considering the present availability of the dry matter required in the livestock sector.

With the criteria mentioned above, the following scoring method was employed. The used data, allocated points, and details of scoring method are shown in Table 4.1.

Table 4.1 Selection Criteria and Scoring Method

No.	Criteria		Data Used	Points Allocated	Scoring Method
(1)	Suitability of soil		National Soil Map	15	15 points were uniformly allocated to each DS based on suitable soil rate. Suitable soil rate = (suitable soil area) / (total DS area)
(2)	Appropriate -ness of water resource	Appropriate -ness of availability of surface water	Major scheme : Present crop intensity (CI) collected from the central and provincial departments of irrigation and Mahaweli Minor scheme : Present CI is estimated based on the data collected from DAD	10	Giving the following points based on the present CI. (1) CI <0.8 : 0 points (2) 0.8< CI <1.0 : 2 points (3) 1.0< CI <1.4 : 10 points (4) 1.4< CI <1.6 : 6 points (5) 1.6< CI <1.8 : 2 points (6) 1.8< CI : 0 points
		Accessibility to ground water	National Ground Water Map	10	10 points were uniformly allocated to each DS based on shallow aquifer rate. Shallow aquifer rate = (area where shallow aquifer exist) / (total DS area)
(3)	Farmer's needs and ability		Data for Yala 2011 Actual data collected from Provincial Director of Agriculture Office	30	Giving the following points based on the present OFC and vegetable cultivated extent in Yala More than 550 ha : 30 points 550 ~ 450 ha : 24 points 450 ~ 350 ha : 18 points 350 ~ 250 ha : 12 points 250 ~ 150 ha : 6 points Less than 150 ha : 0 points
(4)	Marketability	Accessibility to main road from the farm	Type and length of the road collected from each District Secretariat Office	10	Giving the following points based on the density minor road. Density of minor road = (length minor road, cart track, and foot path) / (farming area) More than 10 km/km^2 : 10 points 10 ~ 8 km/km^2 : 8 points 8 ~ 6 km/km^2 : 6 points 6 ~ 4 km/km^2 : 4 points 4 ~ 2 km/km^2 : 2 points Less than 2 km/km^2 : 0 points
		Accessibility to major market	National Road Map	10	Giving the following points based on the travelling time from centre of DS (say location of DS Office) to nearest big market (Colombo, Dumbulla or Tabuttegama, etc.) calculated with the following assumption. A.B class road : 40 km/h Other road : 20 km/h Less than 2 hrs. : 10 points 2 ~ 3 hrs. : 8 points 3 ~ 4 hrs. : 6 points 4 ~ 5 hrs. : 4 points 5 ~ 6 hrs. : 2 points More than 6 hrs. : 0 points
(5)	Adequateness of government extension services		Staff detailed collected from the Department of Agriculture and DAD Office in each district	15	Giving the following points based on number of farmers covered by one Agriculture Instructor. Less than 600 farmers :15 points 600 ~ 900 farmers : 12 points 900 ~ 1200 farmers : 9 points 1200 ~ 1500 farmers : 6 points 1500 ~ 1800 farmers : 3 points More than 1800 farmers :0 points

4.1.2 Selected Candidate Sites for Project Implementation

With the above criteria and scoreing method, 181 DS divisions available in the survey area were scored. Scoring results were summarized in the annexed Table A 4.1.

By looking at the scoring results, there are two major high potential areas that can be identified. One area covers the north of Kurunagala and Puttalam, Trincomalee, in the Eastern Province, Mullativu up to the Northern Province. Other high potential area is located in the Moneragala District, inland of the Eastern Province and northern part of Batticaloa.

Out of 54 DS divisions, eight DS divisions were selected from the Northern Province, ten DS divisions from the Eastern Province, 14 DS divisions from North Central, 12 DS divisions from the North West and ten DS divisions were selected from Uva. The distribution of the candidate sites by province are shown in Table 4.2 and the annexed Table A 4.2.

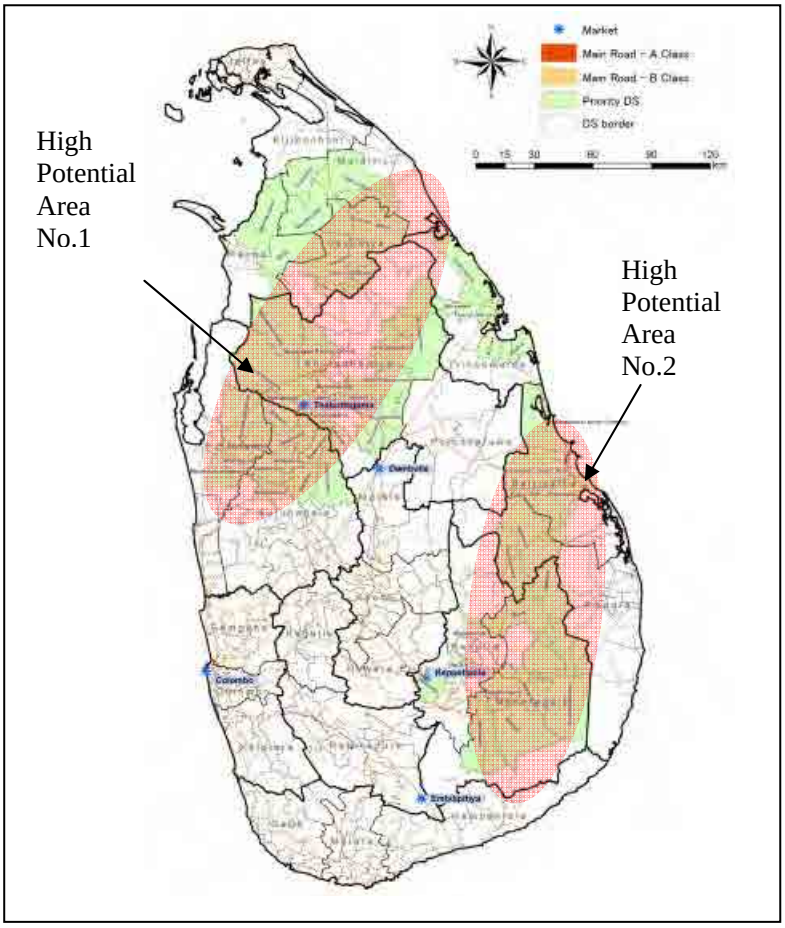


Figure 4.1 Potential Areas for Project Implementation

Table 4.2 Provincial Summary of Candidate DS Divisions

Name of Province	DSs in Survey Area		Candidate Project Site DSs
Northern Province	34	⇒	8 (12%)
Eastern Province	45	⇒	10 (20%)
North Central Province	29	⇒	14 (27%)
North Western Province	47	⇒	12 (21%)
Uva Province	26	⇒	10 (20%)
TOTAL	**181**	⇒	**54 (100%)**

Source: JICA Survey Team

4.2 Basic Approaches

4.2.1 Target Development Areas by Strategic Agricultural Crop

(1) General

Target development areas by strategic crop in relation to the improvement on agricultural production and productivity were determined by following the procedure below:

- Sri Lanka's target crop production for 2020 is firstly compiled based on the relevant target production figures stated in the National Development Plan (Mahinda Chintana

2010);

- Then the production target of each crop in the dry zone is determined based on the present share of the total production of each crop in Sri Lanka;
- Aside from the above, anticipated crop yield is determined for the respective potential crops (see Table 4.6 and Table 4.7 in paragraph (3) in this sub-section);
- The target development area of each potential crop is determined based on the above mentioned production targets and the anticipated crop yields; and
- The above target development area for each crop is compared with the proposed development area of the DS level officers for each potential crop (see the column of Ground Level Needs in Tables 4.3 and 4.4). Between these two areas, the target development area is finally determined for each strategic crop by giving priority to the smaller area in the selection. Only strategic crops will be produced in the future with the Project condition.

Eventual outcomes as a result of the above procedure are presented in Table 4.3 for OFCs and Table 4.4 for fruits.

Table 4.3 Target Development Area of OFCs

Item	Production in 2009	Target Production in 2020	Expected Increase Rate	Target after Deduction of 2009 Production	Share of Five Provinces in the National Production	Production Target in the Five Provinces	Anticipated Yield[c]	Production Area Required	Production Area Required[d]	Ground Level Needs	Target Development Area [g]
	(ton)	(ton)	(% p.a.)	(ton)	(%)	(ton)	(ton/ha)	(ha)	(ha)	(ha)	(ha)
	(1)	(2)	(3)	(4)	(5)	(6)=(4)*(5)	(7)	(8)=(6)/(7)	(9)	(10)	(11)=(MIN(9),(10)
Big Onion	81,707	250,300	10.7	168,593	36.2[a]	61,031	18.0	3,391	3,390	2,280	2,280
Red Onion	46,232	60,750	2.5	14,518	94.9[a]	13,778	15.5	889	890	1,410	890
Dried Chilli	10,318	60,850	17.5	50,532	75.1[a]	37,950	2.75	13,800	13,800	5,280	5,280
Maize	129,769	350,000	9.4	220,231	96.3[a]	212,082	5.0	42,416	42,420	0	0
Kurakkan	6,433	44,600	19.2	38,167	67.1[a]	25,610	1.8	14,228	14,230	0	0
Gingerly	8,523	26,760	11.0	18,237	92.8[a]	16,924	1.5	11,283	11,280	0	0
Legumes	48,936	174,670	12.3	125,734	85.0	106,896	-	57,584	57,580	7,320	7,320
Greengram	9,258	66,900	19.7	57,642	73.3[a]	42,252	1.8	23,473	23,470	-	-
Blackgram	7,071	26,760	12.9	19,689	99.9[b]	19,669	1.8	10,927	10,930	-	-
Cowpea	13,480	35,000	9.1	21,520	90.5[a]	19,476	1.5	12,984	12,980	-	-
Soya bean	6,050	19,250	11.1	13,200	97.4[b]	12,857	2.5	5,143	5,140	-	-
Groundnut	13,077	26,760	6.7	13,683	92.4[b]	12,643	2.5	5,057	5,060	-	-
Total									**143,590**	**16,280**	**15,770**

Note: a; These percentages were estimated based on production data from Department of Census and Statistics.
b; These percentages were estimated based on production data from HARTI . c; Anticipated yields of OFCs are presented in Table 4.6.
d; All figures were rounded. e; Proposed development area by crop was determined giving priority to smaller area in (9) and (10).

Source: Mahinda Chintana 2010 (1)-(4), Statistical Abstract 2010, Department of Census and Statistics and Agricultural Profile 2006, HARTI (5)

Table 4.4 Target Development Area of Fruits

Item	Production in 2009	Target Production in 2020	Expected Increase Rate	Target after Deduction of 2009 Production	Additionally Required Amount	Target Production in 2020	Share of Five Provinces in the National Production	Production Target in Five Provinces	Anticipated Yield[e]	Production Area Required	Production Area Required[f]	Ground Level Needs	Target Development Area[g]
	(ton)	(ton)	(% p.a.)	(ton)	(ton)	(ton)	(%)	(ton)	(ton/ha)	(ha)	(ha)	(ha)	(ha)
	(1)	(2)	(3)	(4)	(5)	(6)=(4)+(5)	(7)	(8)=(6)*(7)	(9)	(10)=(8)/(9)	(11)	(12)	(13)= MIN(11,12)
Banana	378,336	491,000a	2.4	112,664	0	112,664	44.4	50,023	20	2,501	2,500	400	400
Pineapple	59,550	120,000a	6.6	60,450	0	60,450	56.5	34,154	13	2,627	2,630	0	0
Papaw	21,138	45,000a	7.1	23,862	0	23,862	46.9	11,191	25	448	450	1,410	450
Mango	70,418	150,000a	7.1	79,582	0	79,582	51.5	40,985	20	2,049	2,050	1,400	1,400
Lime	4,965	10,559b	7.1	5,594	0	5,594	80.3	4,492	23	195	200	240	200
Passion Fruits	564	1,199b	7.1	635	0	635	90.0d	572	14	41	40	260	40
Sweet Orange	3,772	8,022b	7.1	4,250	4,950c	9,200	81.3	7,479	12	623	620	1,030	620
Total											**8,490**	**4,740**	**3,110**

Item	Production in 2009	Target Production in 2020	Expected Increase Rate	Target after Deduction of 2009 Production	Additionally Required Amount	Target Production in 2020	Share of Five Provinces in the National Production	Production Target in Five Provinces	Anticipated Yield[e]	Production Area Required	Production Area Required[f]	Ground Level Needs	Target Development Area[g]
	(ton)	(ton)	(% p.a.)	(ton)	(ton)	(ton)	(%)	(ton)	(ton/ha)	(ha)	(ha)	(ha)	(ha)
	(1)	(2)	(3)	(4)	(5)	(6)=(4)+(5)	(7)	(8)=(6)*(7)	(9)	(10)=(8)/(9)	(11)	(12)	(13)= MIN(11,12)

Note: a; These target figures are stated in Mahinda Chintana 2010.
b; These target figures were estimated by applying an annual increase rate of 7.1% p.a. which was the same with figure adopted to papaw and mango in Mahinda Chintana 2010.
c; Imported amounts of fresh orange and orange juice were assumed to be additionally required amount as shown in Table 4.5:
d; This percentage was estimated at 90%, although this was only 10% in the available data due to recent high demand of dry zone passion fruits as raw material for fruit juice according to the information of juice production company. It is said that dry zone passion fruits are more suitable for juice production than those at the wet zone.
e; Anticipated yields of fruits are presented in Table 4.7. f; All figures were rounded.
g; Proposed development area by crop was determined giving priority to smaller area in (11) and (12).
Source: Mahinda Chintana 2010, Agricultural Profile 2006, HARTI, and FAOSTAT

Table 4.5 Estimated Amount of Sri Lanka's Imported Orange Products (tons)

Item	2005	2008	2009	3-year Average
Orange juice	518	1,040	950	836
Converted into fresh	648	1,300	1,188	1,045
Fresh Orange	3,844	3,579	4,305	3,909
Total Orange				**4,954**

Note: 2006 and 2007 data are not available in FAOSTAT.
Source: FAOSTAT

(2) Strategic Agricultural Crops

In the National Development Plan, the following important crops were mentioned to have a certain target of production per annum increase from 2009 to 2020, namely, big onions (10.7%), chillis (17.5%), maize (9.4%), kurakkan (19.2%), gingerly (11.0%), and all kinds of legumes (12.3%) in OFCs, and bananas (2.4%), pineapples (6.6%), papaws (7.1%), and mangos (7.1%) in fruits.

On the other hand, in the DS level workshops (see Paragraph (4) below for more details**)**, DS level officers did not select maize, kurakkan, and gingerly as strategic crops for crop diversifiction in each DS division but added and selected other fruits, i.e., lime, passion fruits, and sweet orange.

By combining the above information, the strategic crops selected for the project are chillis, red onions, big onions, and legumes from OFCs, and mangos, bananas, sweet oranges, papaws, lime, and passion fruits from fruit crops as shown in Table 4.3 and Table 4.4.

(3) Anticipated Yield

Estimates for anticipated yields of potential crops were made together with the current yields on the basis of relevant data obtained from related organizations. The results of the estimates are presented in Table 4.6 and Table 4.7 for OFCs and fruits, respectively. The adopted unit yield of each crop was derived from several yield data as the most applicable one to the present survey.

Table 4.6 Estimates of Current and Anticipated Yield for OFCs

(Unit: ton/ha)

Crop	Current Yield							Anticipated Yield				
	DCS Ave. 2008-10 Maha	DCS Ave. 2008-10 Yala	DOA 2009/10 Maha		DOA 2010 Yala		Adopted	Highest 2008-10 Maha	Highest 2008-10 Yala	DOA	Study Report	Adopted
	(1)	(2)	(3)	*	(4)	*	(5)	(6)	(7)	(8)	(9)	(10)
Maize	2.48	3.27	2.94	R	4.69	I	**2.88**	4.15	5.42	4.50	4.00	**5.00**
Kurakkan	1.02	1.01	1.31	R	-		**1.02**	1.86	2.00	3.00	-	**1.80**
Green gram	0.98	0.81	0.95	R	-		**0.95**	2.18	1.62	1.30	1.50	**1.80**
Black gram	0.99	0.93	1.08	R	1.12	I	**0.96**	1.70	2.00	1.60	1.60	**1.80**
Cowpea	1.05	1.01	1.00	R	1.00	I	**1.03**	1.47	1.39	1.60	1.90	**1.50**

(Unit: ton/ha)

Soybean	1.34	1.92	-		2.51	I	**1.63**	2.00	2.50	2.50	-	**2.50**
Groundnut	1.34	1.24	2.00	R	-		**1.29**	2.43	2.40	3.00	2.20	**2.50**
Gingerly	0.60	0.87	0.65	R	0.83	R	**0.73**	1.01	1.00	1.50	-	**1.50**
Red onion	11.01	10.93	9.52	I	-		**10.97**	15.23	15.30	17.00	12.00	**15.50**
Big onion	7.63	12.98	-		-		**10.30**	13.06	18.00	30.00	-	**18.00**
Chilli (green)	3.56	3.84	3.66	R	-		**3.70**	5.93	9.69	15.00	-	**11.00**
Paddy Irrigated **			5.66	I	5.49	I	**5.50**	6.03			5.50	**5.50**
Paddy Rainfed **			3.45	R	3.53	R	**3.50**					**3.50**

Source (1) and (2): Average yield of 14 survey districts during 2008-2010 period based on the data obtained from the Department of Census and Statistics
(3): Analysis made on the Cost of Cultivation of Agricultural Crops, 2009/10 Maha prepared by the Socio-economic and Planning Center, DOA
(4): Analysis made on Cost of Cultivation of Agricultural Crops, 2010 Yala prepared by the Socio-economic and Planning Center, DOA
(5): Adopted current yield to this survey
(6) and (7): Highest yield record among 14 survey districts during 2008-2010 period based on data from the Department of Census and Statistics
(8): Data from the Field Crop Research and Development Institute, DOA, Maha Illupallama
(9): JBIC Pilot Study on Agricultural and Rural Rehabilitation in the North East and North Central Region of Sri Lanka, 2004
(5): JBIC Pilot Study on Agricultural and Rural Rehabilitation in the North East and North Central Region of Sri Lanka, 2004
** : I = Irrigated, R = Rainfed*
*** : It is assumed that irrigated paddy yield will increase with a rate of 5% after rehabilitation of irrigation facilities. However, no yield increase is expected in rainfed paddy, because no project intervention has been made.*

Table 4.7 Estimates of Current and Anticipated Yield for Fruits

(Unit: ton/ha)

Crop	Current Yield			Anticipated Yield			
	DCS Ave. 2008-10 (1)	HARTI 2006 (2)	Adopted (3)	DOA (4)	Study Report (5)	Highest 2008-10 (6)	Adopted (7)
Banana	-	7.28	**7.28**	21.89	20.00	-	**20.00**
Papaw	5.97	4.63	**5.97**	29.63	30.00	11.88	**25.00**
Pineapple	9.56	11.31	**9.56**	14.06	-	10.96	**13.00**
Passion fruit	6.15	0.89	**6.15**	14.83	22.00	14.33	**14.00**
Sweet orange	6.38	1.01	**6.38**	10.07	-	12.00	**12.00**
Lime	16.84	0.61	**15.00**	26.46	-	26.23	**23.00**
Mango	15.1	2.86	**7.13***	11.87	25.00	23.38	**20.00**

Source (1): Average yield of 14 survey districts during 2008-2010 period based on the data obtained from the Department of Census and Statistics
(2): Agricultural Profile 2006, HARTI
(3): Adopted current yield to this survey
(4): Crop budget analysis made by the Socio Economics and Planning Center, DOA
(5): JBIC Pilot Study on Agricultural and Rural Rehabilitation in the North East and North Central Region of Sri Lanka, 2004
(6): Highest yield record among 14 survey districts during 2008-2010 period based on data from the Department of Census and Statistics
** : Provincial Department of Agriculture and Animal Production & Health, North Central Province*

(4) Crop Development Areas Proposed by DS Level Officers

Development area of each important crop proposed by the DS level officers was confirmed in DS level workshops held at ten locations during May 2012-June 2012 period. In the workshops, a total of 504 officers consisting of AIs, SMOs, ARPAs, engineers, divisional secretaries, etc., from 51 DS divisions participated. As one of the final outputs of the workshop, crop development areas in the survey area were confirmed with 16,280 ha for OFCs and 3,850 ha for fruits totalled to 20,130 ha as shown in Table 4.8.

(5) Target Development Areas by Strategic Crop

The target development areas by strategic crop in each DS division are presented in the annexed Table A 4.3 and suumarized in Table 4.9.

As also shown in the annexed Table A 4.3, 13,110 ha or 83% of the total OFCs will be cultivated during Yala with gravity irrigation schemes, and 2,660 ha or 17% of the total remaining area will be cultivated during Maha, with pump irrigation. As for fruits, 2,810 ha or 90% of the total fruits area will be cultivated with agro-well, and 300 ha or 10% of the remaining land for fruits will be cultivated using gravity irrigation schemes.

Table 4.8 Crop Development Areas Proposed by DS Level Officers

OFCs		Fruits	
Crop	**(ha)**	**Crop**	**(ha)**
Big Onion	2,280	Banana	400
Red Onion	1,400	Pineapple	0
Dried Chilli	5,280	Papaw	640
Maize	0	Mango	1,400
Kurakkan	0	Lime	200
Gingerly	0	Passion Fruit	180
Legumesl	7,320	Sweet Orange	1,030
Total	**16,280**	**Total**	**3,850**
Total of OFCs and Fruits			**20,130 ha**

Source: JICA Survey Team

Table 4.9 Crop Development Areas by Strategic Crop

OFCs		Fruits	
Crop	**(ha)**	**Crop**	**(ha)**
Big Onion	2,280	Banana	400
Red Onion	890	Pineapple	0
Dried Chilli	5,280	Papaw	450
Maize	0	Mango	1,400
Kurakkan	0	Lime	200
Gingerly	0	Passion Fruit	40
Legumes total	7,320	Sweet Orange	620
Total OFCs	**15,770**	**Total Fruits**	**3,110**
Total of OFCs and Fruits			**18,880 ha**

Source: JICA Survey Team

(6) Crop Budget under With-project Condition

Crop budget under with-project condition was prepared for all the strategic crops as shown in the annexed Table A 4.4, Table A 4.5, and summarized in Table 4.10.

Table 4.10 Summary of Crop Budget per Hectare by Strategic Crop

(Unit: Rs million/ha)

Crop	Gross Income	Total Cost *	Net Return
OFCs			
Chilli	1,100.0	213.5	886.5
Red onion	1,348.5	407.7	940.8
Big onion	1,206.0	308.7	897.3
Legumes average	231.3	64.1	167.2
Fruits			
Banana	400.0	276.8	123.2
Papaw	830.0	431.5	398.5
Passion fruit	718.2	373.1	345.1
Mango	1,164.0	343.6	820.4
Sweet orange	921.6	236.9	684.7
Lime	1,380.0	368.0	1,012.0

** Excluding the cost for family labor*
Source: JICA Survey Team

4.2.2 Approaches to Livestock Sector Development

(1) Selection of Strategic Livestock Product

There are two major products in the livestock sector in Sri Lanka namely; monogastric related product such as broiler, quail, turkey, swine meat, eggs; and ruminant related products such as cattle, buffaloes, and goat meat and milk. Although both are considered important products providing much needed animal proteins to the nations, the project places priority on ruminant related products especially for dairy (cattle) production considering the following points:

- The importation rate of milk and milk by-products is high and the National Development Plan of Mahinda Chintana addressed the increase of self- sufficiency of milk and milk by-products by providing these products to consumers at an affordable prices.
- The monogastrics meat and egg sector production and distribution system have been developed at some extent during the past three decades and it is operated by a large-scale firm in the country at present. There are no more rooms to intervene under the current government scheme.
- The monogastrics meat and egg sector highly depends on feeds imported from other countries. The promotion of this sector leads further importation of agricultural products and giving negative impact to the international trade due to the recent global price increment of these prices.
- The large promotion of monogastrics animal feed production in the country compete with human edible food production in terms of land and water within the limited resources in the country.
- Conversely, ruminant related products can be produced by converting crop residue, thus, promoting crop-livestock integration. Its feed conversion ratio is as low as broiler meat.
- Interventions in ruminant related products improve the efficiency of natural resources (which are limited) and huge gaps between attainable and actually attained efficiency with existing unused technologies for ruminant production are narrowed. However, other areas of production are being utilized.

(2) Target Farmers for Project Intervention

There are three types of milk producers in the project site, namely, extensive system livestock farmer, semi-intensive system livestock famer, and intensive system livestock farmer. The project targets semi-intensive and intensive system livestock farmers with the following points:

- The extensive system livetock farmers have less interest in milk production as well as less intention in improving their traditional practice. A number of social support programs have been arranged for them to improve their livelihood but demoralized their motivation in improving their practice.
- Breeding and feed improvement are keys in improving milk products. However, cattle mannaged in the extensive system have high mortality and are uncontrollable. Support for extensive system cattle is considered uneconomical.
- Since the variety of cattle is good at present in the intensive and semi-intensive system farmers, there are more rooms for improvement of milk yield in the short-term.

According to recent study, intensive and semi-intensive system cattle have the potential to increase the milk yield by 9.3 liters and 5.1 liters respectively, while 1.13 liters in extensive cattle.

Although the project targets the semi-intensive and intensive farmers in principle, the extensive system cattle benefitted indirectly by project interventions.

(3) Expected Outcome

Each province had all the dairy farms register under the Veterinary Surgeon (VS) of the range. When they were registered the VS collected all the necessary data such as the herd size and composition, Milk production etc.

Analysis of this data provided the Farming systems, total milk production, average milk production per cow per day and number of milking cows. This was sorted to find the best average milk per day producing herd from intensive and semi-intensive farms. The increase in milk production in the intensive system at the end of the project was calculated based on improvement of feeding which, breed improvement, and the rest including management and health improvement.

Table 4.11 shows the sample survey result of dry zone livestock farming practice for the current level and expected level of major indicators specified by the government in different farming systems in cattle rearing.

Table 4.11 Current and Expected Indicator in Different Farming Systems

Items	Unit	Intensive		Semi-intensive		Extensive	
		Min	Max	Min	Max	Min	Max
Current Level							
Total no.	Farm	2.00	17.0	2.00	180.0	11.00	485.00
Milking cows	Farm	0.50	3.97	0.43	6.12	2.42	51.40
Milk/cow	Liters/day	2.50	22.0	0.50	12.0	0.70	1.20
Lactation	Day	238	277	205	240	110	131
Expected Level							
Total no.	Farm	8.00	20.00	10.00	100.0	11.00	300.0
Milking cows	Farm	3.00	8.00	2.00	30.00	3.00	60.00
Milk/cow	Liters/day	10.00	25.00	4.00	15.00	1.20	2.50
Lactation	Day	260	300	230	265	140	210

Source: Study on Dairy farms – Planning Division, Dept. of Animal Production & Health. and Farm Registration 2008, Department of Animal Production & Health.

Considering the above sample survey results also, the expected level of milk production through breeding and feed improvement of each province are justfied as shown in Table 4.12.

Table 4.12 Current Situation and Expected Outcome in Selected DS Division by Province

Province	Target Indicators	Unit	Current	Expected
Northern	Milk production	L/day	3,140	6,283
	Average milk production	L/cow/day	1.5	3.0
	Average milk production	farm/day	-	18.0
	Farms over 10 liters per day	%	0%	35%
	Breeding cows bred by AI	%	1%	20%
Eastern	Milk production	L/day	5,058	10,331
	Average milk production	L/cow/day	6.1	12.5
	Average milk production	farm/day	5.0	10.0

Province	Target Indicators	Unit	Current	Expected
	Farms over 10 liters per day	%	1%	17%
	Breeding cows bred by AI	%	1%	20%
North Central	Milk production	L/day	14,366	42,258
	Average milk production	L/cow/day	2.3	6.7
	Average milk production	farm/day	-	10.5
	Farms over 10 liters per day	%	0%	29%
	Breeding cows bred by AI	%	5%	20%
North West	Milk production	L/day	26,291	76,844
	Average milk production	L/cow/day	2.1	6.3
	Average milk production	farm/day	-	10.6
	Farms over 10 liters per day	%	0%	28%
	Breeding cows bred by AI	%	40%	50%
Uva	Milk production	L/day	25,254	50,344
	Average milk production	L/cow/day	3.8	7.5
	Average milk production	farm/day	-	9.0
	Farms over 10 liters per day	%	-	22%
	Breeding cows bred by AI	%	25%	50%

Source: JICA Survey Team

(4) Target Dairy Cattle Numbers

Table 4.13 shows the number of available cattle in the semi-intensive and intensive farming system in the selected DS divisions. The project targets the total population of 30,496 in the said farming systems in the target DS divisions.

Table 4.13 Target Number of Dairy Cows in Selected DS Divisions

Province	Number of Cattle			
	Total	Intensive System	Semi-intensive System	Target Total
Northern	33,756	68	2,025	2,093
Eastern	49,582	100	2,974	3,074
North Central	43,700	487	5,844	6,331
North West	32,839	1,280	11,001	1,2281
Uva	18,154	2,542	4,175	6,717
Total	**178,031**	**4,477**	**26,019**	**30,496**

Source: Farm Registration 2008, Department of Animal Production and Health

4.2.3 Zoning of Target Development Area

Zoning of target development area is made based on the distribution of strategic crops in each DS division as shown in the annexed Table A 4.6. Area specific advantages of each district (e.g., soil, water availability, acess to markets, etc.) are also considered in zoning, because these characteristics are already evident even under the present situation. As a result, a total of four cultivation zones was identified as presented in Table 4.14. The distribution of each zone over the survey area is illustrated in the annexed Figure A 4.1 together with some important zonal information.

Table 4.14 Characteristics of Cultivation Zones

Cultivation Zone (CZ)	Coverage	Main Strategic Crops	Focus Area for Production	Major Features
CZ -1	Mannar, Vauniya, eastern part of Mullative, and Trincomalee	・ Chilli ・ Red onion	**Agriculture Crop** Major scheme ・ Yan oya anicut (689 ha) ・ Mahadivulwewa (563 ha) ・ Welimathuramadu (304 ha) ・ Muthu lyan kaddu (2468 ha) ・ Kurai (304 ha) ・ Vaunikulam (338 ha), etc. **Milk** ・ Manthai DS ・ Manthai west DS ・ Madu DS	**Soil**: Reddish brown earth soils and red yellow latosols suitable for chilli, legumes, and fruits, and alluvial soils good for onions and legumes. **Water**: Irrigation schemes designed for OFC cultivation, e.g., Welimathuramadu is available. **Advantage**: ・ Chilli and onion production are being promoted by the North Provincial Council, ・ Sufficient farmer's knowledge and experiences on cultivating OFCs, ・ Trincomalee is a major red onion production area and farmer has enough cultivation skills and market channel, ・ Land availability is high for expansion of OFCs production, and ・ Availability of crossbred cattle in Kuchchiweli and Trincomalee Town and Gravets are more than average.
CZ-2	Western and north-eastern parts of Anuradhapura and western part of Ampara to northern part of Batticaloa	・ Big onion ・ Legumes	**Agriculture Crop** Major scheme ・ System H (39,000 ha) ・ Manankatiya tank (427 ha) ・ Kokebe wewa (92 ha) ・ Vahaneri tank (3,441 ha) ・ Tampitiya (174 ha) ・ Borapola tank (81 ha) Minor scheme ・ Diganhalmillawa Pahala Olugolawa (63 ha) ・ Koon wewa (69 ha) ・ Divul wewa (57 ha), etc. **Milk** ・ Padiyatalawa DS ・ Galnewa DS ・ Kekirawa DS ・ Rajangana DS ・ Talawa DS ・ Thambuththegama DS ・ Nochchiyagma DS	**Soil**: Alluvial soils suitable for legumes with proper drainage facilities, and reddish brown earth soils suitable for fruits and onions, **Water**: Irrigation development of Maduru Oya Right Bank Scheme is being planned, **Advantage**: ・ One of the biggest legumes production areas since 1990s and farmers have basic knowledge for cultivation, ・ Enough highland including river side is available for expansion for legume production, ・ MASL is promoting onion, soya bean, and fruits in System H, ・ Big onion seed production program is being carried out by DoA province, ・ High potential of promoting orchard-style production in MASL area, and ・ Availability of crossbred cattle in Padiyatalawa, Galnewa, Kekirawa, Rajangana, Talawa, and Thambuththegama are more than average (DAPH Farm Registration 2008).

Cultivation Zone (CZ)	Coverage	Main Strategic Crops	Focus Area for Production	Major Features
CZ-3	Northern part of Kurunegala and Puttalam	・ Mango ・ Papaw	**Agriculture Crop** Major scheme ・ Inginimitiya (1,080 ha) ・ Neelabemma (746 ha) ・ Tabbowa (847 ha) Minor scheme ・ Thambuttawewa (57 ha) ・ Devanuwera (79 ha) ・ Thambapanniya (60 ha), etc. Others ・ Agro-well (726 nos.) **Milk** ・ Ambanpola DS ・ Mahakumbukkadawal ・ Nawagaththegama DS ・ Anamaduwa DS ・ Nikaweratiya DS ・ Polpithigama DS	**Soil**: Noncalcic brown and reddish brown earth soils suitable for fruit and chilli cultivation. **Water**: Irrigation scheme designed for fruit cultivation (Neelabemma) is available. **Advantage**: ・ More than 40 nursery tree producers are available and they have enough capacity to supply them, ・ Currently, farmers are trading fruits with supermarkets and there is a possibility to expand production and trading channels, ・ Availability of crossbred cattle in Ambanpola, Mahakumbukkadawala, Nawagaththegama, Anamduwa, Nikaweratiya, and Polpithigama are more than average (DAPH Farm Registration 2008), and ・ The livestock cooperative is active in this area.
CZ -4	Surrounding area of Badulla area and dry and intermediate zone of Moneragala	・ Sweet orange ・ Passion fruit	**Agriculture Crop** Major scheme ・ Lunugala yoda (135 ha) ・ Karadadara (91 ha) Minor scheme ・ Ankada Maha (52 ha) ・ Hingurukandura (41 ha) ・ Dambewewa (20 ha), etc. Others ・ Agro-well (657 nos.) **Milk** ・ Hali Ela DS ・ Welimada DS ・ Moneragala DS ・ Badalkumbura DS ・ Wellawaya DS	**Soil**: Reddish brown earths soil is suitable for fruits and chilli, and red-yellow podzolic soil is suitable for onion, **Water**: Less rainfall in Maha which means less crop damages under irrigated condition, **Advantage**: ・ Major fruit cultivation area traditionally with strong market channels including exporters, ・ Farmers have basic knowledge and motivation for cultivation, and ・ Availability of crossbred cattle in Moneragala, Badalkumbura, Wellawaya, Hali Ela, and Welimada are more than average (DAPH Farm Registration 2008).

4.3 Priority Subjects for Project Intervention

4.3.1 Overall Problem Analysis

By studying the current situation of the agriculture sector, livestock and irrigation based on natural and socio-economic data in the survey area, the present issues and constraints to achieve the project purpose can be identified as summarized in the annexed Table A 4.7.

Although the Government of Sri Lanka encourages producing OFCs and fruits, the country could not get enough production to these crops up to now. The constraints for the promotion of OFCs, fruits, and milk production are categorized into three, namely; low production and productivity, ineffectiveness in distribution and trading system, and insufficient government extension services.

4.3.2 Needs Identified through the Village Level Workshop

(1) Introduction

The village level workshops were conducted in June 2012 for five villages selected in the survey area in order to identify the actual needs of the beneficiaries of the project in the rural villages. In accordance with the Project Cycle Management (PCM) based on Participatory Planning Approach (PPA), three kinds of output were prepared by the invited participants consisting of the leaders, board members, or members of CBOs in the selected villages through three steps of analysis (i.e. problem analysis, objective analysis, and approach identification).

(2) Selected Villages

Firstly, five typical DS divisions were identified respectively from five provinces based on project site selection scoring[1]. The JICA Survey Team was given advice by AIs (Agriculture Instructors) who are responsible for the respective DS divisions to identify a village where the workshop will be conducted. Table 4.15 shows the selected DS divisions and the villages, and the dates of workshops in each venue.

Table 4.15 Selected DS Division and Villages, and the Workshop Schedule

No.	Province	District	DS Division	Village	Date
1	North Central	Anuradhapura	Tambuthtegama	Malwanegama	June 12, 2012
2	Eastern	Trincomalee	Kuchchaveli	Thiriyay	June 14, 2012
3	North-Western	Puttalam	Karuwalagaswewa	Saliyawewa	June 18, 2012
4	Uva	Monaragala	Welimada	Thenagallanda	June 21, 2012
5	Northern	Mannar	Madu	Periyapandivirichchan	June 27, 2012

Source JICA Survey Team

(3) Results of the Workshop

Approximately 30 participants consisting of leader(s), committee members, and members of CBOs such as FO (Farmers Organization), RDS (Rural Development Society), and WRDS (Women Rural Development Society) in the community were invited to participate in each workshop. To collect more information and reflect the actual voice of female, women's participation was encouraged.

(a) Problem Analysis

Core problems and its direct causes in each village were discussed as shown in Table 4.16 below. In order to lead the discussion to the direction of the project purpose, the facilitator suggested adopting the following core problem to the participants at the beginning of the workshop.

Production and productivity of other field crops (OFCs), vegetable, fruit, and dairy are low.

With the agreement of all the participants on the above core problem suggested by the facilitator, direct causes based on the core problem were discussed first.

Thereafter, the direct causes and direct effects given at each workshop were analyzed separately. Problem trees prepared in each workshop are presented in the annexed Figure A 4.2 to Figure A 4.11.

[1] Refer to 4.1.1 Selection Criteria and Scoring Method. Five DS divisions with the average scoring point were selected as typical DS divisions.

(b) Cause and Means of Analysis

Table 4.16 shows the direct causes and direct means to core problem discussed in each workshop.

Table 4.16 Direct Causes Prepared in the Village Workshop

Venue	Direct Causes	Direct Means
Malwanegama (North-Central)	Negative attitudes of farmers	Attitudes of farmers are turned into positive
	Lack of new knowledge and skills on farming	Knowledge and skills on farming are improved
	High cost of production	Costs of production are reduced
	Lack of marketing facilities	Proper marketing system is organized
	Problems in proper water (irrigation) management system	Efficient and effective water (irrigation) management system are set up
	Lack of capital	Capital for the investments is assured
	Lack of quality cattle breeding stock	Quality breeding stocks are available
	Lack of pasture lands	Pasture lands are available
Thiriyai (Eastern)	Lack of (irrigation) water	Sufficient irrigation water is provided
	Inadequate income	Adequate income is assured
	Lack of new technologies	Access to new technologies is assured
	Lack of quality livestock and pasture lands	Quality livestock and pasture lands are available
	Lack of marketing opportunities	Market opportunities assured
	Problems from wild elephants	Problems from elephants are solved
	Insufficient lands	Land is sufficient
Saliyawewa (North-West)	Lack of water and water management systems for crop and livestock husbandry	Adequate water and proper water management systems are available
	Low price and lack of market facilities	High prices of product is assured, market is organized
	Lack of quality inputs	Quality inputs are available
	High cost of production	Production cost is low
	Deviation from traditional (sustainable) chena farming system	Traditional (sustainable) chena farming system is adapted
Thenagallanda (Uva)	Lack of (irrigation) water	Irrigation water is available
	Absence of a proper market with fair (good) price	Proper market is available, good price is ensured
	Lack of resources	Sufficient resources inputs is available
	High cost of production	Production cost is low
	Lack of knowledge, skills, and attitudes in technical and managerial aspects	Availability of knowledge, skills, and attitudes in technical and managerial aspects
	Lack of commitments and improper plans of the duty bearers	More commitments and proper plans are provided by duty bearers
Periyapandivirichchan (Northern)	Lack of wealth due to displacements (war)	Wealth is recovered after resettlement
	Lack of water	Water supply is adequate
	Lack of quality input supply	Proper quality input is supplied
	Lack of knowledge, skills, and motivation	Knowledge, skills, and motivation is improved
	Lack of markets and marketing facilities	Marketing facilities are prepared, market is organized
	Lack of technical support (extension, training and treatments)	Technical support (extension, training, and treatments) is assured
	Lack of lands for farmers	Land is provided to farmers

Source JICA Survey Team

According to the above table, similar problems have emerged on all villages. It should be noted that the “lack of water” was mentioned as a direct cause of the core problems in all villages. The “lack of marketing facilities” and “lack of production skill” also seems to be a common problems of all.

In order to capture the problems in the selected villages as a whole, the direct causes mentioned in Table 4.16 above were summarized and classified into five categories, i.e., (i) production infrastructure, (ii) production skills and knowledge, (iii) production input, (iv) marketing, and (v) others.

(i) Production infrastructure (Lack of water)

- Lack of irrigation facilities;
- Poor maintenance/management of irrigation system;
- Lack of knowledge and skills in water management;
- Lack of commitment of FO; and
- Insufficient agro-wells.

(ii) Production skills and knowledge

- Lack of extension services; and
- Inadequate training.

(iii) Production input

- High cost of agro chemicals;
- High cost of seeds;
- Lack of locally produced seeds (have to use imported seeds);
- Lack of quality seeds;
- Lack of quality dairy cattle;
- High cost of breeding materials; and
- High cost of labor.

(iv) Marketing

- Insufficient facilities (market building, storage, transportation, etc.);
- Less contact with outside traders;
- Weak collective bargaining power (lack of community organization activity); and
- Lack of adequate milk collecting centers.

(v) Others

- Absence of electric fence (Problems with wild elephants); and
- Lack of credit facilities (Lack of capital).

Above direct means are summarized and classified into five categories, namely, (i) production infrastructure, (ii) production skills and knowledge, (iii) production input, (iv) marketing, and (v) others. Further discussions were also summarized under each category.

(i) Production infrastructure

- Efficient and effective water irrigation management system is set up.
  - Farmers have efficient water use techniques;
  - Proper maintenance system is established; and
  - More FO and farmers participate in water management.
- Sufficient agro-wells are established.

(ii) Production skills and knowledge

- Access to new knowledge and technologies are assured.
  - Technical support is properly provided by the government.

(iii) Production input

- Costs of production (seeds, agrochemicals, planting materials, machinery) are reduced;
- Quality local seeds are available; and
- Quality dairy cattle are available.

(iv) Marketing

- Market opportunities are assured.
  - Sufficient market buildings/ places are established;
  - More market linkages with outside traders are established; and
  - Marketable products are produced (crop production, sufficient volume of production to attract traders).

(v) Others

- Capital for the investments is assured.
  - Credit scheme is available for all OFCs.
- Problems from wild elephants (elephant) are solved.
  - Electricity fence is set up.
- Traditional (sustainable) chena farming system is adopted.
- More commitments and proper plans are provided by duty bearers and state.
- Land is provided to farmers.

(c) Approach Identification

Project approaches were identified based on the cause and means analysis. After identifying the different approaches, the participants discussed and prepared activities under each approach. The identified approaches by the participants were then prioritized by majority vote. Each participant was given three stones, and then asked to vote (put the stones on the cards) for the approaches they consider the best three. Table 4.17 shows the approaches identified at each village. The following table shows the prioritized approaches suggested at each workshop. Whole prioritized approaches and activities prepared in each workshop are presented in the annexed Table A 4.8 to Table A 4.12 and summary is shown in Table 4.17.

Table 4.17 Summary of Prioritized Approaches Identified in the Village Workshop

Approach	Activities	Priority				
		Malwanegama	Thiriyay	Saliyawewa	Thenagallanda	Periyapandi-virichchan
Water management	Maintain/repair the tanks and irrigation canals; Increasing capacity (desilting) of the existing tanks; Construction of agro-wells in the villages; Introduction of modern irrigation systems (drip irrigation); Linking mother tank to the sub-tanks; Strengthening FO in water management; and Training of farmers for proper water management.	2	1	1	1	1

Approach	Activities	Priority				
		Malwanegama	Thiriyay	Saliyawewa	Thenagallanda	Periyapandi-virichchan
Marketing	Establishment of collecting centers for milk and OFCs; Establishment of storage facilities; Strengthening FO to engage in collective bargaining (coordinate with farmers and collect their products); Inviting of marketing/purchasing companies from outside; Improvement of infrastructure facilities in the villages such as roads to link to the markets; and Improvement of transport facilities.	1	3	2	2	2
Training/awareness building	Training program on: Land preparations; Selecting crops according to the respective soil conditions; Selection and usage of chemicals according to the respective crop and crop damages; Identification of the quality and standard of seeds; Crop water requirements and methods of irrigation; Modern agro production technology and their appropriate usages; Attitude change of the farmers in favor of involvement in OFC cultivation; Extension services/expert inputs/service provisions, subsidy; and Animal husbandry and dairy.	4	6	3	5	3, 6, 7
Extension services/ expert inputs/service provisions, subsidy	Ensuring the regular consultation with the relevant government officers to identify the problems and find solutions; Receiving the advice from experts for proper cultivation methods, marketing techniques and the improvement of quality products; and Organizing exposure tour for the farmers to see new techniques on farming.	-	4	-	3	6
Organizational strengthening of FO	Strengthening FO in water management; and Strengthening FO to engage in collective bargaining (coordinate with farmers and collect their products).	5	-	-	3	-
Minimizing cost of production	Reduce the usage of foreign seeds and fertilizer and the use of locally produced seeds; and Proper utilization of labor.	7	-	3, 5	6	-
Financial and credit	Establishment of credit schemes for OFC farmers.	3	5	3	-	-
Resource/land management	Establishment of electric fence to minimize the wild elephant attacks; Establishment of separate area for the wild animals (sanctuary); and Establishing local seed farms.	-	2	-	4	5
Policy intervention	Establishment of influential FO federation, and have regular dialogue with the policy makers.	6	-	-	-	-
Chena farming	Make use of chena farming.	-	-	4	-	-
Economic development of re-settlers	Introduction of self-employment and home gardening; and Receiving loans through the government, banks, and CBOs.	-	-	-	-	4

*Note: *Figures show the order of priority of the approaches at each workshop in the selected villages.*
Source: JICA Survey Team

From the table above, it shows that water management approach is the most needed approach, followed by marketing approach. Training and awareness building were also mentioned at every village.

4.3.3 Priority Subjects and Project Intervention

Considering the farmer's needs assessment, discussions with provincial and central level officials and problem analysis based on the secondary data, the priority subjects for intervention were identified.

The village workshop revealed that the most felt needs of the beneficiaries are more efficient and effective provision and management of water resources. This includes the construction and rehabilitation of irrigation facilities and agro-wells. At the same time, high priority on the rehabilitation of irrigations and drainage facilities were identified during the field and provincial workshops that were conducted with relevant officers. In addition to irrigation and water management, the output of the workshop showed that concerns of farmers are not only on the production side but also on the marketing aspect of their agricultural produce as well. Farmers desire to have stronger and proper linkage with traders. They also organize themselves for collective bargaining. To support this, the project approach includes activities for logistic system improvement such as the construction of storage facilities and farm access roads/rural roads.

Not only the provision of infrastructure/facilities for production and marketing of agriculture products, it was also made known that farmers have a strong desire to have opportunities to participate in training programs to learn modern agriculture technologies and marketing aspects. Hence, the provision of training opportunities (farm management, business (entrepreneur development), etc.) by the project will inevitably benefit the farmers. The needs for enhancement of government extension service and credit support were also some issues mentioned at the workshops.

With respect to milk production, the workshop identified the needs of the farmers both for the production and marketing aspects. The much emerged needs were the conduct of AI and breeding of quality cattle, establishment of milk collection center facilities, and collection networks. Needs for proper training and extension services provided by the government were also mentioned. The approach and activities concerning milk production consisting of productivity improvement, marketing development, and livestock service quality will satisfy most of farmer's needs.

Table 4.18 and Table 4.19 summarize the issues with priority and responsibility to solve in strategic agriculture crop and milk production, respectively and whether project will intervene or not. As shown in the Table 4.18 and 4.19, the subjects related to strategic agriculture crop and milk production are mixed with the government responsible activities, private sector's and farmer's efforts. Even though some activities are categorized into the private sector's and farmer's effort, the project plans to give the initial support to the subsistence level but motivated farmer or group to initiate their activities.

Table 4.18 Priority Subject in Agriculture Crop Production for Project Intervention

Major Issue	Issues	Cause	Priority to Solve	Responsibility to Solve	Intervention Under the Project

Major Issue	Issues	Cause	Priority to Solve	Responsibility to Solve	Intervention Under the Project
(A1) Low production and productivity	(A1-1) Farmers have less motivation to start the cultivation of OFC and fruits	(A1-1-1) Both farmers and AIs (extension workers) are less business minded on trading farm products and have less knowledge on farm management	High	GOSL	Yes
		(A1-1-2) There is a risk of wild animal and cattle damage	High	GOSL	Yes
		(A1-1-3) No regular trader to sell	Low	Private Sector or farmer	No
		(A1-1-4) Additional income is needed until harvest (in case of fruit cultivation)	Medium	Private Sector or farmer	Yes
	(A1-2) Irrigation water is not sufficient to increase the cultivation area of OFC and fruits	(A1-2-1) Irrigation system deteriorated in lowland or not available in highland	High	GOSL	Yes
		(A1-2-2) Water management and conservation system is not organized properly	Medium	Private Sector or farmer	Yes
		(A1-2-3) Water saving irrigation systems, such as micro-irrigation are not promoted	Medium	Private Sector or farmer	Yes
	(A1-3) The quality seed of OFC and planting material for fruits are not available on time and conveniently	(A1-3-1) Delay in seed certification	High	GOSL	Yes
		(A1-3-2) Lack of facilities in the existing provincial seed farms	Medium	GOSL	Yes
		(A1-3-3) Number and capacity of seed producers are low	High	Private Sector or farmer	Yes
		(A1-3-4) There is no proper storage to keep seeds produced by the farmers	High	Private Sector or farmer	Yes
	(A1-4) Quality of product is low and not attractive to buyers compared to imported commodities	(A1-4-1) Impurities are included in the product	High	Private Sector or farmer	Yes
		(A1-4-2) There is no proper facilities for drying OFCs	High	Private Sector or farmer	Yes
(A2) Ineffectiveness in distribution and trading system	(A2-1) There are unnecessary post-harvest losses	(A2-1-1) Rural roads and farm access roads are damaged or in poor condition	High	GOSL	Yes
		(A2-1-2) No proper packing and transportation system	Low	Private Sector or farmer	No
		(A2-1-3) The marketing channel system is complicated and many middlemen are involved in the transportation of products	Low	Private Sector or farmer	No
	(A2-2) Shipment of production is not enough for filling truck for economical transportation to the market	(A2-2-1) No collecting point to collect small quantity of products	Medium	Private Sector or farmer	Yes
		(A2-2-2) Inadequate common trading places such as Dedicated Economic Centres (DECs)	Medium	GOSL Private Sector or farmer	Yes
	(A2-3) Systematic forward contract/ buy-back /out-grower are not common practices for OFC and fruits	(A2-3-1) There are no general rules or legislations for forward contract agreement and no written agreement in many occasions	Medium	GOSL	Yes
		(A2-3-2) Less communication between farmer and trader	High	Private Sector or farmer	Yes
(A3) Need for improvement	(A3-1) The quality of field training and field	(A3-1-1) One AI covers large number of farm families	Medium	GOSL	No

Major Issue	Issues	Cause	Priority to Solve	Responsibility to Solve	Intervention Under the Project
in agriculture service provision	demonstration are not satisfactory	(A3-1-2) Less fund allocation for technology transfer	Low	GOSL	Yes
		(A3-1-3) There is no proper monitoring and evaluation system on field training and field demonstration	High	GOSL	Yes
		(A3-1-4) Capacity of AI is not satisfactory both in cultivation technology and commercialized farm management	High	GOSL	Yes
	(A3-2) There is a gap between farmers needs and actual training	(A3-2-1) There is no organized communication system among relevant government institutions, private traders, and farmers	Medium	GOSL	Yes

Table 4.19 Priority Subject in Milk Production for Project Intervention

Major Issue	Issues	Cause	Priority to Solve	Responsibility to Solve	Intervention Under the Project
(M1) Low output in all cattle farming systems	(M1-1) Required amount of feed is not available especially in cropping season	(M1-1-1) Crop by-products are not properly and efficiently utilized	High	Private Sector or farmer	Yes
		(M1-1-2) High proportion of unproductive animals in herds	Medium	GOSL	No
		(M1-1-3) Fodder and pasture cultivation not practiced	Medium	Private Sector or farmer	Yes
		(M1-1-4) Processed feed not available	Medium	Private Sector	No
		(M1-1-5) Seasonal density of cattle is grazing land is high	High	Private Sector or farmer	No
	(M1-2) Slow process in upgrading the milking herds	(M1-2-1) Management system is a bottleneck to Artificial Insemination (AI)	High	GOSL	Yes
		(M1-2-2) Non-availability of stud bulls for Natural Mating	Medium	GOSL Private Sector or farmer	No
		(M1-2-3) Loss of semen due to improper cold chain	Medium	GOSL	Yes
		(M1-2-4) Number and technical quality of artificial inseminator is low and mobility is low	High	GOSL Private Sector or farmer	Yes
(M2) Substandard marketing of fresh milk	(M2-1) Inadequate consumption of liquid milk	(M2-1-1) Shelf-life and ease have made powdered milk popular	Low	Private Sector or farmer	No
		(M2-1-2) Low quality of milk	Medium	Private Sector or farmer	Yes
		(M2-1-3) There is a distance between production place and consumption place (town area)	Medium	Private Sector or farmer	No
	(M2-2) Under-developed milk marketing system	(M2-2-1) Low capacity of small and medium entrepreneurs	High	Private Sector or farmer	Yes
		(M2-2-2) Inadequate quality control systems	Medium	Private Sector or farmer	Yes

Major Issue	Issues	Cause	Priority to Solve	Responsibility to Solve	Intervention Under the Project
		(M2-2-3) Seasonal variation in milk production	High	Private Sector or farmer	Yes
(M3) Need improvement in veterinary service provision	(M3-1) Weak transfer of technology	(M3-1-1) Training to VS and LDI is not given in the satisfactory level due to the lack of fund	Medium	GOSL	Yes
	(M-3-2) Poor accessibility to livestock owners	(M3-2-1) One VS Office covering large number of dairy farmers	High	GOSL	No
		(M3-2-2) Lack of mobility and accessibility of farmers and LDI and VS	Medium	GOSL	Yes

4.3.4 Proposed Programs for Implementation

Proposed programs for the increase in production and productivity of agriculture crops and milk are summarized in this section. These programs are all formulated as a result of the analyses made in Chapters 2, 3, and 4.

(1) Promotion of Strategic Agriculture Crop Production Program

By assuming all required activities for development, the following three major programs with 11 sub-programs were formulated:

(a) Productivity Improvement Program

- Rehabilitation and/or construction of irrigation and drainage facilities;
- Establishment of supply chains of quality seeds and planting materials;
- Farmer training on improvement of farm management and production technologies;
- Provision of the machineries to promote quality products with low production cost and fences to protect farm products from domestic and wild animals;
- Provision of credit to producers to support the above activities.

(b) Logistic System Improvement and Entrepreneurship Development Program

- Establishment of proper interface and incubation of business minded leader for effective trading between producer and trader;
- Rehabilitation or/and upgrading of rural road and farm access road;
- Conducting study tours for exporters/processors and government official to major export countries and potential import countries of agricultural products from Sri Lanka.

(c) Program on Enhancement of Extension Services and Ground Adaptive Trials

- Provision of training to extension officers for promotion of commercialized farming;
- Enhancement of DATC/ISTC facilities to carry out the ground level on-farm trials and provision of mobility for field extension officers and other equipment to improve the extension services;
- Overseas training for advanced commercial farming and extension method.

(2) Strategic Livestock Product Promotion Program

Regarding livestock product, the following three major programs with 8 sub-programs were formulated:

(a) Productivity Improvement Program of Semi-intensive and Intensive Farmer

- Establishment of supply chain of feed;
- Breeding improvement through rapid increase in Artificial Insemination (AI);
- Introduction of feed efficient livestock such as milking goat.

(b) Program on Clean Milk Production and Market Network Development of Fresh Milk

- Provision of necessary equipments and training on clean milk production;
- Establishment of effective milk collecting network and promotion of mobile sale.

(c) Livestock Service Quality and Accessibility Improvement Program

- Construction of livestock service center to be a focal point for livestock extension services and milk collection;
- Training of VS and LDI on AI and synchronization; and
- Provision of the mobility to LDI and VS.

As described above, there are three pillars of activities are planned for each agriculture crop and milk. The project set the project objective of "increase in production and productivity of commercially viable strategic agriculture products in potential area in dry zone through the promotion of integrated farming to small holding sector". As a result, the self sufficiency ration of food is improved, the outflow of the foreign currency is decreased and the income of small holding sector farmers are increased. The summary of the project concepts are shown in annex Figure A4.12.

4.4 Project Rationale

4.4.1 Necessity of Project Intervention in Survey Area (Dry Zone Area)

There is an urgent need to promote import substitution crop, fruit, and milk production in the survey area.

The reasons are:

(i) The survey area covers an area of about 41,000 km^2 which accounts for 65% of the country's land area which is occupied by 35% of the total population in the country. There is also land expansion for cultivation in the future.

(ii) The irrigation systems have been developed since ancient period. Nearly 500,000 ha of irrigable land are available in the survey area. Only 65% of the water resources available in the area are being utilized at present and there is more room for improvement on the efficiency of water resources utilization.

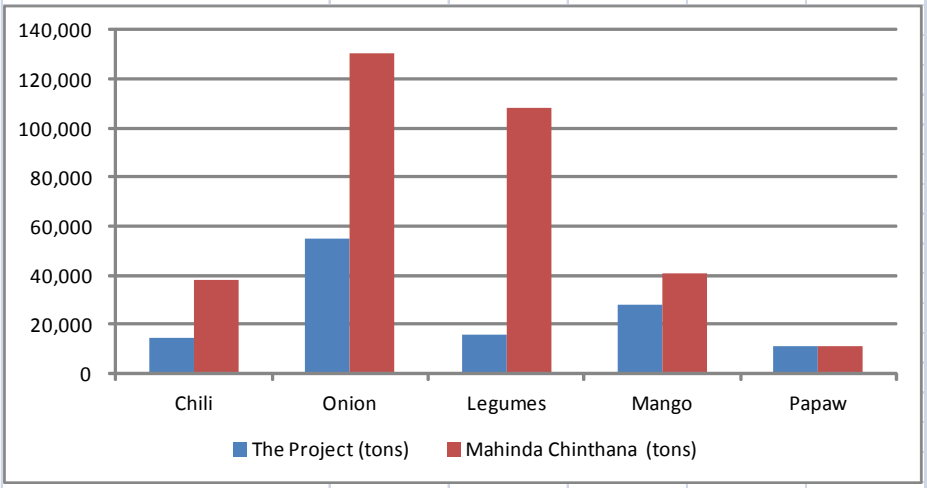
(iii) Soils and climatic condition in the dry zone is very much favorable to the OFC and fruits cultivation. Reddish brown earth soils and non-calcic brown soils are mainly availabe in the

dry zone. Those are suitable for other field crops and fruit cultivation.

(iv) The dry zone consisting of 82% of the national cattle population produce 54% of the total national milk production without much financial and infrastructure interventions during the past several decades. However, an impact could be made by appropriate interventions to double the current crossbred population and also by improving the management system.

(v) The share of agriculture GDP to regional economy is more than 25%, though it is 12% of that of the national economy. The contribution share to national agriculture GDP is more than 50% at present. Agriculture is more important in the survey area and it is worthwhile to change the existing agricultural practices and introduce commercial agriculture in the area.

Under with the project condition, production of strategic crops will be increased significantly. In case of OFCs and fruits, these production increases will be about 38% of the production target in Mahinda Chinthana (2020) for legumes, 42% for onion, 68% for Mango and 100% for papaw as shown in Figure 4.2.



	Chili	Onion	Legumes	Mango	Papaw
The Project (tons)	14,520	54,835	15,701	28,000	11,250
Mahinda Chinthana (tons)	37,950	130,375	108,131	40,985	11,191
Share of the Project	38.3%	42.1%	14.5%	68.3%	100.5%

Figure 4.2 Production Target and Contribution to Mahinda Chinthana Target in Dry Zone

4.4.2 Contribution to the Government Policies

As described in Section 2.3 in Chapter II, the National Development Plan of Mahinda Chintana set the following overall goals of the agriculture and livestock sector in 2020.

- Promotion of OFC production especially big onion, red onion, dried chili, maize, kurakkan, green gram, black gram, cowpea, soya bean, groundnut and gingerly in the country to achieve self-sufficiency.
- Explore the full potential of fruits and vegetable cultivation to export.
- Promotion of dairy industry to achieve self sufficiency on milk and support income generation and employment opportunity.

In line with the National Development Plan of Mahinda Chintana, the Ministry of Agriculture set the

objective to "ensure food security under changing and variable climate through improved and novel research, extension, advisory by promotion of increase production and productivity of OFCs, vegetables and fruits" in the agriculture cooperate plan and promote the national campaign to motivate domestic food production by nominating crop leaders to facilitate the production. The campaign sets the crop production program for paddy, OFC, vegetable, and fruit crops for each production season and allocated Rs250 million to the provincial department of agriculture in 2012. The campaign intervenes the mainly three subjects namely (i) production increase in paddy, OFC, fruits and vegetable by supply of free seeds, field demonstration and training, (ii) infrastructure development for central seed farms and (iii) others such as b-onion production and pesticide regulatory programs. The budget allocation in 2012 for each subject is Rs.150, 80 and 20 million respectively.

On the other hand, the Ministry of Livestock and Rural Community Development sets the policy of "national self-reliance and food security" in the master plan following the Mahinda Chintana and has launched an ambitious program to be self-sufficient in milk production in 2020, moreover to achieve 50% self-sufficiency in 2016. For this reason in particular, it is understood that the pace of milk production today needs to be accelerated beyond what is observed.

In addition, the Ministry of Finance and Planning has imposed high import taxes to agricultural products such as green gram, black gram, cow pea, and processed milk products to encourage the national food production campaign and livestock master plan.

The project objective is to promote an integrated farming with OFCs, fruits, and milk in compliance with the government policies.

4.4.3 Contribution to Decrease the Chronic Deficit in International Trading

As described in Section 2.1 in Chapter II, the GOSL faces chronic deficit in international trade. According to the statistics published by the Central Bank of Sri Lanka, the amount of deficit amounted to Rs589 billion in 2010. The major export items are textile (39.9%) and agricultural products (24.6%) such as tea, rubber, and coconut. Fruit is recognized as one of the potential agricultural export products in the future and its export volume has increased by 45% re-entry (2009 to 2010). The consumption goods have 20.6% share in total import items and more than half of the goods are food and beverages. The total import value of food and beverages were Rs295 billion in 2010 and out of these, nearly 5% and 12% are milk by-products and other field crops, respectively. The Table 4.20 shows the crop wise quantity and value in OFC import.

Table 4.20 List of Major Imported OFC (2010)

Crop	Qty (MT)	Value ('000 Rs)
Chili	37,720	4,997,227
Big Onion	158,086	6,649,347
Red Onion	11,907	641,286
Potato (Cons.)	129,878	4,167,941
Maize (All)	10,506	581,557
Kurakkan	2,052	59,704
Soybean	1,611	94,548
Green gram	11,515	1,755,909
Cowpea	45	2,568
Groundnut	4,604	459,624
Lentils-Red	126,816	13,814,218
Lentils-Yellow	6,533	689,070
Black gram	1,500	194,097
Chickpeas	8,291	833,815

Source : Socio-economic & Planning Center, Department of Agriculture 2011

Almost all imported OFCs except lentils are suitable for cultivation in Sri Lanka, considering the soil, climate and farm management practice of farmers. Although these crops are being grown already, the cultivated extents are not adequate enough to cater the country's demand. Market price of imported

OFC is high at present. This can be reduced if they are produced locally and in the proper way. Therefore, the objective to promote integrated farming with OFCs, fruit and milk has rationality for project support.

4.4.4 Contribution to Increase in the Income of Small Holding Farmers

The promotion of integrated farming with other field crops and fruit is economically feasible by looking at the cost and profit per crop analysis as described in Section 3.3.7 in Chapter III. The production of green gram, black gram, cowpea, chilli, and onion (red and big) have especially more net return than that of the irrigated paddy as shown in Figure 4.3. In addition, these crops require less water compared with rice paddies, therefore, the productivity of available water will also be increased.

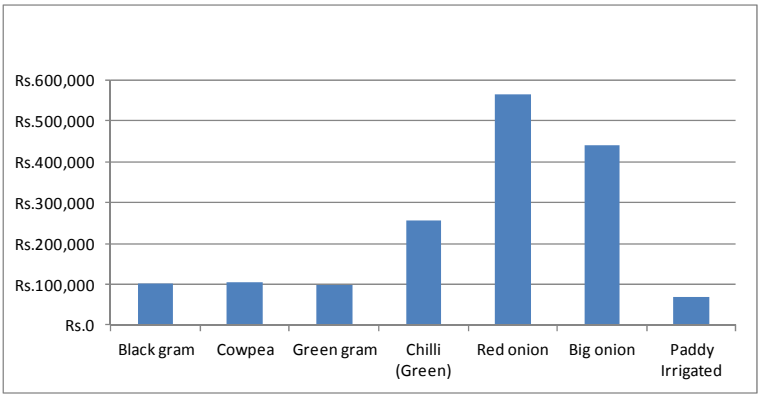


Figure 4.3 Net Return Excluding Family Labor by Crop (Rs/ha)

Considering the livestock sector, converting some of the paddy straw into marketable product rather than open field burning as practiced in Sri Lanka, will also improve the profit margins of rice farmers.

Chapter 5 THE PROJECT

5.1 Project Objectives and Overall Goals

In Chapter 4, four cultivation zones were identified to be used for strategic agricultural and livestock production. Promotion of identified strategic agricultural crops and livestock production are considered to contribute to the national level challenges of: (i) decrease in foreign currency outflow, (ii) improvement of self sufficient ratio of food in OFC and milk and (iii) improvement of small holding farmers' income. The project set these three outcomes as an overall goal of the project.

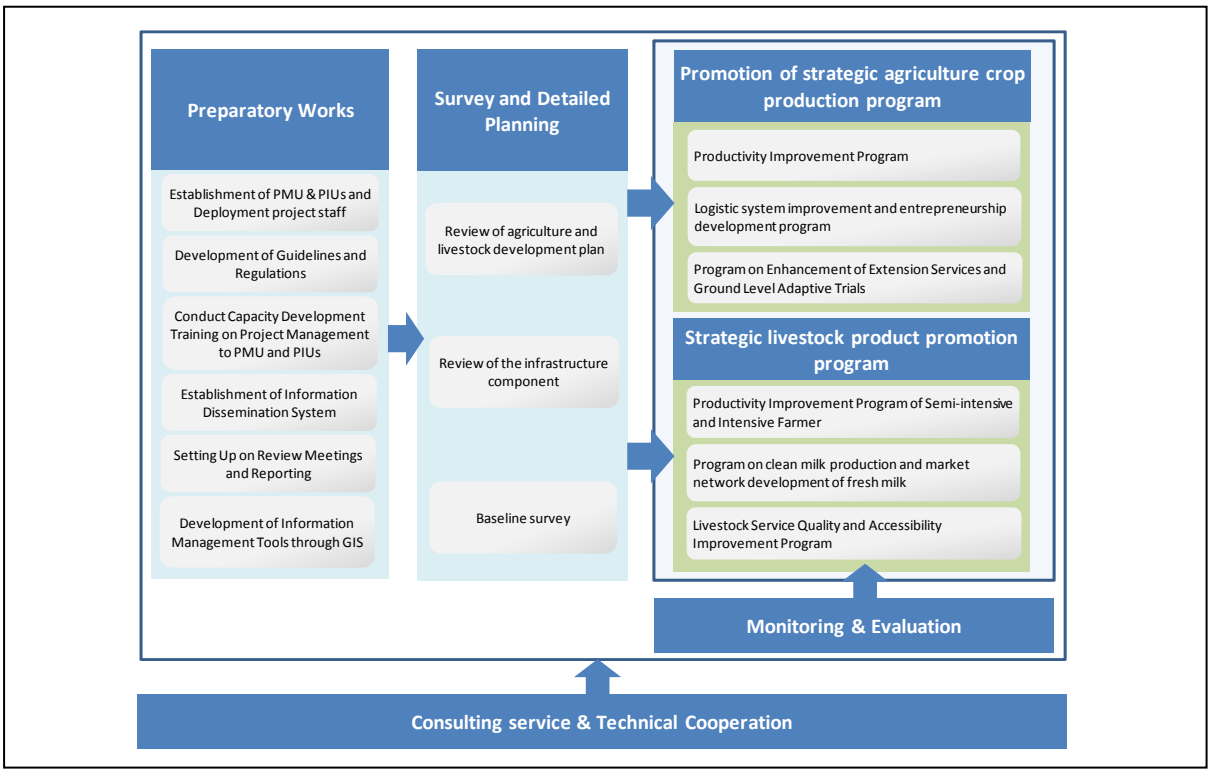
In order to achieve these overall goals, the project sets an immediate objective, which is to "increase in production and productivity of commercially viable strategic agriculture products in potential area in dry zone through the promotion of integrated farming to small holding sector".

The project works described in this chapter are necessary activities to achieve the project objective. The activities are summarized by cultivation zone which were identified in Chapter 4.

5.2 Project Work

5.2.1 Overview of Project Work

The proposed project is composed of six works, namely: i) preparatory work; ii) survey and detailed planning; iii) promotion of strategic agricultural crop production program, iv) strategic livestock product promotion program, v) monitoring and evaluation and vi) technical cooperation/consulting services. Figure 5.1 shows the outline of the proposed work.



Source : JICA Survey Team

Figure 5.1 Overview of the Project Work

Table 5.1 shows the different purposes of each component that were proposed in the project.

Table 5.1 Major Purposes of the Project Components

Components	Major Purposes
Preparatory work	• to establish organizational structures at both central and provincial level and deploy/hire personnel necessary for project implementation and management • to prepare project implementation guidelines/regulations for PMU and PIUs • to procure equipment and vehicles for PMU and PIUs • to prepare technical handbooks and criteria • to procure the GIS data and prepare the GIS base map for project monitoring and further analysis • to make the PMU, PIU, Provincial Council and other relevant government organizations understand the project concept, guidelines/regulations and procedures for project implementation • to capacitate the PMU, PIU and Provincial Councils to implement and manage the project in a proper and effective manner • to make the local communities, including CBOs in the target area, become aware of the project (outlines, concepts, activities, expected benefits and obligations of the communities)
Survey and detailed planning	• to review and identify the agriculture and livestock development (production) plans • to update irrigation scheme inventory data for each target DS division • to identify the area or irrigation scheme where above production target will be achieved • to review and identify the project components and their priority • to identify the detailed information on the project components by scheme or by area including cost and benefit (beneficiaries) • to prepare work plan and schedule, budget plan, monitoring plan, etc, for implementation of each component • to set the baseline to measure project effectiveness and impact
Promotion of strategic agricultural crop production program	• to enable government frontline officers such as AI, DO, ARPA, RDO, IE and other technical officers in the provincial council to provide technical assistance to individual farmers and/or farmer groups. • to improve the productivity of import substitute crops to increase the production of crops such as chilis, onions, legumes • to improve the productivity of fruit crop cultivation to provide quality fruits for national and international market • to improve the present logistic system for fruits and OFC to mitigate post harvest losses • to develop entrepreneurship in the agriculture sector at the village level • to improve the government agriculture extension system for sustainable production and distribution of the import substitute crop (chili, onion and pulses) and export potential crop (fruits)
Strategic livestock product promotion program	• to enable government frontline officers such as VS and LDI and other technical officers of the provincial council to provide technical assistance to individual farmers and/or farmer groups. • to improve the productivity of semi-intensive and intensive milk production farmers • to promote fresh milk consumption and develop the fresh milk market through enhancement of cooperative, etc. • to improve the government livestock service quality and accessibility for sustainable production and distribution of milk
Monitoring and evaluation	• to grasp the physical/financial progress and issues/problems that would affect the project's smooth and effective implementation • to provide adequate and timely information for proper project management • to evaluate the impacts of the project
Technical cooperation / Consulting services	• to assist PMU and PIUs in the implementation and management of the project in an effective and proper manner

Source : JICA Survey Team

Table 5.2 Major Quantity of the Project Components

Components	Major Project Components	Quantities
Preparatory work	• Establishment of PMU, PIU, Steering Committee, and Procurement of Consultant	• 1 PMU in central level & 5 PIU in provincial level • 1 Project Steering Committee in central level & 5 Project Coordination Committee in provincial level
	• Procurement of equipment for PMU & PIU	• 20 vehicle (4WD & pick up), 80 motor bike and 48 desk top PC etc.
	• Development of Guidelines and Regulations	• 9 subjects in principal
	• Conduct Awareness and Capacity Development Training to PMU and PIUs	• Project awareness, training on project management and guidance on monitoring and evaluation
Survey and detailed planning	• Review and identify the agriculture and livestock development (production) plans and review on the infrastructure components	• 54 DS divisions
	• Conduct baseline survey	• 54 DS division / 108 government staff / 108 CBO leaders
Promotion of strategic agricultural crop production program	**Productivity Improvement Program** • Rehabilitation and/or construction of irrigation and drainage facilities;	• Rehabilitation of 44 major irrigation schemes • Rehabilitation of 71 minor irrigation schemes • Rehabilitation or new construction of 5,671 agro wells with water pumps • Procurement of 200 sets of sprinkler irrigation system and 2,248 (ha) of drip irrigation system
	• Establishment of supply chains of quality seeds and planting materials;	• Establishment of provincial seed laboratory : 5 nos. • Enhancement of provincial seed farm : 5 locations • Quality self-seed production for OFCs : 89 programs • Certified seed production for OFCs : 32 programs • Quality planting material production for fruits : 9 programs
	• Farmer training on improvement of farm management and production technologies;	• Farm management improvement : 7 subjects • OFC production improvement : 9 subjects • Fruits production improvement : 10 subjects
	• Provision of the machineries to promote quality products with low production cost and fences to protect farm products from domestic and wild animals;	• Manual highland seeders for legume : 368 nos. • Highland weeders : 368 nos. • Ridgers : 184 nos. • Ground nut decorticating machines : 52 nos. • Pulse splitting machines : 134 nos. • Pulse cleaning machines : 134 nos. • Grinding machines –for chili and pulses : 397 nos. • Barbed Wire Fence : 1,942 km • Electric Fence with solar energy generation equipment : 570 km
	• Provision of credit to producers to support the above activities.	• Fund for Rs 582 million
	Logistic System Improvement and Entrepreneurship Development Program • Establishment of proper interface and incubation of business minded leader for effective trading between producer and trader;	• Construction of collecting point with office equipment : 108 nos. • Provision of equipment ・ Sorting table (2x5m for OFCs and fruits) : 108 nos. ・ Winnower (for legumes) : 216 nos. ・ Sieving equipment (for legumes) : 540 nos. ・ Trays (for OFCs and fruits) : 1,080 nos. • Provision of storage facilities improvement ・ Big and red onion : 2,590 nos. ・ Chili and legume : 5,120 nos. • Improvement Requirements of DECs : 2 locations

Components	Major Project Components	Quantities
	• Rehabilitation or/and upgrading of rural road and farm access road;	• Access road improvement : 86 km • Farm road improvement : 543 km
	• Conducting study tours for exporters/processors and government official to major export countries and potential import countries of agricultural products from Sri Lanka.	• Visit potential import countries (3 weeks) • Visit active export countries for agricultural products (3 weeks)
	Program on Enhancement of Extension Services and Ground Adaptive Trials	
	• Provision of training to extension officers for promotion of commercialized farming;	• Training 180 officers
	• Enhancement of DATC/ISTC facilities to carry out the ground level on-farm trials and provision of mobility for field extension officers and other equipment to improve the extension services;	• Improvement of DATC Bibile and ISTC Bindunuwewa • Provision of vehicle (pick-up) : 5 nos. • Provision of motorcycle : 180 nos. • Provision of personal computer (PC) : 20 nos.
	• Overseas training for advanced commercial farming and extension method.	• Overseas training for OFCs : 60 person-months • Overseas training for fruits : 30 person-months
Strategic livestock product promotion program	**Strategic Livestock Product Promotion Program**	
	• Productivity Improvement Program of Semi-intensive and Intensive Farmer • Establishment of supply chain of feed;	• Feed concentrate production program : 54 nos. • Training : 5 subjects • Provision of equipment ・ Straw Bailing Units : 100 nos. ・ Bio-mass pelleting units : 10 nos. ・ Grass and straw choppers : 60 nos. ・ Seeds of pasture : 60 nos.
	• Breeding improvement through rapid increase in Artificial Insemination (AI);	• Estrus Synchronization : 48,000 nos. • Artificial Insemination : 200,000 nos.
	• Introduction of feed efficient livestock such as milking goat.	• Enhancement of Thalahara National Goat Breeding Center
	Program on Clean Milk Production and Market Network Development of Fresh Milk	
	• Provision of necessary equipments and training on clean milk production	• Training : 4 subjects • Provision of equipment
	• Establishment of effective milk collecting network and promotion of mobile sale.	・ UHT milk processing unit : 8 nos. ・ Chilling tank 1500 liter capacity : 10 nos. ・ Mobile sales unit : 20 nos. ・ Milk cans : 3,110 nos.
	Livestock Service Quality and Accessibility Improvement Program	
	• Construction of livestock service center to be a focal point for livestock extension services and milk collection;	• Livestock service center : 60 nos.
	• Training of VS and LDI on AI and synchronization; and	• Training : 5 subjects • Provision of equipment ・ Liquid nitrogen tank : 5 nos. ・ Semen canister : 17 nos. ・ AI kits : 100 nos.
	• Provision of the mobility to LDI and VS.	• Vehicle (4 x 4 pick-up) : 10 nos. • Motor bike : 42 nos.
Monitoring and evaluation	• Monitoring and evaluation	• Initial Evaluation / Ongoing Evaluation / Mid-term Evaluation / Terminal Evaluation / Ex-post Evaluation
Technical cooperation / Consulting services	• Consulting services	• Management consultant : Foreign 122 MM / National 267 MM • Project consultant : 1,674 MM • Sub-professional : 3,463 MM • Supporting staff : 3,458 MM

Source : JICA Survey Team

5.2.2 Preparatory Work

(1) Set-up Preparation for PMU, PIU, Steering Committee, and Procurement of Consultant

Since the project covers various sector activities in agriculture, livestock and irrigation, the establishment of a project management unit and project implementing unit were proposed. The two units were created exclusively for the preparation and management of the overall and annual implementation plan, arrangement of the budget, accounting work, procurement, monitoring and coordination with other relevant institutions.

The following organizations are mainly lined up for project implementation.

a. Formation of project steering committee (PSC) at the central level
b. Organization of one project management unit (PMU) at the central level
c. Formation of five project coordination committees (PCCs) at the provincial level
d. Organization of five project implementing units (PIUs) at the provincial level

The compositions of PSC, PCC, PMU and PIUs and their major roles are tentatively proposed in Table 5.3. However, the members of the steering committees at the central and provincial levels have been specified and determined at the beginning of the project.

Table 5.3 Staff/Member Composition and Roles of the PMU, PIU and PSCs Established Under the Project

Organization	Major Roles	Composition of Organization
Project Steering Committee (PSC)	1. Make national level policy decisions pertaining to the achievement of project goals and objectives. 2. Overall project monitoring 3. Coordination of relevant government agencies	**Chairperson-** secretary to the executing agency **Members-** 1. Ministry of Agriculture 2. Ministry of Irrigation and Water Resources Management. 3. Ministry of Livestock and Rural Community Development 4. Ministry of Agrarian Services and Wildlife 5. Ministry of Cooperatives and Internal Trade. 6. Japan International Cooperation Agency (JICA) 7. Ministry of Finance (External Resources Department/ National Planning Department) 8. Project Director 9. Chief Secretaries
Project Coordination Committee (PCC)	1.Project monitoring at provincial level 2.Make provincial level policy decisions pertaining to the project implementation	**Chairperson-** Chief Secretary **Members** 1. Secretaries of relevant provincial ministries 2. Provincial heads of relevant departments. 3. Project director and senior staff of PMU
Project Management Unit (PMU)	1. Preparation of annual work plan of the project 2. Arrangement of budget 3. Financial management for implementation of the annual work plan. 4. Project procurement activities 5. Deployment of project staff 6. Coordination of the relevant departments and institutions. 7. Overall project monitoring 8. Conduct regular PCC meetings	**Staff** 1. Project director (1 person) 2. Additional project director- infrastructure development (1 person) 3. Additional project director- agriculture/livestock and marketing (1 person) 4.Senior accountant (1person) 5.Senior procurement officer (1person) 6.Supporting staff (office manager, computer operators, office aid, drivers)
Project Implementation Unit (PIU)	1. Planning and implementation of project annual work plan of the province. 2.Monitor the project work plan at provincial level	**Staff** 1.Deputy project director (1 person) 2.Accountant (1 person) 3.Senior irrigation engineer (1 person) 4.Agricutural specialist (1 person) 5.Livestock specialist (1 person) 7.Supporting staff (office manager, computer operators, office aid and drivers)

Source : JICA Survey Team

The PMU and PIUs employ full time staff through either government organizations or external resources on a contractual basis. In both cases, the terms of reference (TOR), which specify requirements on personnel capabilities, scope of responsibilities, and authorities to be given are determined and publicized by PMU and PIU. When recruiting members from outside sources, PMU and PIU will base the selection on the qualification and expertise of the person; considering the requirements for the vacant posts and comply with the current laws such as the Management Service Circular No.33: "Recruitment, Remuneration and Management of Project Staff" as defined by the Government of Sri Lanka.

Table 5.4 shows the following proposed equipment and vehicles purchased for management of PMU and PIU. Procurement is carried out by following the JICA and Government of Sri Lanka guidelines.

Table 5.4 Vehicles and Equipment to be Procured for PMU and PIUs

Equipment and Vehicles	Unit	PMU	PIU (including irrigation depts.)
4x4 vehicles	No.	1	0
4x4 pick-up	No.	1	18
Motorbike	No.	-	80
Desktop PC with software	No.	8	40
Laptop PC with software	No.	3	15
Laser printer (A4/A3)	No.	2	10
Inkjet printer (A4/A3)	No.	1	5
GIS Software (Arc view with spatial analyst and network analyst)	No.	1	-
Photocopy machine	No.	2	10
UPS (1000VA)	No.	8	40
Digital Video Camera	No.	1	5
A0 plotter	No.	-	5
GPS	No.	2	10
Digital camera	No.	2	10
Projector	No.	1	5

Source : JICA Survey Team

After setting up the PMU, the unit shall procure management consultants attached to PMU and project consultant attached to PIUs. The expertise and quantity of those consultants are specified in section 5.5.3.

(2) Development of Guidelines and Regulations

In order to provide a standardized framework for project implementation and management which would serve as a reference document for decision-making by relevant ministries in the central level, departments from provincial councils and PIUs, related guidelines/regulations are developed by management consultants in collaboration with PMU. The implementation guidelines are aimed at prescribing project implementation rules, regulations and procedures in the administrative, financial and accounting, project management, monitoring and evaluation, and technical aspects. The implementation of project components takes into account the existing regulations and procedures of the central as well as provincial governments. The guidelines cover, but not limited to the following topics.

- Project management
- Monitoring and evaluation
- Billing and fund management

- Capacity development and information dissemination
- Review and finalization of project components
- Irrigation and drainage facilities rehabilitation and O&M
- Rural infrastructure rehabilitation and O&M
- Typical implementation procedure for promotion of strategic agricultural crop production
- Typical implementation procedure for strategic livestock product promotion program

PMU drafts the project implementation guidelines with the assistance of the management consultant. The draft guidelines are discussed in the PSC and presented to the PCC and PIU for finalization. After being ratified by PSC, the implementation guidelines are issued and notified by the executing agency as a ministerial circular prior to the implementation of the field activities.

(3) Conduct Awareness and Capacity Development Training to PMU and PIUs

Orientation, training, and guidance sessions are organized by PMU and the management consultant to raise awareness on the project concept and activities, and to enhance the management skills of staff in PIUs and in relevant government departments. Table 5.5 gives the outline of the activities.

Table 5.5 Outline of Capacity Development Activities for PMU and PIUs

Program	Duration	Target Group	Objective	Content	Implementation
Project Awareness	1 day	All officers involved with the Project	- Create awareness on the Project - Develop a sense of ownership for smooth project implementation	Project background, Objectives, activities, funding and duration of the project Project Implementation structure Role and responsibilities of agencies involved	Management Consultant and PMU
Training on Project Management	5 days	Key officers in PMU and PIU	Improve the capacity of officers in project management	Project management Finance and budget management Preparation of project regulations	Management Consultant, PMU and Outsourcing
Guidance on monitoring and evaluation (M&E)	3 days	Key officers in PMU and PIU Project monitoring officer	Improve capacity of officers monitoring and evaluation	M&E (concepts, objectives, relevant guidelines, indicators, methodologies, schedule) Understanding the logical framework	Management Consultant, PMU and Outsourcing

Source : JICA Survey Team

(4) Establishment of Information Dissemination System

The Project will publish information such as project concept, progress, and achievement to facilitate proper awareness to local communities in the target area and central stakeholders. The publication will be announced in newsletters (paper and electronic basis), videos, radios, and webpage. In addition, field study tours are proposed. Proposed materials to be produced for information dissemination are shown in Table 5.6.

Table 5.6 Proposed Materials to be Produced for Information Dissemination

Nature of the material	Type of material	Frequency	Responsible organization	Target groups
Overall brief project	Print (A4 size both side 1 paper)	Once a year	PMU	All people interested in the project
Annual newsletter	Print (A4 size both side 4 paper)	Once a year	PMU	Stakeholders of the project
Monthly newsletter	Print (leaflet)	Once a month	PMU	Stakeholders of the project
Other awareness creation	5-10 minute video	Once a year	PMU	Stakeholders of the project and other government officers
	Radio information	Twice a month	PMU	All people interested in the project
	Field Tour	Once in each sub project	PIU	Government officers
	Web page	Each time	PMU	All people interested in the project

Source : JICA Survey Team

(5) Setting-up on Review Meetings and Reports

PMU and PIUs are responsible for organizing review meetings to monitor the project's progress, achievements and constraints that are being faced. An outline of key review meetings are shown in Table 5.7.

Table 5.7 Outline of Key Review Meetings

Meeting	Chairperson	Topics to be discussed	Location (Venue)	Frequency
Project Steering Committee Meeting	Secretary of the Ministry of Local government	Make national level policy decisions pertaining to the achievement of project goals and objectives. Overall project monitoring Coordination of relevant government agencies	Colombo	Once in six months
PMU Review Meeting	Project Director	Central level work plan and actual achievement Work Schedule Arrangement of budget Financial management Deployment of project staff Necessary coordination with relevant departments and institutions Constraints and bottlenecks for project implementation	In-house meeting	Weekly
PIU Review Meeting	Deputy Project Director	Provincial level work plan and actual achievement Work Schedule Arrangement of budget Financial management Deployment of project staff Necessary coordination with relevant departments and institutions Constraints and bottlenecks for project implementation	In-house meeting	Weekly

Source : JICA Survey Team

(6) Development of Information Management Tools through GIS

GIS is the system used to manage various types of data such as texts, images, numeric data, files and shapes with regards to positional information. GIS is used as an application tool in various fields such as science, marketing, infrastructure management, road network establishment, resources management. The GIS system has capability to manage different types of data by distinctive categories and draw maps.

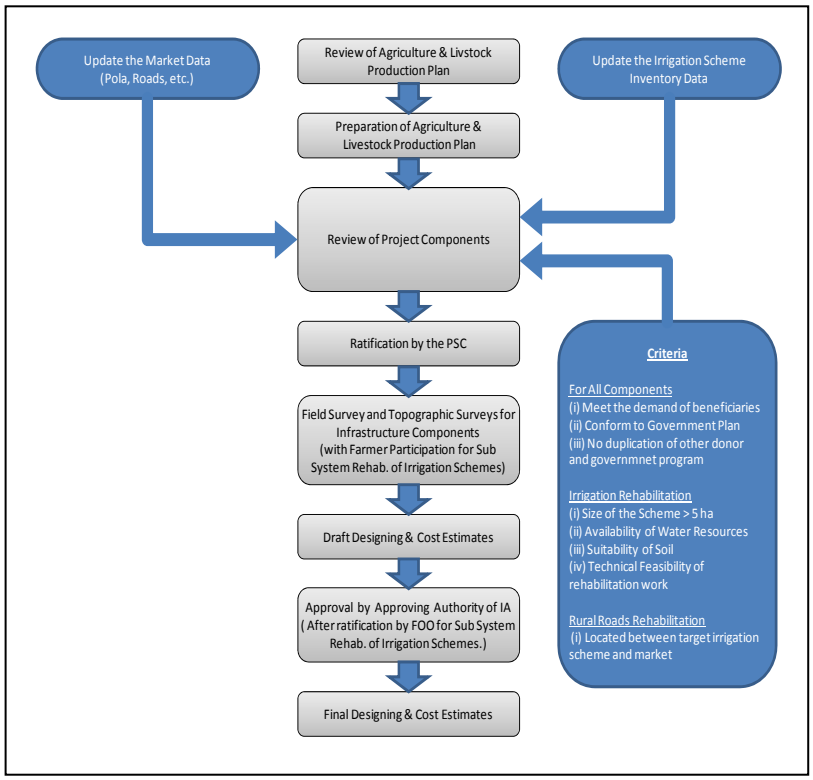
It also has the capability to give visual image to the public.

The project area covers about 45,000 km^2 which spreads throughout five provinces in the dry zone. In order to plan the project components effectively, considering positional synergetic effect of individual component, PMU is recommended to use a GIS system during planning stage. Multiple subprojects can share various components such as base maps, inhabitants, structures, wild animals, disease, and water resources interactively. Furthermore, a GIS system could visually demonstrate the progress in each subproject.

5.2.3 Survey and Detailed Planning for Infrastructure Components

(1) Review of the Agriculture and Livestock Production Plan

The agriculture and livestock production plan is the base of the infrastructure components. The plan mainly depends on several factors such as related policies of the government, availability of land and water, market demand, adequateness of extension services, availability of inputs, as well as knowledge and motivation of farmers. Although the agriculture and livestock production plan and its target are formulated in this survey, some of factors which affect the plan are being reviewed and revised again at the beginning of the Project.



Source : JICA Survey Team

Figure 5.2 Flowchart for Survey and Detailed Planning

Work is carried out by PMU and the management consultant with the help of PIUs, provincial councils and line ministries. These groups assess the latest national and provincial cultivation and production plan for agricultural and livestock products, actual agricultural trade and national consumption data. PMU also shared the revised agriculture and livestock production plan at the steering committee meeting for approval.

(2) Review on the Infrastructure Components

Parallel to the review of the agriculture and livestock production plan, PIU and the project consultant updated its inventory data on the irrigation scheme and on rural roads that were proposed in this survey based on the data collected from the Department of Irrigation (central and provincial), Department of Agrarian Development (DAD), Pradesiya Sabha and RDA (provincial council). Data collected not only

came from published reports but from group discussions, individual meetings and interviews with respective departments as well. Information on other donor funded projects and government programs are also collected to avoid the duplication of assistance.

Based on the revised agriculture and livestock production plan and on the collected information above, PMU and management consultant re-examined the rationality, needs and feasibility of the rehabilitation of infrastructure components, considering the criteria mentioned in the Table 5.8.

The components are shared with PSC for approval.

Table 5.8 Selection Criteria for Major Infrastructure Components

Component	Specific Criteria	Common Criteria
Rehabilitation of Irrigation Schemes	(1) Size of the scheme > 5 ha (2) Availability of water resources (refer to Table 5.10) (3) Suitability of soil (4) Technical feasibility of rehabilitation work	(1) Meet the demand of beneficiaries (2) Conform to government plan (3) No duplication of other donor and government programs
Rehabilitation of Rural Roads	(1) Located between target scheme and market	

Source : JICA Survey Team

Cultivation areas under the proposed agro-wells are generally located: (i) within the command area of candidate irrigation schemes but with irrigation difficulties, (ii) within the command area of the candidate irrigation scheme but in highland areas, or (iii) in other irrigation schemes around the candidate irrigation scheme. The suitable agro-wells for rehabilitation or construction will be selected considering the following criteria.

- Conform to the provincial and DS level agriculture production plan;
- Availability and quality of water : groundwater/seepage water;
- Location: close to the proposed cultivation area/well can be shared by three to four farmers;
- Existing well density, distance between two wells > 180 m.

Suitable location for agro-wells will be identified by a team composed of respective specialists from the agriculture and irrigation department, with technical support from WRB. The team will inspect the existing agro-wells around the proposed well sites and assess the availability and quality of water. This assessment will be carried out considering: (i) observed water depths of existing or abandoned wells, (ii) whether the proposed site is close to an irrigation tank or stream, and (iii) information collected from interviews with farmers. If necessary, yield tests, recharge tests and water quality will be carried out in selected locations. After the assessment of water availability, suitable well sites close to the proposed cultivation areas will be decided considering the number of farmers around the well site and existing well density in the area. Based on the results of the assessment, suitable sites will be selected.

(3) Baseline Survey

With the aim of setting baselines for the project, a household interview survey was carried out by a contractor hired by the PMU prior to the commencement of physical development work in the field. A set of questionnaire forms covering the following topics were prepared and were used for interviews and/or data collection. The survey was done together with the leaders of CBO and government frontline officers of the respective DS division and irrigation scheme.

Table 5.9 Proposed Data Collected in the Baseline Survey

Source	Sample Number	Data to be Collected
DS	54 DS	・ General Information: Number of households, population, ethnicity, religious affiliation, rural labor force, employment and main income source in GN/DS division ・ Production: Agriculture (land area, main crops, Livestock population, farming systems and practices), fisheries, income generation activities, etc. ・ Available Infrastructure: Road network and transportation, irrigation, electricity, markets, etc. ・ Social services: Education, healthcare, drinking water and sanitation, etc. ・ Development and poverty alleviation projects or programs implemented or being implemented in the area.
Frontline Technical Staff (AI, VS & IE)	108 staff	・ Present agricultural and livestock production in range ・ Present agricultural and livestock input supply system ・ Availability of farm machinery ・ Present extension services (quantity and quality) provided to farmers ・ Present agricultural and livestock product marketing system and related problems ・ Number of registered CBOs and their details ・ Availability of credit ・ Number of forward agreement and buy back contract in the range ・ Activities of private sector in agriculture and livestock industry ・ Present crop intensity and O&M status of irrigation scheme
CBO Leaders	108 household	・ General background of the household: household structure, head, size and composition, religion, ethnicity, education level, occupations, house structure and ownership, healthcare status, household facilities, etc. ・ Participation of community organizations: Farmer's Organization, Rural Development Society, etc. ・ Land tenure and present agricultural production ・ Farm machinery owned and used in farming ・ Average annual income and main income sources ・ Average annual/monthly expenditure ・ Access to credit ・ Development needs(recommendations/proposals for possible intervention to support local people)

Source : JICA Survey Team

5.2.4 Promotion on Strategic Agricultural Crop Production

As discussed in Section 4.3.4, three major programs namely: (1) Productivity improvement program, (2) Logistics system improvement and entrepreneurship development program, and (3) Program on the enhancement of extension services and ground level adaptive trials. The contents of these programs are described in this section and the schematic drawing is shown in Figure 5.3 below.

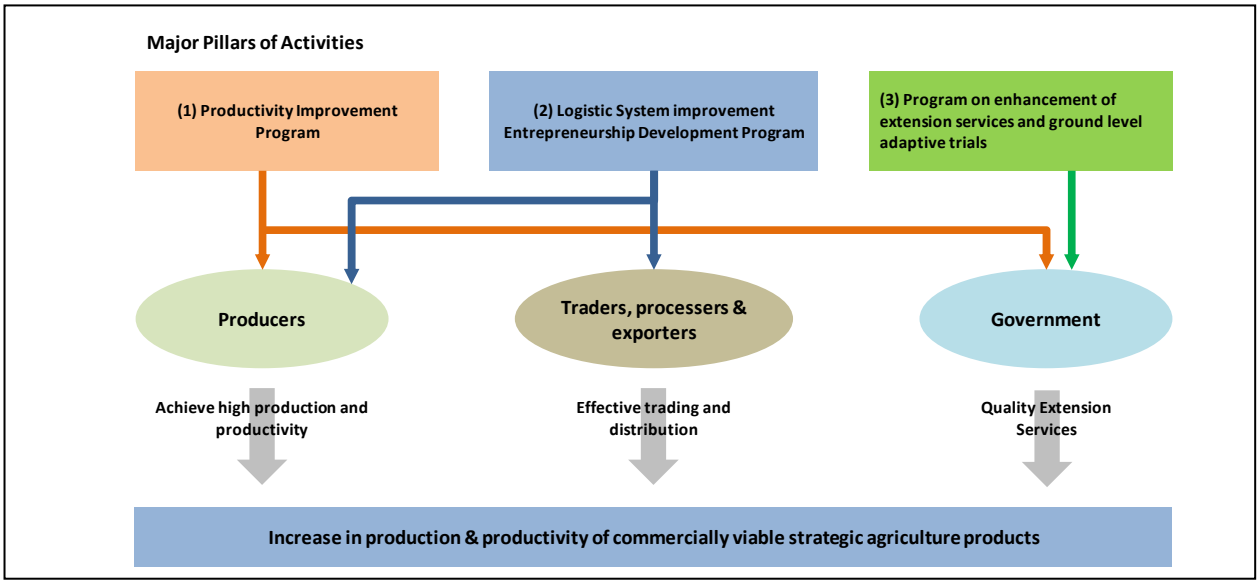


Figure 5.3 Schematic Drawing of Promotion on Strategic Agricultural Crop Production

(1) Productivity Improvement Program

Five major activities are planned in the productivity improvement program as follows:

(a) Rehabilitation and/or construction of irrigation and drainage facilities;
(b) Enhancement of the supply chains of quality seed and planting material;
(c) Farmer training on the improvement of farm management and production technology;
(d) Provision of machineries to promote quality products with low production cost and fences to protect farm products from domestic and wild animals; and
(e) Provision of credit to support the above activities.

(a) Rehabilitation and/or Construction of Irrigation and Drainage Facilities

1) Selection of the Irrigation Scheme

There are 44 major/medium irrigation schemes, 71 minor irrigation schemes and 5,671 agro wells that are proposed to be rehabilitated or constructed for water resources development to improve the productivity of strategic agricultural crop production. They were selected from 530 irrigation schemes proposed by the DS level workshop using criteria of availability from the study data, availability of water resources and scale of the scheme.

A water resources assessment for irrigation schemes were carried out to justify the cultivation plan prepared by the participants of the DS level workshop, as shown in annexed Table A 5.1. The proposed crop extents under each water sources were compared with the estimated crop extents that can be cultivated from available water under the present water source. Available water and estimated possible crop extents under different water sources were assessed in Figure 5.10 below.

Table 5.10 Methodologies of Water Resources Assessment

Type of Irrigation Scheme	Description
Major and medium irrigation scheme	The estimated possible crop extent under major and medium tanks were calculated using available data on tank capacity, tank command area and cropping intensity.
Minor Irrigation Scheme	Maximum possible crop extents under minor tanks were calculated based on available data collected from the Department of Agrarian Development and approximate data calculated are as follows. Approximate tank capacities calculated using the following equations. i. Tank Capacity = 0.4 x Tank water surface area at FSL x Max. tank water depth ii. Tank Capacity = Command area x Average water duty for paddy crop in Maha Season (Assuming tank was designed to 100% Paddy cultivation in Maha season). Seasonal water inflow to tank and seasonal irrigation water requirement for paddy and OFC crops were calculated on the basis of the design booklet "Design of Irrigation Headwork for Small Catchment, published by ID, May 1984.

Source : JICA Survey Team

The availability of ground water varies depending on the location and type and volume of aquifer. Accordingly, possible cultivated extent varies from place to place. However, no comprehensive study to identify the availability was carried out.

The Water Resources Board (WRB) and the National Water Supply and Drainage Board (NWS&DB) are two state organizations involved in ground water studies and investigations in Sri Lanka. They survey the available quantity, quality and water level through yield test and re-charge test at the field prior to the construction of the agro-well.

Since there is no comprehensive study for availability of ground water in Sri Lanka, the following

individual study reports were reviewed in this survey. Possible extents that can be cultivated by one agro-well were then decided.

(i) Research Report No. 66 of the International Water Management Institute (IWMI) – "Agro-well and Pump Diffusion in the Dry Zone of Sri Lanka"
(ii) Technical Paper No. 33, December 2003 of the Integrated Food Security Program (IFSP-GTZ), Trincomalee - Design and Construction
(iii) Study report of the Agricultural Engineering Division, Open University of Sri Lanka – "Sustainability Agro-well Irrigation on Hard Rock Aquifers of Sri Lanka"

According to the above report (i), which was based on research work that was carried out on agro-wells in major and minor irrigation schemes in the dry zone of Sri Lanka, the average size of an agro-well is between 4.0 m to 6.0 m in diameter which can irrigate 0.2 ha to 0.8 ha of highland crops. The technical paper report (ii) gives guidelines for construction of agro-wells under the IFSP-GTZ project, which was prepared based on yield tests carried out in the Trincomalee district. According to this guideline, agro-wells are large in size with a diameter up to 8 m. One agro-well could easily irrigate up to 1.0 ha. The report in (iii) was based on the study conducted in agro-well systems in the North Western Province to determine well dimensions and irrigated land area to achieve sustainable irrigation. Findings of this study stated that sustainable crop extent varies with the well radius, well spacing and maximum highland crop extent that can be irrigated with a 3.15 m radius well spaced at 180m.

Based on recommendations from the above reports, sustainable irrigable land from a 4m to 6 m diameter agro-well is taken as 0.8 ha for OFC cultivation and 1.2 ha for fruits crop cultivation. For fruit cultivation, a higher extent was recommended in report (iv) which was taken considering the less daily crop water requirement for fruit crop than the OFC.

However, irrigable area, well spacing and well diameter of agro-wells are to be decided after conducting yield test and recharge test in the field during the project implementation period.

2) Work Components

The proposed rehabilitation works for irrigation schemes aims to improve the irrigation efficiency and drainage capacity of the scheme. Rehabilitation works for major and minor irrigation systems include the rehabilitation and enhancement of tank bunds, rehabilitation of spillway and intake structures, rehabilitation/construction of main and branch canals and related structures such as regulation tanks, upgrading of tertiary irrigation and drainage system with concrete lining work and the rehabilitation/upgrading of inspection roads. In addition, rehabilitation of pumping houses and re-installation of pumps are also proposed for lift irrigation scheme (refer to Figure 5.4).

Out of the 5,671 agro-wells, 3,000 agro-wells are under rehabilitation while 2,671 are newly constructed. According to the data collected from provincial councils, nearly 18,000 agro-wells are available, with 4,000 out of 18,000 needing upgrade or rehabilitation in the target 54 DS divisions. The Survey Team estimated about 3,000 agro-wells that can be incorporated into the project component by desilting and/or deepening the well with the rehabilitation of protection walls based on the discussion with DS level workshops.

Table 5.11 shows the proposed number of target irrigation scheme and agro-well rehabilitation and construction.

Table 5.11 Number of Irrigation Tanks and Agro-wells to be Rehabilitated or Constructed

Item	unit	Work Quantities by Zone				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Individual other sub-schemes	No	4	1	2	0	7
Major/medium tank	No	28	5	2	2	37
Minor tank	No	25	22	16	8	71
Agro-well	No	1,394	1,519	1,142	1,616	5,671

Source : JICA Survey Team

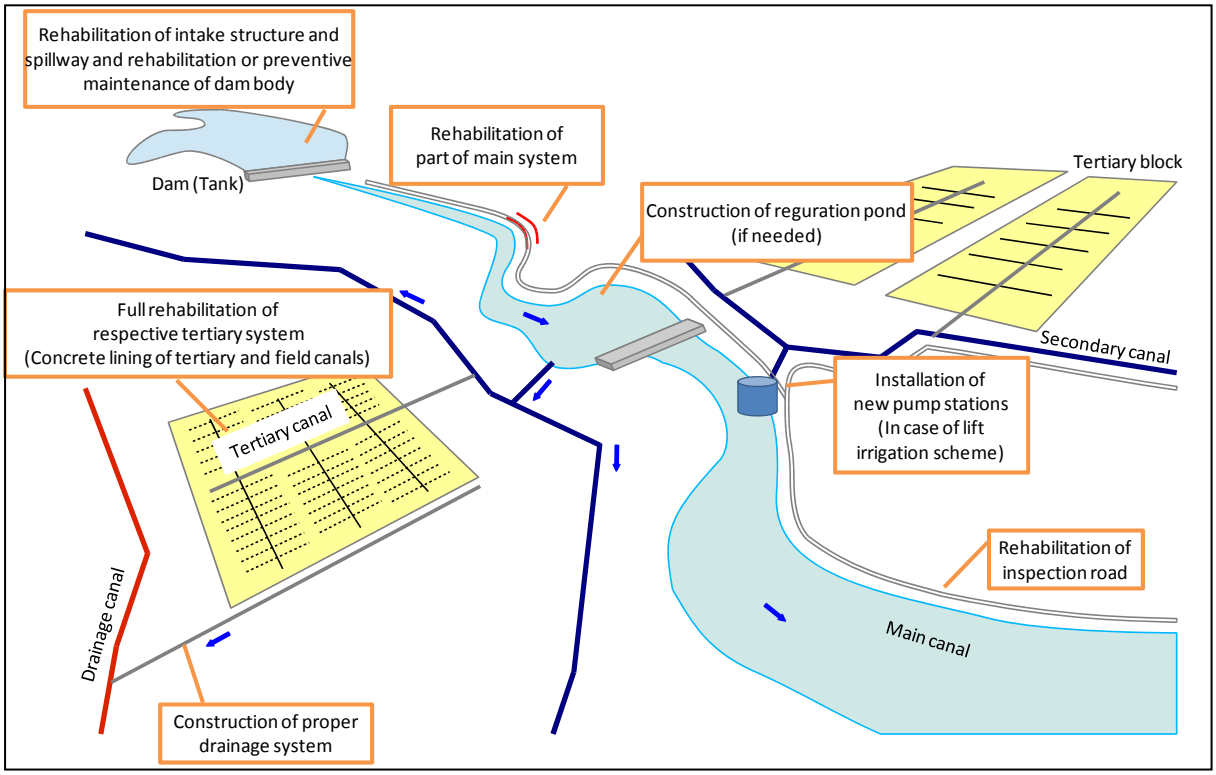


Figure 5.4 Schematic Drawing of Irrigation Rehabilitation Works in an Irrigation Scheme

The following six irrigation schemes have large extents. Proposed rehabilitation and upgrading works for these schemes are big. It is therefore concluded that these schemes are handled separately as an individual sub-scheme from others for the implementation and study. The outline of the rehabilitation and upgrading works for individual sub-schemes are described in Table 5.12.

Table 5.12 Outline of Individual Sub Scheme

Name of sub-scheme	District	DS Division	Project feature	Rehabilitation
Mahaweli system H rehabilitation scheme	Anuradhapura Kurunegala	7 DSs Galgamuwa	Total farm area of System H : 39,900 ha About target area by the Project: Kalawewa reservoir capacity. : 123 MCM Command area: 25,360 ha RB canal : 50 km LB canal : 22 km Kalawewa Yoda Ela : 25.3 Kalawewa Goda Ela :3.7 km Balalu wewa Goda Ela : 2.1 km	Rehabilitation of damaged canal sections and structures in RB and LB main canals with the improvement of headworks and canal systems of 62 minor tanks.

Name of sub-scheme	District	DS Division	Project feature	Rehabilitation
Improvements to Ingnimitiya scheme	Puttalam	Anamaduwa	Tank capacity : 72.6 MCM Command area: 2,643 ha. RB Main Canal : 21 km RB D Canal : 12 km RB Field Canal : 45 km LB Main Canal : 23 km LD D Canal : 14 km LB Field Canal : 49 km	Rehabilitation of 44 km of Main Canals, 26 km of D Canals and 94 km of Field Canals
Neelabemma Scheme (Phase I: Existing)	Puttalam	Karuwalagas wewa	Tank capacity : N.A.(Anicut) Command area : 860 ha (Phase I) LB Feeder Canal : 12 km	Improvement of the 12 km feeder canal and canal system under Kudaottupallama tank.
Kurai Tank augmentation and Parangi aru development project	Manthai West	Murunkan	Kurai Tank Tank Capacity : Present – 2.5 MCM, Proposed – 4.0 MCM Command Area: 700 ha. RB and LB main canals : 6.0 km Prop. upper LB main canal : 6.0 km RB and LB feeder canals : 14.0 km Feeder tanks : 28 nos. Field canals : 50.0 km Parangi Aru Anicut and feeder canal Anicut: Length – 55 m., Max. height – 3 m. Head sluice: 4.5 m x 1.5 m Radial Gate Inlet canal : 100 m, feeder canal – 7.5 km	Kurai Tank Augmentation of tanks by raising 70 cm of tank bund and 75 cm of spillway crest and improvement of 3 sluices. Improvement or construction of 12 km main canals, 14 km feeder canals, 28 feeder tanks and 50 km field canals. Parangi Aru Anicut and feeder canal Construction of new anicut and 7.5 km supply canal for diversion water to Kurai tank.
Rehabilitation of Welimaruthamadu irrigation scheme (Pallamadu GND)	Mannar	Manthai West	Tank capacity : 3.4 MCM Command area : Present - 304 ha, Proposed - 726 ha RB and LB main canals : 2.0 km RB and LB feeder canals : 14.0 km Field tanks : 15 nos. Field canal : 40 km.	Rehabilitation of tank bund, 2 sluices and a spillway. Improvement or reconstruction of 2 km main canals, 14 km feeder canals and 15 feeder tanks.
Rehabilitation of Muthayankaddu tank lift irrigation scheme	Mullaitivue	Oddusudan	Tank Capacity : 50.6 MCM Command Area: 2,468 ha. Main Canal : RB - 20.8 km, LB – 22.8 km RB Br. canal : 1.6 km RB & LB D Canal : 20.5 km RB & LB Field Canal : 173.6 km	Rehabilitation of head works including strengthening of tank bund and repair and reconditioning of two spill radial gates and two sluices. Rehabilitation of 43.6 km of Main Canals, 1.6 km of Branch Canals, 20.5 km of D Canals and 173.6 km of Field Canals Construction & reconstruction of 18 (13 for RB & 5 for LB) pumping stations for lift irrigation including supply of 24 water pumps and construction of 17 pump houses, 13,240 m of rising mains and 32.8 km of concrete lined irrigation canals
Rehabilitation of Vavunikulam Tank - Right and left banks lift irrigation system	Mullaitivue	Monthai East	Tank capacity : 43.5 MCM Command area: 2,790 ha. Main canal : RB-19.6 km, LB–11.4 km, RB Br. canal : 2.4 km RB and LB D canal : 34.1 km RB and LB field canal : 81.9 km	Construction and reconstruction of 10 (6 for RB & 4 for LB) pumping stations for lift irrigation including supply of 17 water pumps and construction of 8 pump houses, 11,900 m rising mains and 41.0 km concrete lined irrigation canals

Source : JICA Survey Team and JBIS Pilot Study on Agricultural and Rural Rehabilitation in the North East and North Central Region of Sri Lanka, Final Report Supporting (1), Short Listed Scheme Outline, May 2004

The provision of micro irrigation kit such as drip irrigation and sprinkler irrigation with necessary operation and maintenance training are planned under the project, as shown in Table 5.13. The cost sharing concept of those equipment, and number and contents of the training are given in the following section.

Table 5.13 Summary of Equipment Provided under Irrigation Component

Item	Spec	Unit	Work Quantities by Zone				
			CZ-1	CZ-2	CZ-3	CZ-4	Total
Water Pump	5 cm pump with diesel or kerosene engine of 3.5 hp	nos.	1,394	1,519	1,142	1,616	5,671
Drip Irrigation System	Hydrosol type emitters, flow rate 2L/h	Ha	184	664	832	568	2,248
Sprinkler Irrigation System	Pando white type emitters, flow rate 134L/s	Set	50	50	50	50	200

Source : JICA Survey Team

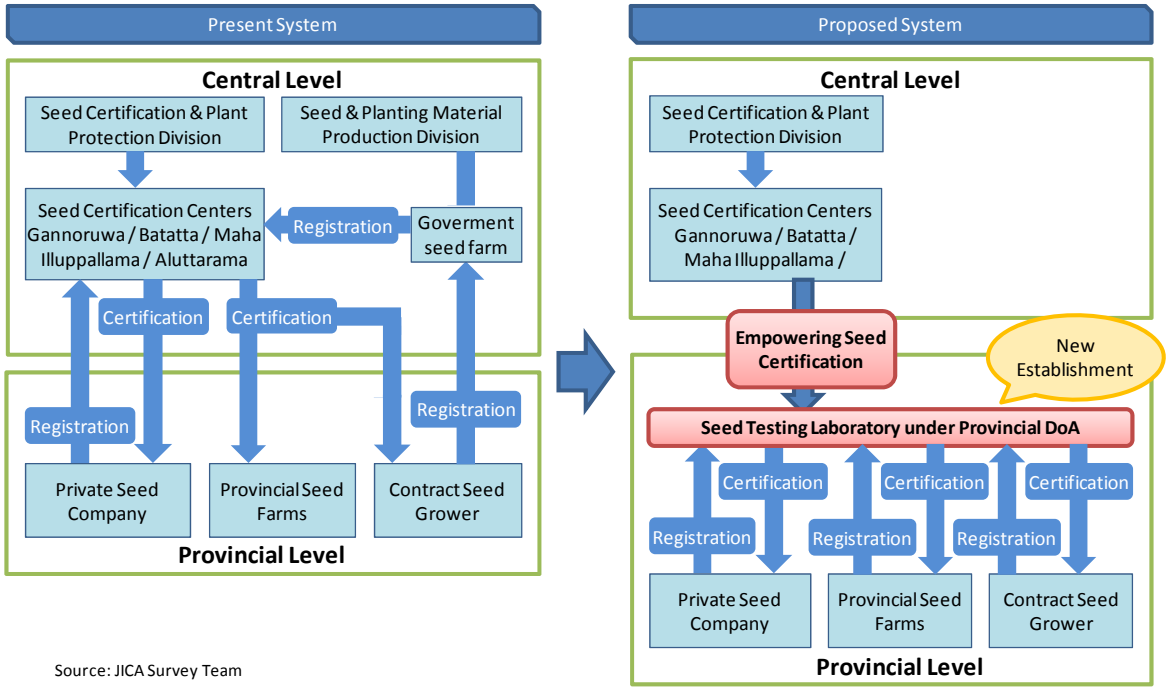
(b) Enhancement of supply chain of quality seed and planting material

1) Establishment of provincial seed testing laboratory

Before the enactment of the Seed Act No. 22 of 2003, the seed and planting materials production were mainly in the hands of the DOA. Government seed farms were also involved in it. With the Seed Act, seed and planting material production became a private sector activity.DOA contribution in this respect was limited to seed and planting material certification and its production in limited quantities. According to the Seed Act, public and private sectors involved in seed and planting material marketing should be registered with the Seed Certification and Plant Protection Division of DOA biannually. Seed producers however can get their seeds and planting materials certified from seed certification centers in four locations, i.e., Gannoruwa, Maha Illupallama, Batata and Aluththarama, by paying the necessary charges. The project for enhancement of production system of certified vegetable seeds is in operation together with JICA's technical cooperation. The operation is expected to supply certified seeds through the DOA route to the Project.

At present, although the supply situation of seed paddy to farmers by private sectors is satisfactory, the supply of seeds of OFC and planting material of fruits are in a very poor state. Under this circumstance, there is a need to produce OFC seeds and planting materials for fruit cultivation in substantial quantities to achieve the project objectives. It is evident that this can be done within the provinces using provincial DOA farms and farmers as contract growers. The main obstacle in the implementation of this program would be the delay in seed certification process of the Central DOA. To overcome this, it was planned to set up seed testing laboratories in each provincial DOAs with the approval of the Director General of the DOA. Central seed certification centers will provide technical guidance for the operation of these laboratories. The Project will also provide necessary tools, equipment and machinery like microscope, seed cleaner, oven, seed counting table, temperature control facility.

The proposed system together with the present one for comparison is presented in Figure 5.5 below.



Source: JICA Survey Team

Figure 5.5 Schematic Drawing of Present and Proposed Seed Certification System

The distribution of provincial seed testing laboratories by zone is presented in Table 5.14.

Table 5.14 Distribution of Provincial Seed Laboratories by Zone

Item	unit	CZ-1	CZ-2	CZ-3	CZ-4	Total
Provincial Seed Laboratory	(No.)	2	1	1	1	5

Source : JICA Survey Team

2) Rehabilitation of provincial seed farms

The Project supports the provincial seed farms for strengthening their activities in supplying basic seeds and foundation seeds to private companies. At present, most of their facilities are malfunctioning and seeds are limitedly produced. The Project rehabilitation facilities are shown in Table 5.15.

Table 5.15 Rehabilitation Requirements of Provincial Seed Farms

Name of Seed Farm	District	Work Components
Okkampitiya Farm, Monaragala	Moneragala	・ Irrigation canal rehabilitation under Okkampitiya Irrigation System ・ Construction of regulation pond ・ Provision of sprinkler and drip irrigation kits ・ Rehabilitation of storage facilities
Wariyapola Seed Farm	Kurunegala	・ Repairs and capacity improvement to existing minor tank. ・ Rehabilitation of agro-wells and provision of micro irrigation facilities ・ Construction of green and net houses ・ Rehabilitation of storage facilities ・ Provision of basic machinery for land preparation
Galgamuwa Seed Farm	Kurunegala	・ Establishment of irrigation system within the farm. ・ Assure water supply shall provide small canals from nearby irrigation tanks to farms. ・ Provision of fences ・ Construction of green and net houses ・ Basic machinery for land preparation ・ Provision of water pump and accessories (high capacity)

Name of Seed Farm	District	Work Components
Vavunia Farm	Vavunia	・ Provision of 3-phase electricity ・ Provision of sprinkler and drip irrigation kits ・ Basic machinery for land preparation ・ Deepening existing wells and constructs several deep wells. ・ Provision of water pumps
Kantale Farm	Trincomalee	・ Provision of water pumps ・ Provision of agro-well ・ Provision of sprinkler and drip irrigation kits

Source: JICA Survey Team

3) Farmer training program on quality self-seed and planting material production

AI conducts self-seed and planting material production program to promote seed production among farmer producers by providing training. However, the quantity and quality of self-seeds are still low due mainly to its low technology level of production. Farmer producers are therefore needed to be trained properly in the production of quality self-seed and planting material. The Project supports farmer training programs consisting of quality self-seed production and certified seed production for OFCs and quality planting material production for fruits. The target number of seed production farmers who will be trained under the Project is estimated based on the target development area of each crop, as shown in Table 5.16.

Table 5.16 Estimate of Required Number of Farmers for Seed and Planting Material Production

Zone	District	OFC Seed Production Farmers				Fruit Tree Planting Material Production Farmers		
		Target Dev. Area (ha)	Estimated No. of Farmers a/ (FHH)	Self-seed Producer b/ (FHH)	of which Certified Seed Producer c/ (FHH)	Target Dev. Area (ha)	Estimated No. of Farmers a/ (FHH)	Planting Material Producer d/ (FHH)
CZ-1	Mannar	340	557	56	19	90	148	7
	Mulathivu	1,960	3,213	321	107	20	33	2
	Vauniya	480	787	79	26	20	33	2
	Trincomalee	970	1,590	159	53	120	197	10
	Sub-total	**3,750**	**6,148**	**615**	**205**	**250**	**410**	**20**
CZ-2	Ampara	120	197	20	7	150	246	12
	Battcaloa	430	705	70	23	100	164	8
	Anuradhapura	1,010	1,656	166	55	480	787	39
	Mahaweli H	8,150	13,361	1,336	445	100	164	8
	Sub-total	**9,710**	**15,918**	**1,592**	**531**	**830**	**1,361**	**68**
CZ-3	Kurunegala	200	328	33	11	860	1,410	70
	Puttalam	1,020	1,672	167	56	460	754	38
	Sub-total	**1,220**	**2,000**	**200**	**67**	**1,320**	**2,164**	**108**
CZ-4	Badulla	490	803	80	27	140	230	11
	Monaragala	600	984	98	33	570	934	47
	Sub-total	**1,090**	**1,787**	**179**	**60**	**710**	**1,164**	**58**
Total		**15,770**	**25,852**	**2,585**	**862**	**3,110**	**5,098**	**255**

Note a/: Average farm size of 0.61 ha/farmer in the survey area is applied in the estimate.
b/: Assumed that the number of self-seed producers would be about 10% of OFCs' target development area
c/: Assumed that about 1/3 of self-seed producers would be registered as certified seed producers
d/: Assumed that the number of planting material producers would be about 5% of fruits' target development area

Source: JICA Survey Team

The potential OFC seed production farmers will be trained by arranging training sessions at district level, both for self-seed producers and certified seed producers. AIs will take responsibility for the selection of potential farmers. The venue utilized for the training will be at the DATC of each district. SMOs from the provincial DOA or from the central DOA will be the trainers of each session. In case of potential farmers for fruit tree planting material production, they will be trained using ISTCs' facilities that are available in and around the target development areas. ISTCs are located at Mahailuppallama, Peradeniya, and Bandarawela, respectively. AIs will also take responsibility for the selection of potential farmers for fruit tree planting material production. Trainers/lecturers of the training session will be the experts (including SMOs) of fruit tree plant material production.

The number of sessions provided to potential farmers for production of OFC seeds and fruits tree planting materials is summarized in Table 5.17. Detailed farmer training program including the above mentioned sessions is also presented in annexed Table A 5.2.

Table 5.17 Training Program for Production of Self-seeds, Certified Seed and Planting Materials

Name of Training Program	unit	Number of Sessions by Zone				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Quality self-seed production for OFCs	nos.	22	54	7	6	89
Certified seed production for OFCs	nos.	8	19	3	2	32
Quality planting material production for fruits a/	nos.	-	-	-	-	9

Note a/: This training will be organized at ISTCs, not at district and provincial levels.
Source : JICA Survey Team

(c) Farmer training on improvement of farm management and production technology

The Project will provide training to beneficiary farmers. The training is divided into two large categories: one is for farm management improvement and the other for crop production improvement. The latter category is further divided into two sub-categories, i.e., OFCs production improvement and fruits production improvement.

In the training for farm management improvement, farmers will be trained on how to make their farming economically viable through seven sessions as presented in Table 5.18. All these sessions will be arranged in a classroom style using available venues (even under a tree) in nearby villages. Because farmers have difficulty attending the training sessions conducted for more than half a day, each session will be designed strategically to be completed in three hours, even if duration announced is half-day.

The training for OFCs and fruits production improvement will be conducted on-farm basis using demonstration farms established at a rate of three farms in each DS division. The training will consist of eight sessions for OFCs and nine sessions for fruits production, and study tours to advanced OFCs and fruits production farm(s) as shown in Table 5.18.

The selected farmers at a rate of 30 farmers in each session will be trained in production technologies of OFCs and fruits depending on the selected crops in each DS division. The training participants training are expected to learn all the important technologies including farm mechanization, irrigation methods and management, pruning method in case of fruits, post-harvest handling, and processing of produce.

Table 5.18 Number of Farmer Training Programs/Sessions for Improvement of Farm Management and Crop Production

Name of Training Program	unit	Number of Programs by Zone				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Farm Management Improvement a/						
Characters of entrepreneur and successful entrepreneur	nos.	39	75	36	30	180
Analysis of market information and market survey	nos.	39	75	36	30	180
Farm Record keeping	nos.	39	75	36	30	180
Preparation of farm business plan	nos.	39	75	36	30	180
Finance management in farm business	nos.	39	75	36	30	180
Marketing of farm produce	nos.	39	75	36	30	180
Risk assessment and management in farm business	nos.	39	75	36	30	180
OFCs Production Improvement b/						
Basic cultivation technologies on chili and red onion	nos.	21	23	9	6	59
Basic cultivation technologies on big onion and legumes	nos.	15	25	5	5	50
Farm mechanization program	nos.	36	48	14	11	109
Study tour to advanced OFC cultivation farm(s)	nos.	36	48	14	11	109
Productivity improvement of available water resource for OFC cultivation	nos.	36	48	14	11	109
Introduction of basic irrigation methods and operation	nos.	36	48	14	11	109
Installation and O&M of micro irrigation	nos.	36	48	14	11	109
Post-harvest handling of OFC crops (legumes/ chili/ onion)	nos.	36	48	14	11	109
Processing black gram flour/ chili powder	nos.	36	48	14	11	109
Fruits Production Improvement b/						
Basic cultivation technologies on mango and papaw	nos.	3	12	18	7	40
Basic cultivation technologies on sweet orange and passion fruits	nos.	0	4	4	12	20
Basic cultivation technologies on banana and lime	nos.	0	11	0	0	11
Technical training on pruning for plant establishing and proper fruits setting	nos.	3	27	22	19	71
Study tour to advanced fruits cultivation farm(s)	nos.	3	27	22	19	71
Productivity improvement of available water resources for fruits cultivation	nos.	3	27	22	19	71
Introduction of basic irrigation methods and operation	nos.	3	27	22	19	71
Installation and O&M of micro irrigation	nos.	3	27	22	19	71
Post-harvest handling of fruits crops	nos.	3	27	22	19	71
Value addition of fruits products	nos.	3	27	22	19	71

Note a/: See annexed Table A 5.3 for more details.
b/: See annexed Table A 5.4 for more details.
Source: JICA SurveyTteam

(d) Provision of machineries to promote quality products with low production cost and fences to protect farm products from domestic and wild animals

The Project will provide machineries necessary for farm mechanization so as to promote quality products with low production cost. The machineries to be provided are manual highland seeders, highland weeders, ridgers, groundnut decorticating machines, legume splitting machines, and legume cleaning machines. With these machineries, beneficiary farmers are expected to reduce their cost of production, improve quality of products and increase production of value-added products. Operation and management of the machineries will be carried out by producer groups under FO. Monitoring will be carried out by responsible agents from AI or ARPA.

In addition to the machineries, fences or fencing materials will be provided to the beneficiaries to mitigate crop damages from domestic and wild animals. Crop damages by domestic animals are observed widely in the target development area because animals freely graze in the upland crop cultivation area without watchmen patrolling the area, particularly during Yala season. Wild animals especially elephants also damages both upland and lowland crops. Damages from wild elephants are

larger than that from domestic animals as elephant residing areas are found mainly around the reserves. Because of the above situation, barbed wire fences will be provided to the area where damages from domestic animals occur frequently. Electric fences to areas where the damages from wild elephants are severe shall also be provided. For the purpose of reducing operation cost of electric fence, solar energy generation equipment will be provided.

Quantities of machineries, barbed wire and electric fence to be provided are summarized in Table 5.19.

Table 5.19 Quantity of Machineries, Barbed Wire and Electric Fence

Item	unit	Quantities by Zone				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Manual highland seeders for legume a/	nos.	47	288	28	5	368
Highland weeders a/	nos.	47	288	28	5	368
Ridgers a/	nos.	24	144	14	2	184
Ground nut decorticating machines a/	nos.	7	40	4	1	52
Pulse splitting machines a/	nos.	18	104	10	2	134
Pulse cleaning machines a/	nos.	18	104	10	2	134
Grinding machines –for chili and pulses a/	nos.	98	231	35	33	397
Barbed Wire Fence b/	km	416	870	333	323	1,942
Electric Fence with solar energy generation equipment c/	km	60	180	300	30	570

Note a/: Number of farm machineries required for OFCs production and processing is estimated in annexed Table A 5.5.
b/: Estimate of barbed wire requirements (km) is presented in annexed Table A 5.6.
c/: Estimate of electric fence is presented in annexed Table A 5.7.
Source: JICA Survey Team

(e) Provision of credit to support above activities

According to the cost sharing concept, beneficiary farmers will be requested to pay 25% of the cost for procurement of machineries and barbed wire. This percentage is the same with the one that was adopted in the PEACE project which is being implemented when applying cost sharing concept for procurement of farm inputs. For ensuring this payment, the Project will establish a financial supporting system for the farmers who will have difficulty in paying the 25% share in initial cost.

In case of the electric fence including solar energy generation equipment, beneficiaries will not be requested to share the initial cost. Instead, they will be requested to take responsibility for O&M of the fence based on a written agreement between the farmer group and implementing agency. Similarly, farmers will not be requested to share the initial cost for the construction of collecting point with prerequisite equipment for its operation (see (2) in this section). The farmer group will take responsibility for its O&M fully. As for other components, the cost sharing concept will be adopted to the initial cost of agro-wells both for the construction and procurement cost of pumps.

The Project will set up a fund in a certain bank to support the cost sharing concept. Since the cost for procurement of machineries, barbed wire and agro-well is estimated to be Rs 3,494 million, the total fund requirement is estimated at Rs 582 million assuming that two thirds of beneficiaries will obtain loan.

A proper handling bank of the proposed fund will be studied and selected during the preparatory work period. Other details of loan conditions including bank handling charge, interest rate to the farmers, loan period, etc. will also be decided during this period.

(2) Logistic System Improvement and Entrepreneurship Development Program

There are three major activities planned for logistic system improvement and entrepreneurship development program as follows:

(a) Establishment of proper interface and incubation of business minded leader for effective trading between producer and trader;
(b) Rehabilitation and/or upgrading of rural road and farm access road;
(c) Conduct study tours for exporters/processors and government officials to major export countries and potential import countries of agricultural products from Sri Lanka.

(a) Establishment of proper interface and incubation of business minded leader for effective trading between producer and trader

1) Establishment of collecting points

With the object of facilitating collective shipment in the crop production area, a collecting point will be established under the Project. It will work as an interface between farmers and traders. It will be a place for transaction of farm inputs and outputs (products) between farmers and traders. It is expected that the farmers will be able to get higher selling price because they will sell their products collectively and traders will be able to save time and money for the collection of products. It is also expected that the farmers will have bargaining power if the number of visiting traders increases in the collecting point.

Furthermore, the collecting points will function as a market information sharing hub. This will enable traders coming to the collecting point to provide information like price behavior being anticipated in the coming period, the types of produce in high demand, consumer prefer qualities, etc. In return, the farmers will provide the traders information on their production schedules, expected minimum price, etc.

The business minded leader attached to the collecting point will develop linkages with input traders, output traders and relevant government officers to help his fellow farmers to be involved in market oriented production. Collecting point will be established under the responsibility of DAD. However, its operation will be handed over to a production group to be organized particularly for operation of the proposed facility. Once the production group is organized, the two parties will sign on a written agreement for its operation. The group will organize a management committee of the collecting point and appoint a leader who will manage the point as a representative of the production group. DO will assist the leader in the operation of the collecting point and management of the production group/committee. AI will assist the leader in post harvest technical issues. The leader will be also requested to participate in farmer training programs presented in Section 5.2.4 (1). The schematic drawing of the collecting point operation is shown in Figure 5.6.

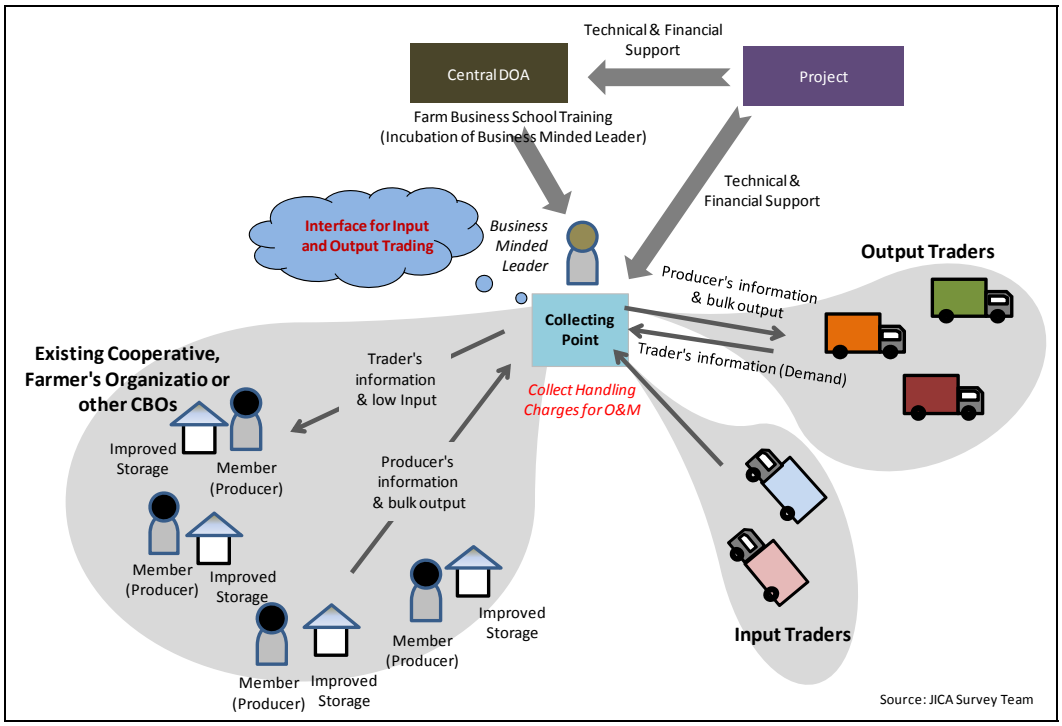


Figure 5.6 Schematic Drawing of Establishment of Proper Interface for Trading

The facility itself will have a loading and unloading open space for products. It shall have a concrete floor of 90 m^2 and roofing arrangement. The facility will also be designed to have a sorting and grading yard, storage room and small closed office space. Water and electricity should also be equipped. The number of collecting points established by the Project is as shown in Table 5.20.

Table 5.20 Number of Collecting Points to be Constructed

Item	unit	Number of Collecting Points				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Collecting Point	Nos.	26	20	38	24	108

Source: JICA Survey Team

Using the facility of collecting point, the member farmers are expected to carry out value adding activities with the purpose of selling high-quality products to traders/markets. The Project thus provides equipment for cleaning and grading of farmers' products as presented in Table 5.21.

Table 5.21 Equipment Required at Collecting Points

Item	unit	Number of Equipment				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Sorting table (2x5m for OFCs and fruits)	Nos.	26	20	38	24	108
Winnower (for legumes)	Nos.	52	40	76	48	216
Sieving equipment (for legumes)	Nos.	130	100	190	120	540
Trays (for OFCs and fruits)	Nos.	260	200	380	240	1,080
Office equipment	L.S.	26	20	38	24	108

Source: JICA Survey Team

2) Improvement of farmers' storage facilities

Generally, the prices of agricultural products are declining during the harvesting season if the produce is kept for some time. After the season, higher price can be fetched. The proper storage is impotent in this regard to avoid to crop losses and to keep the quality of produce.

At present, many farmers are using improperly arranged storage facility in which stored products are easily damaged by insects, rats and humidity/fungi. As a result, the quality of their products is low, and accordingly, requirements for improvement of farmers' storage facilities are very high. The Project will thus support the farmers for improvement of their storage facilities with the purpose of quality increase in their products and obtaining higher price of products because of off-season sale.

For the storage of big and red onions, the Project will provide materials for improvement of floor, roof and shelves. For the storage of chili and legumes, the Project will provide materials for making pallets on which dried chili and legumes are stored. The number of farmers whose storage facilities will be improved under the Project is as presented in Table 5.22.

Table 5.22 Number of Target Farmers for Improvement of Storage Facilities

Item	unit	Number of Farmers				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Big and red onion farmers	Nos.	980	1,070	240	300	2,590
Chili and legume farmers	Nos.	1,090	3,150	490	390	5,120

Note: Estimated number of farmers cultivating big & red onions and chili & legume is presented in annexed Table A 5.8 (all figures are rounded).
Source: JICA Survey Team

3) Improvement of Dedicated Economic Center (DEC) facilities

The system of DEC was introduced by the Ministry of Trade, Marketing Development, Cooperatives and Consumer Services in 1999 by constructing the first center in Dambulla. The objectives of setting up DECs are to:

- Ensure obtaining reasonable prices for agricultural producers for their crops by providing the targeted market;
- Provide opportunity to small scale producers to minimize their transport costs and wastage in transportation;
- Provide opportunities for wholesale traders to purchase fresh fruits and vegetables, directly from producers;
- Encourage the business community by providing a competitive marketing environment for wholesale traders;
- Create an opportunity to distribute area specific agricultural products among people in all parts of the island; and
- Provide facilities for consumers to purchase food items at cheaper prices.

There are 12 DECs in Sri Lanka, of which two are available in the survey area. Keppetipola DEC (constructed in 2001) is mainly for highland vegetables and Tambuttegama DEC (2005) is for lowland products; the former is in Badulla district and the latter is in Anuradhapura district. The Dambulla DEC is the largest center in Sri Lanka. Although it is located outside of the survey area in Matale district, Dambulla DEC handles a large portion of agricultural products marketed in the dry zone.

Dambulla DEC and Tambuttegama DEC are requesting the improvement of present facilities for a more effective and convenient operation and management. Improvement requirements are summarized in Table 5.23.

Table 5.23 Improvement Requirements of DECs

Name of DEC	District	Type of Work	Work Components
Dambulla	Matale	Improvement	・ Multipurpose cool storage for vernalization onion seed production and vegetable storage ・ Construction of 14 new stalls for export marketing ・ Compost pit for waste treatment ・ Installation of biogas plant
Tambuttegama	Anuradhapura	Improvement	・ Construction of canopy ・ Rehabilitation of internal road ・ Construction of toilet facilities ・ Compost pit for waste treatment ・ Installation of biogas plant

(b) Rehabilitation and/or upgrading of rural road and farm access road

Road condition largely affects the marketing and transportation of agricultural products. Accessibility and availability of appropriate road condition to collection centers, pola, local markets and town markets would be helpful for producers and purchasers to reduce transport losses and cost, and increase the market access.

Lengths of rural and farm roads to be rehabilitated within the proposed production areas were identified during the DS level workshops. As described in the previous section, seven individual sub-schemes, 37 major/medium irrigation schemes, 71 minor irrigation schemes and 5,671 agro-well sites were selected as candidate production areas under the project. Accordingly, lengths of rural and farm roads to be rehabilitated in candidate production areas were tentatively estimated in proportionate to command areas of the candidate schemes and agro-wells in this stage. Lengths of rural roads were estimated based on the present average road densities in the production areas, while lengths of farm roads were estimated based on the existing average farm road densities in the areas considered. The estimated length and proposed length of road rehabilitation works in the DS level workshop were compared, and the lower figures were selected as the target length of rehabilitation, as shown in Table 5.24.

Table 5.24 Proposed Length of Rehabilitation and/or Upgrading of Rural and Farm Access Road

Item	Specifications	Unit	Work Quantities Proposed				
			CZ-1	CZ-2	CZ-3	CZ-4	Total
Rural Road (Access road)	Reservation–13.5 m, Carriageway– 3.65 m, Asphalt Road	km	28.5	48.5	6.5	2.5	86
Farm Road	Reservation-10 m, Carriageway-3.3 m, Gravel Road	km	247	195	75	26	543

Responsibilities for the rehabilitation of rural roads are taken by the provincial road development authority/provincial road development department or Pradesiya Sabha. Farm roads in the Mahaweli area are handled by Mahaweli Authority of Sri Lanka. In other areas, they are handled by the central irrigation department or provincial irrigation department, depending on their locality.

(c) Conducting study tours for exporters/processors and government official to major export countries and potential import countries of agricultural products from Sri Lanka

Exportation of agricultural products from Sri Lanka is mostly to Sri Lankan residences in export destination except for some commodities. In order to increase the export of Sri Lankan products, market expansion to ordinary markets in potential countries is needed. Seeking potential export of Sri Lankan commodity, and visiting potential countries so as to understand its food supply situation is the way to create trade relation. The proposed study tour are taken and listed as follows:

- Understand the food supply system of potential countries;
- Identify potential food items in kind and quality of import countries;
- Understand business procedure and custom of import countries; and
- Create communication and business relation with import countries.

There are some active export countries for agricultural products. These countries practice maintaining stable production, technology improvement to meet market demand and practical export procedure for smooth trading.

This tour is aimed for the study of the following:

- Kinds and quality of export items;
- Production system of export commodities;
- Support system of production on extension and technology improvement;
- System of marketing channel and facilities;
- Export business structure and practices; and
- Trade and export policy and administration system.

Table 5.25 Outline of Study Tours to Major Export Countries and Import Countries of Agricultural Products from Sri Lanka

Name of Study Tour	Objective	Destination	Contents	Participant	Duration
Visit potential import countries	(1) Seek export potential (2) Identify potential Sri Lankan agricultural products	(1) UAE (2) EU countries (3) Singapore	(1) Meeting with government officials on trade and food supply (2) Meeting with importers and traders of food items and facilities (3) Visit local groceries, supply markets, common markets and supermarkets	(1) Exporter/ processor: 5 member (2) Government official: 3 members (3) PMU: 1 member (4) Attached by economic attaché of the Sri Lankan Embassy in respective countries	3 weeks

Name of Study Tour	Objective	Destination	Contents	Participant	Duration
Visit active export countries for agricultural products	(1) Identify the kind and quality of export items (2) Identify support system of production on technology improvement and extension (3) Identify marketing channels and facilities (4) Identify the country's trade and export policy and administration system (5) Identify the production systems of export products	(1) Thailand (2) India (3) Vietnam (4) Malaysia	(1) Meeting with Government officials on trade, export policy and administration (2) Meeting with exporters and processors in visiting production sites and facilities (3) Visiting local production and marketing sites	(1) Government official: 5 members (2) Exporter/ processor: 3 member (3) PMU: 1 member (4) To be attached by economic attaché of the Sri Lankan Embassy in respective countries	3 weeks

Source: JICA Survey Team

Participants of the tour to potential export countries will be selected from exporters/processors who are experienced in export to visiting areas and officials of technical development and trade administration. The participants of the tours will be requested to prepare reports on the tours and export promotion plan. The contents of reports will be presented in a workshop for the development of Sri Lankan agricultural export promotion strategy.

(3) Program on Enhancement of Extension Services and Ground Level Adaptive Trials

The following are three major activities planned for the program on the enhancement of extension services and ground level research:

(a) Provision of training to extension officers for the promotion of commercialized farming.

(b) Enhancement of DATC/ISTC facilities to carry out ground level on-farm trials and provision of mobility for field extension officers and other equipment to improve the extension services.

(c) Overseas training for advanced commercial farming and extension method.

(a) Provision of training to extension officers for promotion of commercialized farming

The extension officers consisting of SMOs and AIs (both in the Central and Provincial DOAs) and FAs (in MASL) will be trained so as to improve their services in promotion of commercialized farming in the target development area. Historically, extension officers are being trained by focusing mainly on paddy/rice production increase under the government subsidized schemes. They are therefore still weak in technologies of commercialized farming, both in farm management and diversified crop production. Accordingly, the Project will also provide training for trainers strategically to the extension officers.

Under the Project, extension officers in the target development area will participate in the training of trainers (TOT) program developed by the central DOA under the FAO assistance (the Project for Strengthening Agricultural Extension through Agro-enterprise Development). The total number of extension officers is estimated to be 180 in the target development area. The Project will provide TOT program covering all these officers. One training session will be organized for 30 officers, and accordingly, the total number of sessions will be six times for 180 officers. Time frame of one session

will be 14 days for the farm management improvement, and 17 days for crop production improvement, as presented in annexed Tables A 5.9 and A.5.10.

(b) Enhancement of DATC/ISTC facilities to carry out ground level on-farm trials and provision of mobility for field extension officers and other equipment to improve the extension services

A variety of recommendations for crop production technologies are available in Sri Lanka. Most of them have been developed by the Central DOA. However, these recommendations are very general, covering the whole crop production area of the country and not specifying adaptive locations or taking area specific agro-climatic and socio-economic conditions into account. It is therefore necessary to modify them to be adaptable to area specific conditions. The modification can be made at ground level in the target development area by applying on-farm trials using the existing facilities of DATC and ISTC. Since all extension officers have access to these facilities easily, important outputs from the on-farm trials will be applied to field demonstrations and field training programs.

In order to execute the above mentioned on-farm trials, however, some rehabilitation works are needed in 1-DATC and 1-ISTC among eight DATCs and two ISTCs in the survey area (see Section 3.1.2). The Project will thus support these rehabilitation works, as shown in Table 5.26.

Table 5.26 Rehabilitation Requirement in DATC and ISTC

Type of Facilities	Name of Facilities	District	Work Components
Training Facilities	DATC Bibile	Moneragala	・ Construction of irrigation canal for DATC farm (for seed production) ・ Rehabilitation of storage facilities ・ Provision of farm machinery
	ISTC Bindunuwewa	Budulla	・ Construction of agro-well ・ Development of demonstration plots for training

Source : JICA Survey Team based on the information from DS level officers

Under the concept of the provision of mobility and other equipment to improve the extension services, the Project will provide 180 motorcycles to field extension officers and 20 computers to relevant extension officers as shown in Table 5.27. This is because of the ground level needs confirmed in the DS level workshops. Without motorcycles, ground level services including demonstration farm operations will not be attractively conducted. Also, office documentation works will not be effectively performed without computers.

Table 5.27 Number of Motor Cycles and Personal Computers Provided by the Project

Item	unit	Quantities Proposed				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Vehicle (pick-up)	nos.	2	1	1	1	5
Motorcycle	nos.	39	75	36	30	180
Personal computer (PC)	nos.	4	8	4	4	20

Note a/: Estimated at the rate of three motor cycles per DS division
b/: Estimated at the rate of one PC per three DS divisions
Source: JICA Survey Team

(c) Overseas training for advanced commercial farming and extension method

The Project will furnish overseas training to the selected officers by expecting them to learn advanced

commercialized farming and extension methods from an advanced foreign country. Object persons of the training program will be a deputy director and an assistant director of each provincial DOA. What they are expected to learn in this training are methods for an effective and efficient extension works for expansion of commercialized farming in the small holding sector. Particularly for fruits, they have to learn not only the production technology, but also the export-import trend worldwide.

A total of five officers will learn about fruits and another five will learn about OFCs. The training period will be one year for fruits and half a year for OFCs. The project cost for overseas training is estimated to be USD 2,500/month/person (including academic fees, living expenses and travel expenses) assuming the training courses to be organized will be in Thailand. The quantity of the overseas training will be 90 person-months in total as shown in Table 5.28.

Table 5.28 the quantity of the overseas training

Type of trainings	quantity
Overseas training for OFCs:	60 person-months (5 persons x 12 months)
Overseas training for fruits:	30 person-months (5 persons x 6 months)
Total	**90 person-months**

Source: JICA Survey Team

As for fruits, Sri Lanka's potential for commercial production is considered to be very high. It can be exploited both for domestic and export markets particularly in the dry zone, having advantages in fruit production in terms of climate (particularly different rainfall patterns by sub-zone), soil, water, and comparatively high quality labor force.

In light of the circumstances above, the central DOA proposed to strengthen the research work of crop adoptability test. In order to identify promising varieties in the dry zone, potential varieties of OFCs and fruits have to be collected from all over the world and tested in several research farms in the dry zone. Important subjects in crop adoptability test in case of fruits will be to select recommendable varieties with higher yield, better quality and lower cost in case of OFCs, and with competitiveness (in terms of price, quality and quantity) in the international markets. The central DOA is strongly proposed to power up the adoptability test immediately; otherwise, Sri Lanka would lose the chance to exploit the market day by day.

5.2.5 Livestock Product Promotion Program

The three major activities taken to achieve the project objective on livestock product promotion program, include: i) productivity improvement program for semi-intensive and intensive farmers, ii) program on clean milk production and market network development on fresh milk and iii) livestock service quality and accessibility improvement. The interrelation among these activities is shown in Figure 5.7 below.

The productivity improvement of semi-intensive and intensive farmers is enhanced by means of establishing a system to maintain a steady supply of quality feed and timed artifical insemination (TAI) with the promotion of estrus synchronization. The program on clean milk production and market network development on fresh milk are implemented, first, by imparting knowledge on clean milk production to all stakeholders. Then, supplying equipment to maintain quality throughout the milk market chain is executed. Finally further market development with the promotion of mobile sales is provided. These activities are carried out by the Provincial Department of Animal Production and

Health. Therefore, the provision of technical training and mobility, and establishment of livestock service center are planned as part of the livestock service quality and accessibility improvement program. Figure 5.7 shows the outline of the strategic livestock product promotion program.

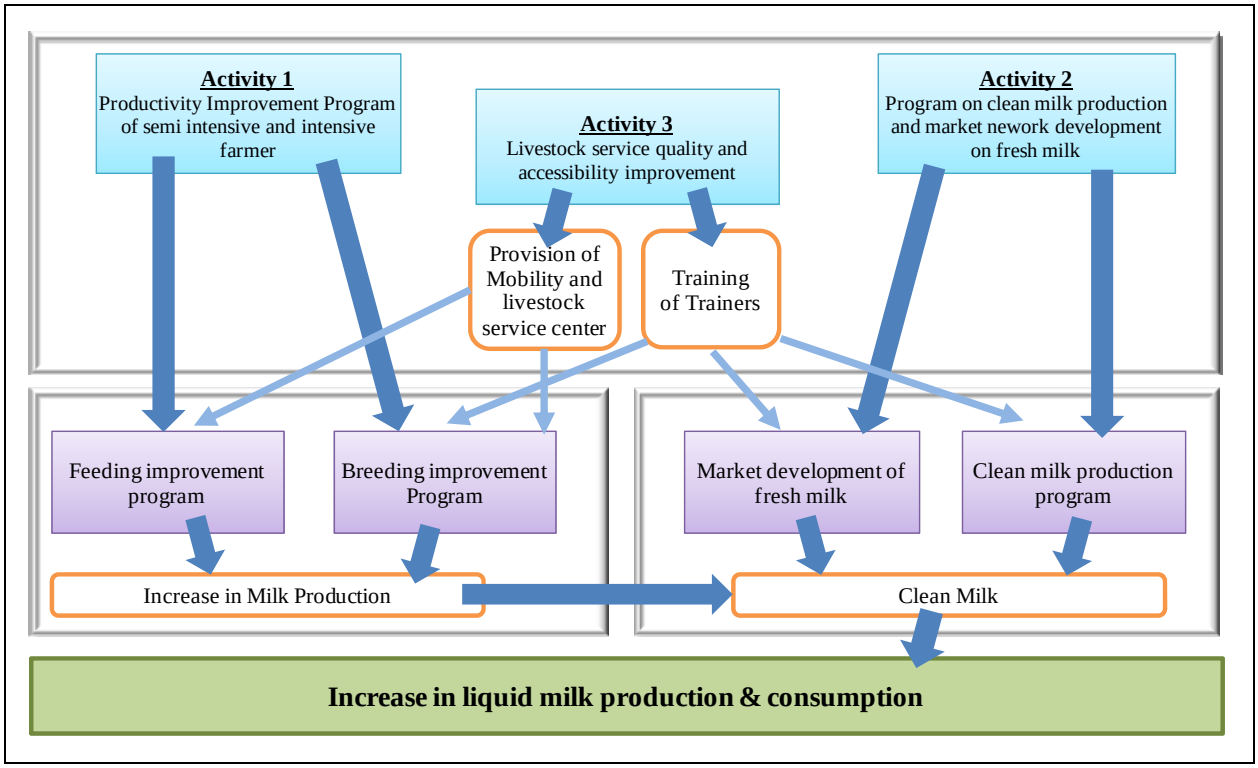


Figure 5.7 Schematic Drawing of Strategic Livestock Product Promotion Program

5.2.6 Productivity Improvement Program of Semi-intensive and Intensive Farmers

(a) Establishment of supply chain of feed

The fodder for livestock in the dry zone is mainly supplied by natural pasture grasses and small quantity of crop such as rice straw and stubble on the fallow paddy field. Even though 23.3% of livestock farmers take the intensive and semi-intensive system in their management, they graze their cattle in a restricted way during some seasons.

Figure 5.8 and Figure 5.9 show the feeding calendar for livestock and seasonal milk collection in the dry zone, respectively. The figures indicate that the collected volume of milk fluctuates nearly three times depending on the availability of feeds. These imply that the practices and some measures to equalize feed availability are required to increase the milk yield in the dry zone.

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep
Land	Maha - 100% cultivable land							Yala - 55% cultivable land				
Cultivation	Rice planting and growing					Rice Harvest		Rice planting and growing			Rice harvest	
Cattle movement	Village	Migration to inaccessible / marginal lands						Village	Restricted grazing in uncultivated dry crop land			
Grazing area	Restricted grazing crop land	Stubble consumption in overgrazed pasture land						Grazing in uncultivated moist crop land	Grazing in uncultivated dry crop land and water shortage			Restricted grazing crop land
Residue usage	Crop residue wasted	Grass and fodder residue wasted in crop cultivation area				Crop residue wasted		Crop residue available for consumption	Depleted crop residue			Crop residue wasted
Weeks	40-43	44-47	48-52	1-4	5-8	9-12	13-17	18-21	22-25	26-30	31-34	35-39

Figure 5.8 Feeding Calendar for Livestock in the Dry Zone

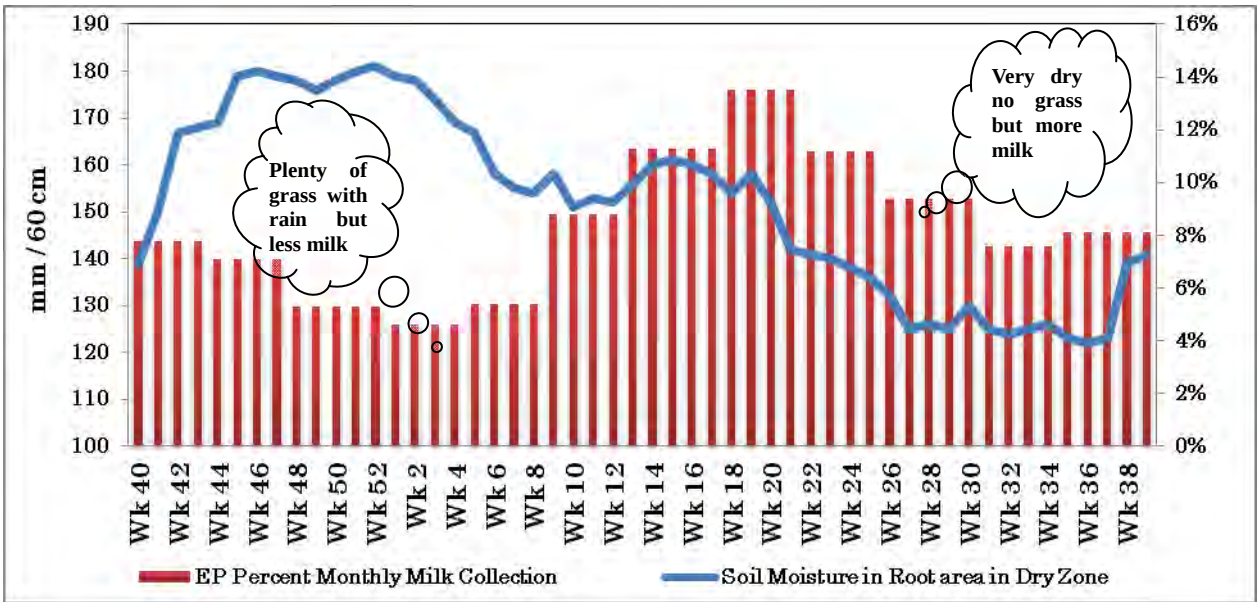


Figure 5.9 Soil Moisture Level and Milk Collection Fluctuation

To equalize the seasonal gap in the availability of feeds, the project enhances the production of feed concentrate made of agricultural by-products, which is available at the end of the rainy season, and are then preserved as feeds for the dry season. This is a combined strategy for livestock and agriculture to multiply the income of livestock and agricultural farmers, and to develop the entrepreneurial activities.

The activities to establish the supply chain of feed concentrate will start with the collection of inventory data on FO such as location, membership, cultivated land, cropping pattern, and so on, to find out the potential FO for production. Subsequently, the project gives FO the necessary awareness and support to make the production and sales plan based on the availability of crop by product, market needs and economical analysis. After assessing the feasibility of such plan, necessary equipment for production such as straw bailing units, biomass pelleting units, and grass and straw choppers are given to the said farmers.

The activities of FO in both technical and social aspect are followed up until the end of the project.

In addition to the production of feed concentrate by agricultural by-product, the project also promotes high nutritional value of fodder such as alfalfa to enhance the feed supply chain for livestock, especially in the area where enough water is not available. Alfalfa is a long-lived, very deep rooted perennial. It often reaches a depth of 5 to 6 feet by the first season, 10-12 feet by the end of the second year, and may ultimately extend to a depth of 20 feet or more[1]. It can grow in dry areas and give enough nutrition to the livestock. The project supplies the imported seed of alfalfa (60 units of 20 kg) to farmers in the target area, and revolves the seed for expansion of the activities. Field demonstration and seed production are carried out by the Department of Animal Production and Health through the District Veterinary Training Center for each district.

The project also supports improving the traditional storage methodology by introducing an appropriate silage making. Silage making is one of the technologies that empower farmers to provide quality

[1] http:// en.wikipedia.org/wiki/alfalfa

roughages throughout the year using available forages, crop residues, and agro-industrial by-products. It presents an eco-friendly way of utilizing crop waste and converts them into feed stuff for livestock.

The outline of the feed improvement programs are shown in Table 5.29.

Table 5.29 Summary of Feeding Improvement Program

Items	Target Number					Remarks
	CZ-1	CZ-2	CZ-3	CZ-4	Total	
FO targeted for feed concentrate production	13	17	12	12	54	
Training to be conducted						
Production planning, financial and operational management of crop residue usage	40	60	60	40	200	
Awareness and utilization of crop residue	40	60	60	40	200	
Technical training on products from crop residue	40	60	60	40	200	
Improving nutritive quality of crop residue	40	60	60	40	200	
Production of micro silage	600	1100	1200	850	3750	
Equipment to be supplied						
Straw Bailing Units	27	28	25	20	100	Super high-density straw bale machine
Bio-mass pelleting units	2	4	2	2	10	Straw and animal feed pelleting machine
Grass and straw choppers	14	22	12	12	60	Electric grass choppers
Seeds of pasture	9	19	18	14	60	Legume seed 20 kg packs

Source : JICA Survey Team

(2) Breeding improvement through rapid increase in artificial insemination (AI)

Parallel to the feed improvement program, the breeding improvement program is carried out through provision of AI with estrus synchronization. In dry zone areas, the conception rate by AI is low with 33% mainly due to the improper heat detection manner of some farmers and low capacity and low mobility in artificial inseminator of LDI.

Synchronization of heat can solve the low conception rate of AI and can rapidly increase the number of crossbred cattle. The targeted increase of conception rate per AI is up to 60% since LDIs easily inseminate at the same time in large numbers of cattle. Moreover, it becomes clear that the heat cycle of cattle and conception rate of the following 2nd and 3rd heat will be high.

Figure 5.10 shows the herd synchronization plan. It is assumed that the composition of herd based on district workshop data is 30% for pregnant, 15% for pre-pregnant diagnosis, 50 % for non-pregnant and 10 % for culling. The target is non-pregnant cows in I/S-I cows, which utilize drugs twice to show estrus sign at the same time.

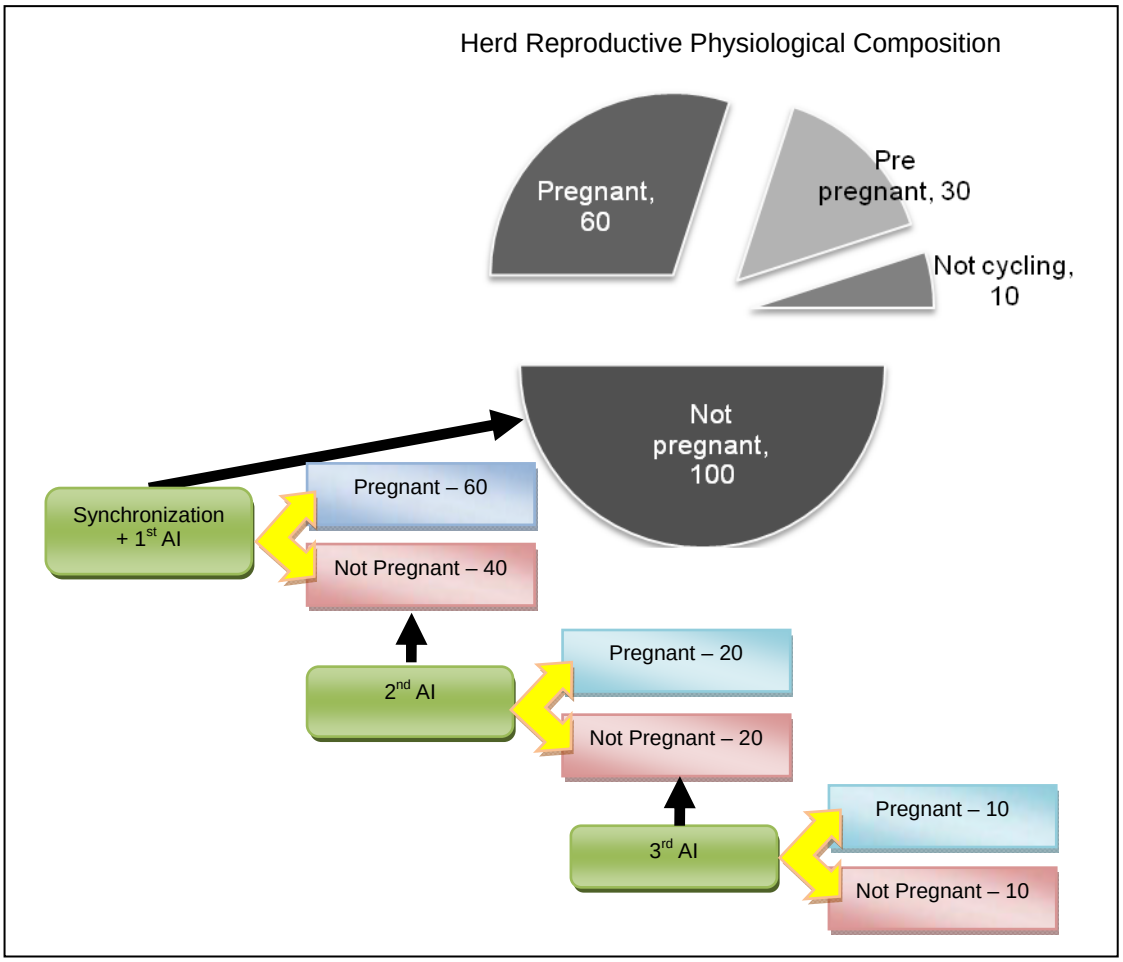


Figure 5.10 Herd Synchronization Plan

Table 5.30 shows the synchronization and AI program proposed under the project. It covers the breeding improvement of 30,496 cattle to be targeted as specified in the previous chapter. The estimation basis are available in the annexed Table A 5.11. This program is mainly carried out by PDOAPH with the support of the Faculty of Veterinary Medicine in the University of Peradeniya.

Table 5.30 Outline of Synchronization and AI Program

Items	Target Number or Number to be Supplied					Implemented by
	CZ-1	CZ-2	CZ-3	CZ-4	Total	
Estrus Synchronization	6,000	16,000	16,000	10,000	48,000	PDAPH & FVMAS
Artificial Insemination	25,600	66,000	66,800	41,600	200,000	PDAPH

Source : JICA Survey Team

(a) Introduction of feed efficient livestock such as milking goat

The introduction of goat milking increases milk production and improves its feed efficiency in the livestock sector. Feed requirement for body maintenance in goat is much less than in cattle. Furthermore, they consume a type of grass, which is different from the ones consumed by cattle. For these reasons, promotion of a dual purpose goat such as Jamnapari and Sanaan crossbred are proposed by the project. Raising goats is very profitable considering their productive nature (1.5 kids per year) and milk production (4-5 kg as the peak milk production per day). Milk production and high meat price can bring good benefits to people who breed goats. However, the number of goats at present is insufficient and thus, it is necessary to enhance the Thalahara National Goat Breeding Center of Central

DAPH to address such issue.

Table 5.31 shows the outline of enhancement program in Thalahara National Goat Breeding Center.

Table 5.31 Outline of Enhancement Program on Thalahara National Goat Breeding Center

Goat Breeding Project	Number	Description	Implementation Organization	Beneficiary
1 Rehabilitation of goat breeding station	sum	Well, water tank, stores, pens, sprinkler facility for pasture, tractor, trailer, straw bale machine, mower	DAPH	I/SI farmers
2 Planting pasture and legume	20 (ha)	Land preparation, planting, watering, maintaining and harvesting	DAPH	I/SI farmers
3 Seeds of grass and legumes	20 packages	20 kg per package	DAPH	I/SI farmers
4 Rearing cost for parents	1000 dams 25 sires	To produce 3500 goats	DAPH	I/SI farmers
5 Purchasing *Saanan* (milk type) breeding males	40	To mate 1000 dams	DAPH	I/SI farmers

Source : JICA Survey Team

Planned provision of a pair of goats for a year is 700 heads. Hence, 590 heads of female goats are needed (590 x 1.5 = 885 kids, mortality rate is 20%, 885 x 80 %-----708). At present, the two national goat breeding centers, which distribute goats countrywide, have 300 heads of adult female goats. It further needs 600 female goats to increase the number for the five provinces to 700 heads per year for five years.

Concerned authorities of the breeding centers request to repair the present well, water tank, stores, pens etc. Furthermore, another well and water tank with equipment for watering fodder fields should also be built. A tractor with an attached accessory is also necessary to produce enough forage from pasture field. Moreover, the introduction of a new variety of fodder grass or legumes such as Alfalfa is required to produce fodders. Consequently, training for fodder making should also be carried out.

(3) Program on Clean Milk Production and Market Network Development on Fresh Milk

Large daily companies such as MILCO and Nestle collect only 54% of the total milk, whereas, small and medium scale dairy entrepreneurs including cooperative societies collect 46%. The small and medium scale entrepreneurs including cooperative societies are the key players in liquid milk trading and consumption at present. However, their quality control systems are still poor and need some improvements to increase the fresh milk consumption in the country. In general, fresh milk consumed by public, mostly in urban areas, is derived from small and medium scale entrepreneurs and cooperative sectors. Public health risks in small and medium scale entrepreneur and cooperative sector channels are uncertain and depend on consumers' practices such as boiling of milk before consumption. Uncertainty of the quality of fresh milk is one of the reasons that cause decline in the consumption of fresh milk at present. It is therefore needed to develop standards and regulations for ensuring the quality of fresh milk in the dairy sector, at farmer, collector, retail seller, and value-added operator levels, with necessary infrastructure and equipment support. The project proposed to supply UHT milk processing unit, chilling tank, and mobile sales unit to any potential organizations such as cooperative society and small and medium scale entrepreneur under this program. Areas with long milk haulage to the market

require chilling tanks of 1500 liter capacity, with backup generator to prevent spoilage of milk. Consumers demand a longer shelf-life as well as ease in usage. Thus, installation of UHT milk processing plant with a 2000 liter capacity in the selected milk collecting center was proposed to improve the shelf-life (3~4 months) of milk.

The intervention planned by the project is to support producer cooperatives in improving the milk collecting network, and finally to process liquid milk for consumption in urban areas. Milk collection is enhanced during crop growing season when animals are curtailed to remote inaccessible areas through mobile milk collection units.

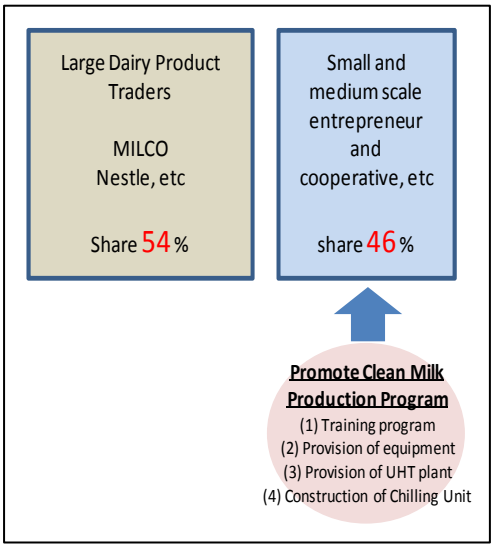


Figure 5.11 Target of Clean Milk Production

These cooperatives should not function merely as milk vendors purchasing milk from their members then selling to dairy plants. The project will support such cooperatives in the immediate vicinity of urban areas to supply liquid milk in order to enhance urban consumption by promotion of mobile milk sales.

The necessary units of equipment for development of clean milk production are shown in Table 5.32.

Table 5.32 Necessary Equipment for Development of Fresh Milk Marketing

Items	Target Number				
	CZ-1	CZ-2	CZ-3	CZ-4	Total
UHT milk processing unit	4	3	1	0	8
Chilling tank 1500 liter capacity	2	4	2	2	10
Mobile sales unit	5	5	6	4	20
Milk cans 20 (Liters)	650	850	900	600	3,000
Milk cans 40 (Liters)	52	58	50	50	110

Source : JICA Survey Team

The contents of necessary training programs to be implemented under the project are shown in Annexed Table A 5.12. Meanwhile, Table 5.33 shows the proposed number of said training programs.

Table 5.33 Training of Clean Milk Production and Market Network Development

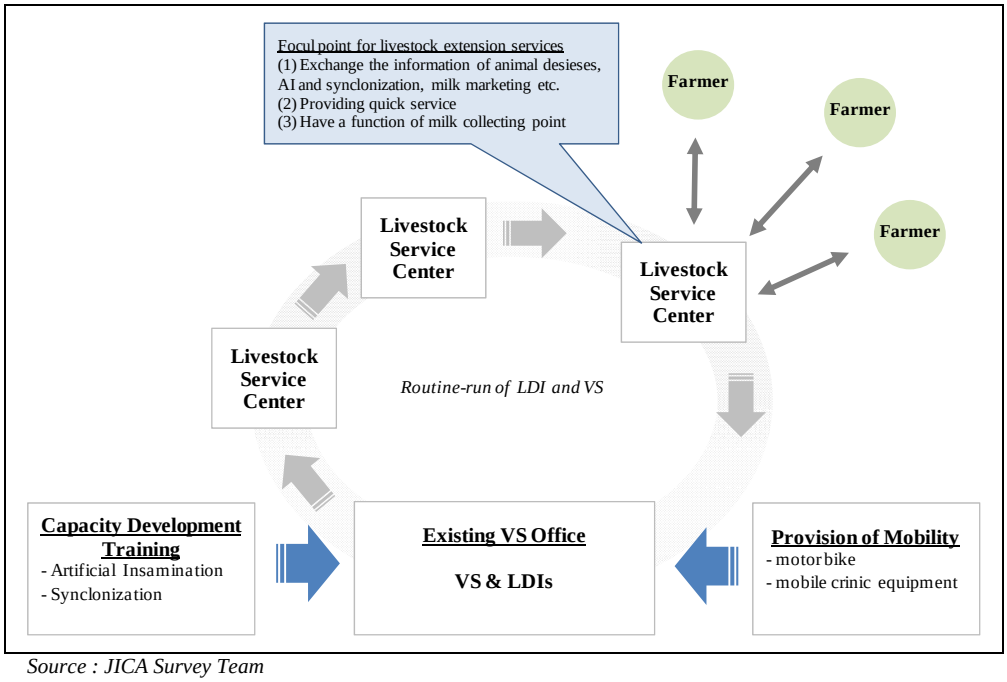
Items	Target Number of Farmer				
	CZ-1	CZ-2	CZ-3	CZ-4	Total
Clean milk production	6,500	6,250	4,000	3,500	20,250
Operation and maintenance of UHT processing plant	45	55	45	35	180
Establishment of effective milk collection network	40	50	35	30	155
Market planning and entrepreneurship development	40	50	40	35	165

Source : JICA Survey Team

(4) Livestock Service Quality and Accessibility Improvement Program

Livestock service centers are proposed to be constructed in VS range in remote areas to improve farmer access to extension services. These will be located in suitable places and will have multipurpose functions such as milk collection, information service, training zone, extension, treatment, AI requests, commodity supply, monitoring of activity, vaccination service, etc. VSs and LDIs can inform farmers concerning future events and the dates in advance. There will be savings in time since VSs and LDIs

need not inform of such events individually to each farmer. Farmers can receive multiple services from livestock service centers anytime, and also request their needs to VSs and LDIs. The livestock service center therefore plays a vital role as the hub to back up total productivity of the area while providing smooth mutual cooperation among farmers and VSs and LDIs. At the same time, the project gives the mobility to VSs and LDIs for smooth and effective implementation of livestock services and project programs. Motorcycles and vehicles are required by VSs and LDIs to especially carry out synchronization and AIs on time.



Source : JICA Survey Team

Figure 5.12 Schematic Diagram of Livestock Service Quality and Accessibility Improvement

The proposed number of livestock service center and mobility improvement are summarized in Table 5.34.

Table 5.34 Summary of Proposed Livestock Service Center and Mobility to be Provided to DoAP&H under the Project

Item	Unit	Quantities proposed				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Livestock service center	nos.	19	21	10	10	60
Vehicle (4 x 4 pick-up)	nos.	3	3	2	2	10
Motor bike (125 cc motor bicycle with luggage carrier)	nos.	15	12	8	7	42

Source : JICA Survey Team

At provincial levels, semen cold chain should be established to maintain their proper condition. All provinces need one large liquid nitrogen tank together with one large frozen semen canister. At district levels, one medium size frozen semen canister is needed while at the levels of VS one small frozen semen canister for each LDI (AI) is required. It is also essential to have AI kits for successful AI programs.

Table 5.35 Equipment to be provided under the Project for Improvement in Cold Chain for Semen Transport

Item	Unit	Quantities proposed				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Liquid nitrogen tank	nos.	1	2	1	1	5
Semen canister (big)	nos.	1	2	1	1	5
Semen canister (medium)	nos.	2	4	3	3	12
AI kits	set	20	40	20	20	100

Source : JICA Survey Team

The Project also plans to conduct trainer's training on various issues to enhance the capacity of VS and LDI. Such issues addressed during training include sustaining a steady supply of feed during the year, promoting availability of clean liquid milk and breeding management for rapid upgrading.

Initially selected trainers (VSs and LDIs) are trained by a group of experts from the University of Peradeniya, Central DAPH and GFMI – JICA project. This training includes 411 VSs and LDIs from five provinces. Technical training for reproductive management and nutritional management for trainers are handled by the Faculty of Veterinary Medicine, Central Department of Animal Production and Health, GFMI – JICA project and the Faculty of Agriculture. They shall develop modules for training both VSs and LDIs.

Table 5.36 Number of Trainer's Training to be Conducted under the Project

Item	Unit	Quantities proposed				
		CZ-1	CZ-2	CZ-3	CZ-4	Total
Reproductive management for VS	nos.	116	160	71	64	411
Reproductive management for LDI	nos.	116	160	71	64	411
Nutritional management for veterinary surgeons and livestock officers	nos.	116	160	71	64	411
Clean milk production for VS and LDI	nos.	116	160	71	64	411
Training of trainers – VS and LO	nos.	116	160	71	64	411

Source : JICA Survey Team

5.2.7 Project Monitoring and Evaluation

(1) General

The main objectives of M&E are: i) to systematically manage the project implementation and project resources effectively and efficiently, ii) to assess the project impact adequately, and iii) to ensure the sustainability of the project. Monitoring is relevant to project management while evaluation is aimed at the assessment of the project impact as well as sustainability. Consequently, the former is to be carried out by a project implementer as one of the project management activities, while the latter is to be done on a periodic or ad hoc basis by an external source.

The project cycle management is an idea intended to feedback the results of monitoring and evaluation into projects, so that operation and management of ongoing and future projects are improved without criticizing the project for any shortcomings. In the project cycle, monitoring takes place in the implementation period, while evaluation is undertaken upon completion or several years down the track. In any case, the purpose of monitoring and evaluation is to improve the operation and management of the project, and draw useful lessons for other projects.

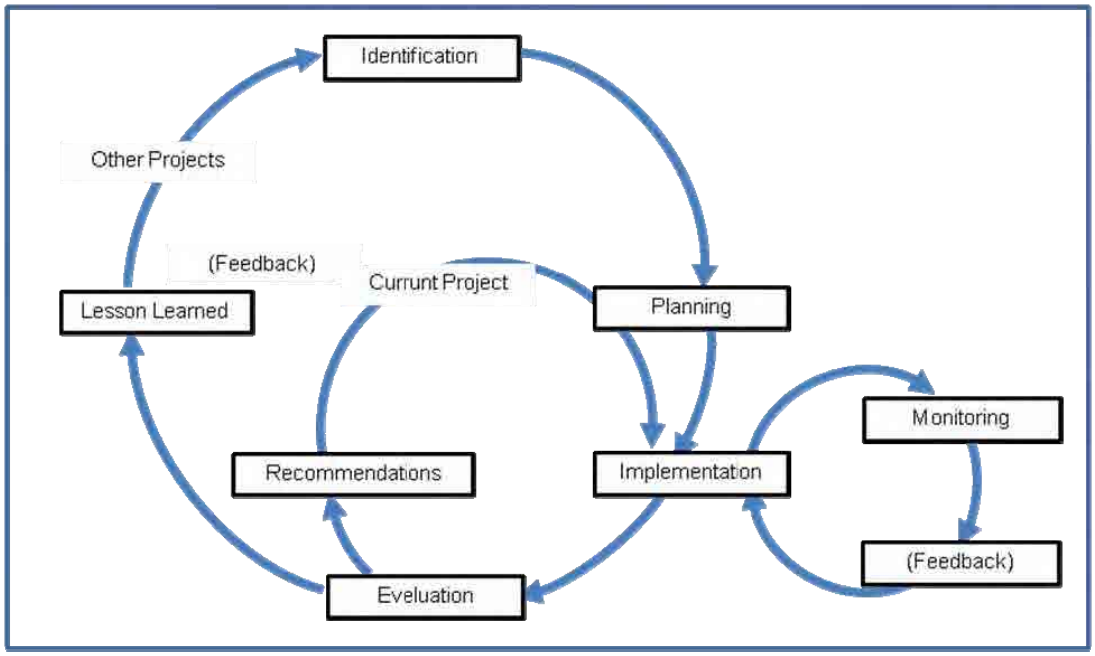


Figure 5.13 Schematic Diagram on Monitoring and Evaluation under Project Cycle Management

Considering such cycle management, the project employs the logical framework from its commencement, by compiling related purposes, overall goals, activities, indicators, important assumptions etc., for easy monitoring and evaluation.

The project nominates its monitoring officer in the project management unit (PMU), who will monitor the activities from time to time by collecting necessary information from PIUs. The monitoring officer regularly submits the information to the Department of Project Management and Monitoring under the Ministry of Finance and Planning, who monitors foreign funded projects at the national level. The monitoring data is shared in the Project Steering Committee Meeting, Provincial Coordinating Committee Meeting, existing committee meetings and in-house meetings of PMU and PIU, as well as in periodic reports (monthly, quarterly and annually) for discussion and for any suggestion for improvement of project implementation.

(2) Performance Indicators

There are two important indicators set for evaluation of the project namely, operation indicator and effective indicator. Proposed indicators for project monitoring and evaluation, and expected data sources are shown in Table 5.37.

Table 5.37 Proposed Performance Indicators

Category of Indicator	Purpose	Indicator	Data Source
Operation Indicator	To measure, quantitatively, the operational status of a project	(1) Area benefited by the Project (18,880 ha)	Progress report
		(2) Cultivation area by crops Fruits : 3,110 ha Chili : 5,280 ha Onion : 3,170 ha Legumes : 7,320 ha	Statistical data from MASL, central Department of Irrigation, provincial Department of Irrigation or DAD
		(3) Number of artificial insemination carried out (200,000 nos.)	Progress Report and/or special survey conducted by PMU

Category of Indicator	Purpose	Indicator	Data Source
		(4) Sufficiency rate of operation and maintenance cost of collection center and irrigation facilities (80%)	Progress Report and/or special survey conducted by PMU
Effective Indicator	To measure, quantitatively, the effects generated by a project	(1) Production volume of major crops Mango : 28,000 ton/year Papaw : 11,000 ton/year Chili : 14,000 ton/year Onion : 54,000 ton/year Legumes : 15,000 ton/year	Statistical data from provincial DoA
		(2) Yield of major crops (ton/ha) Mango : 20 ton/ha Papaw : 25 ton/ha Chili : 11 ton/ha R-Onion : 15 ton/ha B-onion : 18 ton/ha Green gram : 1.8 ton/ha	Statistical data from provincial DoA
		(3) Yield of milk 6.1 L/head/day for intensive and intensive system	Statistical data from provincial DoAP&H
		(4) Gross annual average of farm income Surface irrigation farmer scheme: Rs 330,000 Agro well farmer scheme: Rs 210,000	Special survey conducted by PMU

Source : JICA Survey Team

(3) Project Evaluation Plan

Under the project, the following key evaluations shown in Table 5.38 are planned during project implementation and after its completion.

Table 5.38 Summary of Key Evaluations Proposed under the Project

Name of Evaluation	Purpose	Timing
Initial Evaluation	Review the actual present situation of the project areas and target groups.	After the commencement of the project.
Ongoing Evaluation	Assist the decision makers and provide information about any needed adjustment of objectives, policies, implementation strategies or other elements of the project.	Once a year.
Mid-term Evaluation	Evaluate the achievements and the process of the project. Based upon its results, the original project plan may be revised or the operation structure strengthened if necessary.	Mid-term of the project period
Terminal Evaluation	Help make a decision regarding follow-up or completion of the project.	After the project completion, within 6 to 12 months.
Ex-post Evaluation	Deriving lessons and recommendation for the improvement of future projects	After a certain period (2 to 3 years) passed since the completion of the project.

Source : JICA Survey Team

5.3 Gender consideration

5.3.1 Introduction

Careful consideration is needed for vulnerable people in the process of planning and formulating the project. In Sri Lanka, several groups of people can be cited as vulnerable– who are in particularly disadvantaged position and need special attention and care from outsiders, including the government. In

that sense, women should also be considered as one of the vulnerable groups.

Generally, it is said that the situation of Sri Lankan women are comparatively better than that of other developing countries in Asia. The Constitution of 1978 guaranteed equal rights without discrimination on the grounds of sex. Women in Sri Lanka have been allowed to occupy positions in the society or in family to undertake certain roles though their status is limited compared with that of males. Even so, there seems to be a long way ahead in achieving the internationally acceptable level of gender equality.

In rural areas of Sri Lanka, women generally play an important role in agricultural activities in addition to household chores. However, compared with males, female access to information and knowledge such as new agricultural technology is limited because they have less opportunity participating in social activities, and have low level of education and literacy. In order to realize the improvement of agricultural production and productivity through the diversification of products, active participation of female farmers to the project is necessary. Thus, it is important to consider how the project can encourage female farmers to participate in project activities by paying special attention to their needs and requests.

5.3.2 Women in Rural Sector

The following practices are commonly observed in rural areas in Sri Lanka. These are rooted from the social structure and/or traditional value, and it may not be easy to alter people's way of thinking in a short period of time. However, continuous support is required to overcome such practices through the project activities:

- Though contribution of women to household livelihood seems huge, decision making is done mainly by men, and the influence of women in family matters is smaller compared with men.
- The role of women in agricultural activities is underestimated, and there is an income gap between men and women. Wages paid to women are half of that paid to men for similar works[2].
- Women's access to marketing information and agricultural knowledge is limited because of their relatively lower level of education. Their access to credit service is also limited.
- Ownership of land is generally granted to men, and not to women.
- Board members of a community group consist mainly of men, while women's voice seems not considered carefully and seriously.
- Division of agricultural work by sex is observed. Particular work such as paddling, hand weeding, harvesting, and product processing are supposed to be done by women[3].
- Some women migrate to find agricultural labor work in other areas of the district.

Careful attention to Muslim women should also be considered as they are generally under stricter control of men than Tamil and Sinhalese women. Traditional restriction allows Muslim women to

[2] Center for Women's Research Sri Lanka, and FAO Regional Office for Asia and Pacific, "*Rural women in Sri Lanka's post-conflict rural economy*", 2006

[3] "Asia's women in agriculture, environment and rural production (Sri Lanka)", Sustainable Development Department (SD), FAO. On the other hand, land preparation, seed sowing, applying fertilizer and pesticides, threshing, winnowing (mechanical), harvest transport are supposed to be done by the male.

engage only in home-based informal sector activities such as mat weaving, food preparation, rice pounding, etc.

It is said that flexible situation under internal conflict period enabled women to engage in more active economic activities[4]. Moreover, the gender situation is gradually becoming better through several awareness training programs and gender empowerment projects carried out by local and international NGOs, international organizations, and donors. Despite those changes, traditional values perpetuated through the caste system, and social practice still dominate the mindset of the people. Furthermore, such culture more or less restricts women empowerment in rural communities.

5.3.3 Approaches

Through the project, it is recommended that special attention shall be paid to the following gender consideration issues as basic principles based on JICA's guidelines[5].

(1) Reduce the burden of women's labor

In rural areas, it is assumed that women engage more in agricultural work than men in addition to household chores. This hard burden may be depriving women their time to participate in social and economic activities. Therefore, it is necessary to consider project activities which reduce the burden of women's labor.

(2) Income generation of women

Livelihood improvement of women can be realized through income generation of women by their own initiative and independence from men. Not only power on decision making in a family with regards to spending money earned from agricultural work, but also women's participation in economic activities are also encouraged.

(3) Social participation of women

Equal gender relationship is needed for better improvement of agricultural production/productivity and rural development. Throughout the project, women's active participation in decision making should be encouraged.

In line with the above basic principles, adaptation of the following gender approaches is recommended for consideration, which involves incorporating consultative and participatory process with females and female group of beneficiaries into the planning and implementation of the project.

(a) Gender situation survey and analysis

Gender situation differs by area. Thus, a comprehensive gender situation survey and analysis is suggested to be conducted prior to its detailed project formulation, along with the baseline survey of the target communities. Survey and analysis was carried out in order to disclose women's living situation, roles in agriculture in the area, participation to CBOs, their access to agricultural inputs (e.g. water, seeds, farming equipment), or support services from the government (e.g. subsidy, trainings), and so on.

[4] Center for Women's Research Sri Lanka, and FAO Regional Office for Asia and Pacific, *"Rural women in Sri Lanka's post-conflict rural economy"*, 2006

[5] JICA Guideline for agriculture development and rural development (Kadaibetsu Shishin Nougyou-Kaihatsu/Nouson-Kaihatsu) (2011)

(b) Gender strategy

It is recommended that gender strategy be developed for the overall program and project components based on gender situation survey and analysis. Each project component should have gender responsive strategy for the mobilization of women, and concrete measure to overcome the limitation and constraint of female participation to project activities, and to improve their capacity. Gender strategy is developed based on gender situation analysis responding to the needs of females as a whole, and also the special needs of particular groups of females such as female headed households, widows, singles, and displaced. It is recommended that qualitative and quantitative indicators (e.g. access to training and extension service, provision of seeds and farming equipment, membership participation to FO or other CBOs) are identified and included in the gender strategy for the assessment of positive and negative impacts of the project on gender situation. Gender strategy is assessed regularly and revised flexibly based on the change of gender situation, in line with the progress of the project.

(c) Ensure government officers to recognize gender issues

It is recommended that a gender awareness workshop be conducted for government officers concerned with the project. The result of gender situation survey and analysis should be shared with related government officers. Consequently, gender strategy should be discussed jointly among concerned parties.

(d) Extensive capacity building of women's group

Capacity improvement of women's group in a community is a significant factor in encouraging female cooperation to the project. Capacity building program for women's groups should be undertaken in the project. Cooperation with women's groups in planning and implementing the detailed project should be considered.

(e) Monitoring of gender situation

It is also recommended that gender situation be monitored periodically using the indicators developed in the gender strategy throughout the project implementation. If a negative impact is found, and/or no expected improvement is observed, gender strategy should be reviewed and altered depending on the situation of each community.

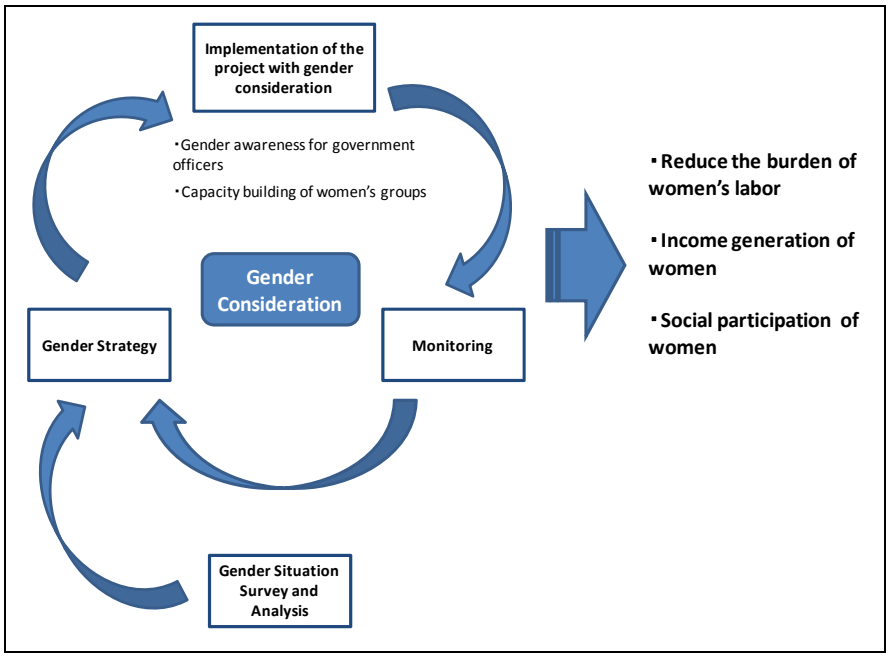


Figure 5.14 Gender Consideration Flow

5.4 Environmental and Social Considerations

5.4.1 Environmental Administration in Sri Lanka

In Sri Lanka, an environmental impact assessment (EIA) was introduced for the first time in 1981 under the Coast Conservation Act. The act required carrying out EIA for projects located within "coastal zones". The EIA was formally brought into practice for prescribed projects since 1988, through legal provisions under the National Environmental Act (Amendment), No.56 of 1988. The prescribed projects are listed in the Gazette No.772/22 dated June 24, 1993, No.859/14 dated February 23, 1995, No.1104/22 dated November 5, 1999 and No.1108/1 dated November 29, 1999. The project proponent (PP) should conduct an initial environmental evaluation (IEE) or EIA for the prescribed project, and obtain an environmental clearance before starting the project.

The Central Environmental Authority (CEA) acts as the main regulatory body for environmental issues, for example, preparation of the terms of reference for EIA, review EIA report, issuing of environmental clearance, and monitoring the implementation of environmental management plan.

(1) Legal Framework for Environmental and Social Considerations in Sri Lanka

Article 14 of the Constitution of the Democratic Socialist Republic of Sri Lanka states that, "The State shall protect, preserve and improve the environment for the benefit of the community". Table 5.39 shows the main laws and regulations related to environment and social considerations in Sri Lanka.

Table 5.39 Key legislations that Adhere to Environmental and Social Considerations in Sri Lanka

Law	Contents	Responsible institutions
Constitution of the Democratic Socialist Republic of Sri Lanka 1978	Establish that the state must protect, preserve and improve the environment for the benefit of the community.	The president of the republic

Law	Contents	Responsible institutions
National Environmental Act No.47 of 1980 and its amendments made in Act No. 56 of 1988, Act No.53 of 2000	Establish the CEA. Defines its powers, functions and duties, and how it interacts with other line agencies to ensure environmental management. Provides umbrella environmental protection legislation. Set up licensing procedures, environmental standards and project approving procedures. Allows CEA to prosecute and enforce environmental safeguards.	Central Environmental Authority (CEA), Ministry of Environment and Natural Resources
Coast Conservation Act No.57 of 1981 (As amended)	Identifies coastal zone and regulates activities within. Define EIA process of the project located in coastal zone.	Coast Conservation Department (CCD)
Fauna and Flora Act No.49 of 1993 (As amended)	Defines the buffer zone of national reserves.	Department of Wildlife Conservation (DWLC)
Fauna and Flora Protection Ordinance No.02 of 1937 (As amended)	Provides for conservation of plants and animals which have been declared protected, or which are found within the gazetted protected areas. Defines protected areas where no commercial exploitation is allowed.	Department of Wildlife Conservation (DWLC)
Forest Ordinance No.16 in 1907 and amendments	Aimed at preventing deforestation, setting fire to forest lands, encroachments of state forest lands which cause major adverse impacts to the environment.	Department of Forest Conservation (DFC)
Felling of Trees Control Act	Provides for the felling of trees in the whole of Sri Lanka and their eventual marking, offences and related penalties.	Ministry of Environment and Natural Resources
Irrigation Ordinance No.32 of 1946 (As amended)	Deals with environmental aspects of water and land use in irrigated agriculture	Irrigation Department, Ministry of Irrigation and Water Resources Management
Mahaweli Authority Act No.23 of 1979	Establishes the Mahaweli Authority of Sri Lanka which deals with environment and natural resources in Mahaweli and its adjacent basins.	Mahaweli Authority of Sri Lanka
National Heritage Wilderness Act No.03 of 1988	Focuses on declaring and protecting important wilderness areas	Forest Department, Ministry of Agricultural Development
National Water Supply and Drainage Board Act No.02 of 1974 (As Amended)	Sets up the National Water Supply and Drainage Board which covers water supply and use	National Water Supply and Drainage Board
Water Resources Board Act No.42 of 1999	Establishes the Water Resources Board and defines its role and responsibilities	Water Resources Board
Land Development Ordinance Act No.19 of 1935 of Land Development Ordinance. Functions of the Department were further regularized as per the following Acts:- No.16 of 1969, No.27 of 1981, No.22 of 1993, No.05 of 1995 and No.20 of 1996	Amends the Land Development Ordinance and repeals the Sale of State Land (Special Provisions) Law.	Land Commissioner's Department / provincial Land commissioner
Land Acquisition Act No.09 of 1950 (As Amended)	Establishes the procedures for land acquisition and payment of compensation to the owners.	Ministry of Land and Land Development
Crown Land Ordinance	Establishes the management of state lands at a well coordinated level with all relevant agencies ensuring optimum utilization to gain sustainable development while maintaining environmental equilibrium	Land Commissioner General's Department
Soil conservation Act No.25 of 1951 and amendments	Is designed to minimize adverse environmental impacts from land clearing and agricultural activities.	Department of Agriculture
Control of Pesticide Act No.33 of 1980 and Act No.31 of 2011	Is designed to minimize the use of toxic chemicals and their release into the environment.	Government of Sri Lanka
Plant Protection Ordinance No.10 of 1924 and Plant Protection Act No.35 of 1999	Provides for the prevention and eradication of whatever organism (plant, bacteria, virus, algae, fungi etc. etc.) or potentially harmful weeds that could be introduced or spread in the Country	Ministry of Agriculture Development and Agrarian services

Law	Contents	Responsible institutions
Agrarian Services Act No.58 of 1979 and Agrarian Services (Amendment) Act of 1991 (No.4) Act of 1993 (No.40).	Provides security of tenure to tenant cultivators of paddy lands; to specify the rent payable by tenant cultivators to landlords; to provide for maximum productivity of paddy and other agricultural lands through the proper use and management of agricultural crops and livestock.	Ministry of Agriculture Development and Agrarian services
Antiquities Act No.09 of 1940 and Amendment Act No.24 of 1998.	Responsible on granting approval for the projects associated with cultural or archeologically significant places/areas	Department of Archeology
Mines and Minerals Act No.33 of 1992	Since the project will not set up its own quarries or burrow sites, all resource requirements for construction must be procured from quarries or burrow sites having valid mining license obtained from the Geological Survey and Mines Bureau (GSMB) or Environmental Protection License (EPL) from the Central Environmental Authority (CEA).	Geological Survey and Mines Bureau (GSMB)

Source: Prepared by the JICA Survey Team based on the documents and information obtained by CEA[6]

Table 5.40 shows the environmental quality standards.

Table 5.40 Environmental Quality Standards in Sri Lanka

Environmental Quality	Name of standard
Standard for Potable Water	Standard SL614: 1983
Standard for effluent discharge into water	National Environmental (Protection & Quality) Regulation No. 01 of 2008; Gazette Notification Number 617/7 dated July 2, 1990.
Air quality	National Environmental Ambient Air Quality Regulations 1994 Ozone Depleting substances and Natural Environmental (Ambient Air Quality) Regulations 1994. Gazette Notification Number 850/4 dated December 20, 1994. Amendment to National Environment (ambient air quality) Regulation 1994. Gazette Notification Number 1562/22 dated August 15, 2008. Amendment to Gazette Notification Number 1295/11 dated June 30, 2003.Gazette Notification Number 1557/14 dated July 19, 2008. Amended Regulations (Air Emission, Fuel and Vehicle Importation standards) Gazette Notification Number 1137/35 dated June 23, 2000. National Environmental (Air Emissions, Fuel and Vehicle Importation standards) Amended Regulations. Gazette Notification Number 1295/11 dated June 30, 2003.
Mobile Air Emission Standards	Motor Traffic (emission control) Regulation Number 817/6 dated May 3, 1994
Noise	National Environmental (Noise Control) Regulations 1996. Gazette Notification Number 924/12 dated May 23, 1996.

Source: Prepared by the JICA Survey Team based on documents and information obtained by the CEA

(2) Major Environmental Policies in Sri Lanka

The national policy, Mahinda Chintana (2012), sets the human-elephant conflict (HEC), air quality management, solid waste management, disaster management, watershed and water resources conservation, and coastal conservation and management as the target sectors in terms of conservation of environment. Table 5.41 shows the major environmental policies in Sri Lanka.

[6] "National Environmental Policy and Strategies", Ministry of Environment and Natural Resources, 2003; Environmental Guidelines for Agriculture Sector Projects in Sri Lanka, CEA, 1997; "Your Environmental Rights and Responsibilities: A Handbook for Sri Lanka", Environmental Foundation Ltd. 2006.

Table 5.41 Major Environmental Policies in Sri Lanka

Name of Policies	Explication
National Environment Policy – 2003	The policy aims to promote sound management of Sri Lanka's environment, balancing the needs for social and economic development and environment integrity. It also aims to manage the environment by linking together the activities, interests and perspectives of stakeholders and to assure environmental accountability.
National Forestry Policy – 1995	The policy was drawn up to provide clear directions for safeguarding the remaining natural forests of the country in order to conserve biodiversity, soil and water resources.
The National Policy on Wild Life Conservation – 2000	The policy renews the commitment of the government to conserve wildlife resources through promoting conservation, maintaining ecological processes and life sustaining systems, managing genetic diversity and ensuring sustainable utilization, and sharing of equitable benefits arising from biodiversity. It emphasizes the need for effective protected area management with the participation of local communities.
National Air Quality Management Policy – 2000	The policy aims to maintain good air quality to reduce morbidity due to air pollution and in turn reduce national health expenditures.
National Watershed Management Policy – 2004	The policy aims to conserve, protect, rehabilitate, sustainably use and manage the watersheds while managing their environment characteristics with the involvement of people.
Cleaner Production Policy – 2004	The objective of this policy is to incorporate cleaner production concepts and practices into all development sectors of the country.
National Biosafety Policy – 2005	The policy on biosafety set the overall framework in which adequate safety measures will be developed and put into force to minimize possible risks to human health and the environment while extracting the maximum benefits from any potential that modern biotechnology may offer.
National Air Quality Management Policy – 2000	The purpose of this policy is to maintain good air quality to reduce morbidity due to air pollution and in turn reduce national health expenditures.
National Policy on Wetlands – 2005	The policy seeks to give effect to National Environment Policy and other relevant national policies, while respecting national commitments towards relevant international conventions, protocols, treaties and agreements to which Sri Lanka is a party.
National Policy on Sand as a Resource for the Construction Industry – 2006	The policy statement reflects Sri Lanka's constitutional, international and national obligations, including the Mines and Minerals Act No. 33 of 1992, the National Environmental Act of 1980, the Coast Conservation Act of 1981 and other relevant legislations, regulations and policy statements. It defines the commitment of the government, in partnership with its people, to effectively manage the construction-sand resource for the benefit of present and future generations.
National Policy on Elephant Conservation – 2006	The policy was developed to ensure the long-term survival of elephants in the wild in Sri Lanka through the mitigation of the human-elephant confect.
National Policy on Solid Waste Management	The policy has been prepared to ensure integrated, economically feasible and environmentally sound solid waste management practices for the country at national, provincial and local authority level. The main objectives of the policy are (a) to ensure environmental accountability and social responsibility of all waste generators, waste managers and service providers (b) to actively involve individuals and all institutions in an integrated and environmentally sound solid waste management practices (c) to maximize resource recovery with a view to minimize the amount of waste for disposal and (d) to minimize adverse environmental impacts due to waste disposal to ensure health and well being of the people and on ecosystems.

Source: Elaborated by the JICA Survey Team based on http://www.environmentmin.gov.lk/policies.htm (Accessed on 2012/08/20)

(3) EIA in Sri Lanka

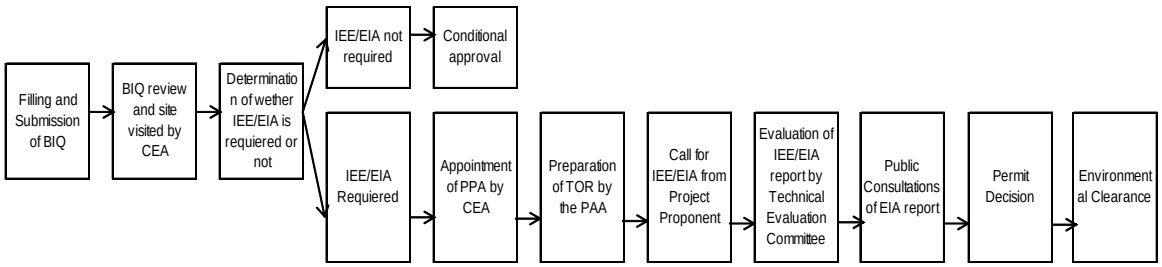
(a) Process of IEE/EIA and Environmental Clearance

"Prescribed projects" under the provision of the National Environmental Act contained in the Gazette are required to be subjected to IEE or EIA in Sri Lanka (refer to Annexed Table A 5.13). After the approval of the IEE/EIA report, an environmental clearance will be issued by the CEA.

Under this project, rehabilitation of major irrigation scheme project components will be under Part I of the prescribed projects. Then, an IEE or EIA will be required for each project components.

The National Environment Act No. 47 of 1980 (amended) and the National Environmental Regulations

No.1 of 1993 define the process of IEE/EIA in Sri Lanka. Figure 5.15 shows the flowchart of the process of IEE/EIA.



BIQ: Basic Information Questionnaire
CEA: Central Environmental Authority
TOR: Terms of Reference
PAA: Project Approving Agency
Source: Prepared by the JICA Survey Team based on Guidance for Implementing the EIA Process, CEA, 4th edition, 2006

Figure 5.15 Flowchart of IEE/EIA Process in Sri Lanka

Table 5.42 shows the detailed steps and responsible actor for each of them.

Table 5.42 Process of IEE/EIA

No.	Steps	Responsible actor	Duration
1	Fill out a basic information questionnaire (BIQ) and submit it to CEA	PP	
2	Review of the BIQ	CEA	
3	Determination of whether IEE/EIA is required or not	CEA	
4(1)	If IEE/EIA not required, issuance of conditional approval	CEA	
4(2)	If IEE/EIA required, appointment of Project Approval Agency	CEA	
5	Environmental scooping (preparation of Terms of Reference of IEE/EIA)	PAA	14 working days for IEE 30 working days for EIA
6	Preparation of IEE/EIA report	PP	
7	Submission of IEE/EIA report to PAA	PP	
8	Evaluation of IEE/EIA report by Technical Evaluation Committee	PAA and other related actors	
9	Public Consultation	PAA and the public	30 working days
10	Submission of comments from the public to PP	PAA	
11	Response to the comments	PP	6 working days from the date received comments
12	Decision making (Issuing Environmental Clearance)	PAA	

Source: Prepared by the JICA Survey Team based on the documents and information obtained by CEA

(b) Regulatory Bodies conducting IEE/EIA Process in Sri Lanka

There are four main parties engaged in the EIA process of Sri Lanka: CEA as the regulatory body, Project Approving Agency (PAA) appointed by CEA, the public having impact from the proposed project, and PP (executing agency or implementing agency).

CEA, the Coast Conservation Department (CCD), and the Department of Wildlife Conservation (DWLC) have enacted a legislation for the carrying out of IEE/EIA process in Sri Lanka, as shown in Table 5.43.

Table 5.43 Agencies Related to EIA Process Approval

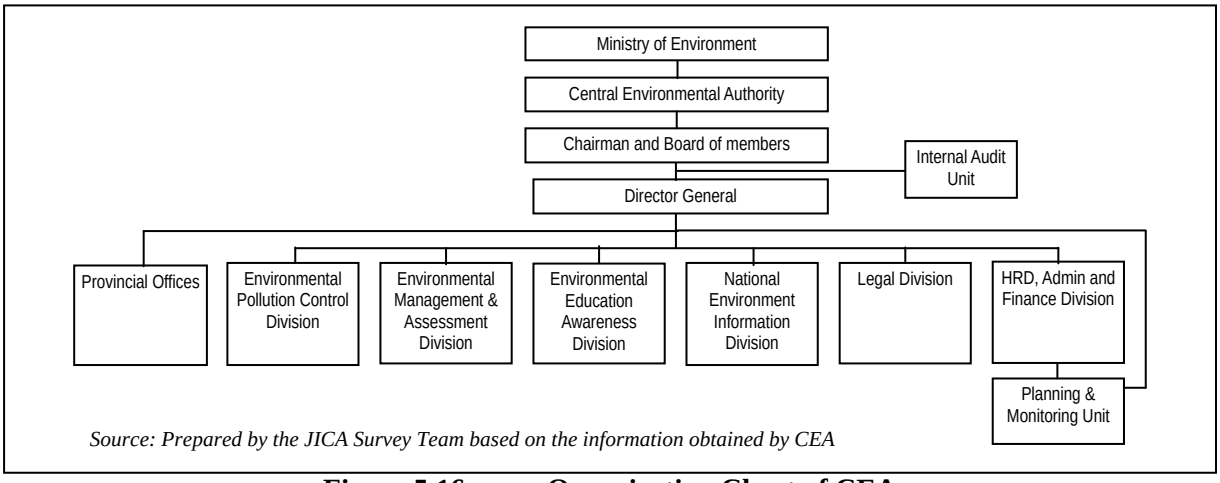
Agency	Responsible Projects	Law
Central Environmental Authority (CEA)	Projects wholly or partly outside the area which is covered by the Coast Conservation Act, Fauna and Flora Act, and North Western Provincial Environmental Statue.	National Environmental (Amended) Act No. 56 of 1988
Coast Conservation Department (CCD)	Projects wholly of partly located within the Coastal Zone	Coast Conservation Act No.57 of 1981

Agency	Responsible Projects	Law
Department of Wildlife Conservation (DWLC)	Projects wholly of partly located within one mile from the boundary of any national reserve and 100 m from the boundary of any area declared as a sanctuary under the Fauna and Flora Protection Ordinance (Chapter 469)	Fauna and Flora (Amended) Act No.49 of 1993

Source: JICA Survey Team

1) CEA

CEA acts as the main regulatory body on the initiation of EIA/IEEs followed by the basic information questionnaire (BIQ) submitted by the PP. There are CEA regional offices at the provincial level and district level. CEA is responsible for carrying out the EIA process. The provincial and district office of CEA are responsible for carrying out IEE in their respective areas. Figure 5.16 shows the organization chart of CEA.



Source: Prepared by the JICA Survey Team based on the information obtained by CEA

Figure 5.16 Organization Chart of CEA

2) Project Approving Agencies (PAA)

The National Environmental Act stipulates that approval for all prescribed projects must be granted by a PAA as the government agency responsible for administering the IEE/EIA process of a project. It is important to note that a state agency, which is a PP, cannot function as a PAA for that project. Based on the BIQ prepared by the PP, CEA appoints the PAA for each project (PAAs are listed in Gazette Extra Ordinary No.859/14 dated February 23, 1995, and Gazette Extra Ordinary No.1373/6 dated December 29, 2004) At present, 23 government agencies have been designated as PAAs. In this project, the respective ministries, which designate the project type such as irrigation, agriculture, or livestock, include Mahaweli Authority of Sri Lanka, DWLC and CEA may act as PAA.

a) PAA of the project within or close to Protected Areas (PA)

There are various categories of PA in Sri Lanka, managed for different purposes by various authorities (See Table 5.44). Any project within or close to PA will be considered as the prescribed project and will be required to carry out an IEE/EIA under CEA guidelines.

DWLC manages two types of protected area, which are national reserves (NR) and sanctuaries. There are four categories under NR, namely, strict natural reserves, nature reserves, national parks, jungle corridors, and marine reserves. The Fauna and Flora Act defines 1 mile (1.6 km) outside the boundary

of NR as the buffer zone. Meanwhile, the National Environmental Act defines 100 m outside the boundary of sanctuary as the buffer zone. DWLC will act as the PAA for any activity carried out within the buffer zone of NR and sanctuaries.

The Department of Forest Conservation (DFC) manages four categories of PAs, which are conservation forests, forest reserves, national heritage wilderness areas, and proposed forests. DFC will act as the PAA of any activity carried out within 100 m of a conservation forest, forest reserves and proposed forests.

Coastal Conservation Department (CCD) will act as the PAA of any activity carried out within the coastal zone.

Table 5.44 Categories of PA in Sri Lanka

Category of Protected Areas	Explanation	Responsible Authorities
National Reserves (NR)		Department of Wildlife Conservation (DWLC)
Strict Natural Reserves (SNR)	Afforded the highest protection; Nobody is allowed to enter without express permission of the DWLC.	
Nature Reserves (NR)	Maintained for conservation of nature; Nobody is allowed to enter without express permission of the DWLC.	
National Parks (NP)	A ticket permit ticket is required to enter.	
Jungle Corridors (JC)	Tracts of habitats which are preserved in order to connect to larger PA.	
Marine Reserves (MR)	Aims to protect marine biodiversity.	
Sanctuaries (S)	Places of safety for fauna and flora; People are allowed to enter without permit, but they may not harm the birds and animals, or disturb their livelihood area.	
Conservation Forests (CF)	Nobody may enter without prior permissions from the Conservator of Forests.	Department of Forest Conservation (DFC)
Forest Reserves (FR)	All activities except observation of plants and animals are prohibited, except with permission from the Conservator of Forests.	
National Heritage Wilderness Areas (NHWA)		
Proposed Forests (PF)	Forests to be gazetted as reserved forests	
State Forests (SF)	Forests administered under state agencies other than forest department/ Wild Life Department	State Plantation Corporation and Land Reform Commission
Other State Forest (OSF)	Forests administered under state agencies other than forest department / Wild Life Department and allocated for multiple purposes.	
Coastal Zone	Is defined in the Coast Conservation Act as that area lying within a limit of 300 m landwards of the Mean High Water Line and a limit of 2 km seaward for the Mean Low Water Line. In the case of river, streams, lagoons, or any other body of water connected to the sea, either permanently or periodically, the landward boundary extends to a limit of 2 km, measured perpendicular to the straight base drawn between the natural entrance points and includes waters of such rivers, streams and lagoons or any other body of water so connected to the sea.	Coastal Conservation Department (CCD)
Fisheries Management Area (FMA)	Ensures that fishing activities can be carried out in a sustainable manner.	Department of Fisheries and Aquatic Resources (DFAR)
Parliamentary Water Retention Area (PWRA)	Maintained for flood retention; Filling and development activities without authorities are illegal.	Sri Lanka Land Reclamation and Development Corporation (SLRDC) and Local Government Authorities
Greater Colombo Flood Retention Areas (GCFRA)		

Source: Prepared by the JICA Survey Team based on "Your Environmental Rights and Responsibilities: A Handbook for Sri Lanka", Environmental Foundation Ltd. 2006.

3) Public Consultation

EIA reports are required to be opened for public inspection and for comment on the EIA report. Once an EIA report is submitted, the PAA publishes a notice in the national newspapers in Sinhala, Tamil and English languages, inviting the public to inspect and comment on the EIA report within 30 working days. The reports are usually available in the CEA Headquarter Library, relevant Divisional Secretariat Office and Paradeshiya Sabha. The public's comments are sent to the PP for response.

IEE reports are not required to be opened for public comments. However, in addition to above public inspection, informal consultation and dialogue with the local people during the IEE/EIA study are required in general. The results of such consultation and dialogue should be attached to the IEE/EIA reports.

4) Project Proponent (PP)

PP is the executing agency (EA) or implementing agency (IA) that contact CEA and conduct IEE/EIA if necessary. In Sri Lanka, it is common that the sector ministry (Ministry of Agriculture for agricultural sector project, for instance) acts as the PP in the CEA procedure.

(c) IEE/EIA Report Contents

"Guidance for Implementing the Environmental Impact Assessment (EIA) Process" (CEA, 2006) sets the standard format for EIAs. The following are the most common outline of an IEE/EIA report:

(i) Executive summary
(ii) Background of the study and methodology of IEE/EIA
(iii) Description of the Project and analysis of alternatives
(iv) Description of the existing environment (physical/biological/socio-economical)
(v) Assessment of anticipated environmental impacts (physical/biological/socio-economic)
(vi) Proposed mitigation measures and Environmental Management and Monitoring Plan (EMMP)
(vii) Institutional setup and grievance redress mechanism
(viii) Conclusion and recommendation
(ix) Appendix

(d) Monitoring System

An Environmental Monitoring Committee (EMC) is proposed in the IEE/EIA report with an Environmental Management Plan (EMP) for a project. EMC consists of members representing the EA, regional officer of CEA and other related implementing/line agencies. EMC will produce timely progress reports on their monitoring outcomes, and report to respective environmental specialist their observation, in relation to the duly activation of EMP by the appointed contractor/agency of an executive agency.

5.4.2 JICA Guidelines for Environmental and Social Considerations

All JICA cooperation projects should follow and apply the JICA Guidelines for Environmental and Social Considerations (JICA Guidelines). Such guidelines state that it is the responsibility of the

recipient country to conduct environmental and social considerations. The objectives of the JICA Guidelines are: 1) to encourage the project to have appropriate considerations for environmental and social impacts, and 2) to ensure that the recipient countries supported by JICA ascertains that environmental and social considerations are carried out accordingly.

(1) Categorization

The JICA Guidelines initially classify proposed projects into four categories, which are:

- Category A: if proposed projects are likely to have significant adverse impacts on the environment and society. A Category A project is required to carry out EIA and publish the EIA report to public, 120 days before the date of loan agreement.
- Category B: if proposed projects' potential adverse impacts on the environment and society are less adverse than those of "Category A" project. A Category B project is required to carry out an IEE/EIA.
- Category C: if proposed projects are likely to have minimal or little adverse impact on the environment and society. A Category C project does not require IEE/EIA.
- Category FI: if proposed projects cannot be specified prior to JICA's project appraisal.

This project is categorized as Category FI because its components will be defined by the Government of Sri Lanka after the loan agreement with Japanese Government. For a Category FI project, it is required to confirm the environmental and social management system (ESMS) of the EA and its capacity to ensure that the environmental and social consideration will be taken within each project component according to the Government of Sri Lanka regulatory and JICA Guidelines.

(2) Project Components Selection Criteria

This project will not include project components, which are classified as "Category A". That is because the procedures required by JICA for a "Category A" project take longer time. Moreover, the project components focus on the improvement of existing irrigation system, tanks, access roads to the market, and it is not foreseen that the selected project components will generate significant adverse impact on the surrounding environment and community.

The JICA Guidelines define the "Illustrative List of Sensitive Sectors, Characteristics, and Areas" for Category A in its Appendix 3 (See Annexed Table A 5.14). The EA should carry out screening using the following criteria in the project component selection stage:

- Selected project component is not an agricultural project involving large scale land clearing, deforestation or irrigation (more than 100 ha).
- Selected project component is not a large-scale groundwater pumping project (the amount of pumping water of more than 10,000,000 m^3/year).
- Selected project component does not require large-scale land acquisition (more than 200 persons).
- Selected project component is not located within the sensitive areas such as: protected areas under DWLC, DFC and DFAR; and archaeological area.
- Selected project component does not generate adverse impact on indigenous community such as:
  - Resettlement;

- Land acquisition of more than 10% of indigenous people's property;
- Development of land identified as socially important area for indigenous people;
- Damage to the community property (such as cultural and religious important building) of indigenous people.

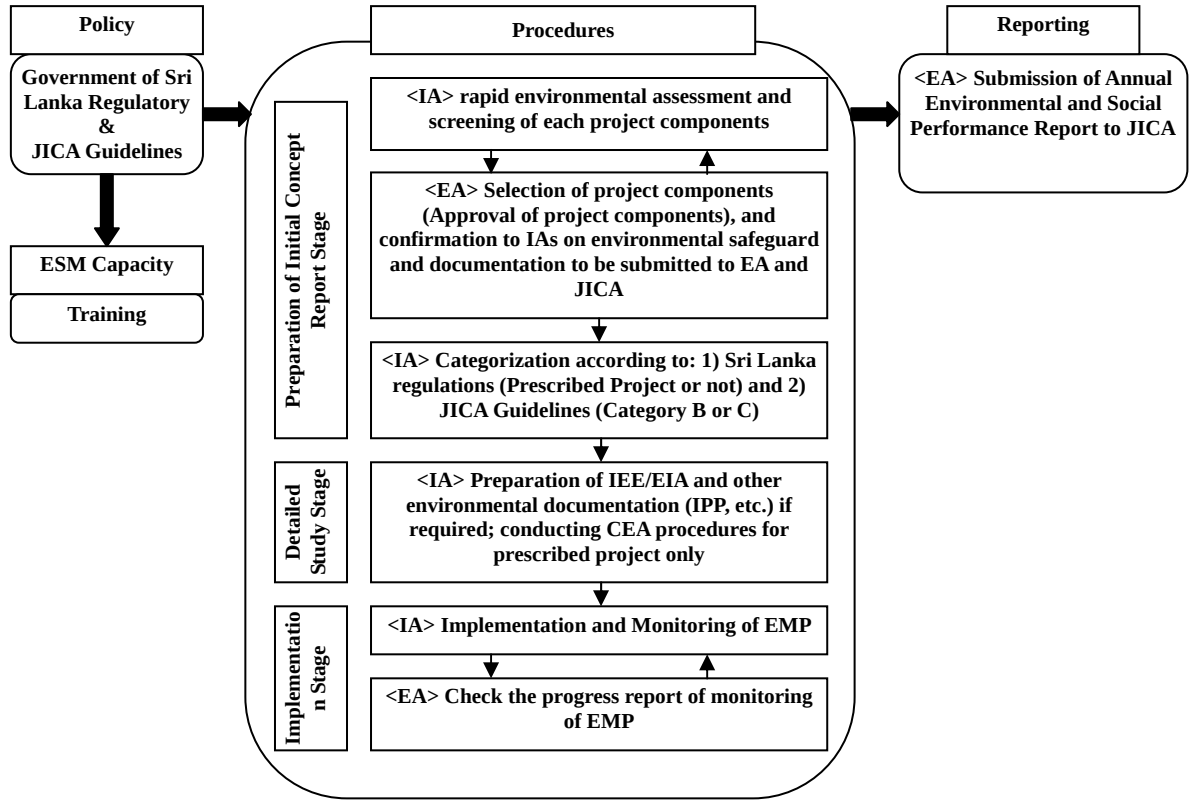
5.4.3 ESMS Arrangement

The EA of the project will establish a project steering committee, and other relevant agencies, chaired by the secretary of the ministry. The credit facility will be administered by an EA, where a PMU will be established.

According to the Safeguard Policy Statement of ADB (June 2009), "ESMS will incorporate the following elements: (i) environmental and social policies; (ii) screening, categorization, and review procedure; (iii) organizational structure and staffing including skills and competencies in environmental and social areas; (iv) training requirements; and (v) monitoring and reporting".

Four candidate executing agencies for project implementation namely; the Ministry of Local Government and Provincial Council, Ministry of Economic Development, Ministry of Agriculture and Ministry of Irrigation and Water Resources Management are proposed in this survey. The JICA Survey Team filled out the "List of Environmental and Social Management System" to check if the candidate ministry has an ESMS. Annexed Table A 5.15 shows the checklist of ESMS for one of the candidate ministries, the Ministry of Economic Development, as an example. Examination of checklist was carried out for all the candidate ministries, and the conclusions are as follows:

- There is no existing ESMS in the candidate ministries except in the Ministry of Agriculture.
- However, in case of the Ministry of Agriculture, large-scale projects with appointed external consultants (local environmental and social experts) have been managed. There is a mechanism adopted through CEA procedure to establish an ESMS for new projects, ensuring the compliance with the Government of Sri Lanka regulations of environmental and social considerations, and donors safeguard policies, if any.
- In Sri Lanka, ESMS is established for new projects under CEA procedures to ensure its compliance with the Government of Sri Lanka regulation for environmental and social considerations and donors safeguard, if any. The procedures undertaken by an EA or IA under the National Environmental Act and relevant regulatory have been well implemented by PP, and been monitored and controlled by the CEA in Sri Lanka.
- To ensure the sustainability of ESMS within the proposed project, the JICA Survey Team proposed the formation of an ESMS Coordination Committee in the candidate ministry under the Project Director/PMU, by appointing an experienced environmental and social expert who will be responsible and confident about the functions of ESMS proposed in Figure 5.17.



Note: Implementing Agency; EA: Executing Agency; ESM: Environmental and Social Management, EMP: Environmental Management Plan; IPP: Indigenous People Plan (according to OP 4.10 of World Bank)
Source: JICA Survey Team

Figure 5.17 Proposed ESMS

(1) ESMS Policy and Applicable Requirement

There is no ESMS policy in the candidate ministries. The existing Sri Lanka environmental and social regulatory and the JICA Guidelines (2010) will be considered as the ESMS policy for this project.[7] The candidate ministry has no legal responsibility under any of the Sri Lankan environmental legislation, which is under the framework of the CEA. However, there are issues related to environmental legislation in connection with its project financing that the IAs would need to adhere to. The legal responsibility of environmental and social impact generated by a project component lies with the IAs. As part of its overall requirements, candidate EA needs to ensure that these investment project components are in compliance with the legal requirements in order to safeguard its interests.

(a) Comparison between Environmental Safeguard Policies of Government of Sri Lanka and JICA Guidelines

Most of the Government of Sri Lanka and JICA requirements pertaining to environmental safeguard policies are similar. Prescribed project list of Government of Sri Lanka covers Appendix 3 “Illustrative List of Sensitive Sectors, Characteristics, and Areas” of the JICA Guidelines. The contents of an IEE/EIA report are the same. Consultation with relevant stakeholders including local community is ensured in IEE/EIA process.

[7] In the sector loan project funded by the World Bank/ADB, the EMS policy is a combination of WB Ops and Government of Sri Lanka environmental regulatory adhered by CEA.

(b) Comparison between Social Safeguard Requirements of Government of Sri Lanka and JICA Guidelines

Table 5.45 compares the key social safeguard requirements between the Government of Sri Lanka regulatory and JICA Guidelines. There is no disparity on compensation of land acquisition between the national law and the JICA Guidelines. On the other hand, there is no specific national law intended for consideration of indigenous people.

Table 5.45 Comparison between Social Safeguard of the Government of Sri Lanka and JICA Guidelines

Criterion	National Laws	WB OP Requirement	Action Needed
Land Acquisition			
1. Assessment of losses and compensation	1) Compensation for the affected land at replacement cost 2) Compensation for affected structure at replacement cost without deduction of any depreciation or salvageable materials 3) Rehabilitation assistance will be provided for the loss of livelihood	1) Compensation for land at replacement value 2) Structure to be compensated at replacement cost without depreciation 3) Livelihood assistance for loss of livelihood (land/commercial)	None
2. Eligibility	Non-title holders are entitled for compensation for loss of assets (for affected structures, transportation allowance, rental allowance, provision of alternative flat, etc.)	Non-title holders are entitled for compensation for loss of assets (not for land)	None
3. Assistance for vulnerable households	Special support to enhance project benefits for the vulnerable households	Additional assistance for vulnerable households	None
Consideration for Indigenous People	Not specified	Positive and/or negative impact will require an IPP	IA should prepare and implement IPP if the project component includes indigenous people resettlement.

Source: JICA Survey Team

(2) Environmental and Social Management Procedures

(a) Screening and Categorization

Each IA will prepare an initial concept report (ICR) for project components, which will be submitted to EA. During the preparation of ICR, IA should conduct an environmental and social screening with appointed environmental experts and social experts, and attach the results in the ICR (Refer to the format on Annexed Table A 5.16).

Based on the results of the environmental and social screening, the environmental expert and social expert of the PMU will categorize each project component, according to JICA Guidelines (Use Annexed Table A 5.17 and Annexed Table A 5.18). If the project components may involve any Category A activity, the EA will not approve such project component. Hence, the Government of Sri Lanka will not implement Category A project components to avoid delay in implementing the project.

According to the initial screening, if it is revealed that the project component will be located in an indigenous people settlement area, the IA should appoint an experienced social expert to prepare an indigenous people plan (IPP) based on the IPP framework prepared by the JICA Survey Team (refer to

Annexed Table A 5.19). If any project components require land acquisition, the IA should prepare an abbreviated resettlement action plan (refer to Annexed Table A 5.20).

(b) Due Diligence

The ESMS Coordination Committee under the EA should review if the IA is conducting the procedures and studies required. An environmental and social impact of a Category B project can be regulated under the Sri Lankan environmental and social regulatory framework (as mentioned on 5.3.1 of this report). IA is responsible for the environmental and social negative impacts of its project component.

IA should also provide all the required environmental and social consideration information to the ESMS coordination committee of EA. IA will contract an environmental expert and social expert for the preparation of EMP and monitoring of its implementation. Environmental and social experts of IA will conduct an IEE or EIA if the project is within the prescribed project list (Category B under JICA Guidelines), under the CEA procedures.

Each IA should establish a grievance redress mechanism to address possible concerns and complaints of affected people on the environmental and social implications of their project components. If any complaints are received, IA must take prompt action to resolve the problem, and shall also report to the ESMS Coordination Committee. The EA should discuss serious issues during steering committee meetings.

(c) Compliance Monitoring and Reporting

After selecting the project components, the ESMS Coordination Committee should communicate with IA, and confirm from time to time, its obligation for compliance with applicable environmental and social safeguard requirements of the Government of Sri Lanka and JICA. The ESMS Coordination Committee should confirm IA's responsiveness with the applicable requirements, in its environmental and social monitoring report.

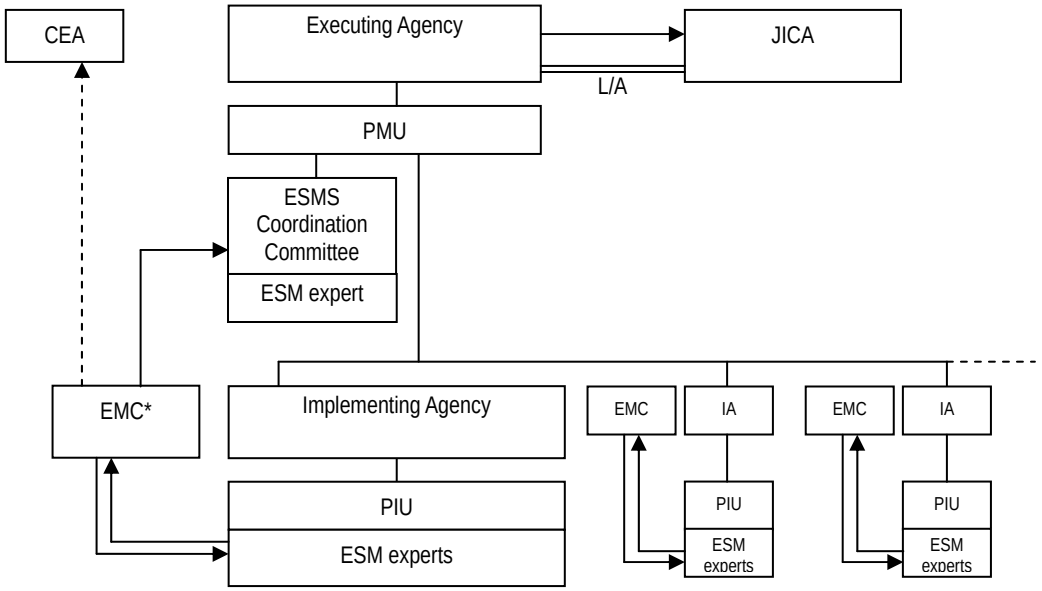
Evaluation of environmental and social performance of the IA should be conducted every year. The IAs should submit annual monitoring reports on project components. The EA will prepare an annual environmental and social performance report for submission to JICA. (Use the format in the Annexed Table A 5.21).

(3) Organizational Structures, Responsibilities, Resources and Capacity

(a) Organizational Structures

The JICA Survey Team proposed an organizational structure of ESMS under the EA for this project as shown in Figure 5.18. It is highly recommended to incorporate the existing mechanism of ESMS under CEA procedures for the sustainability of the system[8].

[8] JICA Survey Team interviewed with relevant agencies officers, World Bank environmentalist, and environmental local consultants.



*Note: * Environmental Monitoring Committee (EMC) will be proposed in IEE/EIA report and the member will be appointed by relevant line agencies (DWLC, FD, DCC, etc.) according to the characteristic of the project component.*
CEA: Central Environmental Authority; JICA: Japan International Cooperation Agency; L/A: Loan Agreement; PMU: Project Management Unit; ESM: Environmental and Social Management; PIU: Project Implementing Unit; IA: Implementing Agency
Source: JICA Survey Team

Figure 5.18 ESMS Organizational Structure

(b) Responsibilities of the ESMS Coordination Committee of the EA and ESM experts of IAs

The following are the responsibilities of the ESMS Coordination Committee with appointed environmental and social management (ESM) expert:

- Request for data and documentation from the IAs regarding environmental and social safeguard compliance, for example, monitoring report to demonstrate compliance to legal requirement or EMP.
- Inform the EA Appraisal teams regarding non-compliance, if any.
- Advise the EA Appraisal team to defer financing decision on a project component due to non-compliance with environmental and social safeguard issues.
- Advise the EA appraisal team to delay the disbursement to IA due to non-compliance with environmental and social safeguard issues.
- Prepare annual environmental and social performance report for submission to JICA.

The following are the responsibilities of the environmental and social management experts of IAs:

- Conduct initial environmental and social screening in the preparation stage of initial concept report of project component;
- Submit data and information required by the ESM expert of PMU;
- Conduct CEA procedures (IEE/EIA), if required;
- Prepare and submit to the ESM expert of PMU, other environmental and social documentation such as IPP, if required; and
- Monitor the progress of EMP, which will be implemented by the contractor during its implementation stage, and submit monthly monitoring progress report to EMC.

(c) Resources and Capacity

As part of the annual budgeting process, EA should ensure that sufficient funds are made available for

the effective conduct of ESMS. The management should ensure that the ESM expert of PMU is technically qualified to carry out the responsibility of screening with due diligence.

5.5 Institutional Arrangement

5.5.1 Organizational Setup for the Overall Project Implementation

(1) Overview of the Organizational Set-up and Key Agencies for Project Implementation

The overview of the organizational set-up is shown in Annex Figure A5.1. There are four layers in the organizational set-up, namely, the central, provincial, district, and divisional secretariat, and are composed of various agencies, units, and committees.

The key agencies for project implementation are executing agency, implementing agency, and service providing agencies taking necessary roles as shown in Table 5.46.

Table 5.46 Key Agencies for Project Implementation

Agency	Major Roles	Candidate Ministry or Department
Executing Agency	In line with the project implementation, the executing agency will coordinate with all the relevant agencies involved with the project activities. In this regard, the executing agency will establish a well defined coordination mechanism. Preparation of overall work plan and budget, financial management, monitoring of progress, facilitation of implementing agencies, and reporting will be the other major roles of the executing agency.	(1) Ministry of Local Government and Provincial Council (2) Ministry of Economic Development (3) Ministry of Agriculture (4) Ministry of Irrigation and Water Resources Management
Implementing Agency	Implementing agencies will be involved in the project activities in addition to their normal operations. Keeping proper coordination with the executing agency and implementation of project activities in the field will be the major role of the implementing agencies. Detailed planning with budget, financial management, monitoring, and reporting will be the other major roles of the implementing agencies	(1) Ministry of Cooperative and Internal Trade (2) Irrigation Department (3) Mahaweli Authority of Sri Lanka (4) Inter-provincial Extension Unit (IPU) of Department of Agriculture (5) Provincial Councils (North, East, North West, North Central, and Uva)
Service Providing Agency	Provide vital support activities to the project through their normal operations, but will not make any procurement to the project directory. Some buildings/facilities and/or services under these agencies will be upgraded under the project in order to serve the beneficiaries more effectively.	(1) Ministry of Livestock and Rural Community Development (2) Ministry of Agrarian Services and Wildlife (3) University of Peradeniya

Source: JICA Survey Team

The JICA Survey Team nominated four candidate ministries handling the agriculture and irrigation based development projects in the provincial and national levels as executing agencies for project implementation. The executing agency for the project implementation should be decided before the commencement of implementation. The summary of pros and cons for each candidate ministry is shown in Table 5.47.

Table 5.47 Ministry's Pros and Cons for Project Implementation

Candidate Ministry	Pros	Cons
Ministry of Local Government and Provincial Council	Since this ministry is supervising the budget and activities related to the provincial council, the coordination between national budget and project budget will be easy.	This ministry has less technical capacity on agriculture, irrigation, and livestock development.

Candidate Ministry	Pros	Cons
	This ministry is handling eight foreign funded projects at present and has enough experience in project management. Since this ministry has handled JICA projects such as Southcap and rural road rehabilitation project before, it has sufficient knowledge of JICA procurement guidelines and reimbursement procedures.	
Ministry of Economic Development	Since this ministry is handling various donor funded projects such as ADB and World Bank, the coordination with other projects will be easy. Since the government policy aims to concentrate on the development projects in this ministry, there is a rational to be the executing agency. In addition, this ministry handles projects such as *"Divineguma", "Gamneguma" and "Haga Neguma*", which are locally funded but are related to the rural agricultural development.	Since the ministry is handling a number of projects, it is necessary to strengthen the management capacity.
Ministry of Agriculture	Since this ministry has mandate to prepare the national agriculture production plan, it is easy to coordinate project plans with the national plan.	The ministry has less experience in donor funded loan projects. The main components of the irrigation rehabilitation and rural road rehabilitation are not covered by this ministry and it is not easy for them to control the project quality and progress.
Ministry of Irrigation and Water Resources Management	The major components of irrigation rehabilitation works are handled by this ministry. The ministry has enough experience to handle foreign funded projects as well as JICA projects. Mahaweli Authority of Sri Lanka (MASL) under this ministry has much experience in agriculture diversification in System-H and Uda Walawe Scheme.	The ministry has less capacity in agricultural and livestock extension works compared to irrigation works.

Source: JICA Survey Team collected information from the JICA Sri Lanka Office and relevant organization of the Government of Sri Lanka

(2) Key Existing Committees Related to the Project Implementation

Despite the project's own coordination meetings and monitoring mechanism, the project has to be with the normal administration of the country by participating in relevant meetings and providing information about the project implementation and progress. The project can use this opportunity to brief other agencies about the project and get their assistance when necessary to make the project implementation successful. The key committees currently in operation in the country's normal administration are given in Table 5.48.

Table 5.48 Key Existing Committees Related to the Project Implementation

Name of Committee	Chairperson	Frequency	Major Roles
Provincial Coordination Committee (PCC)	Chief Secretary	Once in three months	Monitoring progress of programs implemented by government departments in the province and taking decisions, monitoring of special projects, identification of new programs, discussion on work plan, budget and cash flow, and solving problems.

Name of Committee	Chairperson	Frequency	Major Roles
District Coordination Committee (DCC)	Government Agent	Monthly	Discuss program and progress of government departments, ongoing projects, and special development programs, etc. Identification of work items and allocation of fund coming through decentralized capital budget (DCB), and solving problems.
District Agriculture Committee	Deputy Director of Agriculture	Monthly	Discussion and taking decisions mainly on agriculture related matters like, irrigation water levels, extension of water issues, situation of crops in the field, crop prices and related problems, input supply, marketing, O&M of irrigation, etc. Solving inter-department problems and other problems raised by farmers' representatives.
Divisional Agriculture Committee	Divisional Secretary	Monthly	Attend to agriculture related matters like late cultivation, land disputes, damages to irrigation system, O&M of irrigation, solving institutional problems, and forwarding ground level problems to relevant authorities.

Source: JICA Survey Team

5.5.2 Organizational Setup for Implementation of Project Components

The implementation organization for irrigation and drainage rehabilitation work is planned based on the technical capacity of the government officers by province and scale and type of work. The number of technical staff is summarized in Table 5.49.

Table 5.49 Number of Technical Staff and Present Special Programs

Items	Unit	NP	EP	NCP	NWP	UP
Available technical officers in management level	Nos.	94	193	97	114	66
Coverage of one technical staff in selected area	(ha)	755	742	1,149	669	589
Annual budget	M.Rs.	200	435	500	350	75

Note : Above figures include central DOI and provincial DOI figures
Source: JICA Survey Team collected information from relevant organization of the Government of Sri Lank

The project proposes two different implementation organization setups as shown in Figure 5.19. The implementation organization A is applied to where the present government management and technical capacity is not enough or present work load is too high to implement the components or large scale works. The implementation organization B is applied to where the government technical and management capacity is enough to handle the project components or small scale works.

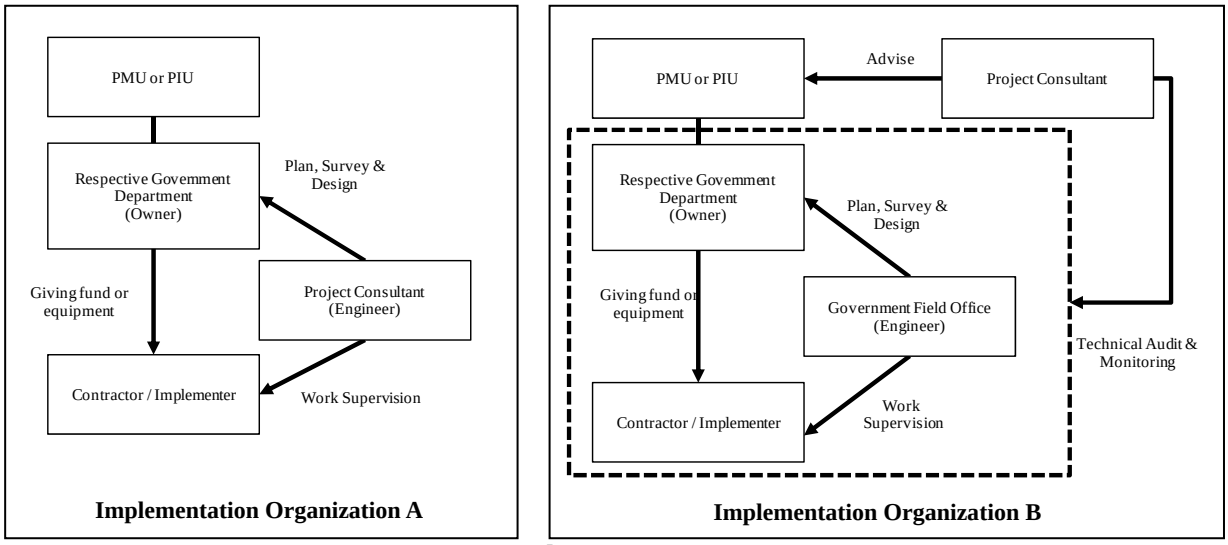


Figure 5.19 Implementation Organization Setup

Looking at Table 5.49, the number of the technical staff for Northern Province, Eastern Province, North Central Province, North Western Province, and Uva Province are 94, 193, 97, 114, and 66, respectively, and covering 775 ha, 742 ha, 1149 ha, 669 ha and 589 ha of crop area, respectively, by one technical staff. The Northern and Eastern provinces have more government special projects than the other provinces. Considering these factors, the project considers the implementation organization by selecting either A or B for irrigation rehabilitation works as shown in Table 5.50.

Table 5.50 Implementation Organization for Irrigation Rehabilitation Work by Province

Work Items	NP	EP	NCP	NWP	UP
Individual scheme	A	-	A	A	-
Major scheme	A	A	B	B	B
Minor scheme	B	B	B	B	B
Agro well	B	B	B	B	B

Note : A stands for "implementation organization A" and B stands for "implementation organization B" above.
Source: JICA Survey Team

The implementation organization of the project components are summarized in Table 5.51.

Table 5.51 Summary of Implementation Organization

Program Name	Component	Owner/ Client	Executer/ Contractor	Engineer/ Technical Service Provider
Preparatory Work				
	Setting up PMU and PIUs	EA	EA	-
	Procurement of vehicle and equipment for PMU and PIUs	PMU	Local Supplier	-
	Procurement of consultants	EA	PMU	-
	Development of guidelines and regulations	PMU	PMU	Consultant
	Awareness and capacity development training	PMU	PMU PIU Consultant	Consultant
	Establishment of information dissemination system	PMU	Consultant	Consultant
	Setting up review meetings and reports	PMU	PMU	-
Survey and Detailed Planning for Infrastructure Components				
	Review of agriculture and livestock production plan	PMU	PMU PIU Consultant	Consultant
	Review on the infrastructure components	PMU	PIU Consultant	Consultant
	Baseline survey	PMU, PIU	Local Contractor	Consultant
Promotion of Strategic Agricultural Crop Production				
Productivity improvement program	Individual irrigation scheme rehabilitation	RDI PDOI	Local Contractor	Consultant
	Major irrigation scheme rehabilitation	RDI PDOI	Local Contractor	Consultant RDI PDOI
	Minor irrigation scheme rehabilitation	PDOI DAD	Local Contractor CBO	PDOI
	Agro well rehabilitation/construction	PDOA	Local Contractor CBO	WRB
	Establishment of a provincial seed laboratory and rehabilitation of a provincial seed farm	PDOA	Local Supplier Local Contractor	CDOA P. Building Dept.
	Self seed production program	PDOA	Registered seed	PDOA

Program Name	Component	Owner/ Client	Executer/ Contractor	Engineer/ Technical Service Provider
			and planting material producers	
	Farm management/OFC/Fruits training	PDOA	PDOA	PDOA CDOA Consultant
	Provision of machinery and equipment for cultivation	PDOA	Local Supplier	PDOA
	Provision of credit	PIU	Development bank	PDOA
Logistics system improvement and entrepreneurs development program	Construction of collecting point	DAD	Contractor	PDOB
	Incubation of business minded leaders and preparation the guidelines	DAD	DAD Consultant	CDOA Consultant
	Provision of equipment to collecting point	DAD	Local Supplier	PDOA
	Improvement of storage facilities	DAD	Farmer	PDOA
	Improvement of DEC	MITC	Local Contractor	MITC Consultant
	Rehabilitation of farm access road and rural road	PS PRDA	Local Contractor	PS PRDA
	Study tour for exporters	PMU	Consultant	Experts in 3rd country Consultant
Program on enhancement of extension services and ground level adaptive trials	Training of trainers	PDOA	CDOA PDOA	CDOA PDOA
	Enhancement of DATC	PDOA	Contractor	PDOB
	Provision of mobility	PMU	Local Supplier	-
	Overseas training	PMU	Experts in 3rd country	Experts in 3rd country consultant
Strategic Livestock Product promotion program				
Productivity improvement program	Training on feed improvement	PDAPH	PDAPH	CDAPH
	Provision of equipment for feed improvement	PDAPH	Local Supplier	PDAPH
	Conduct synchronization and AI	PDAPH	PDAPH	CDAPH University of Peradeniya
	Enhancement of Thalahara Goat Farm	Thalahara Goat Farm	Local Contractor Local Supplier	CDAPH
Program on clean milk production and market network development	Provision of equipment	PDAPH	Local Supplier	PDAPH
	Conduct training on clean milk production	PDAPH	PDAPH	CDAPH University of Peradeniya
Livestock service quality and accessibility improvement program	Construction of livestock service center	PDAPH	Local Contractor	PDOB
	Provision of mobility to VS and LDI	PMU	Local Supplier	-
	Provision of equipment for semen transport	PDAPH	Local Supplier	CDAPH
	Training of trainers	PDAPH	CDAPH University of Peradeniya	CDAPH University of Peradeniya
Monitoring and Evaluation				
	Monitoring and evaluation	PMU PIU	PMU and PIU Local Contractor	Consultant

Note : EA : Executing Agency / PMU : Project Management Unit / PIU: Project Implementation Unit / RDI :Regional Director of Irrigation / PDOI : Provincial Department of Irrigation / PDOA : Provincial Department of Agriculture / CDOA : Central Department of Agriculture / WRD : Water Resources Board / DAD : Department of Agrarian Development / MITC : Ministry of Internal Trade and

Cooperative Development / PDOB : Provincial Department of Building / PS : Pradesha Sabha / CDAPH : Central Department of Animal Production and Health / PDAPH : Provincial Department of Animal Production and Health
Source: JICA Survey Team

The potential community based organizations such as FO will take the important roles in the implementation based on the capacity of them. The part of the on-farm level rehabilitation works, the agro well construction, operation and maintenance of the irrigation facilities under D-canal, operation and maintenance of the provided equipment, part of operation and maintenance of agriculture collecting point and so on will be responsible of the respective FO or producer's group. The capacity of the CBO will be assessed after commencement of the Project then proper implementation and O&M plan will be prepared based on the result of the assessment.

5.5.3 Consulting Service

(1) Management Consultants

As discussed in Sections 5.2.4 and 5.2.5, various activities from agricultural training to rehabilitation of infrastructure are planned in the project. On the other hand, the government staff is not adequate in number to handle these activities. In this context, the assignment of management consultant to assist the PMU in the project implementation is indispensable. The management consultant has an adequate number of foreign and national experts.

The management consultant shall (i) conduct capacity development training programs for the PMU and PIUs, (ii) prepare criteria for survey design, construction, and construction supervision of infrastructure, (iii) prepare the guidelines and training materials for agricultural and livestock technologies transfer, (iv) training and supervision of the marketing support activities carried out by the PIUs, (v) supervise works conducted by project consultants attached to the PIUs, (v) identify the optimum fund flow system, fund monitoring system, and standardize the financial system, and (vi) develop the monitoring and evaluation systems of the project. The experts required for management consultants and their assignment periods are shown in Table 5.52.

Table 5.52 Experts Required for Management Consultants

No.	Experts	Origin	Assignment Period (M/M)
1	Team Leader/Project Management	Foreign	58
2	Co-Team Leader/Monitoring Engineer	National	63
3	Agriculture Marketing Specialist	Foreign	44
4	Agriculturist (Fruit crop management)	Foreign	8
5	Hydrogeologist	National	6
6	Architect	National	12
7	Senior Agronomist	National	75
8	Senior Livestock Expert	National	75
9	Project Monitoring and Evaluation	National	14
10	Procurement Specialist	National	12
11	Specialist as required	Foreign	12
12	Specialist as required	National	10
TOTAL		**Foreign**	**122**
		National	**267**

The following technical cooperation programs are planned under the project. The qualifications and job descriptions of the experts are summarized in Annex Table A 5.22.

(2) Project Consultant

The required experts for the project consultant to support field implementation are as follows:

Table 5.53 Experts Required for Project Consultant

No.	Specialist	Required MM for each PIU				
		NP	EP	NCP	NWP	Uva
1	Sr. Design/Construction Engineer	58	-	50	50	-
2	Design/Construction Engineer	108	51	52	52	-
3	Mechanical Engineer	21	-	-	-	-
4	Surveyor	15	-	-	17	-
5	Agriculture Marketing Specialist	72	72	72	72	72
6	Agriculture Extension Specialist (OFC)	72	72	72	72	72
7	Agriculture Extension Specialist (Fruits)	72	72	72	72	72
8	Livestock Expert	24	24	24	24	24
Total		442	291	342	359	240

Depending on the workload and type of work that each province handles, the category of consultants and their service periods have been decided. The service period of the agriculture and livestock experts are equally distributed where the same engineering experts vary in five provinces according to the work load. The senior design/construction engineers will assist in the rehabilitation and construction works covering the overall and annual planning, implementation, and provision of technical guidance and on-the-job training. The design/construction engineers will execute the work in the field with relevant parties engaged in construction supervision, quality control, preparation of BOQ, preparation of work schedule, measurement, preparation of bills, etc. More activities related to the rehabilitation of sluice gates, spill gates, and pump houses exist in the Northern Province; therefore it will require the assistance of a mechanical engineer. According to the type of work plan of major irrigation rehabilitation projects in the Northern and North Western provinces, the services of surveyors are essential for establishing benchmarks.

A specialist in agriculture marketing will assist in running the collection center to be an interface for trading.

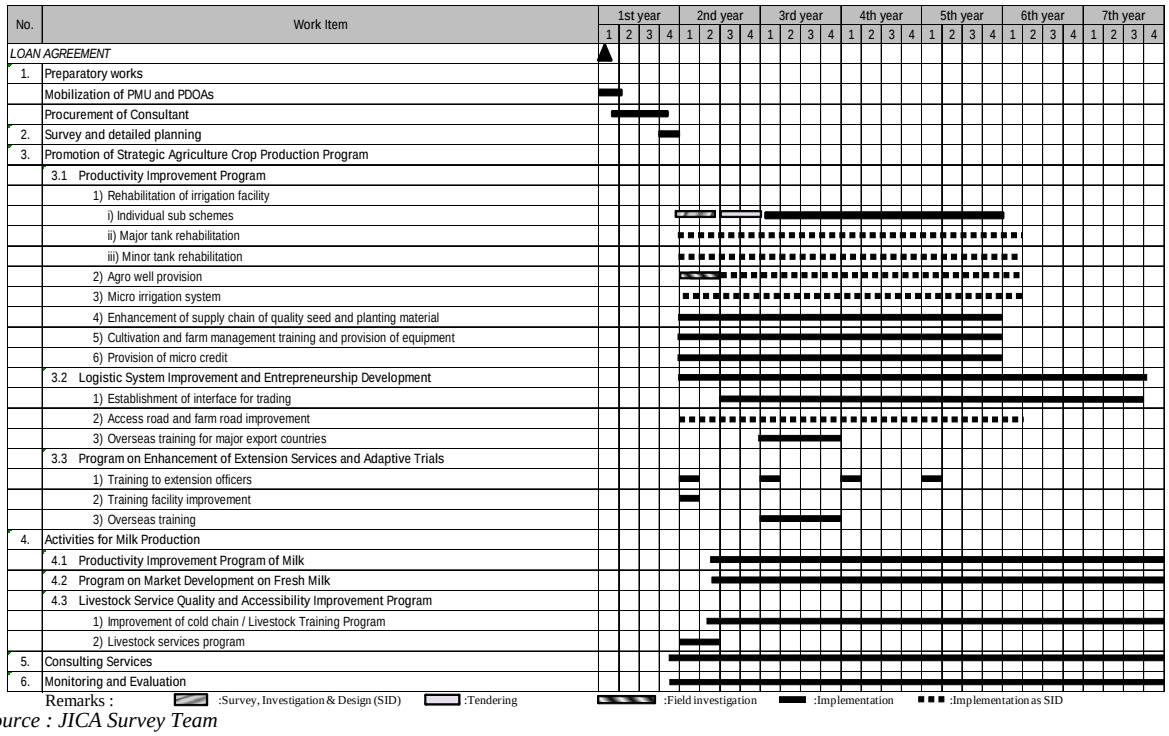
Agriculture and livestock extension specialists will monitor and assist the activities to be carried out by the provincial departments.

In addition to the above experts, 3463 sub-professionals and 3458 support staff will be assigned to the management and project consultancy team.

The proposed assignment schedule for both management and project consultants are shown in Annex Figure A5.2.

5.6 Implementation Schedule

The project will be implemented within seven years and according to the following schedule:



Source : JICA Survey Team

Figure 5.20 Implementation Schedule of the Project

The project will be carried out per divisional secretariats DS basis except in the individual irrigation scheme. The selected DS divisions are prioritized within the province and the project work will be carried out by DS division by stages. Figure 5.20 shows the target number of DS in each implementation. The 1st to 4th batch is planned and the 1st batch will commence their work a year after the loan agreement. The 1st batch has 12 DS divisions while the 2nd, 3rd, and 4th batches have 15, 15, and 12 DS divisions, respectively.

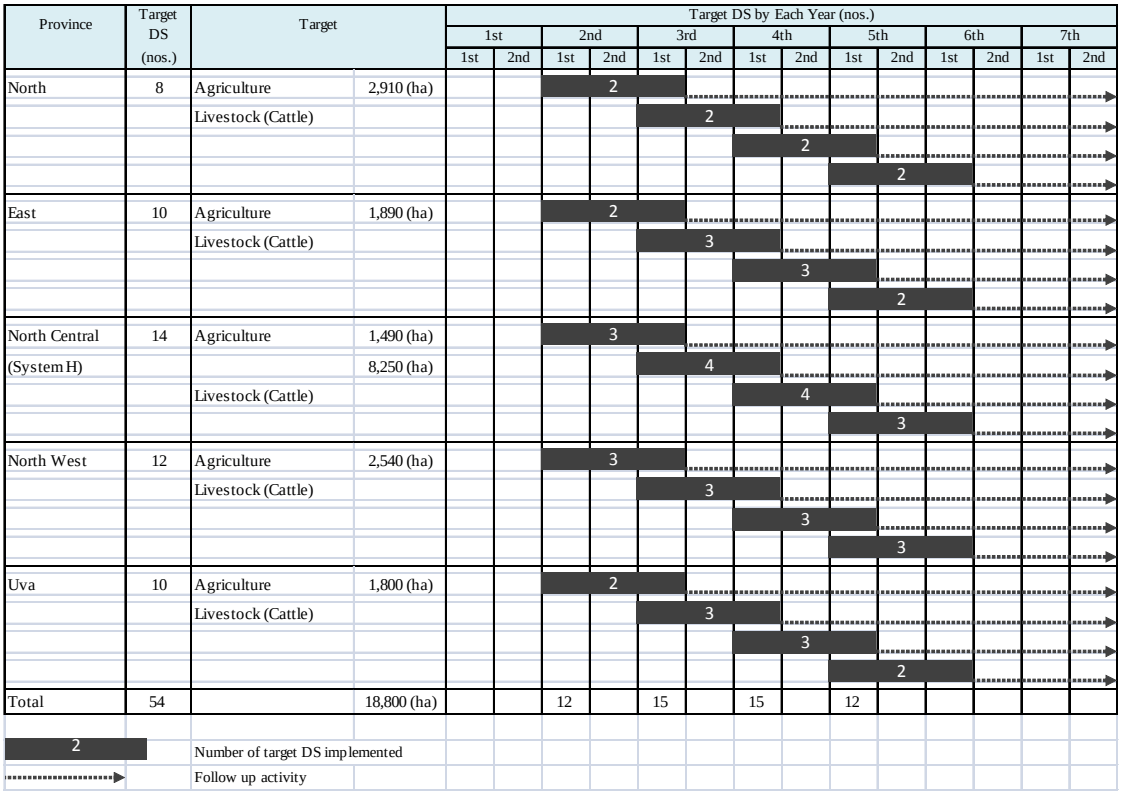


Figure 5.21 Staged Implementation Plan by Divisional Secretariats Division

The agriculture related works including the irrigation infrastructure rehabilitation works will be carried out in three cultivation seasons as shown in Figure 5.22. Assuming that the loan agreement is made in March 2013 and the estimated one year preparatory works before the commencement of physical work, the cultivation season will start from Yala to Maha then from Maha to Yala.

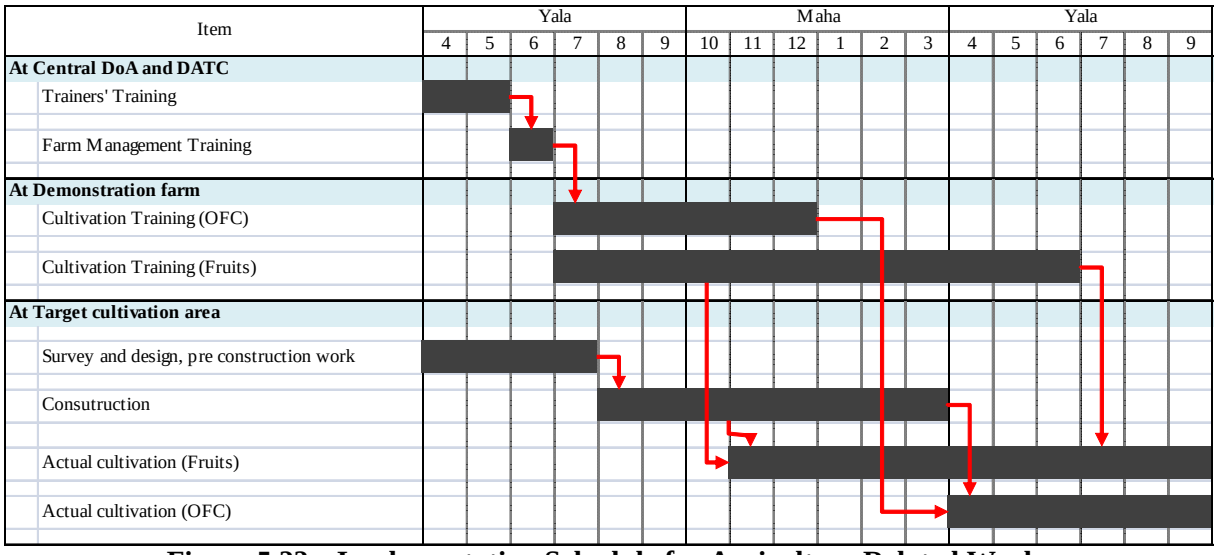


Figure 5.22 Implementation Schedule for Agriculture Related Works

The agriculture component starts with the training of trainers such as AI and SMO and cultivation training in the selected demonstration plot will follow subsequently. During these trainings, the survey, design, pre-construction work, and physical construction such as rehabilitation of minor tanks and construction of agro wells will be carried out. The actual production in the rehabilitated schemes or agro well site will start accordingly.

As described in Section 5.2.3, the infrastructure components will be reviewed and ratified by the project steering committee in the preparatory work stage. After the ratification of the project components, the field survey and detailed design work will commence.

Field surveys and topographic surveys such as inventory survey of the existing facilities, canal route surveys, site surveys of structures, etc., will be carried out by those responsible in their respective departments and as much as possible, in cooperation with its beneficiaries. The beneficiary's opinions on how the facilities will be rehabilitated/improved are collected throughout the field survey. Walk through surveys along canal traces will be conducted with the participation of the officers and farmers and will decide on the rehabilitation needs with the consent of the farmers.

Based on the results of the field and topographic surveys, the draft rehabilitation plan, design, and cost estimate including drawings and bid documents for infrastructure components will be prepared by the responsible organization. In case of sub-irrigation system scheme and minor irrigation system, the development plans and contents of the design report are explained to the respective FO for ratification. The environmental impact assessment will also be carried out in this stage if needed.

Prepared design report and bid documents will be submitted to the respective implementing agencies for approval.

Construction contractors for the seven individual irrigation schemes are procured by the National Competitive Bidding (NCB) which is described in Section 5.8. According to the procurement

guideline established by the national procurement agency and the NCB, construction may take about six months while other irrigation schemes will be rehabilitated according to the priority of the production plan. As for the agro well construction works, prior investigation by the Water Resources Board under the Ministry of Irrigation and Water Resources Management will be implemented for the availability of ground water in Yala season in every DS division. Since more than 5600 agro wells will be developed for all the project areas, prior investigation is indispensable for its effective development and use. The construction of the market access and farm roads will be done according to the priority set by the PRDD and selection of contractors will be made after the proper packaging of the works.

The livestock related activities will also be operated within 1.5 year basis by the DS division same as agricultural crop related works. The implementation schedule for livestock related works are shown in Figure 5.23. The livestock components starts with the training of trainers such as VS and LDI and artificial insemination with synchronization, training on production of feed concentrate to FO, and training on clean milk production to the cooperative will be the next. The project will provide the necessary equipment and will install the facilities for clean milk production and sales.

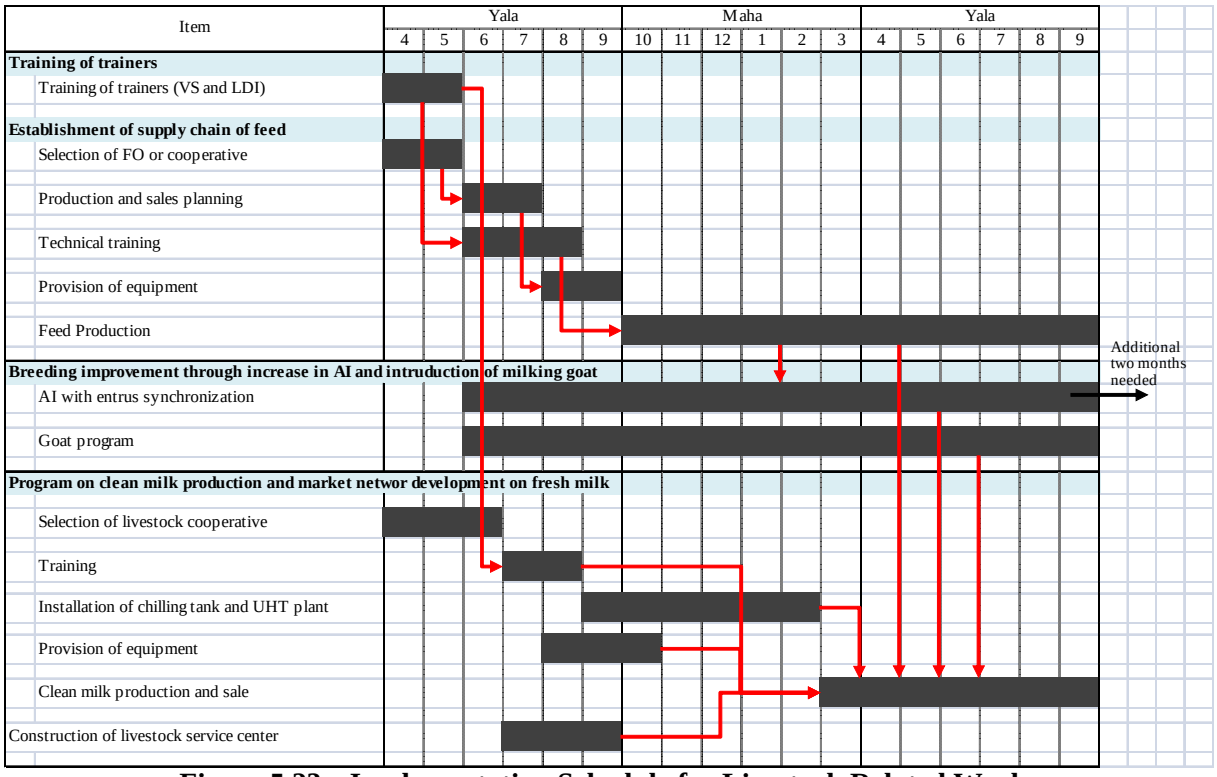


Figure 5.23 Implementation Schedule for Livestock Related Works

5.7 Estimated Cost

5.7.1 Basic Conditions of the Project Cost

The basic conditions and assumptions employed for the project cost estimate are as follows:

(1) Cost estimate refers to the prices as of January 2012.

(2) The following exchange rates applied for the cost estimate:

US$1 = Rs.32.0 = ¥79.0

(3) Base cost of labor, construction materials, and equipment were collected from the District Price Fixing Committee (PFC) of every district as of January 2012.

(4) The main unit prices of civil works to be used for estimation of construction cost are the updated unit prices of the PEACE Project used from 2008 to 2010. Updating of the unit prices was carried out based on the consumer price indices of equipment, materials, and labor between 2008 and 2009 and between 2010 and 2011, respectively.

(5) The unit prices in 2011 adjusted by considering escalation were further converted to provincial level unit prices according to the base costs taken from the PFC.

(6) All costs are estimated using Sri Lankan Rupee (Rs.).

(7) Price escalation rates are assumed to be 2.1%/annum for foreign currency (F/C) and 4.0%/annum for local currency (L/C).

(8) Physical contingency is principally set at 5.0%.

(9) Tax (value added tax) is 12% according to the government regulation.

(10) Commitment charge of JICA is 0.1%.

(11) Interest rate for civil works and procurement during construction is 1.4% and that for consulting services is 0.01% of accumulated loan portion.

(12) The project cost is categorized into F/C portion and L/C portion as shown below:

Foreign currency (F/C) portion :

- Heavy equipment for construction, specific equipment and machinery, and materials and goods imported from foreign countries; and
- Foreign consultants of the consulting services.

Local currency (L/C) portion :

- Machinery, materials, and goods produced/available in Sri Lanka;
- Labor cost; and
- Local consultants of the consulting services.

(13) Ratios of F/C and L/C for infrastructure works are estimated based on a similar project type in Sri Lank and 65% for F/C and 35% for L/C are applied.

5.7.2 Summary of Project Cost

The total project cost is estimated to be Rs. 18,561 million (JPY 11,160 million) consisting of JPY 5,240 million for the F/C portion and Rs. 9,890 million for the L/C portion. The project cost is shown in Annex Table A 5.23 and summarized in Table 5.54.

Table 5.54 Summary of Project Cost

Unit : Million

No.	Description	F/C (JPY)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Direct Cost	3,743	3,978	6,125	10,233
	(a) Mobilization of PMU & PIUs	*105*	*0*	*105*	*176*
	(b) Activities for Agricultural Crop	*3,335*	*3,442*	*5,393*	*9,015*
	(c) Activities for Milk	*303*	*536*	*627*	*1,042*
2	Price Contingency	402	876	926	1,548
3	Physical Contingency	207	243	352	589
4	Consulting Services	453	2,291	1,824	2,962
	Sub-total (1 to 4)	**4,805**	**7,388**	**9,228**	**15,332**
5	Interest during Construction	426	0	426	712
6	Commitment Charge	9	0	9	15
	Sub-total (Eligible Portion)	**5,240**	**7,388**	**9,663**	**16,059**
7	Administration Cost	0	582	348	582

8	Tax		0	1,920	1,149
	Sub-total (Non-eligible Portion)	**0**	**2,502**	**1,497**	**2,502**
	Total Project Cost	**5,240**	**9,890**	**11,160**	**18,561**

Source : Estimated by the JICA Survey Team

(1) Direct Cost

The direct cost for the procurement and works is estimated on the activities required to achieve the target in each component of the programs.

(a) Cost for Mobilization of PMU and PIUs

For the implementation of the project, the PMU in the central level and operational PDOA offices in five provinces will be established. The necessary equipment for the management of the offices will be procured as shown in Table 5.55.

Table 5.55 Summary of Mobilization of PMU and PIU Cost

Unit : Million

No.	Description	F/C (¥)	L/C (Rs.)	Total	
				in ¥	in Rs.
1	Vehicle and equipment	92	0	92	154
2	Office equipment	13	0	13	22
	Total	**105**	**0**	**105**	**176**

Source : Estimated by the JICA Survey Team

(b) Cost for Activities for Agricultural Crop Production

The activities for agricultural crop production consist of (i) productivity improvement program, (ii) logistics system improvement and entrepreneurs' development program, and (iii) program on enhancement of extension services and ground level research. Table 5.56 shows the summary of the cost of these activities and the details by zone are shown in Annex Table A 5.24.

Table 5.56 Summary of Cost of Activities for Agricultural Crop Production

Unit : Million

No.	Description	F/C (¥)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Productivity Improvement Program (Agricultural Crop)	2,827	2,852	4,533	7,574
2	Logistics System Improvement and Entrepreneurs Development Program	461	552	790	1,323
3	Program on Enhancement of Extension Services and Ground Level Research	47	38	70	118
	Total	3,335	3,442	5,393	9,015

Source : Estimated by the JICA Survey Team

(c) Cost of Activities for Milk Production

The activities for milk production consist of i) productivity improvement of semi-intensive and intensive farmers, ii) program on market development on fresh milk through enhancement of cooperative or small and medium scale entrepreneurs, and iii) livestock service quality and accessibility improvement program. Table 5.57 shows the summary of the cost of these activities and the details by zone are shown in the Annex Table A 5.24.

Table 5.57 Summary of Cost of Activities for Milk Production

Unit : Million

No.	Description	F/C (¥)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Productivity Improvement Program of Semi-intensive and Intensive Farmers	189	386	420	702
2	Program on Market Development on Fresh Milk	58	91	112	187
3	Livestock Service Quality and Accessibility Improvement Program	56	59	95	153
	Total	**303**	**536**	**627**	**1,042**

Source : Estimated by the JICA Survey Team

Meanwhile, the direct cost can be categorized in accordance with input components, i.e., civil work component, procurement of equipment component, and soft component as shown in Table 5.58.

Table 5.58 Breakdown of Direct Cost by Component

Unit : Million

Description of Component	F/C (¥)	L/C (Rs.)	Total	
			in ¥	in Rs.
(a) Civil Works	2,828	2,509	4,327	7,236
- Rehabilitation of irrigation facilities	*1,512*	*1,360*	*2,322*	*3,886*
- Provision of agro-wells	*1,061*	*920*	*1,612*	*2,694*
- Rural and access road rehabilitation	*255*	*229*	*392*	*655*
(b) Procurement of Equipment	344	402	584	976
- Vehicle and equipment for PMU and PIUs	*105*	*0*	*105*	*176*
- Micro irrigation system	*53*	*118*	*123*	*206*
- Farm machinery and equipment	*186*	*284*	*356*	*595*
(c) Soft Component	571	1,067	1,209	2,021
- Agricultural crop production except (a) & (b)	*268*	*531*	*586*	*979*
- Milk production except (a) & (b)	*303*	*536*	*624*	*1,042*
Total	**3,743**	**3,978**	**6,121**	**10,233**

Source : Estimated by the JICA Survey Team

On the other hand, the costs for agricultural crop production and milk production activities by zones are summarized in Table 5.59 and detailed in the Annex of Cost Estimate.

Table 5.59 Costs for Agricultural Crop Production Activity and Milk Production Activity by Zone

Unit : Million

No.	Description	Total Cost (Rs. million)				
		Zone-01	Zone-02	Zone-03	Zone-04	Total
1. Agricultural Crop Promotion Program		**3,527**	**2,520**	**1,946**	**1,022**	**9,015**
1-1	Productivity Improvement Program (Agricultural Crop)	3,083	1,920	1,708	864	7,575
1-2	Logistics System Improvement and Entrepreneurs Development Program	428	569	223	103	1,323
1-3	Program on Enhancement of Extension Services and Ground Level Research	16	31	15	55	118
2. Livestock Product Promotion Program		**248**	**325**	**297**	**172**	**1,042**
2-1	Productivity Improvement Program of Semi-intensive and Intensive Farmers	130	203	236	132	702
2-2	Program on Market Development on Fresh Milk	74	65	33	16	187
2-3	Livestock Service Quality and Accessibility Improvement Program	44	56	29	24	153
	Total	**3,775**	**2,845**	**2,244**	**1,194**	**10,057**

Source : Estimated by the JICA Survey Team

While the costs for these activities classified by provinces and MASL are shown in Table 5.60.

Table 5.60 Costs for Agricultural Crop Production Activity and Milk Production Activity by Provinces

Unit : Rs. Million

No.	Description	Province or Other Authority						
		EP	NP	NCP	NWP	UP	MASL	Total
1. Agricultural Crop Promotion Program		1,202	2,729	1,470	1,946	1,021	647	9,015
1-1	Productivity Improvement Program (Agricultural Crop)	958	2,470	1,070	1,708	864	505	7,575
1-2	Logistics System Improvement and Entrepreneurs Development Program	231	247	383	222	102	138	1,323
1-3	Program on Enhancement of Extension Services and Ground Level Research	14	12	17	15	55	5	118
2. Livestock Product Promotion Program		167	195	128	298	172	82	1,042
2-1	Productivity Improvement Program of Semi-intensive and Intensive Farmer	72	118	82	236	132	62	702
2-2	Program on Market Development on Fresh Milk	66	41	25	33	15	7	187
2-3	Livestock Service Quality and Accessibility Improvement Program	30	36	21	29	24	14	153
	Total	**1,370**	**2,924**	**1,599**	**2,243**	**1,193**	**729**	**10,057**

Source : Estimated by the JICA Survey Team

(2) Consulting Services Cost

The cost for the consulting services is estimated based on the consultant inputs. The relevant cost consists of remuneration for professional staff, salary of sub-professional and supporting staff, and direct costs such as transportation, communication, office running cost, field investigation cost for design, etc. The cost is detailed in Annex Table A 5.25 and summarized in the following table.

Table 5.61 Summary of Consulting Services Cost

Unit : Million

No.	Description	F/C (¥)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Base Cost for Consulting Services	392	1,806	1,473	2,462
	(a) Remuneration of Pro-A	*287*	*0*	*287*	*479*
	(b) Remuneration of Pro-B	*0*	*691*	*413*	*691*
	(c) Sub-professional &Supporting Staff	*0*	*748*	*447*	*748*
	(d) Direct Cost	*106*	*367*	*326*	*544*
2	Price Contingency	39	376	264	359
3	Physical Contingency	22	109	87	141
	Total	**453**	**2,291**	**1,824**	**2,962**

Source : Estimated by the JICA Survey Team

(3) Administration Cost

The administration cost is estimated based on the expense of the PMU and PDOAs offices for staff salary, office running cost, and O&M cost for office equipment. The cost is summarized in Table 5.62 below.

Table 5.62 Summary of Administration Cost

Unit : Million

No.	Description	F/C (JPY)	L/C (Rs.)	Total	
				in JPY	in Rs.
1	Personnel cost – officers	0	292	175	292
2	Personnel cost - supporting staff	0	194	116	194
3	Monitoring and survey	0	6	4	6
4	Operation and maintenance of vehicles / motor cycles	0	31	19	31
5	Office maintenance	0	19	12	19
6	Consumables and others	0	40	24	40
	Total	**0**	**582**	**348**	**582**

Source : Estimated by the JICA Survey Team

5.7.3 Annual Disbursement Schedule

The annual disbursement schedule is worked out based on the implementation schedule shown in Figure 5.20 and as shown in the Annex Table A 5.26 and summarized in Table 5.63.

Table 5.63 Summary of Annual Disbursement Schedule

Unit : million

Year	JICA Portion (Yen)	Other Portion (Yen)	Total	
			in JPY	in Rs.
1st year	275	44	319	534
2nd year	913	146	1,059	1,769
3rd year	2,514	401	2,915	4,871
4th year	2,524	398	2,922	4,882
5th year	1,958	302	2,260	3,777
6th year	1,019	148	1,167	1,951
7th year	459	57	515	861
Total	**9,663**	**1,497**	**11,160**	**18,645**

Source : Estimated by the JICA Survey Team

5.7.4 Operation and Maintenance Cost

The operation and maintenance cost includes (i) labor cost for water management (ii) operation and maintenance cost for irrigation facilities including irrigation pumps, and (iii) maintenance cost of access and farm roads. The annual operation and maintenance cost is estimated at Rs.127 million, which is assumed to be 2% of the construction cost for civil works.

5.7.5 Replacement Cost

The replacement cost will be used for the replacement of pump machinery for lift irrigation system and gates and other metal works for irrigation schemes. The replacement should be done every ten years. The replacement cost is estimated at Rs.316 million, which is assumed to be 5% of the construction cost for civil works.

5.8 Procurement Procedure

The procurement of contractors for the construction of civil works and building works and suppliers for equipment/machinery and materials under the project shall be made in accordance with the procurement guidelines published by the National Procurement Agency in 2006.

5.8.1 Procurement method

There are five procurement methods for goods and works in Sri Lanka, as follows:

(1) International Competitive Bidding (ICB) :

The ICB is for large contracts for goods, works, and services valued at Rs.300 million or more under the following circumstances:

(i) When the capacity of the domestic contractors, suppliers, and service providers are limited; and
(ii) For foreign funded projects, when the foreign funding agency agreement requires the procuring entity (PE) to resort to ICB procedures.

However, in the case of works contracts in view of the development of domestic construction industry, the possibility of slicing the contract to suit domestic contractors may be considered.

(2) National Competitive Bidding (NCB)

The NCB is the competitive bidding procedure that shall be applied for most of Government of Sri Lanka funded projects when the goods and works are available within Sri Lanka at price significantly below those in the international markets. NCB may be applied for foreign funded projects with the following:

(i) With the agreement of the foreign funded agency;
(ii) By allowing foreign contractors or suppliers to bid on same terms with the domestic contractors or suppliers;
(iii) By not giving preference to domestic bidders or approved societies; and
(iv) By considering registration in appropriate category under the national registration system of Institute for Construction Training and Development (ICTAD) as equivalent experience and qualification criteria described in the bidding documents.

(3) Limited/Restricted International Competitive Bidding (LIB) and Limited/Restricted National Competitive Bidding (LNB)

The limited/restricted bidding procedure is followed when the invitation to bid is directly addressed to a pre-selected list of international or national suppliers or contractors. Bids should be solicited from a list of potential suppliers broad enough to ensure competitive prices, including all known suppliers if their number is small.

(4) Shopping

Shopping is an appropriate procurement method for procuring frequently used:

(i) Actual available and low-value off-the-shelf goods;
(ii) Low-value commodities (not to exceed Rs.5 million) for which specifications are standard; and
(iii) Low-value works or services (not to exceed Rs.5 million).

These procurements are confined to limit and authority specified under the guideline.

(5) Direct Contracting

Direct contracting is a means of procurement of goods, works or services from a single supplier or contractor. It entails no competition and shall be used only under exceptional circumstances. This method is appropriate under the following circumstances:

(i) When the price or rate is fixed pursuant to legislation by regulatory bodies; and
(ii) Standardization of equipment, to be compatible with existing equipment, may justify additional purchase of the same type of goods (repeat order).

Procurement method to be applied is selected among five methods based on the conditions of goods and works to be procured. Table 5.64 shows the procurement and implementation methods to be proposed for the Project.

Table 5.64 Procurement Methods for Major Project Component

Work Item	Procuring Entity (PE)	Planning and Design	Procurement Method	Contractor	O&M
Civil Works					
Individual irrigation sub schemes	RDI PDOI	Consultant	NCB	Local contractor	RDI, PDOI or FO
Other irrigation schemes	RDI PDOI DAD	RDI PDOI Consultant	NCB or shopping or direct contracting	Local contractor or CBO	PDOI, RDI, DAD or FO
Agro well provision	RDI PDOA	Water Resources Board Consultant	Shopping or direct contracting	Local contractor or CBO	PDOA CBO
Rural and farm road	PRDA PS	PRDA PS	NCB	Local contractor	PRDA PS
Building Works					
Dedicated Economic Center (DEC)	MITC	PDOB	NCB	Local contractor	MITC
Collecting center for agricultural crops	DAD	PDOB	Shopping or direct contracting	Local contractor or CBO	DAD
Milk collection center	PDAPH	PDOB	Shopping or direct contracting	Local contractor or CBO	CBO
Livestock service center	PDAPH	PDOB	Shopping or direct contracting	Local contractor or CBO	PDAPH
Procurement of Machinery and Goods					
Machinery and goods	Entity in charge	Project consultant	NCB or LNB or shopping or direct contracting	Local supplier	Entity in charge
Procurement of Consultant					
Consultant	PMU	PMU	ICB	International consultant	PMU and PIU

Remarks:
RDI :Regional Director of Irrigation
DAD : Department of Agricultural Development
MIWRM : Ministry of Irrigation and Water Resource Management
PRDA : Road Development Authority (province)
CBO : Community Based Organization
FO : Farmers' Organization
PDOA : Provincial Department of Agriculture
MITC : Ministry of Internal Trade & Cooperation
PDAPH : Provincial Department of Animal Production & Health
NCB : National Competitive Bidding
LNB : Limited National Competitive Bidding
PS : Pradesha Sabha
PDOI :Provincial Department of Irrigation
PDOB : Provincial Department of Building

Source: JICA Survey Team

5.8.2 Capability of Construction Contractors in Sri Lanka

The classification and grading is a screening of the capabilities of prospective contractors to determine their general ability to undertake different types and sizes of projects without reference to any specific contractors. In order to maintain uniformity and avoid possible inconsistencies, the ICTAD took over under its umbrella the registration and grading of domestic construction contractors. The construction contractors in Sri Lanka are classified into ten categories, C1 to C10 and registered in ICTAD by evaluation on the following aspects:

Table 5.65 Categories of Contractors in Sri Lanka

Financial Aspect	(a)	Working capacity / net worth
	(b)	Permanent overdraft facilities
Technical Ability	(a)	Resources (human resources)
		- Professional staff
		- Supervisory staff
	(b)	Resources (human resources)
	(c)	Experience
		- Turnover from construction of previous year
		- Turnover from construction for the last 5 years
		- The largest relevant project completed in the last 5 years
	(d)	Organization
		- Owners / Directors, Technical professionals
		- Management staff
		- Experience of the company
	(e)	Other considerations

The financial limits of each grade of registered construction contractors are showed in Table 5.66.

Table 5.66 Financial Limit of Registered Construction Contractor

Grade	Financial Limitation (Rs. Million)
C1	>= 600
C2	600>= > 300
C3	300>= > 150
C4	150>= > 50
C5	50 >= > 25
C6	25 >= > 10
C7	10 >= > 5
C8	5 >= > 2
C9	2 >= > 1
C10	1 <=

Source: Institute for Construction Training and Development (ICTAD)

Small amount contract with less than Rs.2.0 million (Rs.1.0 million x 2 projects) can be through direct contracting to community based organization (CBO) according to the Supplement-12 of the procurement manual.

According to the observations at the construction sites in Sri Lanka, the contractors of Sri Lanka have enough capabilities to handle the construction/rehabilitation of irrigation schemes which do not require sophisticated techniques.

5.8.3 Loan Disbursement Procedure

The three loan disbursement procedures of JICA ODA loan are 1) Reimbursement procedure, 2) Special Account procedure, and 3) Transfer procedure. Among the three, it is recommended to apply the special

account procedure for the project activities except for the consulting services, taking into consideration the various small-scale activities and works contracts, smooth fund flow, and the limited budget of the Government of Sri Lanka. In addition, the Government of Sri Lanka has experience on the special account procedure in the on-going PEACE Project funded by JICA at present. Meanwhile, disbursement procedure will be applied for the consulting services and transfer procedure for foreign consultants. On the other hand, reimbursement procedure will be applied for local consultants.

Chapter 6 PROJECT EVALUATION

6.1 General

The objective of the project evaluation is to assess the economic and financial feasibility of the Project.

For economic analysis, the economic cost and economic benefit are calculated based on the assumptions in the evaluation of the impact to the whole society induced by the Project. In conclusion, the economic internal rate of return (EIRR) and benefit-cost ratio (B/C) are calculated to justify the project implementation. A sensitivity analysis is also conducted to evaluate the sustainability of the project against possible changes in the project costs and benefits.

Regarding the financial analysis, the capacity to pay of typical farmers is analyzed to predict the financial sustainability of farmers.

In the end, the indirect benefits which could not be quantified in monetary value are reviewed briefly to perceive the whole impact caused by the project implementation.

The basic assumptions adopted for economic and financial analysis are summarized as follows;

- The project life is assumed to be 30 years from 2014 to 2043.
- The initial construction period including preparatory works are supposed to continue for seven years.
- All prices are expressed in 2012 constant Sri Lankan Rupees (Rs).
- The exchange rate of US$1.0 = Rs.132.0 = ¥79.0 (as of August 2012) is used.

6.2 Economic Analysis

6.2.1 Economic Cost of the Project

The economic cost is composed of initial construction cost, O&M cost, and replacement cost. The economic cost is estimated adopting the standard conversion factor (SCF) on the domestic currency portion of the financial construction cost. The shadow wage ratio (SWR) is also adopted on the labor cost of domestic currency portion.

The SCF is estimated at 0.95 based on the export and import data for the latest five years as shown in Table 6.1.

Table 6.1 Estimation of the SCF

(Unit: Rs million)

Year	2006	2007	2008	2009	2010	2011	5 Years Average
Export of Good and Services (f.o.b.)	715,557	845,137	878,665	814,350	975,256	1,167,509	936,183
Import of Good and Services (c.i.f.)	1,065,902	1,249,564	1,526,478	1,173,193	1,520,770	2,241,143	1,542,230
Export Subsidy	-	-	-	-	-	-	-
Export Tax	-	-	-	-	-	-	-
Import Subsidy	-	-	-	-	-	-	-
Import Tax	73,807	84,406	112,336	137,260	130,749	158,080	124,566
SCF	0.96	0.96	0.96	0.94	0.95	0.96	0.95

Source: Economic and Social Statistic of Sri Lanka 2012, (Central Bank of Sri Lanka)

Note: SCF = (E+I)/｛(E+Es-Et)+(I-Is+It)｝ Where: E = Export, I = Import, Es = Export Subsidy, Et = Export Tax, Is = Import Subsidy, It = Import Tax

The SWR is assumed to be 0.65 assuming the composition of skilled labor and unskilled labor at 30% and 70%, respectively, and the conversion factor of the unskilled labor at 0.5.

The disbursement schedule of initial project cost in terms of economic cost is summarized in Table 6.2. The cost is estimated based on the amount estimated in Chapter 5.6. The price escalation, interest of loan, and tax are excluded from the total cost to avoid distortion.

Table 6.2 Disbursement Schedule of the Initial Project Cost in terms of Economic Cost

(Unit: Rs million)

Item	Conversion Factor	1st 2014	2nd 2015	3rd 2016	4th 2017	5th 2018	6th 2019	7th 2020	Foreign Cost	Local Cost	Total
Project Cost	FC:100%, LC:95%	184	580	2,764	2,662	1,809	547	13	5,479	3,080	8,559
Labour Cost (Consultant cost)	FC: 100%, LC: 65%	194	607	671	655	603	537	348	1,776	1,839	3,615
Other Costs (Administration and Contingency Cost)	FC: 100%, LC:95%	15	50	136	131	97	46	16	13	478	491
Total		393	1,237	3,571	3,448	2,509	1,130	377	7,268	5,397	12,665

Source: JICA Survey Team

The economic O&M cost per year is estimated to be Rs.127 million which corresponds to 2.0% of the civil part of the initial construction cost. The replacement cost of equipment amounting to Rs.316 million is added every ten years. In addition, the residual value of facility of construction work is added as the benefit in the final year assuming that the economic life of the facility is 50 years.

6.2.2 Expected Economic Benefit

The economic benefit is estimated by forecasting the "incremental increase in production of target crops (and dairies)" influenced by the project implementation. The other benefits, such as improvement of farmers' livelihood and increase in employment opportunity are excluded from the economic benefit as these are difficult to quantify in monetary value.

(1) Benefit of Agriculture Sector

The economic benefit of agriculture is simply calculated by multiplying the (i) economic net profit of each crop and (ii) planned cultivation area implemented by the Project. The assumed conditions under the "With Project" and the "Without Project" are compared, and the differences between each condition are considered as the total incremental economic benefit of the Project.

The economic net profit of each crop is calculated as similar to the crop budget formerly analyzed in Chapters 3.7.7 and 4.2.1. The unit number of input (cost) and output (revenue) under the "With Project" condition are set based on the past survey, and historical yield data which is described in the previous Tables 4.6 and 4.7. Those of "Without Project" are the same figures as the present condition described in Annex Table A 3.20.

The financial prices are changed to the economic price to estimate the impact of the project on the national economy. The basic assumptions of economic prices are explained below.

(a) Economic Prices

The adopted economic prices are summarized in Annex Table A 6.1. The prices are calculated respectively based on the following assumptions.

1) International tradable crops

Import and export parity prices of paddy, maize, and soybeans are estimated as shown in Annex Tables A 6.2, A 6.3, and A 6.4. The prices are estimated referring to the latest commodity price forecast of the World Bank until 2025 which were released in June 2012. The forecast price of each crop in 2025 is converted to the constant price in 2012 by adopting the manufactures unit value (MUV) index forecast from 2012 to 2025.

2) Non-tradable crops

The farm gate prices are adopted as the economic prices for the other non-tradable commodities. Details are shown in Annex Table A 6.1.

3) Fertilizers

The same estimation for tradable commodities is adopted for the fertilizers of urea, TSP, and MOP. Details are indicated in Annex Table A 6.5. As the government is subsidizing 90% of the real price of fertilizers, the economic price shows a significant difference in financial price.

4) Agro Chemicals

Agro-chemicals are generally imported from foreign countries. About 17% of the whole financial price is excluded from the wholesale price, to exclude the transaction cost consisting of VAT, PAL, and NBT which summed up to be 21% imposed on the CIF price.

5) Labour Cost

For the labor cost in the farm work, the composition of skilled labor and un-skilled labor are assumed to be 30% and 70%. The SWR of un-skilled labor is assumed to be 0.5 by considering the present employment condition in the project area. Then, the SWR of whole work is estimated at 0.65.

6) Other Traded Cost

Regarding other costs that farmers usually pay to wholesalers or local market, 0.89 is multiplied to the farm gate price to exclude the VAT amount. For other items, where farmers are able to obtain from their own farm, such as seed for paddy and OFC crops, the farm gate price is directly adopted without any conversion.

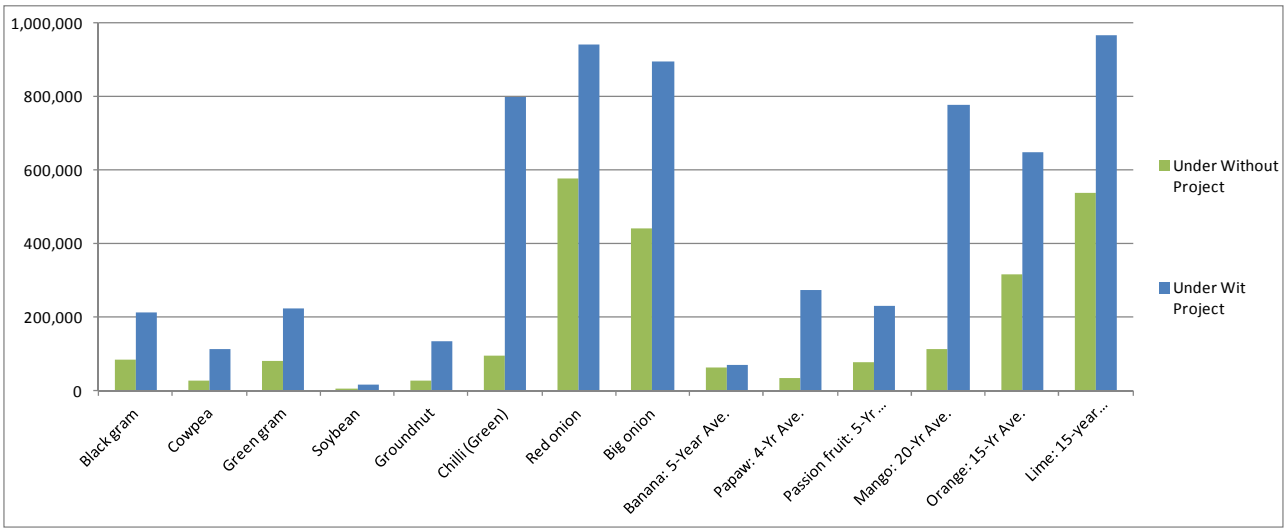
(b) Net Profit of Target Crops and Fruits

Applying the above economic prices and the assumed unit numbers of input and output under both “With Project” and “Without Project” conditions, the economic net profit of each crop was calculated as summarized in Table 6.3 and Figure 6.1. The detailed calculation is attached in Annex Tables A 6.6 and A 6.7.

Table 6.3 Economic Net Profit of Each Crop

No.	Item	Net Profit under With Project	Net Profit Under Without Project	No.	Item	Net Profit under With Project	Net Profit Under Without Project
	OFCs (Rs./ha/season)				Fruits (Rs./ha/year)		
1.	Black gram	212,815	84,755	9.	Banana: 5-Year Ave.	68,434	60,809
2.	Cowpea	112,573	26,161	10.	Papaw: 4-Yr Ave.	274,803	34,704
3.	Green gram	222,371	79,575	11.	Passion fruit: 5-Yr Ave.	231,522	75,650
4.	Soybean	14,718	6,118	12.	Mango: 20-Yr Ave.	777,232	111,084
5.	Groundnut	132,360	25,465	13.	Orange: 15-Yr Ave.	647,561	314,646
6.	Chilli (Green)	797,211	93,271	14.	Lime: 15-year Average	964,873	537,912
7.	Red onion	942,130	575,511				
8.	Big onion	893,560	442,362				

Source: JICA Survey Team



Source: JICA Survey Team

Figure 6.1 Economic Net Profit of Each Crop (Rs./ha)

(c) Planned Cultivation Area by the Project

The cultivation area under "With Project" and "Without Project" is assumed as follows:

With Project: By the Project, the OFCs and fruits cultivation area is increased to 18,880 ha in total as it has been indicated in the previous Tables 4.3 and 4.4. The irrigated paddy area in Yala season of 2417 ha is converted to the above cultivation area.

Without Project: Even without the Project, regarding to the development plan in each area, the land area for OFC cultivation increases to 2514 ha and 3342 ha in the project area of "surface irrigation" and "agro well" schemes, respectively. The present irrigated paddy field reduces by 1058 ha as it is converted into OFC cultivation field.

The comparison in future farm land per project scheme is summarized in Table 6.4.

Table 6.4 Comparison in Assumed Cultivation Area between With Project and Without Project

Crop Pattern	OFC (cowpea, ground nut, chillie, eed onion, big onion, soybeans, green gram, black gram)		Fruit (banana, lime, mango, papaw, passion fruits, orange)		Irrigated Paddy (Yala)	TOTAL
Cultivation Type	Under Surface Irrigation (Yala)	Under Agro Well (Maha and Yala)	Under Surface Irrigation	Under Agro Well		
	(ha/season)		(ha/year)		(ha/year)	(ha)
Area under "With Project"	+ 13,110	+ 2,660	+ 300	+ 2,810	-2,417	+ 16,463
Area under "Without Project"	+2,514	+ 3,342	-	-	-1,058	+ 4,797

Source: JICA Survey Team

(d) Benefits of Agriculture Sector

Based on the "economic net profit" and "planned project area", the total benefits of agriculture sector under both "With Project" and "Without Project" are calculated at Rs.9517 million/year and Rs.819 million/year, respectively, as indicated in Table 6.5. The incremental economic benefit becomes Rs.8698 million/year when the target yield is achieved.

Table 6.5 Annual Agricultural Benefit by the Project

	Unit	Fruit						OFC								Paddy	Total
		Banana	Lime	Mango	Papaw	Passion Fruits	Sweet Orange	Cowpea	Ground Nut	Chili	Red onion	Big onion	Soya Bean	Green Gram	Black Gram		
With Project																	
Economic Net Return (with project case)	1000Rs. /ha/year(season)	68	965	777	275	232	648	113	132	797	942	894	15	222	213	33	
Planned Project Area	ha	400	200	1,400	450	40	620	842	1,009	5,280	890	2,280	3,683	518	1,268	-2417	16,463
Total Return	Million Rs. /year	27	193	1,088	124	9	402	95	133	4,208	838	2,038	55	115	270	(80)	**9,517**
Without Project																	
Economic Net Return (with project case)	1000Rs. /ha/year(season)	61	538	111	35	76	315	26	25	93	576	442	6	80	85	33	
Planned Project Area	ha	-	-	-	-	-	-	293	351	1,991	351	878	1,347	176	468	-1058	4,797
Total Return	Million Rs. /year	-	-	-	-	-	-	8	9	185	202	388	8	14	40	(35)	**819**
																Incremental Benefit	**8,698**

** The composition of crops cultivated in the OFC used area under "Without Project" is assumed to be the same as the composition under "With Project".*
Source: JICA Survey Team

After the implementation of the Project, long-term trial and training of farmers are needed before achieving the target yield of each crop. Hence, the yield of crops is assumed to increase gradually after the project implementation. It is assumed that the production starts occurring from 2018 (five years after the project commencement) at 7% of the total target benefit, and the figure increases at 7% annually until the target yield amount is achieved in the year 2032.

Table 6.6 Economic Benefit of the Project

Year	2014 - 2017	2018	2019	2020	2021	-	2029	2030	2031	2032 – 2043
Incremental Production of OFC and Fruits	(0%)	(7%)	(14%)	(21%)	(28%)		(84 %)	(91%)	(98%)	(100%)
	0	609	1,218	1,827	2,435	-	7,306	7,915	8,524	8,698

Source: JICA Survey Team

(2) Benefit of Livestock Sector

For livestock sector, the benefit is considered to be the incremental increase of milk production.

The detailed production amount per production style is attached in Annex Table A 6.8. The economic net profit per one liter of milk is calculated by assuming the average yield and cost of typical farm of "intensive" and "semi-intensive" types as shown in Annex Table A 6.9.

To evaluate the economic impact, the financial price is converted to economic price. The selling prices of milk and meat are assumed to be the same as the farm gate price. Regarding the labor cost and other costs, 0.65 (SWE) and 0.95 (SCF) are applied as same as the assumption for agriculture sector.

In conclusion, the economic net profit per one liter of milk is used as indicated in Table 6.7. In consideration of the proportion of milk production by each system, the average economic unit profit of milk production resulted to Rs.22.4/l.

Table 6.7 Net Profit per One Liter of Milk

	Unit Profit (Rs./l)
Average of intensive and semi-intensive system	**22.4**

Source: JICA Survey Team

The present and future expected production amounts are shown in the previous Table 4.12. As the training and education of farmers take time, the incremental milk production is assumed to increase at 10% per year after 2019. In conclusion, the benefit of milk production is estimated by multiplying the incremental milk production amount and net benefit of milk as shown in Table 6.8.

Table 6.8 Planned Milk Production and Benefit by the Project

	Unit	2018	2019	2020	-	2026	2017	2028 - 2043
Daily Production	**l/day**	**173,998**	**196,598**	**219,198**	-	**354,800**	**377,400**	**400,000**
Northern		16,878	20,190	23,502	-	43,376	46,688	50,000
Eastern		28,545	31,991	35,436	-	56,109	59,555	63,000
North Central		52,555	56,700	60,844	-	85,711	89,856	94,000
North West		33,009	39,708	46,407	-	86,602	93,301	100,000
Uva		43,011	48,010	53,009	-	83,002	88,001	93,000
Annual Production	1000 l/year	63,509	71,758	80,007	-	129,502	137,751	146,000
Occurrence Rate of Benefit		0%	10%	20%	-	80%	90%	100%
Incremental Production	1000 l/year	0	8,249	16,498	-	65,993	74,242	82,491
Net Benefit	Rs./l	22.4	22.4	22.4	-	22.4	22.4	22.4
Total Benefit from Milk Production	Million Rs./Year	0	185	370	-	1,478	1,663	1,848

Source: JICA Survey Team

6.2.3 Results of the Cost Benefit Analysis

In order to calculate the EIRR and B/C, the annual flow of cost and benefit is predicted as indicated in Annex Table A 6.10.

The EIRR of the project resulted to 25.1%, while the B/C at the discount rate of 10% resulted to 3.77. The results implied the project is economically viable.

Table 6.9 Result of Economic Analysis of the Project

Economic Indicators	EIRR	B/C
Base case	25.1%	3.77

** The discount rate for B/C is set at 10%.*
Source: JICA Survey Team

6.2.4 Sensitivity Analysis

In respect to the changes in benefit and cost, project sensitivity is evaluated to analyze the sustainability of the project. Three alternative cases, i.e., (i)10% cost increase, (ii)15% benefit decrease, and (iii) both 10% cost increase and 15% benefit decrease, are assumed as shown in Annex Table A 6.10. EIRR and B/C are calculated as indicators under each case.

The EIRR and B/C results are 21.5% and 2.92, respectively, under Case 3 (worst case). The project is economically viable even under the worst environmental condition.

Table 6.10 Results of Sensitivity Analysis of the Project

Economic Indicators	Condition	EIRR	B/C
Base Case	-	25.1%	3.77
Case 1	Cost +10%	23.7%	3.43
Case 2	Benefit -15%	22.8%	3.21
Case 3 (worst case)	Cost +10%, Benefit -15%	21.5%	2.92

** The discount rate for B/C is set at 10%.*
Source: JICA Survey Team

6.3 Financial Analysis

6.3.1 Farm Budget Analysis

In order to evaluate the profit improvement of farms in each household and the farmers' capacity to pay for the additional O&M cost of the Project, the farm budget of a typical farming style in the project area was analyzed.

Two typical project schemes, namely, "surface irrigation scheme" and "agro well Scheme", are assumed for evaluation as designed in Chapter 5.

The typical share of cultivation area and crops under each project scheme is assumed as shown in Table 6.11. Under the "surface irrigation scheme", owing to the sufficient water provision by the Project, the OFCs are supposed to be cultivated in Yala season in addition to the existing paddy cultivation in Maha season. Under the "agro well scheme", an additional fruit production will be managed in the area where no farming is being conducted at present.

Table 6.11 Assumption of the Project Scheme

Season	**A. Surface Irrigation Scheme** (Anuradhapura District, 0.94 ha)		**B. Agro Well Scheme** (Kurunegala District, 0.84 ha)			
	Present	With Project	Present		With Project	
Maha	Paddy (0.94 ha)	Paddy (0.94 ha)	Paddy (0.42 ha)	None (0.42 ha)	Paddy (0.42 ha)	**Fruits: Mango and Papaw (**0.42 ha**)**
Yala	**None**	**OFCs: Chilli and Onions (0.31 ha), Pulses (0.63 ha)**	Paddy (0.42 ha)		Paddy (0.42 ha)	

Source: JICA Survey Team

The basic assumptions of the analysis are shown as follows:

- The average farm land size is taken from the "Census of Agriculture 2002", the category of "holding size of farmers more than 0.11 ha" in Anuradhapura and Kurunegala districts.
- The amount of gross income and living expenditure are assumed referring to the base line survey results of the "Pro-poor Economic Advancement and Community Enhancement (PEACE)" Project conducted in 2008. The figure is adjusted to be the price in 2012 based on the Colombo Consumer's Price Index (CPI) after the year 2008.
- Non-farm income is adjusted regarding farmers' available time for other cash earning works.
- Living expenditure under the "With Project" and "Without Project (present)" is assumed to be equal.
- The unit revenue and expenditure for each crop (Rs./ha./year) is taken from the crop budget analysis evaluated in Chapter 3.7.7. (Tables A 3.20, 3.21) under present condition and Chapter 4.2.1 (Table A 4.4, 4.5) under with project condition.
- The O&M cost is calculated regarding the present condition in the project area. Under the "irrigation scheme", the narrow canal around the farm land is maintained by voluntary work of the group called "Field Canal Group (FCG)" which is composed of neighboring farmers. The main (wider) canal is being operated and maintained by farmers' organization, who is responsible for collecting the fixed service charge (approximately Rs.1000/ha/season) from farmers. Under the "highland agro well scheme", three farmers are assumed to share one agro well and pay for the operational (fuel) cost and replacement cost (every ten years) of the water pump at their own expenses.

Table 6.12 Farm Budget Analysis under With and Without Project

Items	unit	Unit Price (Rs/ha)		Surface Irrigation Scheme (Anuradhapura district)		Agro Well Scheme (Kurunegala district)	
		Present	With Project	Present	With Project	Present	With Project
1. Extent of Farm Land				**0.94**	**0.94**	**0.84**	**0.84**
2. Cultivated Area	ha/farm						
1) Paddy Irrigated (Maha)	ha/farm			**0.94**	**0.94**	**0.42**	**0.42**
2) Paddy Irrigated (Yala)	ha/farm			0.00	0.00	**0.42**	**0.42**
3) OFC (Yala, Chili, Onion)	ha/farm			0.00	**0.30**	0.00	0.00
4) OFC (Yala, Pulses)	ha/farm			0.00	**0.64**	0.00	0.00
5) Fruits (Mango, Papaw)	ha/farm			0.00	0.00	0.00	**0.42**
3. Farm Budget							
i) Gross Income *	Rs/farm/year			**224,760**	**698,242**	**174,680**	**588,100**
− Farm Income	Rs/farm/year			**144,760**	**658,242**	**64,680**	**548,100**
1) Paddy Irrigated (Maha)	Rs/farm/year	154,000	154,000	144,760	144,760	64,680	64,680
2) Paddy Irrigated (Yala)	Rs/farm/year		154,000	0	0	0	64,680
3) OFC (Yala, Chili, Onion) *1	Rs/farm/year		1,218,167	0	365,450	0	0
4) OFC (Yala, Pulses) *2	Rs/farm/year		231,300	0	148,032	0	0
5) Fruits (Mango, Papaw) *3	Rs/farm/year		997,000	0	0	0	418,740
− Non-Farm Income	Rs/farm/year			**80,000**	**40,000**	**110,000**	**40,000**
ii) Gross Expenditure	Rs/farm/year			**203,461**	**337,460**	**161,327**	**358,134**
− Production cost excluding Family Labour	Rs/farm/year			**76,165**	**210,164**	**34,031**	**230,838**
1) Paddy Irrigated (Maha)	Rs/farm/year	81,027	81,027	76,165	76,165	34,031	34,031
2) Paddy Irrigated (Yala)	Rs/farm/year		81,027	0	0	0	34,031
3) OFC (Chili, Onion) *1	Rs/farm/year		309,936	0	92,981	0	0
4) OFC (Pulses) *2	Rs/farm/year		64,092	0	41,019	0	0
5) Fruits (Mango, Papaw) *3	Rs/farm/year		387,561	0	0	0	162,776
− Living Expenditure *	Rs/farm/year			**127,296**	**127,296**	**127,296**	**127,296**
iii) Net Profit	Rs/farm/year			21,299	360,782	13,353	229,966
4. Incremental Net Income	Rs/farm/year				**339,483**		**216,613**
5. O&M cost	Rs/farm/year			**940**	**1,880**	**0**	**8,367**
Payment to F.O. for O&M of irrigation facilities	Rs/farm/year			940	1,880	0	0
Fuel cost for Agro-wells	Rs/farm/year			0	0	0	5,700
Replacement cost of water pump (every 10 years)	Rs/farm/year			0	0	0	2,667

**1 The revenue and expenditure per hectar is estimated as the average of chillies, big onions, and red onions.*
**2 The revenue and expenditure per hectar is estimated as the average of black gram, cowpea, green gram, soybean, and groundnut.*

**3 The revenue and expenditure per hectar is estimated as the average of mangoes and papaw.*
Source: JICA Survey Team

6.3.2 Improvement of Farm Economy

Under the "With Project" condition, the farm income of both schemes increased approximately by Rs.500 thousand/year owing to the incremental production of OFCs and fruits after the project implementation. Simultaneously, the farm expenditure increased to around Rs.130–200 thousand/year reflecting more intensive farming style by using chemicals and fertilizers. In conclusion, the incremental net profit of farmers became Rs.220–340 thousand/year under both project schemes. The said profit significantly supports the improvement in the financial condition of farmers in the project area.

6.3.3 Farmers' Capacity to Pay for the O&M Cost for Irrigation and Agro Well

In terms of O&M cost of "irrigation scheme" and "highland agro well scheme", the payment for irrigation system and agro wells are summed up to be Rs.1.9 thousand/year and Rs.8.4 thousand/year, respectively.

The estimated O&M costs correspond to 0.6%–3.8% of the incremental net profit of each scheme. The amount accounted below 5% of the annual net incremental income, and hence, farmers are capable of paying the additional cost.

6.4 Indirect Benefits

In addition to the benefits of incremental production which could be quantified in monetary value, there are many indirect benefits provided by the project implementation as stipulated below.

6.4.1 Improvement of Farmers' Livelihood

Influenced by the project implementation, income of farmers is expected to increase due to profit improvement. Such increase in farmers' income directly contributes to the improvement of farmers' living standard, and makes it easy to further invest on their business.

6.4.2 Saving the Foreign-Currency Reserve

Presently, the target crops of the Project are mainly imported from foreign countries. This is one of the main reasons in the reduction of national foreign currency reserve. Influenced by the project implementation, imported crops are substituted by newly produced national crops. Hence, there is a possibility that the produced crops will be exported in the future.

6.4.3 Reduction of Subsidy

The current government provides significant amount of subsidy on fertilizers to alleviate the basic expenditure of farmers. Through implementation of intensive style farming which is recommended by the Project, the farmer's affordability to pay increases, and hence, government subsidy could be reduced in the future.

6.4.4 Capacity Development of Implementing Agencies

The Project includes the training programs for implementing groups (officers and farmers) of both agriculture and livestock sector. Such capacity building would surely contribute to the implementation and management of future work in the project area.

6.4.5 Increase in Employment Opportunity

The project would increase the demand for labors in the project area because of its intensive farming style after project implementation. In addition, during the construction period of irrigation system and roads, employment opportunity for unskilled labor increases that will render sufficient work force around the project area.

6.4.6 Reduction of Transportation Time

As one of the project components, the main roads in the project area will be rehabilitated. Approximately, 20–30 % of the present transportation time is supposed to be saved, and the people could utilize the saved time for any other works including farming and household work.

6.4.7 Improvement of Marketing Structure

Future marketing structure in the project area will likely expand as compared to the present condition. With predicted higher production amount, the merchants will have a larger turnover which could be invested for the improvement of marketing condition.

6.4.8 Mitigation of Water Shortage for Domestic Use

The project area has suffered water shortage during dry season. As the irrigation water is provided by agro wells and open canals, water for domestic use can be obtained from these said improvements in case of emergency in the project area. This will reduce the social risk in farmers' livelihood.

Chapter 7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The dry zone agriculture plays an important role in the national economy of Sri Lanka. For example, the agricultural GDP in the dry zone areas (five provinces) has a share of 51% in the national agricultural GDP. In addition, crop production of the dry zone areas accounts for 74% of the national production in rice, 91% in cowpea, 73% in green gram, and 95% in red onion, although productivities of these crops are still low. Meanwhile, the population share of the dry zone is only 35% of the national population. In light of these situations, the proposed project is designed to further increase the share of the dry zone agriculture to the national production with the project objective of improving the production and productivity of commercialized agricultural products in the dry zone.

Overall in dry zone agriculture, fundamental infrastructure and supporting system for improvement of production and productivity and diversification are weakly and insufficiently arranged. For example, many irrigation schemes are already deteriorated, accessibility of rural and farm roads to markets is poor, distribution system for farm inputs/output and market linkages are weak, and agriculture extension service and its system for agricultural technique and technology are insufficient. In this context, the overall situation is not strong enough to achieve a long leap in the production and productivity, and the proposed project is thus formulated as countermeasure for these issues.

The proposed project aims to diversify agricultural products and improve production and productivity of imported substitute crops including livestock products for foreign exchange savings and increase small holding farmers' income. For the improvement of agricultural crops, the project plans to implement three programs, i.e., (i) productivity improvement program which includes rehabilitation of the irrigation systems of major and minor tanks, (ii) logistics system improvement and entrepreneur development program, and (iii) program on enhancement of extension services and ground level adaptive trials. For the improvement of livestock product, the project proposes to implement also three programs, i.e., (i) productivity improvement program of semi-intensive and intensive farmers, (ii) program on market development on fresh milk through enhancement of cooperative or small and medium scale entrepreneurs, and (iii) livestock service quality and accessibility improvement program.

Through the implementation of these programs, a total of 18,880 ha of farm land will be irrigated by rehabilitating the existing surface and ground water irrigation schemes (13,410 ha and 2890 ha, respectively) and construction of new ground water schemes (2580 ha) additionally. Proposed products to be introduced are OFCs, fruits, and milk following the national policy on diversification of agricultural products. Under the project condition, the production of these products will be increased, and production target of Mahinda Chinthana (2020) will be achieved significantly, ranging from 100% in papaw to 14.5% in legumes. In case of milk, its achievement ratio will be comparatively smaller at 14%. To ensure the diversification, production, and productivity improvement, the project proposes, under the abovementioned programs, to strengthen various sorts of supporting services covering all major stakeholders consisting of farmers, extension-related officers, and market-related persons. The Project also plans to rehabilitate the existing facilities related to the extension and marketing services so as to improve their functions. The number of beneficiary farmers is estimated to be about 31,000

farm households with 124,000 persons of farm population.

The total project cost, including direct cost, price contingency, physical contingency, consulting services, administration cost, tax, interest during construction, and commitment charge is estimated to be Rs.18,561 million. The economic internal rate of return (EIRR) is evaluated to be 25.1%. The EIRR is high enough to justify the project implementation. Increase in farm household income per household, which is the basic development aim, is increased by 17 times while the annual net income is increased to Rs.339,480 in typical farm under the surface irrigation scheme and Rs.216,610 under the agro well rehabilitation/new construction scheme. The results of typical farm budget analysis also indicated the project feasibility.

7.2 Recommendations

7.2.1 Commencement of the Proposed Project with Financial Assistance from the Japanese Government

In the Progress Meeting No. 2 between the Sri Lankan and Japanese sides held on July 23, 2012, the DG of the Department of National Planning, Ministry of Finance and Planning announced to the Japanese side that an agriculture project like the one proposed in the Progress Report No.2 is not applicable for implementation using a loan from the Japanese government, because most parts of the project envisaged in the report could be implemented and funded solely by the Government of Sri Lanka. However, the Government of Sri Lanka still recommended implementing the proposed project using the loan from Japanese government due to the following reasons:

(1) Dry zone areas have high potential for development of diversified and commercialized agricultural crops, and such high potential would be realized by applying a comprehensive approach using large amount of fund as presented in this report. Development activities using its own fund would need a longer time for development due to limited budget. Such approach for development is not recommendable, because the available resources are still not effectively and efficiently utilized and needed to be developed as early as possible.

(2) Most small-scale farmers, who are primary target beneficiaries of the proposed project, are still weak in competitiveness compared with private business persons, in terms of fund availability, technical knowledge, and experiences in commercial transactions. These farmer beneficiaries would be left behind by the diversified and commercialized agriculture, if no particular support is provided by the government, and as a result, disparity between the rich and the poor would be widened. In order to avoid such situations, comprehensive supports which are proposed in this report would be needed for the small-scale farmers at least in the early stage of diversified and commercialized agriculture.

(3) Many agricultural products in Sri Lanka are high in their production costs. In case of OFCs, it is said that Sri Lankan production costs are three times higher than the production cost of Indians. The high production costs generally increase in import and decrease in export of agricultural products. As for the issues in marketing, concerned persons point out higher storage loss, transportation loss, and quality loss. With this situation, many food processing factories prefer to use imported agricultural products as raw materials. In order to make a breakthrough in this situation, the dry zone agriculture needs to be converted as early as possible into an internationally competitive one by implementing the proposed project for which considerable

amount of fund infusion is required.

7.2.2 Simplification of Organizational Arrangement for Agricultural Diversification

The division of roles among government agencies related to agricultural development is quite complicated in Sri Lanka as well as in the dry zone areas. Agricultural diversification would be difficult to achieve under such complicated situation. It is therefore recommended that these complicated arrangements need to be simplified so as to make efficient use of Sri Lanka's available resources such as development budget and human resources for agricultural diversification.

7.2.3 Coordination Among Institutions Concerned

As an urgent countermeasure for the smooth implementation of the project, it is important to coordinate all the activities of concerned government agencies at the central, provincial, and local levels to maximize the project benefits. To this end, it is recommended to establish the PMU to initiate this coordination as soon as possible. It is also recommended to organize PSC at the central government level and PCC at the provincial level.