

**FEDERAL DEMOCRATIC REPUBLIC OF NEPAL
MINISTRY OF IRRIGATION
MINISTRY OF AGRICULTURE DEVELOPMENT
NEPAL AGRICULTURE RESEARCH COUNCIL**

**PREPARATORY SURVEY
ON
JICA'S COOPERATION PROGRAM
FOR AGRICULTURE AND RURAL DEVELOPMENT
IN NEPAL**

- FOOD PRODUCTION AND AGRICULTURE IN TERAI -

**FINAL REPORT
SUPPORTING DATA**

OCTOBER 2013

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

**NIPPON KOEI CO., LTD.
VISION AND SPIRIT FOR OVERSEAS
COOPERATION (VSOC) CO., LTD.
C.D.C. INTERNATIONAL CORPORATION**

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FINAL REPORT

SUPPORTING DATA

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Supporting Data A

*Minutes of Meetings
on Joint Coordination Committee*

Minutes of Meeting
The 1st Joint Coordination Committee meeting
on
Inception Report

**Preparatory Survey of JICA's Technical Cooperation Program for Agricultural and Rural
Development, Food Production and Agriculture in Terai Plain, Nepal**

The meeting was held as follows;

Date Time: April 9, 2013 AM 10:00 to PM 12:30
Place: Seminar hall, Department of Irrigation (DoI), Lalitpur
Attendance: Refer in the attached Attendance List

Mr. Uttam Raj Timilsina Deputy Director General, Irrigation Management Division, Department of Irrigation made opening statement. After the statement Team Leader of JICA Mission Mr. S. Ban explained the Inception Report, using presentation material.


During and after his presentation, technical discussion and exchange of technical opinion were taken.

The following responses and suggestion on the preparatory survey were given to the Study Team in the meeting.

Responses and Suggestions

Responses

- ① The agencies are working coordinately in some projects but facing problem due to institutional arrangement for fund flow.
- ② Department of Agriculture (DoA) is making O&M survey of Agriculture Extension and will devise new arrangement to extend service to large numbers from existing to about 10 percent only.
- ③ NARC emphasized expectation of software and technical assistance for the proposed TCP, especially efficient water use and management as well as institutional development, mentioning that several similar projects implemented have been covering mainly hardware components, albeit on-farm water management has been totally neglected.



④ NARC pointed out that involvement of the DDC is important as mentioned in the inception report as coordination problems has been observed due to approval system in allocation of budget, in which Ministries cannot allocate budget without approval of the DDCs.

⑤ Responding to the request from the Team Leader of the Study Team to form strategical coordination system among the relevant government agencies with clearer details and actual plan as well as specifying the responsible agent and personnel, NARC pointed out to prepare strategy plan by the relevant ministries as there has been missing link between Ministries as different components of agriculture activities are handled by different ministries.

⑥ Regarding the coordination system, NARC suggested that sustainability of the programme should be taken into account by clarifying who are to be involved during and after the project, identifying available resource and emphasizing capacity building.

Suggestions

- ① To ensure sustainability of the program, after support phase out to be considered.
- ② Consider helping develop WUA as multi-functional organization to generate resources.
- ③ Regarding the question raised by the Department of Agriculture why those 4 district were selected as target areas of the study, it was confirmed that the results of the survey in the sample 4 districts shall be replicated to other area for future planning.

Then, Team Leader Mr. S. Ban replied that the Survey Team will pay careful attention to the suggestions mentioned above during the Survey and requested the members to set up a responsible agency for coordination and to provide counterpart persons for the preparatory survey work.

In reply to Team Leader's request mentioned above, Mr. Uttam Raj Timilsina Dy. DDG of DOI gave clear statement on formation of an authorized Joint Coordination Committee by selecting personnel approved through head of respective organization shortly including mobilization of counterpart officials during field survey and requested for itinerary.

Field visit for introductory coordination meetings at district level was proposed for the following week and the MoI promised to send a staff to accompany and arrange with district level responsible persons.



The Joint Coordination Committee basically accepted the Inception Report, and On behalf of the Joint Coordination Committee, Mr. Uttam Raj Timilsina closed the meeting on AM 12:30.

Kathmandu, 11th April 2013

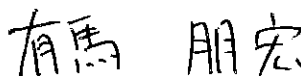


Mr. Shoichiro Ban
Team Leader
JICA Study Team



Mr. Uttam Raj Timilsina
Deputy Director General
Department of Irrigation
Ministry of Irrigation

Witness:



Mr. Tomohiro Arima
Representative
Japan International Cooperation Agency
Nepal Office

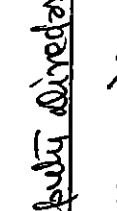
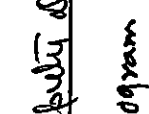
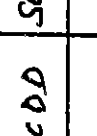









List of Participants




Preparatory Survey on JICA's Cooperation Program for Agriculture and Rural Development

Subject : JCC meeting

Date & Time : 9th April 2013

Venue: Department of Irrigation, Kathmandu

No.	Name	Organization	Designation	Contact No.	Signature
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8	Narayan Kumar Gurung	JICA	Chief Program Manager	9851041085	
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Name	Organization	Designation	Contact No.	Signature
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Minutes of Meeting

Progress Report for 2nd coordination Committee Meeting

Preparatory Survey of JICA's Technical Cooperation Program for Agricultural and Rural Development, Food Production and Agriculture in Terai Plain, Nepal

The meeting was held as follows.

Date Time: June 11, 2013 IS 10:30 to AM 12:00
Place: Seminar hall, Department of Irrigation (DoI), Lalitpur
Attendant: Refer in the attached Attendance List

Mr. Uttam Raj Timilsina, Deputy Director General, Irrigation Management Division, Department of Irrigation welcomed the participants and requested Mr. Ban, Team Leader of JICA Preparatory Survey Team to present the findings of the Survey.

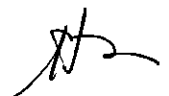
Mr. S. Ban explained the Progress report for The 2nd Joint Coordination Meeting using presentation material. After his presentation, he add further statement that the report is still the draft and technical cooperation project plan and comprehensive agriculture development plan will be a broad outline only due to time constraints of work schedule. The Study Team will soon prepare the Interim Report on the Survey inclusive more clear draft plan on technical cooperation project as well as comprehensive agriculture development plan.

Furthermore, he also informed the work schedule of the Study Team in Nepal as well as Tokyo, of which the Survey Team will leave for Tokyo on 16th June, 2013 and will come around mid-July to finalize the Study.

After the presentation by the Team Leader, technical discussion on the findings of the Survey, tentatively proposed technical cooperation project as well as comprehensive agriculture and rural development plan was held.

During the technical meeting, many questions, comments and requests on the findings as well as tentatively proposed plans are discussed among the attendants.

The questions, comments and requests and its' responses are summarized below.



1 Queries and Responses

1.1 Sustainability of OFWM project under NISP

(Queries)

As for the On-Farm Water Management Project (OFWMP) implemented under the umbrella of the Nepal Irrigation Sector Project (NISP) financed by the WB as Pilot scheme for strengthening WUA, Is the functions of WUA and O & M management still sustainable?

<Response from DOI>

The OFWMP was implemented at a few areas of the Irrigation Line of Credit Project (ILC) and follow up NISP areas.

The outcome of the pilot scheme of OFWMP under NISP was tested as a part of implementation program of proposed Integrated Crop and Water Management Program (ICWMP) and with successful result, at present, DOI is implementing ICWMP program as a regular program with its limited fund. DOA is providing the budget only in limited Schemes. In addition IWRMP also implementing as a small component (component D).

<Response from the Survey Team>

The survey team has not visited those project sites. But the evaluation study 2003 has shown that farmers were operating most of the projects satisfactorily. Since they have learnt techniques, it can be anticipated that projects are being managed accordingly.

1.2 Organizational Reform

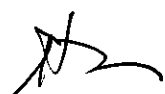
(Queries)

What will be the organization reform for TCP?

<Response from DOI>

GoN intends to adopt the similar integrated coordination mechanism, of which was adopted in the GoN/ICWMP program. The coordination committee is established at central level and can be established at the district level as District Coordination Committee (DCC), according to ICWMP guideline book and coordination activities will be closely connected between the central and the district level.

DOI and DOA supports to go ahead almost in the same approach for the implementation of the TCP.



1.3 Selection of Tentative Projects for TCP

(Queries)

Considering the requests of district level on the TCP, the GoN expects to select, at least one (1) candidate of the each district. In the list of the tentative candidate for TCP, the two (2) candidates at Morang and Mahottari districts are assessed as the slightly acceptable, except for another two (2) candidates in Jhapa and Dhanusa Districts. Is it possible to lift up “the slightly acceptable “ to “the acceptable”?

<Response from the Survey Team>

Evaluation of the projects in 4 districts was made based on the information available from respective IDDOs. Two projects were chosen as the accepted and another 2 in another districts were categorized as the slightly acceptable due to low possibility of irrigation water for year round irrigation at on-farm level due to lack of shortfall of on - farm irrigation facilities (whether turnout, tertiary canal, division structure and water course are not constructed) and lack of adequate technical information of the project.

More information shall be made available shortly to facilitate evaluation.

2 Suggestions

2.1 Ground Water Development

Deep tube well irrigation development is being positively carried out in the on-farm water management program (OFWM), but installation of DTW is recommended in the pilot sites only with lower cost.

2.2 Necessity of Drainage Canal Development during On-farm Facility Development

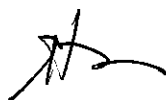
The minimum requirements on drainage canal development is tertiary drainage system to be connected with river and/or stream

2.3 Necessity of Farmers Field School

The necessity of Farmers Field School and multiplying its effectiveness on the farm and farmers, taking into consideration the real output after piloting of NISP program

2.4 Sustainability issues of the project

During formulation of the projects, addressing method for sustainability on the project has to be carefully discussed.



2.5 Need to clarify integrated organization reform

Appropriate integration among DOI, DOA, NARC and other relevant stakeholders is need to implement the TCP successfully.

It is possible to carry out the implementation of the TCP in integrated approach like in Integrated Crop and Water Management (ICWMP). The existing mechanism of ICWMP has to be reviewed.

2.6 Additional information on the 2 candidates for TCP

DOI should provide additional information of the two (2) candidates for the TCP in Morang and Mahottari Districts, if available.

2.7 Demarcation of Scope of Works for TCP among the on-going similar projects

DOI should make clear demarcation of the scope of works for TCP among the on-going similar projects financed by the donors, especially rehabilitation works of the Kankai irrigation project undertaken under the IWRMP.

Mr. Uttam Timilsina, Chairman of the Joint Coordination Committee thanked for the presentation and assured to avail more information to facilitate further evaluation. He also informed that he will contact Director General regarding coordination with DOA and NARC.

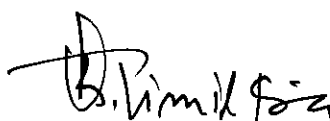
Team Leader Mr. S. Ban acknowledged and responded to clarify comments and agreed the suggestion.

Mr. Uttam Raj Timilsina Deputy Director General of IMD/DOI on behalf of the Joint Coordination Committee basically agreed on the Progress Report.

Kathmandu, 11th June 2013

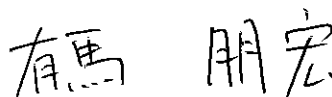


Mr. Shoichiro Ban
Team Leader
JICA Study Team



Mr. Uttam Raj Timilsina
Deputy Director General
Department of Irrigation
Ministry of Irrigation

Witness:



Mr. Tomohiro Arima
Representative
Japan International Cooperation Agency
Nepal Office

Minute of Meeting

Presentation of Draft Interim Report, July 2013 Preparatory Survey of JICA's Technical Cooperation Program for Agricultural and Rural Development, Food Production and Agriculture in Tarai Plain, Nepal

The presentation and discussion on the Draft Interim Report, July 2013 was held as follows:

Date/Time: July 17, 2013
Place: Seminar Hall, Department of Irrigation
Participants: Refer in the attached Attendance List

Mr. Uttam Raj Timilsina, Deputy Director General Department of Irrigation welcomed to the participants and requested Mr. Ban, Team Leader of JICA Preparatory Study Team to present the Draft Interim Report.

The Team Leader briefed the overall structures of the presentation including objectives of the study, progress of the study and other features of the study area. After his briefing, Mr. Sano, Sr. Irrigation Engineer of the Study Team sequentially explained the present conditions of agriculture in the 4 district areas of the Terai, of which the Study Team found out during the 1st field survey, such as irrigable areas, cultivation area of major crops, crop production based on available data of 2011/12, annual balance of cereal, food sufficiency, target farmers for the agriculture development and farmers' income, and overall issue and problems on irrigated agriculture including the envisaged countermeasures for the issues and problems.

The Team Leader continued his presentation covering the key topics of the study, such as past and ongoing projects supported by main donors, agricultural constraints, counter measures & proposed development programs in the Central and Eastern Region areas of the Terai Plain and the proposed JICA's assistance program for 10-year, consisting of 3 programs, such as (i) the pilot program, (ii) the model program of on-farm irrigation development with area of approximately 10,000ha and (iii) the extension support activities program of agriculture and institutional support system in the model program area of the 10, 000 ha.

He also gave elaborately additional explanation on JICA's assistance program as follows:

The first pilot scheme, namely Technical Cooperation Program-1 (TCP-1) aims to demonstrate on-farm development, improvement water management, agriculture development and trainings and improvement of institutional support system, and the outcomes from the TCP-1 will be transferred into the model project of on-farm irrigation development to test the outcomes.

The model program aims to implement on-farm irrigation development by adopting the outcomes of the TCP-1 and the program area will be selected from existing irrigation projects in the 4 districts (Jhapa, Morang, Dhanusha and Mahottari Districts).

The Technical Cooperation Program-2 (TCP-2) has the aims to carry out agriculture development and trainings, improvement of institutional support system experienced under the TCP-1, mainly managed by GoN with JICA's assistance.

Furthermore, the Team Leader explained that TCP-1 is proposed as JICA's Technical Cooperation Project and that the pilot project area is assumed at approximately 500 ha per a scheme as secondary irrigation block, consisting of construction and rehabilitation of on-farm irrigation facilities, O & M irrigation facilities and implementation of various agricultural activities through bottom-up approaches. Detail contents of TCP -1 would be prepared in detail in this period.

Finally, the Team Leader requested the Joint Coordination Committee for their views and suggestions regarding the following points:

- (i) Integrated organizational setting up for TCP-1 operation and management
- (ii) Demarcation of approaches among Donors especially in Kankai with IWRMP

After the presentation, discussion on the Draft Interim Report was made among the Joint Coordination Committee, Study Team and JICA Nepal Office. The following comments, requests and suggestion were given to the Study Team.

(1) Comments and Response of the Study Team

The comments and the responses are summarized below.

(i) Comment-1

Potential irrigation area identified in the study area should be verified with Satellite system or GIS or land use maps. If needed, information can be provided by DOI for Jhapa and Morang districts.

(ii) Comment-2

Irrigated area presented in Table 1 is primarily for monsoon season and does not reflect the irrigated area for winter and spring crops Segregation of overall total irrigable and potential area into winter and monsoon season is needed.

- Response to Comments-1 & 2 by the Study Team

The Study Team expressed its limitation to go far beyond for such studies. The information provided is based on data provided from each district office and GON's agricultural statistics. It is much helpful for the study that the DOI provide the available information.

(iii) Comment-3

Considering the conditions of surveyed sample and data, such as social structure and status, location, type of water resource, other physical conditions, etc, the

output of the survey and interpretation should be categorized and reflected into the report.

- Response to Comments-3 by the Study Team

The Study Team has already tried to clarify in these views as explained in the meeting on the progress report in June 2013. As for performance and management activities of WUA as well as water management, much difference influenced from these factors was not significantly found out. But, the Study Team is still studying other components concerned with agriculture development and remains these comments under consideration in this period.

(iii) Comment-4

The study should focus on improving water availability aspects for sustainable crop planning

- Response to Comments-4 by the Study Team

The Study Team welcomed this idea of the participants but at the same time expressed its scope limited to better manage whatever water is available in the command area

(2) Suggestions

The following suggestions were given to the Study Team and the Study Team replied to improve the suggested matters within the remaining time frame.

- (i) Suggestions were given by the participants to present 'other income data' shown in Table 7 in disaggregated form in the case of House Holds below 0.5 ha.
- (ii) Participants suggested for ranking study area based on the observed issues and constraints particularly focusing on policy issues, shortage of agriculture inputs, on-farm issues and labor shortage
- (iii) Developing multipurpose WUA should be considered for better performance in sustaining the project activities, reorganizing and empowering them through policy support.
- (iv) Participants suggested to set up a coordination mechanism among NARC, DOA and DOI making WUA as hub or center point for development for the smooth project operation and management,
- (v) Participants requested Study Team for the circulation of Interim Report through emails to the committee members. The members will provide their comments and suggestions to the Study Team.

(3) Requests

The following requests were given to the Study Team by the participants and the Study Team replied to study the requested matters as much as possible, within the remaining time frame.

- (i) It was requested by the participants to incorporate items such as new agricultural technology, water utilization technique, communication mechanism within and outside WUA with better information management process in the final report.
- (ii) It was also suggested to include in the final report the institutional arrangements for project implementation, coordination and cooperation mechanism with clear cut roles and responsibility of different actors of project implementation.
- (iii) Explaining the situation of prevailing lower irrigation efficiency that has been observed (less than 35%) in farm irrigation management, loss of applied chemical fertilizers, participants requested to the Study Team to include, land leveling and land consolidation program also for enhancing irrigation efficiency.
- (iv) Also participants requested to include Mohattari(Bigi) and Morang with one project for the equal consideration.

Mr.Satoshi Fujji, Senior Representative, JICA highlighted the present challenges in meeting food deficit in Nepal. Also highlighting project implementation coordination issues, he shared his past experiences how it would be solved at the end. In the course of his advices for the successful implementation of TCP, he said that JICA would support to the extent of its capacity for the better prospect and future of agriculture development in Nepal.

Mr.Uttam Raj Timilsina Chairman of the Joint Coordination Committee thanked for the presentation and basically agreed on the Interim Report for further improvement with given possible suggestions within the given time frame of the Study Team.

The Team Leader acknowledged comments, suggestions and replied to clarify these matters within the remaining time frame.



Mr. Shoichiro Ban
Team Leader
JICA Study Team



Mr. Uttam Raj Timilsina
Deputy Director General
Department of Irrigation
Ministry of Irrigation

List of Participants
Preparatory Survey on JICA's Cooperation Program for Agriculture and Rural Development

Subject: Joint Coordination Committee Meeting
 Date and Time: 17th July 2013
 Venue: Department of Irrigation Office, Jawalakhel

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Minutes of Meeting

Presentation on Draft Final Report

Preparatory Survey of JICA's Technical Cooperation Program for Agricultural and Rural Development, Food Production and Agriculture in Terai Plain, Nepal

The presentation and discussion on the Draft Final Report was held as follows:

Date/Time: August 25, 2013, AM 11: 00 – PM 1:20
Place: Seminar Hall, Department of Irrigation
Participants: Refer to Attachment-1 (Attendance List)

Mr. Uttam Raj Timilsina, Deputy Director General Department of Irrigation made opening statement of the meeting and requested Mr. Shoichiro Ban, Team Leader of JICA Preparatory Survey Team to present the Draft Final Report.

Team Leader of the JICA Survey Team expressed his gratitude to everyone for attending the meeting and explained that presentation of the Draft Final Report would be conducted by team members with slides of Power-Point (refer to Attachment-2). Then, he handed over Mr. Kenichi Shibuta, Deputy Chief Engineer of Nippon Koei, Head Office.

Mr. Shibuta commenced his presentation from overall contents of the presentation as the introduction, and then continued the objectives of the preparatory survey, Nepal's position in the world paddy production, production of major crops in the 4 District, total household incomes, available resources in irrigation and agriculture extension service, marketing issues and constraints in irrigated agriculture, policy of irrigation and agriculture; and finally he ended his presentation with the various lesson learned from the past and ongoing projects in Nepal.

Ms. Kazuko Shirai, Marketing Expert presented program development scenario, the proposed strategy of the program, the goals, the objective, the output and the activities including time frame for the establishment of the model in two (2) districts by the proposed Technical Cooperation Project (TCP).

Mr. Yukinori Sano, Senior Irrigation Engineer explained existing and sample cropping pattern and agriculture incomes for the TCP.

Ms. Nobuko Miyake, Sociologist presented the proposed implementation structure of the TCP explaining different tiers and committee member composition. Also she presented concept of platform meetings to be organized with all stakeholders, DADO/DOA, IDDO/DOI, NARC, WUA, private sectors, etc.

Mr. Ban continued his presentation on justification of TCP and the role and responsibilities of the GON in making the TCP successful. Finally he explained the 10-year development plan for irrigated agriculture in Terai plain along with the conclusion and recommendation.

After the presentation, discussion on the Draft Final Report was held among the members of the Joint Coordination Committee (JCC), Survey Team, JICA Nepal Office and the Second Secretary, Embassy of Japan in Nepal. The following comments and suggestion were given to the Survey Team.

(1) Comments and Response of the Survey Team

The comments and the responses are summarized below.

Comment 1: DADC would have been the best option at district instead of DCC as the earlier one has legal status. Agricultural program is devaluated while irrigation program is centralized. So, DADC would have been the best option.

Response 1: Director General of DOI responded that the situation of agriculture devolution and about DADC was discussed in earlier meetings and DCC was accepted with the consensus that upper level co-ordination committee will solve the issues concerned in DADC. And, also, DADC cannot focus on pilot scheme like this as it has many projects in the district.

Comment 2: Roles and responsibility of different actors involved have not been elaborately explained.

Response 2: Director General of DOI responded that all roles and responsibility of all members and committees have been explained in the guide book of ICWMP agreed by all department chiefs of DOI, DOA, NARC and ADB.

(2) Suggestions

The participants suggested the following points to be considered while finalizing the Final Report.

- (i) Include programs approach for crop diversification, land leveling and profitable farming,
- (ii) It was suggested to keep up TCP model as learning institution for future transfer of knowledge and practices. NARC is willing to lead to support as Research Center for TCP,
- (iii) Define clear cut roles and responsibilities of each stakeholder in the proposed organization chart,
- (iv) Clearly define the ownership of this project in the Final Report, and
- (v) No fund flow arrangement is seen clearly for project implementation, so please define it in the Final Report.

(vi) It is requested for the support for the 10-years program from JICA with GON initiative.

Before the end of the comments and suggestions, Mr. Shiva Kumar Sharma, DG of DOI expressed his commitments to acknowledge the roles and responsibility of DOI to make the program successful. Also, he appreciated the effort and time devoted by the Survey Team in producing very good reports and presentation derived through the past lessons from the projects.

It was confirmed by the JCC members that the comments on the Draft Final Report submitted should be sent to the Survey Team by the end of August 2013.

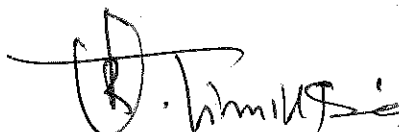
Mr. Satoshi Fujii, Senior Representative of JICA explained how important this TCP is for Nepal Terai Agriculture in the present Context. However, some facts like motivation of field staff to run program smoothly should be discussed elaborately. Success also depends not only by farmer and field staff, but also on government initiative and its support is inevitable. At the end, he appreciated the effort of government and the Survey Team for interesting presentation.

Mr. Uttam Raj Timilsina Chairman of the Joint Coordination Committee thanked for the presentation and basically agreed on the Draft Final Report with further improvement with given possible suggestions within the given time frame of the Survey Team.

The Team Leader acknowledged the comments and suggestions and replied to clarify these matters in the Final Report.



Mr. Shoichiro Ban
Team Leader
JICA Study Team



Mr. Uttam Raj Timilsina
Deputy Director General
Department of Irrigation
Ministry of Irrigation

Attachment -1: Attendance List

Attachment -2: Presentation materials on the Draft Final Report








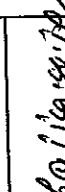


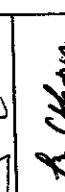

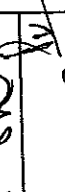


JOINT COORDINATION COMMITTEE MEETING

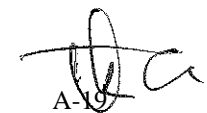
Attendance Sheet







Venue: Meeting Hall, Room no 424, Department of Irrigation

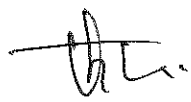
Date : 25th August, 2013

Time: 11 am

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Supporting Data B

*Development Policies and Legislation
on Agriculture and Irrigation Sectors*

SP-B-1 Three Year Interim Plan (2007/2008-2009/10)

1. Agriculture Sector

The Average annual growth rate in agriculture sector remained at 2.67 percent against the targeted annual growth rate of 4.11 percent during the Tenth Plan period. Major issues of low agriculture production and productivity during the period are adverse climatic condition, low investment, political instability, land fragmentation, unavailability of quality fertilizers, inadequate year round irrigation facilities, limited agriculture commercialization initiatives etc. In general, the country appears to be self sufficient in food production; however, 55 districts are still food deficit.

In this backdrop, The TYIP was primarily formulated based on the Agriculture Perspective Plan and the National Agriculture Policy, 2005 as the central policy for the development of agriculture. The set overall goal of the Interim Plan was “to achieve broad based, gender inclusive and sustainable agricultural growth”. The agriculture sector identified the following specific objectives:

- 1) To increase agricultural production and productivity.
- 2) To maintain food sovereignty by ensuring food security.
- 3) To make the agriculture and livestock sector competitive by transforming subsistence agriculture into commercial agriculture.
- 4) To increase employment opportunities for rural youths, women, Madhesis, persons with disability, Muslims and deprived groups.
- 5) To conserve, promote and utilize agricultural biodiversities through the development and dissemination of environment friendly technologies.

Major strategies adopted to increase agricultural production and productivity includes:

- 1) To avail improved and quality seeds necessary for agricultural production.
- 2) To provide concessions to farmers, in order to reduce the production costs, based on farmers' economic capacity and status by increasing the investments in groundwater and surface irrigation in the Terai.
- 3) To ensure the sustainable utilization of important productive resources, such as land, water and labour.
- 4) To increase agricultural loan investment by simplifying agricultural loan delivery processes and by facilitating the reduction of time and costs to acquire loan.
- 5) To deliver available technologies to farmers, in order to enhance competitive capacity by reducing the production cost of agricultural in a simple and efficient way.
- 6) To make agriculture research and extension services demand driven, inclusive and results-oriented.
- 7) To increase the marketing capacity of farmers.
- 8) To make a partnership among the government, co-operatives and the private sector, sustainable for the development of commercial agriculture by establishing, developing and strengthening larger pocket areas based on geographic, technical and economic feasibilities.
- 9) To orient Madhesis, Adibasi Janjatis, persons with disability and Muslim youths of rural areas towards self-employment, by launching the rural agriculture employment program with a priority to create opportunities of self-employment in villages.

- 10) To uplift economic status of targeted areas and groups by developing skilled human resources in government, NGO and private sectors to increase employment opportunities through commercialization and diversification of agriculture.

The agriculture sector was targeted to achieve the growth rate of 3.6 percent per annum. However, the growth rate remained at 3.3 percent in the Plan period. The contribution of agriculture sector to Gross Domestic Product at the end of the interim plan was at the level of 33.5%. Overall, the share of agriculture sector in national economy is declining. Adverse weather and unavailability of chemical fertilizers negatively affected the agriculture production. Effect of climate change in agricultural production was also apparently visible.

Table 1 Achievements in the Agriculture Sector in the Three-Year Interim Plan

(Quantity in '000 metric tons)

Agricultural Products	Targets at the Final Year of the Interim Plan	Production Situation by the FY 2009/10	Achievements (%)
Food Grains	7778	7762	99.8
Pulses	285	262	91.9
Fruits	723	706	97.6
Vegetables	3001	3004	100.1
Sugarcane	2894	2593	89.6
Potatoes	2379	2517	105.8

Data source: TYP (2010/11-2012/13)

2. Irrigation sector

The 3-year interim plan (TYIP) had been formulated and implemented after the completion of 10th five- year plan. Lack of dependable irrigation services to targeted areas; inadequate repair, maintenance and upkeep in several irrigation scheme; lack of water resource development of irrigation project areas, such as dam reservoir and small ponds as envisaged by the Water Resources Strategy and the National Water Plan and lack of active participation of water user association in the operation, repair and maintenance of public sector irrigation schemes are the major problems that limit the performance of irrigation sector.

In the back drop of the above problems and to undertake counter measures to address the problems, the objective of the TYIP included “To enhance the agriculture production through year round, dependable and sustainable irrigation services promoting opportunities of employment generation, social inclusion and geographically balanced development”.

To achieve the objective of irrigation sector in the TYP period the following strategies were formulated:

- 1) Formulate projects based on the concepts of Integrated Water Resources Management resorting to regionally balanced and inclusive development and creating opportunities of additional employment.
- 2) Implement large and medium scale irrigation schemes, besides groundwater schemes, in the Terai and small and medium scale irrigation schemes in the Hills.

- 3) Continue with promotion of non-conventional irrigation technologies (drip, sprinkler, ponds) catering to the needs of small and marginal farmers in the areas infeasible for conventional irrigation development.
- 4) Promote year round and sustainable irrigation facilities in the public sector and FMISs through needed rehabilitation and improvement.
- 5) Undertake research/studies, innovations and exploratory works on appropriate water management practices, including the feasibility of reservoir backed irrigation schemes and trans-basin water transfer projects, for the development and expansion of irrigation facilities.
- 6) Continue with support for management transfer of the public sector irrigation schemes to organized groups of users through essential structural improvement and capacity building of water users.
- 7) Develop human resources in the irrigation sector through result oriented program implementation and improvement of the monitoring and evaluation system.

Review of the TYIP indicates that irrigation sectors could not provide irrigation facilities in the area as targeted in the interim plan. Availability of inadequate resources was the prime factor that reduced the progress in irrigation sector. The details are given in the table:

Table2 Achievements in the irrigation sector during the TYIP period

No	Program	Unit	Targets of TYIP	Achievements in TYIP	Achievements in percentage
1	Surface irrigation project	ha	26,900	1,800	6.7
2	Medium irrigation project	ha	30,000	3001	10.0
3	Ground water irrigation project	ha	37,400	934	2.5

Data source: TYP (2010/11-2012/13)

SP-B-2 Other National Policies in Agriculture Sector

1. National Coffee Policy 2003

The policy has been designed to involve public and private sectors in coffee production, processing and transaction for income generation, employment creation and increased export for foreign exchange earnings.

The specific objectives of the policy are:

- 1) To substitute import and promote export of coffee
- 2) To generate income and employment opportunities to help poverty alleviation
- 3) To expand coffee cultivation and help protect environment
- 4) To make coffee cultivation a sustainable and attractive business

2. Agro-Biodiversity Policy, 2007

Realizing the national responsibility to conserve and sustainability use agro biodiversity for ensuring food security and livelihood improvement of the Nepalese people and the commitment to fulfill its obligation of implementing Convention on Biological Diversity (CBD), 1992 and other international treaties and agreements the National Agro-biodiversity policy has been formulated. The vision of the Policy is to conserve and sustainable use agricultural genetic resources / materials and associated traditional knowledge and have fair and equitable sharing of benefits to reduce poverty and ensure food security of for present and future generations.

Objectives of the policy are:

- 1) To strengthen food and nutrition security and ensure sustainable agriculture development through Conservation, promotion and sustainable use of agro-biodiversity;
- 2) To protect and promote farmers' traditional knowledge, innovation, technology, skill and practices;
- 3) To establish appropriate distribution system of fair and equitable sharing of benefits arising from the access and use of agricultural genetic resources and materials;
- 4) To contribute to maintaining sustainable ecological balances (ecosystems services) though conservation and sustainable use of agro biodiversity.

3. Aquatic Animal Protection Act, 1960

This Act has defined aquatic lives as any animals living in water, which includes fishes, amphibians, reptiles, birds and mammals living in water. It intends to protect aquatic lives in their natural places from fishing and their natural way of life. It recognizes the government and private water body/ reservoir and prescribes appropriate methods of fishing.

4. Livestock Health and Livestock Services Act, 1999

The act aims to develop livestock industry and to provide for healthy production, sale, distribution, import and export of animals, animal products and animal production inputs. It is concerned with the establishment and management of animal quarantine and authorizes the government to frame rules prescribing terms and conditions to be followed by traders in exporting and importing animals, animal production input and animal products.

SP-B-3 Other Relevant Acts, Rules and Legislations

In agriculture sector, several legislations/orders have been enacted by the GoN. However, these legislation/orders have been promulgated to address agricultural sub sectors' issues. None are focused on the overall management of the agricultural development programs. The purpose of each legislation/order has been described in brief:

1. Plant Protection Act, 1950

The act aims at preventing and controlling expansion of any plant epidemic, infectious or communicable diseases and exporting or importing of plant and plant products.

2. Food Act 1966

The food act is directly related to human health safety. It has provisions for maintaining food quality and preventing undesirable adulteration and/or extraction of/reduction in the inherent quality of food items in view of public health.

3. Pesticides Act 1991 (amended 1998):

The pesticide act has been enacted to regulate import, export, production, sale, purchase and use of pesticides against pests and diseases in seeds, plants, trees, animals, birds, etc. It restricts the import of pesticides like DDT, dieldrin, andrin, aldrin, heptachlor, mirex, texaphene, BHC, linden, organomercury fungicides, methyl parathion, and monocrotophos are banned. The Pesticide Act 1991 and its first amendment in 2008 have a provision of a maximum fine up to Rs 5,000 and seizure of products for trading illegal pesticides

4. Cooperatives Act 1992:

The cooperative act authorizes to manage the formation and operation of various types of cooperatives for the enhancement of economic and social status of farmers, resource poor, laborers, landless, unemployed or social workers.

5. Seeds Act 1988 (amended 2007):

The act was primarily promulgated to serve the economic interest of farming communities by systematizing the production, processing and testing of seeds and to avail quality seeds of different crops for increasing agricultural production and productivity. In conformity with the seed act, the National Seed Board has authority to recommend/advise government on formulation and execution of national policies/regulation concerning seeds to ensure the availability of quality seeds through seed production, processing and marketing.

6. Livestock Health and Livestock Services Act, 1999

The act aims to develop livestock industry and to provide for healthy production, sale, distribution, import and export of animals, animal products and animal production inputs. It is concerned with the establishment and management of animal quarantine and authorizes the government to frame rules prescribing terms and conditions to be followed by traders in exporting and importing animals, animal production input and animal products.

7. Local Self-Governance Act (LSGA) 1999:

The act is enacted for the decentralization and democratization of governance including the

participation of people and the institutional development of local bodies enabling them to bear the responsibility for carrying out plans at the local level. It enhances leadership and decisions making of local bodies on matters affecting them and the lives of the people. The Local Self-Governance Act authorizes the local bodies such as Village Development Committees (VDC), District Development Committees (DDC) and municipalities to formulate and implement policies, programs and activities related agriculture, rural development and other development activities in the respective command areas.

SP-B-4 Water Resource and Irrigation Acts

The Government of Nepal has promulgated the 3 Acts concerned with Water Resource and Irrigation, namely (i) Irrigation Act 1961, (ii) Water Tax Act 1966 and (iii) Water Resource Act 1968/1992.

1. Irrigation Act 1961

The Irrigation Act 1961 was enacted as the first water law act of Nepal to aim at facilitating on construction, maintenance of canal distribution of water and collection of water charges. After the promulgation of the Irrigation Act 1961, the Government has executed massive irrigated area expansion works, construction of canals from main canal up-to tertiary and related structures with bilateral agency support (ADB and WB) in the 4th, 5th, 6th 5-Year Plan (1970-1985).

2. Water Tax Act 1966

The Water Tax Act 1966 articulated provision for water tax and licensing.

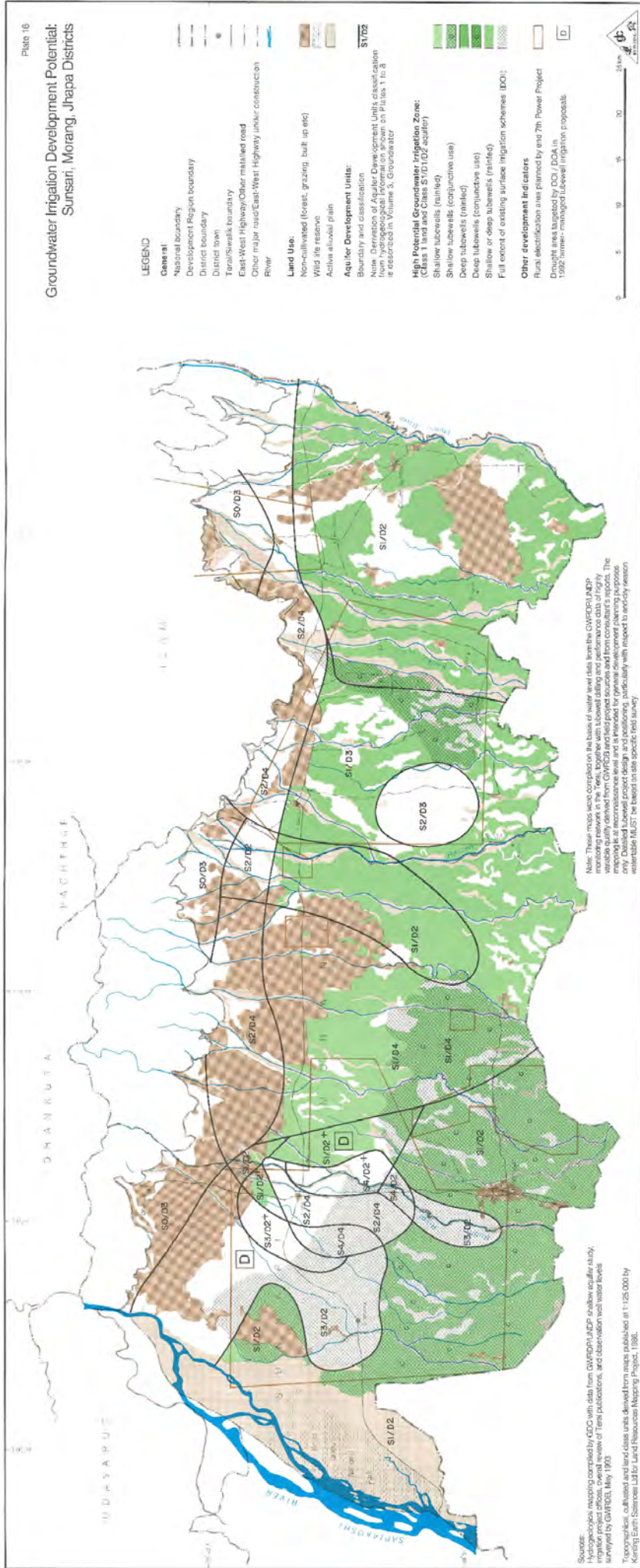
3. Water Resource Act of 1968/1992

The Water Resource Act of 1968 provided legal frame work for the various types of use of water. However, these entire acts could not articulate for the participation of actual water users and other important stake holders. During the 2nd TYP (1966-70) The Government focused in minor irrigation project development.

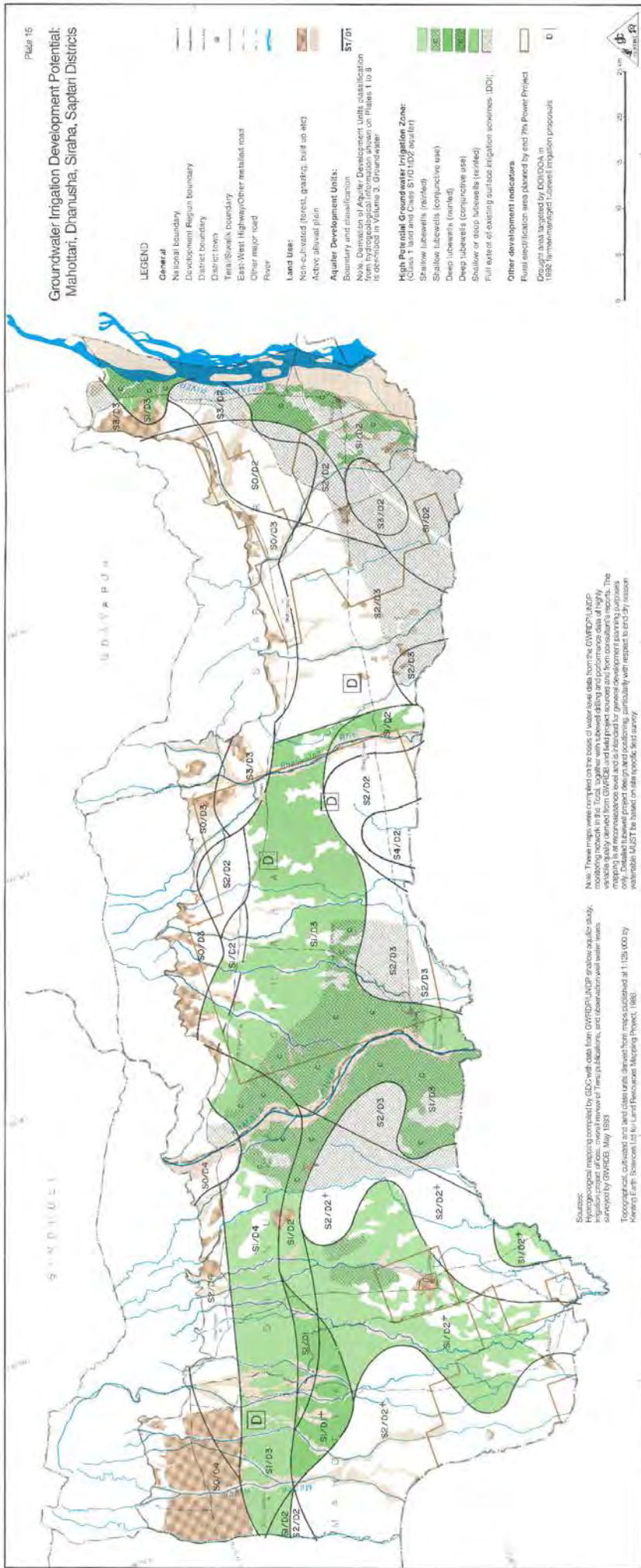
Water Resource Act 1992 was promulgated as the umbrella legislation for water resource sub-sectors such as hydropower, irrigation, drinking water and other water uses. And, the District Water Resource Committees (DWRCs) was established to regulate the use of water resources at the district levels.

Supporting Data C

Irrigation



SP-C-1 Potential Map of Ground Water Resource in Jhapa and Morang District Areas



SP-C-2 Potential Map of Ground Water Resource in Mahottari and Dhanusha District Areas

SP-C-3 (1/4) Monthly Rainfall in Jhapa

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1992	2.2	2.8	0.0	10.5	215.9	162.1	1,014.5	299.8	308.0	91.4	0.0	52.0	2,159.2
1993	23.2	7.8	41.6	118.6	161.1	438.1	958.5	672.1	310.1	320.6	60.3	0.0	3,112.0
1994	50.6	61.5	23.2	29.9	149.1	401.4	335.9	742.3	413.9	7.8	7.8	0.0	2,223.4
1995	2.8	13.8	11.4	2.8	233.6	704.7	646.1	458.4	319.5	145.2	74.4	24.9	2,637.6
1996	42.8	12.8	2.6	25.9	290.3	378.9	1,248.2	449.6	247.2	137.5	0.0	0.0	2,835.8
1997	18.4	6.6	16.7	124.6	92.3	343.2	608.8	349.8	719.0	8.2	0.0	45.7	2,333.3
1998	0.0	2.8	90.1	101.8	119.9	502.6	1,054.0	1,347.6	419.5	115.1	8.0	0.0	3,761.4
1999	0.0	0.0	8.5	43.2	210.5	334.2	837.5	814.0	508.6	275.2	6.6	0.0	3,038.3
2000	0.0	10.6	0.0	100.2	142.7	422.0	831.7	745.9	211.9	89.8	28.3	0.0	2,583.1
2001	1.2	0.9	12.5	98.2	205.5	348.3	462.7	434.0	403.3	426.8	46.5	0.0	2,439.9
2002	58.0	0.0	12.9	91.4	188.9	450.7	937.3	246.5	195.9	129.7	0.0	0.0	2,311.3
2003	0.6	28.2	17.8	41.3	132.0	428.6	1,159.6	381.8	304.1	201.7	34.1	18.3	2,748.1
2004	20.4	0.0	10.2	93.2	245.3	308.7	903.0	327.1	412.7	130.7	0.0	0.0	2,451.3
2005	23.4	8.0	49.0	46.6	110.9	198.6	436.8	757.8	110.2	91.1	0.0	0.0	1,832.4
2006	0.0	2.9	7.2	66.4	213.1	231.7	470.2	234.4	321.3	140.7	6.6	2.8	1,697.3
2007	0.0	102.5	7.3	68.4	130.5	400.7	890.2	332.1	483.2	50.5	31.0	0.0	2,496.4
2008	33.6	4.4	58.2	67.2	199.3	666.1	543.7	954.7	255.4	77.8	0.0	0.0	2,860.4
2009	0.0	0.0	12.4	84.6	342.6	517.4	397.7	827.8	131.4	246.2	0.0	8.0	2,568.1
2010	0.0	0.0	0.0	9.0	202.4	720.2	1,106.2	571.4	300.8	92.1	24.5	0.0	3,026.6
2011	6.6	4.6	13.8	125.6	341.6	421.6	843.6	507.7	320.5	25.2	10.2	1.4	2,622.4
Total	283.8	270.2	395.4	1,349.4	3,927.5	8,379.8	15,686.2	11,454.8	6,696.5	2,803.3	338.3	153.1	
Average	14.2	13.5	19.8	67.5	196.4	419.0	784.3	572.8	334.9	140.2	16.9	7.7	2,586.9

SP-C-3 (2/4) Monthly Rainfall in Morang

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1992	2.0	2.6	0.0	1.7	186.7	147.2	396.4	201.4	189.3	290.6	0.1	1.4	1,419.4
1993	21.1	1.0	34.6	91.3	130.4	307.5	357.1	699.0	346.4	48.5	8.9	0.0	2,045.8
1994	28.3	31.2	8.9	2.9	80.7	165.3	122.8	224.8	160.2	0.9	3.4	0.3	829.7
1995	4.1	14.9	1.8	0.0	46.8	561.7	308.3	252.9	371.0	17.9	70.4	16.8	1,666.6
1996	41.4	57.9	0.2	1.6	201.3	220.0	659.0	541.4	149.5	70.4	0.0	0.0	1,942.7
1997	11.7	2.0	6.4	62.1	180.8	243.0	476.0	228.4	380.4	16.6	0.3	65.3	1,673.0
1998	1.3	4.1	29.0	71.2	47.6	260.5	1,225.2	733.4	276.7	22.2	5.3	0.0	2,676.5
1999	0.0	0.0	0.0	29.5	176.8	317.9	534.9	501.1	202.0	272.9	1.0	0.0	2,036.1
2000	0.0	8.9	0.2	102.5	307.4	569.2	558.0	342.8	382.4	21.0	0.0	0.0	2,292.4
2001	2.4	0.0	1.4	76.9	228.5	296.4	206.1	383.6	509.6	560.8	13.8	0.0	2,279.5
2002	38.4	3.2	4.0	90.8	151.6	233.8	1,000.1	306.7	87.2	6.7	0.0	0.0	1,922.5
2003	20.0	30.8	30.6	140.8	141.6	324.1	787.2	168.1	317.7	138.6	0.4	8.3	2,108.2
2004	39.6	1.4	4.3	133.5	211.9	224.0	876.1	249.2	365.5	38.4	0.0	0.0	2,143.9
2005	38.5	13.5	25.3	23.5	112.0	381.1	276.9	572.7	94.4	57.6	0.0	0.0	1,595.5
2006	0.0	0.0	5.5	45.2	221.5	149.2	356.8	132.6	280.0	105.5	1.1	2.6	1,300.0
2007	0.0	55.0	2.8	24.9	240.0	309.7	392.2	672.6	417.7	1.6	0.9	0.0	2,117.4
2008	0.1	2.6	35.6	44.6	142.3	372.5	369.4	434.2	248.8	49.9	0.0	0.0	1,700.0
2009	0.0	0.0	4.4	17.0	460.3	296.4	280.1	455.8	58.0	117.1	0.6	0.0	1,689.7
2010	0.0	0.0	0.0	33.3	136.2	409.0	564.0	443.7	254.7	29.2	0.0	0.0	1,870.1
2011	5.8	9.1	8.1	107.7	242.3	377.6	467.3	430.1	250.1	12.3	9.2	0.0	1,919.6
Total	254.7	238.2	203.1	1,101.0	3,646.7	6,166.1	10,213.9	7,974.5	5,341.6	1,878.7	115.4	94.7	
Average	12.8	11.9	10.2	55.1	182.4	308.3	510.7	398.8	267.1	94.0	5.8	4.8	1,861.5

SP-C-3 (3/4) Monthly Rainfall in Dhanusha

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1992	0.1	2.8	0.2	9.5	172.8	121.5	208.3	170.1	82.7	176.2	1.6	0.0	945.8
1993	4.9	1.8	27.3	156.0	88.9	162.0	291.6	575.4	128.7	0.0	0.0	0.0	1,436.6
1994	44.8	37.3	5.7	12.4	89.5	60.4	365.9	284.1	303.2	0.0	0.0	0.0	1,203.3
1995	8.6	20.5	7.0	0.0	20.7	324.1	231.2	119.4	72.1	18.7	28.3	11.4	862.0
1996	32.7	3.2	0.4	1.4	14.1	308.7	550.5	253.9	80.2	115.7	0.0	0.0	1,360.8
1997	11.9	0.6	4.4	108.7	97.7	302.6	573.9	328.7	130.0	5.9	0.4	32.8	1,597.6
1998	11.2	10.0	40.7	62.6	21.5	189.8	823.3	712.0	104.2	67.4	12.7	0.0	2,055.4
1999	0.0	0.0	0.0	24.1	183.4	453.2	360.8	344.2	164.3	219.6	0.0	0.0	1,749.6
2000	5.0	5.0	16.0	0.0	82.3	151.1	566.9	79.7	220.7	238.4	18.8	0.0	1,383.9
2001	3.2	0.0	0.7	10.5	133.1	300.1	335.6	382.0	299.7	281.0	0.0	0.0	1,745.9
2002	44.3	12.1	0.0	49.3	233.5	68.0	776.3	100.2	98.2	3.7	0.2	0.0	1,385.8
2003	21.9	22.2	35.3	0.0	129.6	774.0	525.9	238.6	107.7	69.1	0.0	12.2	1,936.5
2004	18.4	0.0	0.0	117.0	189.5	367.8	1,221.5	117.8	135.0	32.4	0.0	0.0	2,199.4
2005	0.0	5.9	0.0	101.4	63.8	180.0	183.6	677.9	57.6	35.8	0.0	0.0	1,306.0
2006	0.0	0.0	33.4	37.4	85.1	290.9	262.8	59.1	491.9	0.0	0.0	0.0	1,260.6
2007	0.0	0.0	9.3	65.3	150.9	438.1	976.8	523.8	398.9	0.0	0.0	0.0	2,563.1
2008	2.5	0.0	12.5	48.5	161.1	207.0	352.8	261.5	100.5	64.2	0.0	0.0	1,210.6
2009	0.0	0.0	2.5	8.3	277.9	78.0	197.2	577.7	0.0	58.4	0.0	4.1	1,204.1
2010	0.0	5.4	4.5	43.5	157.6	93.5	324.3	297.3	0.0	11.5	0.0	0.0	937.6
2011	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.0
Total	209.5	126.8	199.9	855.9	2,353.0	4,870.8	9,129.2	6,103.4	2,975.6	1,398.0	62.0	60.5	
Average	11.1	6.7	10.5	45.1	123.8	256.4	480.5	321.2	156.6	69.9	3.3	3.2	1,488.2

SP-C-3 (4/4) Monthly Rainfall in Mahottari

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1992	0.0	2.0	1.0	20.0	206.0	112.0	192.0	169.2	102.0	171.5	0.0	0.0	975.7
1993	6.0	0.0	13.0	57.7	32.5	126.5	295.0	461.0	179.0	0.0	0.0	0.0	1,170.7
1994	26.3	6.5	2.2	2.2	45.9	43.2	190.1	194.9	297.0	0.0	0.0	0.0	808.3
1995	4.9	0.0	0.0	0.0	0.0	302.6	162.7	290.5	33.5	3.0	0.0	13.0	810.2
1996	0.0	8.7	0.0	0.0	16.0	216.5	437.7	245.2	210.7	126.7	0.0	0.0	1,261.5
1997	13.0	0.0	39.0	71.2	28.5	121.0	271.5	256.7	222.0	0.0	0.0	0.0	1,022.9
1998	6.0	10.5	31.0	68.0	99.5	110.0	589.0	509.0	0.0	0.0	0.0	0.0	1,423.0
1999	0.0	0.0	0.0	22.0	150.5	515.0	316.2	445.0	63.0	21.5	0.0	0.0	1,533.2
2000	0.0	10.5	0.0	20.0	103.0	368.5	171.0	314.0	10.0	0.0	0.0	0.0	997.0
2001	0.0	10.5	0.0	20.0	103.0	368.5	161.0	324.0	10.0	0.0	0.0	0.0	997.0
2002	0.0	0.0	0.0	10.0	45.9	43.2	190.1	194.9	297.0	0.0	0.0	0.0	781.1
2003	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	NA
2004	0.0	0.0	60.0	100.0	103.0	368.5	171.0	314.0	10.0	0.0	0.0	0.0	1,126.5
2005	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	NA
2006	0.0	10.5	0.0	20.0	103.0	368.5	161.0	324.0	10.0	0.0	0.0	0.0	997.0
2007	0.0	28.0	11.5	34.0	177.2	493.5	389.4	74.5	296.5	27.0	0.0	0.0	1,531.6
2008	0.0	0.0	4.5	5.2	132.0	109.0	259.0	191.0	197.0	0.0	0.0	0.0	897.7
2009	0.0	0.0	0.0	0.0	53.0	43.5	47.9	232.9	37.0	47.5	0.0	0.0	461.8
2010	0.0	0.0	0.0	42.0	114.5	58.0	148.0	324.0	10.0	0.0	0.0	0.0	696.5
2011	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	NA
Total	56.2	87.2	162.2	492.3	1,513.5	3,768.0	4,152.6	4,864.8	1,984.7	397.2	0.0	13.0	
Average	3.3	5.1	9.5	28.9	89.1	221.6	244.3	286.2	116.8	23.4	0.0	0.8	1,028.9

SP-C-4 Organizational Situation of WUA in 4 Districts

No	District	Basic Information of WUA				Organization of WUA			Member of Main Committee			Committee activities	
		Projects	Irrigation area (ha)	Branch Canal	Main Committee	Branch Committee	Male	Female	Total	% of Female	Water Distribution	ISF collection	
1	Jhapa	Lower Kisini khola	1,500	5	1	6	8	3	11	27%	Branch Committee	Branch Committee	
2	Jhapa	Bhuteni Sainik	350	9	1	NA	6	3	9	33%	Main Committee	Main Committee	
		Sub Total	1,850	14	2	6	14	6	20	60%			
3	Morang	Ke.Bho.Le.Na	980	15	1	15	16	3	19	16%	Branch Committee	Branch Committee	
4	Morang	Musargatta	600	8	1	NA	9	2	11	18%	Main Committee	Main Committee	
5	Morang	Bhuwa chisang	350	4	1	5	11	4	15	27%	Branch Committee	Main Committee	
6	Morang	Hasina Simsar	335	5	1	NA	NA	NA	NA	NA	Main Committee	Main Committee	
		Sub Total	2265	32	4	20	36	9	45	61%			
7	Dhanusha	Jallad	750	7	1	NA	0	0	0	0%	Main Committee	Main Committee	
8	Dhanusha	Hardinath (west)	1,100	24	1	21	23	2	25	8%	Branch Committee	Branch Committee	
9	Dhanusha	Hardinath (east)	1,000	13	1	13	NA	NA	17	NA	Branch Committee	Main Committee	
10	Dhanusha	Dudhumati	200	4	1	NA	9	2	11	18%	Main Committee	Main Committee	
11	Dhanusha	Dhanuji Bandh	335	2	1	NA	10	5	15	33%	Main Committee	Main Committee	
		Sub Total	3385	50	5	34	42	9	68	59%			
12	Mahottari	Bigihi	3,500	7	1	7	11	3	14	21%	Main and Branch Committee	Main and Branch Committee	
13	Mahottari	Kalapani	220	7	1	NA	7	4	11	36%	Main Committee	Main Committee	
14	Mahottari	Pachain	600	3	1	NA	8	3	11	27%	Main Committee	Main Committee	
15	Mahottari	Cheru Maisthan	100	3	1	NA	8	3	11	27%	Main Committee	Main Committee	
		Sub Total	4,420	20	4	7	34	13	47	111%			

Source : JICA Survey Team 2013

SP-C-5 Situation of Water Management, Cultivation Plan and Water Distribution Plan

No	Basic information of Irrigation Systems				Cultivation plan			Water Distribution plan				Executor of Field Water Distribution			Fine Rules		Remarks
	District	Projects	Irrigation area (ha)	Branch Canal	Prepared by	Approved by	Prepared by	Approved by	Main committee	Branch committee	Operator	Users	Existence of Rule	Action	Remarks		
1	Jhapa	Lower Kisimi khola	1,500	5	x	x	x	x	x	O	x	O	x	No systematic operation			
2	Jhapa	Bhuteni Saimik	350	9	x	x	x	x	x	O	x	O	x	No systematic operation			
3	Morang	Ke. BHO. Le. Na	980	15	x	x	x	x	x	O	x	O	x	No systematic operation			
4	Morang	Musargatta	600	8	x	x	x	x	x	O	x	O	x	No systematic operation			
5	Morang	Bhuwa chisang	350	4	Branch committee for winter crop cultivation plan	Main committee for winter crop cultivation plan	Branch committee	Main committee	x	O	x	O	O	Harmonised coordination operation			
6	Morang	Hasina Simsar	335	5	x	x	x	x	x	O	x	NA	NA	No systematic operation			
7	Dhanusha	Jallad	750	7	x	x	x	x	x	x	x	x	x	No technical Approaches			
8	Dhanusha	Hardmath (West)	1,100	24	x	x	x	x	x	O (Main)	x	O	x	No systematic operation			
9	Dhanusha	Hardmath (east)	1,000	13	x	x	x	x	x	O	x	O	x	No systematic operation			
10	Dhanusha	Dudhumati	200	4	x	x	x	x	O	x	x	O	x	No systematic operation			
11	Dhanusha	Dhanuji Bandh	335	2	x	x	Main committee	General assembly	O	x	x	O	O	Harmonised coordination operation			
12	Mahottari	Bighi	3,500	7	x	x	x	x	x	O	x	O	x	No systematic operation			
13	Mahottari	Kalapani	220	7	x	x	x	x	x	O	x	O	O	No systematic operation			
14	Mahottari	Pachain	600	3	x	x	Main Committee	General assembly	O	x	x	NA	NA	Harmonised coordination operation			
15	Mahottari	Cheru Maisthan	100	3	x	x	Main committee	general assembly	O	x	x	O	O	Harmonised coordination operation			

Source : JICA Survey Team 2013

SP-C-6 Status of ISF Collection Mechanism at Irrigation Systems of Sample Survey Area

No	District	Name of the system	Irrigation area (ha)			Rate of ISF				Collected by					Collection ratio			Payment of ISF tax to GoN (10%)
			Planned	Irrigated summer	Irrigated winter/spring	Cash	In kind	Unit	Timing for ISF collection	Times per year	Main committee	Branch committee	Other	Collected Amount (Rs.)	% for Expected Area	Expected Amount for Total Cultivated Area*	% for Total Area	
1	Jhapa	Lower Kisini khola	1,500	1,100	450-600	750		ha	winter/spring	1	x	O	x	79,560	20%	1,218,750	7%	7,956
2	Jhapa	Bhutei Suinik	350	300	170-190	300		ha	winter/spring	1	O	x	x	67,500	125%	144,000	47%	6,750
3	Morang	Ke.Bho.Le.Na	980	780	200-300	300		ha	winter/spring	1	x	O	x	63,778	85%	309,000	21%	6,378
4	Morang	Musargatta	600	550	330-425	750		ha	winter/spring	1	O	x	x	132,330	47%	695,625	19%	13,233
5	Morang	Bhuva chisang	350	350		2,950		ha	summer	1	x	x	900,000	87%	1,032,500	87%	90,000	
6	Morang	Hasina Sinsar	335	134				ha	summer	1	x	x	-	-	Rice 1,983.2kg	-		
7	Dhanusha	Jallad	750	700	225-300	x	x	x	x	x	x	x	x	x	x	x	x	
8	Dhanusha	Hardinath (west)	1,100	1,000	150-200	150		ha	winter/spring	1	x	O	x	20,500	78%	176,250	12%	2,050
9	Dhanusha	Hardinath (east)	1,000	1,000		148		ha	summer, winter	2	visit each HH	x	x	-	-	147,500	-	
10	Dhanusha	Dudhumati	200	200	47	295		ha	winter	1	visit each HH	x	x	-	-	72,865	15%**	
11	Dhanusha	Dhanuji Bandh	335	355				ha	summer, winter	2	x	x	operator (4nos)	-	-	Rice 9,916kg/wheat 4,958kg	-	107,000
12	Mahottari	Bighi	3,500	3,000	400-500	3,000		day	winter/spring by VDCs, irregularly	1	x	O	x	107,000	-	-	-	107,000
13	Mahottari	Kalapani	220	201	70-105	35		hours	winter/spring	1	x	X	operator	11,797	-	-	-	1,180
14	Mahottari	Pachain	600			222		ha	only once in the beginning		O	x	x	-	-	133,200	-	
15	Mahottari	Cheru Maishan	100			295		ha	summer	1	x	x	operator (4-5nos)	-	-	8,880kg	-	
			Total								5	4	6					
			%								33%	27%	40%					

* Total of cultivable land of summer, winter and spring.

** Based on the information collected through interview and observation by the study team

Source : JICA Survey Team 2013

SP-C-7 Situation of Maintenance Works, Source of Budget at Sample Survey Area

No	District	Name of the system	Irrigation area (ha)	Irrigated area (ha)	Management	WUA's Involvement on Maintenance			Maintenance cost (Rs.)	Source of maintenance budget	Participation on canal clean up	Penalty rules		Remarks
						Structures	Main canal (lined)	Other canal (Earth)				Existence	Effect	
1	Jhapa	Lower Kisini khola	1,500	1,100	FMIS	x	O	O	84,011	ISF	high	O	x	IDD and VDC supported maintenance budget last year
2	Jhapa	Bhuteni Sainik	350	300	FMIS	x	x	O	244,020	DADO, DDC/IDD	high	O	x	
3	Morang	Kc.Bho.Lc.Na	980	780	FMIS	x	O	O	252,728	IDD	high	O	x	Users contributed 7% of total maintenance cost. WUA collected fine and penalties 5,979Rs.
4	Morang	Musargatta	600	550	FMIS	x	O	O	139,055	IDD, DADO	high	O	x	
5	Morang	Bhuwachising	350	295	FMIS	x	x	O	NA		high	O	O	Keep 10% of ISF as maintenance fund
6	Morang	Hasha Simsar	335	134	FMIS	NA	NA	NA	NA		-	NA	NA	Managed by operator
7	Dhanusha	Jallad	750	700	FMIS	x	x	x	NA		low	x	x	
8	Dhanusha	Hardinath (west)	1,100	1,000	JMIS	x	x	O	380,448	IDD	low	O	x	
9	Dhanusha	Hardinath (east)	1,000		JMIS	x	x	O	NA		low	O	x	
10	Dhanusha	Dudhumati	200		FMIS	x	x	O	NA		O	O	x	
11	Dhanusha	Dhanuji Bandh	335		FMIS	x	x	O	NA		high	O	O	Repair gabion box at intake almost every year by users
12	Mahottari	Bighi	3,500	3,000	FMIS	x	x	O	471,567	IDD	low	O	x	
13	Mahottari	Kalapani	220	201	FMIS	Earthen dam	x	O	9,288	Forest user group, VDC	high	O	O	WUA collected fine and penalty 2,600Rs.
14	Mahottari	Pacham	600		FMIS	x	x	O	NA	IDD	O	NA	NA	On maintenance by IDD
15	Mahottari	Cheru Maisthan	100		FMIS	x	x	O	NA		high	O	O	
Total						1	3	13			8	12	4	
						7%	20%	87%			53%	80%	27%	

Source : JICA Survey Team 2013

SP-C-8 Financial Balance of WUA and Proportion of O & M Cost

No	District	Name of the system	Income (Rs)					Expenditure (Rs)					Balance (Income - Expenditure)			Proportion of O&M Cost		
			ISF	Agency support	Others & carry over	Subtotal	Water tax (10 % of Income)	Operator	Operation cost	Repair & maintenance	Subtotal	Operation cost	Operation (%) against	Maintenance Cost (Rs)	Maintenance (%) against			
1	Jhapa	Lower Kisini khola	79,560	0	36,062	115,622	NA	2,500	23,161	84,011	109,672	5,950	25,661	22.2	84,011	72.7		
2	Jhapa	Bhuteni Saimik	67,580	220,000	20,502	308,082	NA	23,161	36,000	109,672	139,249	59,161	19.2	109,672	35.6			
3	Morang	Ke.Bho.Le.Na	63,668	0	758,059	821,727	NA	111,600	45,531	252,728	409,859	411,868	19.1	252,728	30.8			
4	Morang	Musargatta	132,330	171,460	55,798	359,588	NA	49,300	71,450	139,055	259,805	99,783	33.6	139,055	38.7			
5	Morang	Bhuwa chisang	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
6	Morang	Hasina Simsar	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
7	Dhanusha	Jallad	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
8	Dhanusha	Hardinath	20,500	380,448	26,641	427,589	15,000	NA	NA	380,448	32,141	15,000	3.5	380,448	89.0			
9	Dhanusha	Hardinath	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
10	Dhanusha	Dudhumati	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
11	Dhanusha	Dhanuji Bandh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
12	Mahottari	Bjghi	107,000	471,567	12,125	590,692	NA	93,000	13,950	471,567	12,175	106,950	18.1	471,567	79.8			
13	Mahottari	Kalapani	11,797	35,000	3,156	49,953	NA	12,000	12,056	9,288	16,609	24,056	48.2	9,288	18.6			
14	Mahottari	Pachain	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
15	Mahottari	Cheru	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			

Source : JICA Survey Team 2013

SP-C-9 Salient Features of 12 Ground Water Irrigation Systems of 4 Districts

No	District	Name of the system	Year of construction	Support	Irrigation area (ha)	Type	HH	Ethnicity	VDC	Data collected by
1	Jhapa	Prithivinagar Maheshpur	1999	GoN	36	Deep tube well	45	Hill caste	Prithivinagar-4, Maheshpur-1	Local consultant
2	Jhapa	Suryodaya	2011	GoN	15.2	Shallow tube well	22	Hill caste	Ghaila Dhubba-5	Local consultant
3	Morang	Sundar Samuhik	1987/2007	JICA/GoN	44	Deep tube well	64	Hill caste	Sundarpur	Local consultant
4	Morang	Indrapur	2001	GoN	14.2	Deep tube well	50	Hill caste	Indrapur-1	study team
5	Morang	Sansari Mai	2011	GoN	14.2	Shallow tube well	18	Terai caste	Amgacchi	Local consultant
6	Morang	Pragatisil Krisak Samuha	2011	GoN	20	Shallow tube well	21	Terai caste	Rangeli-6	study team
7	Morang	Gyandhara	2011	GoN	13.4	Shallow tube well	7	Hill caste	Itahara-5	study team
8	Dhanusha	Naktajhij	1987	JADP	38	Deep tube well	150	Terai caste	Naktajhij	Local consultant
9	Dhanusha	Binihi	2009	JADP	43	Deep tube well	111	Terai caste	Binihi	Local consultant
10	Dhanusha	Bateswor 7	1995/2012	JADP/JADP	25	Deep tube well	250	Terai caste	Bateswor-7	study team
11	Mahottari	Shiva Parbati	1999	GoN	60	Deep tube well	82	Terai caste	Laxminiya	Local consultant
12	Mahottari	Sanakishan	2008	GoN	130	Shallow tube well	200	Terai caste	Paraul	Local consultant

Source : JICA Survey Team 2013

SP-C-10 Situation of Irrigated Area, Irrigation Facilities and Water Management, Ground Water Irrigation Project

No	District	Name of the system	Irrigation Area (ha)	Irrigated Area (ha)	Irrigation Facilities				Cropping pattern				Situation of Water Distribution
					Type (number)	Water extraction structure	Discharge capacity (liter per sec.)	Area to irrigate per hour (ha)	Distribution canal	Summer	Winter	Spring	
1	Jhapa	Prithvinagar Maheshpur	36	36	DTW (1)	Electric pump, Artesian	50	0.16 - 0.2	3.5km pipe with outlet & 2km earthen canal	Paddy	Wheat, Oil crops	Maize, Vegetable	Rotation System (First-come basis, at least 2 outlets at a time)
2	Jhapa	Suryodaya	15.2	15	STW (5)	Electric (4) & Diesel pump (1)	7 - 12	0.03 - 0.06	flexible pipe, few field canal	Paddy	Wheat, Potato, Oil crops	Vegetable, Maize	Not applicable
3	Morang	Sundar Samuhik Kraisak	44	44	DTW (1)	Electric pump with pump house	40	0.13 - 0.16	1.85km with 20 outlets & 3km earthen canal	Paddy, Banana	Wheat, Banana	Banana, Maize, Vegetable	Rotation System (First-come basis)
4	Morang	Indrapur	14.2	14	DTW (1)	Electric pump with pump house	25 - 30	0.17 - 0.3	1.8 km pipe with 18 outlets	Paddy	Vegetable, Potato, Maize	Vegetable, Potato, Maize	Rotation System (First-come basis)
5	Morang	Sansari Mai	14.2	14	STW (5)	Electric pump	7 - 12	0.03 - 0.06	flexible pipe, few field canal	Paddy	Wheat, Potato, Oil crops	Vegetable, Maize	Not applicable
6	Morang	Pragatisil Kraisak Samuha	20	20	STW (NA)	Electric & Diesel pump	NA	NA	flexible pipe & field canal	Paddy	Wheat, Vegetable	Early paddy	Not applicable
7	Morang	Gyandhara	13.4	13	STW (5)	Deisel pump (5)	NA	0.03 - 0.1	flexible pipe, few field canal	Paddy	Wheat, Potato, Oil crops, Maize	Early paddy	Not applicable
8	Dhanusha	Naktajhij	38	38	DTW (1)	Electric pump with pump house	38	0.15 - 0.2	7.5 km (2km permanent, 0.5km pipeline)	Paddy, Sugar cane	Wheat, Sugar cane	Sugar cane, Vegetable	Rotation System (First-come basis)
9	Dhanusha	Binitii	43	43	DTW (1)	Electric pump, Artesian	Pump: 50 Artesian: 30	0.13 - 0.2	No permanent canal	Paddy	Wheat, Potato, Oil crops	Vegetable, Maize	No defined rule
10	Dhanusha	Bateswor 7	25	25	DTW (1)	Electric pump with pump house	25	NA	500m permanent canal	NA	NA	NA	Rotation System (First-come basis)
11	Mahottari	Shiva Parbati	60	60	DTW (1)	Electric pump with pump house	30	0.13 - 0.17	Pipe 1.5km with 10 outlets	Paddy, Sugar cane	Wheat, Sugar cane	Sugar cane, Vegetable	Rotation System (First-come basis, at least 2 outlets at a time)
12	Mahottari	Sanakishan	130	130	STW (50)	Electric (30) & Diesel pump (20)	7 - 12	0.03 - 0.06	flexible pipe, few field canal	Paddy	Wheat, Potato, Oil crops	Vegetable, Maize	Not applicable

Source : JICA Survey Team 2013

SP-C-11 Situation of ISF Fee Collection at Ground Water Irrigation Systems

No	District	Name of the System	Rate of ISF			Breakdown per ha				Remarks		
			Cash	Unit	Rate per ha	Unit per ha**	Electricity charge	Operator	Maintenance		% of Maintenance Budget	Others
1	Jhapa	Prithvinagar Maheshpur	10	unit*	900	90	630.00	270	-	-	electricity unit rate is 7 rupees and need to pay 366 rupees per month as electric demand fee due to no-	
			6,000	ha	6,000	-	O	O	-	-	-	for electricity
2	Jhapa	Suryodaya	100	hour	2,222	-	-	-	-	-	for generator	
			250	hour	5,555	-	-	-	-	-	-	-
3	Morang	Sundar Samuhik Krisak	5	unit*	1,380	276	1,010	177	13%	-	-	
4	Morang	Indrapur	5	unit*	1,195	239	874.74	81	7%	-	-	
5	Morang	Sansari Mai	100	hour	2,222	-	-	-	-	-	-	for electricity
			250	hour	5,555	-	-	-	-	-	-	-
6	Morang	Pragatisil Krisak Samuha	40	hour	NA	NA	NA	NA	NA	NA	NA	for electricity
			75	hour	NA	NA	NA	NA	NA	NA	NA	NA
7	Morang	Gyandhara	NA	NA	NA	NA	NA	NA	NA	NA	-	
8	Dhanusha	Naktajhij	360	hour	2,057	229	838.14	1,219	-	-	-	
9	Dhanusha	Bimithi	0	-	0	0	0.00	x	x	-	-	
10	Dhanusha	Bateswor 7	360	hour	NA	NA	Rs 147 per hour	Rs 163 per hour	45%	-	-	
11	Mahottari	Sanakishan	100-150	hour	2,222 - 3,333	-	-	-	-	-	-	for electricity
			250	hour	5,555	-	-	-	-	-	-	-
12	Mahottari	Shiva Parbati	12	unit*	3,125	260	953.13	781	1,390.63	45%	-	ISF for non-member is 16rs/unit

* "unit" means 1 unit of electric power consumption

** 40 units per 1 hour in average

Source : JICA Survey Team 2013

SP-C-12 Situation of Maintenance Works at Ground Water Irrigation Systems

No	District	Name of the system	Irrigation Area (ha)	Irrigated area (ha)	WUA Resource for Maintenance Works			Maintenance Cost (RS)	External Source of Maintenance	Participation on Maintenance	Remarks
					Major Repair	Minor Repair	Water Leakage				
1	Jhapa	Prithvinagar Maheshpur	36	36	x	x	individual	6,500	-	limited	ISF is not sufficient for repair and maintenance
2	Jhapa	Suryodaya	15.2	15.2	users	users	individual	-	-	high	
3	Morang	Sundar Samuhik Krisak	44	44		ISF	individual	NA	-		WUA committee is depositing 70 paisa (Rp 0.7), 0.35% of ISF for repairing of pump
4	Morang	Indrapur	14.2	14.2	x	ISF	individual	NA	GWRDB (few years ago)	high	
5	Morang	Sansari Mai	14.2	14.2	users	users	individual	-	-	high	Operating pump on individual basis
6	Morang	Pragatisil Krisak Samuha	20	20	users	users	individual	-	-	high	WUA committee provides 300 rupees per day for hard labor
7	Morang	Gyandhara	13.4	13.4	individual	individual	individual	NA	-	individual	Operating pump on individual basis
8	Dhanusha	Bimihi	43	43	x	x	x	NA	JADP, VDC	poor	15% of total construction cost which Rs 310 out of ISF Rs 360 are kept by committee for
9	Dhanusha	Bateswor 7	25	25	NA	NA	NA	NA	JADP	NA	
10	Dhanusha	Naktajhij	38	38	additional fund	ISF	individual	362,520	JADP, VDC	no problem	
11	Mahottari	Shiva Parbati	60	60	-	ISF	individual	23,924	-	-	
12	Mahottari	Sanakishan	130.0	130.0	users	users	individual	-	-	high	Operating pump on individual basis

Source : JICA Survey Team 2013

SP-C-13 Financial Balance of WUA and Propotion of O & M Cost, Ground Water Irrigation Project (DTW)

No	District	Name of the System	Income (Rs)				Expenditure (Rs)				Financial Balance (Income - Expenditure)				Proportio of O & M Costs			
			ISF	Agency Support	Others & Carry Over	Subtotal	Electricity Charge	Operator	Operation Activities	Repair and Maintenance	Subtotal	Balance (Income - Expenditure)	Cost (Rs)	Operation (%) Against	Cost (Rs)	Maintenance (%) Against		
1	Jhapa	Prithvinagar	11,500	0	0	11,500	10,500	6,500		17,000	-5,500	NC	NC	NC	NC			
2	Jhapa	Maheshpur Suryodaya	-	-	-	0												
3	Morang	Sundar Samuhik Krisak	45,000	0	0	45,000	32,400	6,300		38,700	6,300	38,700	86.0	0	0.0			
4	Morang	Indrapur	NA	NA	NA	NA						NA			NA			
5	Morang	Sansari Mai	-	-	-	0												
6	Morang	Pragatisil Krisak Samuha	-	-	-	0												
7	Morang	Gyandhara	-	-	-	0												
8	Dhanusha	Naktajhij	177,030	293,824	11,735	482,589	41,324	14,730	64,415	342,520	19,600	120,469	25.0	342,520	71.0			
9	Dhanusha	Binihi	0	0	0	0						NA			NA			
10	Dhanusha	Bateswor 7	NA	NA	NA	NA						NA			NA			
11	Mahottari	Shiva Parbati	114,674	0	0	114,674	35,003	27,003		85,930	28,744	62,006	54.1	23,924	20.9			
12	Mahottari	Sanakishan	-	-	-	0												

Source : JICA Survey Team. 2013

SP-C-14 (1/5) Irrigation Project and Irrigation Area of 4 Districts

No	District	Type or Project/Program	No. of project	CCA (ha)
1	Jhapa	ISP	21	7,231
		SISP	8	3,408
		CMISAP	4	990
		MIP	8	4,500
		AMIS	2	7,388
		FMIS	4	1,148
		Sub Total	47	24,665
2	Morang	ISP	15	7,276
		SISP	11	2,763
		CMISAP	4	1,080
		MIP	4	1,860
		AMIS	25	43,161
		FMIS	5	1,254
		Sub Total	64	57,394
3	Dhanusha	ISP	3	3,000
		SISP	2	400
		CMISAP	3	1,527
		MIP	8	5,152
		AIMS	2	26,600
		FMIS	8	1,881
		Sub Total	26	38,560
4	Mahottari	ISP	5	3,100
		SISP	1	500
		CMISAP	3	1,680
		MIP	7	10,030
		FMIS	8	3,585
		Sub Total	24	18,895
		Total	161	139,514

Source: JICA Survey Team

Note: CCA - Net Irrigation Area

SP-C-14 (2/5) List of Medium Irrigation schemes in Jhapa District

							District : Jhapa		
No.	Name of the Project	Location	Type of work	Completed Year	Water Source	CCA (ha.)	No. of HH	No of Benefic.	Remarks
Project Completed under ISP									
1	Aduwa khola	Chakchaki 7	New	1997	Aduwa khola	600			
2	Bhuteni khola	Garamani	New	1994	Bhuteni khola	500			
3	Hadiya	Chandragadhi-3	New	1993	Hadiya Khola	495			
4	Bhuteni sanik khola	Garamani-9	Rehab	1994	Bhuteni khola	550			
5	Devaniya Pathivara	Mahespur	Rehab	1994	Devaniya Khola	219			
7	Dhyangri khola	Topgachhi	Rehab	1996	Dhyangri khola	250			
8	Harchana khola	Haldibari	Rehab	1994	Harchana khola	240			
9	Geuriya	Juropani-7 & 9	Rehab	1994	Geuriya khola	330	270	1,604	
10	Miyabadi	Garamuni-2	Rehab	1993	Miyabadi Khola	225			
11	Rajpani ISP	Arjundhara	Rehab	1997	Rajpani khola	250			
12	Timai Khola ISP		Rehab	1993	Timai Khola	300			
13	Upper Timai Khola ISP	Shantinagar	Rehab	1994	Timai Khola	240			
14	Karki Paini ISP	Budhabare 3	Rehab	1997	Karki Paini	225	218	1,170	
15	Rekha khola ISP	Anarmani	Rehab	1996	Rekha khola	200			
16	Sanumai Khola	Tagandubai, Shramamati	Rehab	1997	Sanumai Khola	800			
17	Surunga Khola ISP	Surunga	Rehab	1996	Surunga Khola	600			
18	Upper Ramchandre Khola	Juropani	New	1996	Upper Ramchandre Khola	225	350	1,600	
19	Upper Timai Khola	Shantinagar 1	Rehab	1994	Upper Timai Khola	282			
20	Geuriya Khola ISP	Lakhanpur & Topgachhi	New		Geuriya khola	300			
21	Bhuteni Khola ISP	Goldhap	New		Bhuteni khola	400			
	Sub Total					7,231	838	4,374	
Project Completed under SISP									
1	Gauriya Khola	Juropadi 7.9	Rehab	1997	Gauriya Khola	400	465	2,980	
2	Ghaghra khola	Dangbari 6,7 &8	Rehab	1997	Ghaghra khola	250	165	823	Completed
3	Upper Leliya Khola	Dharampur-9	Rehab	1997	Upper Leliya Khola	200	160	857	
4	Lower Kisni khola	Gaurigunj	Rehab	2000	Lower Kisni khola	1,765			
5	Ratuwa khola	Damak	Rehab	1997	Ratuwa khola	240	112	850	Completed
7	Topgachhi Dhyangri khola	Topgachhi	Rehab	1997	Topgachhi Dhyangri khola	353			
8	Leliya Khola IP	Dharampur-2,6 &7	New		Leliya Khola	200	111	738	Completed
	Sub Total					3,408	1,013	6,248	
Project Completed under CMIASP									
1	Mawa khola Dhuunge ISP	Damak 5	Rehab		Mawa khola	208	253	1,372	OG
2	Paliya	Jyamirgadhi 1,2,3,8 & 9	Rehab		Paliya Khola	227	300	1,520	OG
3	Shadhtar Nete Sisne ISP	Khutunabari 1,2	Rehab	2011		355	500	3,001	
4	Tanging Kali Khola	Arjundhara-5	Rehab	2011	Tanging Kali Khola	200	243	1,227	
	Sub Total					990	1,296	7,120	

SP-C-14 (2/5) List of Medium Irrigation schemes in Jhapa District

District : Jhapa

No.	Name of the Project	Location	Type of work	Completed Year	Water Source	CCA (ha.)	No. of HH	No of Benefic.	Remarks
Project Completed under ISP									
1	Aduwa khola	Chakchaki 7	New	1997	Aduwa khola	600			
2	Bhuteni khola	Garamani	New	1994	Bhuteni khola	500			
3	Hadiya	Chandragadhi-3	New	1993	Hadiya Khola	495			
4	Bhuteni sanik khola	Garamani-9	Rehab	1994	Bhuteni khola	550			
5	Devaniya Pathivara	Mahehsapur	Rehab	1994	Devaniya Khola	219			
7	Dhyangri khola	Topgachhi	Rehab	1996	Dhyangri khola	250			
8	Harchana khola	Haldibari	Rehab	1994	Harchana khola	240			
9	Geuriya	Juropani-7 & 9	Rehab	1994	Geuriya khola	330	270	1,604	
10	Miyabadi	Garamuni-2	Rehab	1993	Miyabadi Khola	225			
11	Rajpami ISP	Ajundhara	Rehab	1997	Rajpami khola	250			
12	Timai Khola ISP		Rehab	1993	Timai Khola	300			
13	Upper Timai Khola ISP	Shantinagar	Rehab	1994	Timai Khola	240			
14	Karki Paini ISP	Budhabare 3	Rehab	1997	Karki Paini	225	218	1,170	
15	Rekha khola ISP	Anarnani	Rehab	1996	Rekha khola	200			
16	Sanumai Khola	Taganduba, Shramamati	Rehab	1997	Sanumai Khola	800			
17	Surunga Khola ISP	Surunga	Rehab	1996	Surunga Khola	600			
18	Upper Ramchandre Khola	Juropani	New	1996	Upper Ramchandre Khola	225	350	1,600	
19	Upper Timai Khola	Shantinagar 1	Rehab	1994	Upper Timai Khola	282			
20	Geuriya Khola ISP	Lakhanpur & Topgachhi	New	1997	Geuriya khola	300			
21	Bhuteni Khola ISP	Goldhap	New		Bhuteni khola	400			
Sub Total						7,231	838	4,374	
Project Completed under SISIP									
1	Gauriya Khola	Juropadi 7.9	Rehab	1997	Gauriya Khola	400	465	2,980	
2	Ghaghra khola	Dangbari 6,7 &8	Rehab	1997	Ghaghra khola	250	165	823	Completed
3	Upper Leliya Khola	Dharampur 9	Rehab	1997	Upper Leliya Khola	200	160	857	
4	Lower Kisni khola	Gaurigunj	Rehab	2000	Lower Kisni khola	1,765			
5	Ratuwa khola	Damak	Rehab	1997	Ratuwa khola	240	112	850	Completed
7	Topgachhi Dhyangri khola	Topgachhi	Rehab	1997	Topgachhi Dhyangri khola	353			
8	Leliya Khola IP	Dharampur-2,6 &7	New		Leliya Khola	200	111	738	Completed
Sub Total						3,408	1,013	6,248	
Project Completed under CMIASP									
1	Mawa khola Dhuunge ISP	Damak 5	Rehab		Mawa khola	208	253	1,372	OG
2	Paliya	Jyamirgadi 1,2,3,8 & 9	Rehab		Paliya Khola	227	300	1,520	OG
3	Shadnatar Nete Sisine ISP	Kiudunbari 1,2	Rehab	2011		355	500	3,001	
4	Tangting Kali Khola	Ajundhara-5	Rehab	2011	Tangting Kali Khola	200	243	1,227	
Sub Total						990	1,296	7,120	

SP-C-14 (2/5) List of Medium Irrigation schemes in Jhapa District

Project Completed under MIP									
1	Mansapur	Ghailaduba	Rehab	2004	Mansapur paini	205			
2	Gauriya	Jurepani	Rehab	2010	Geuriya khola	330			
3	Kaptan Jansamuha Paini	Shantinagar	Rehab	2011	Timaikhola	220	218	1,170	
5	Siddhi Khola	Bahundangi	Rehab		Siddhi Khola	1,700	1,515	11,084	OG
6	Kapilmuni paini	Samischara-2	Rehab		Spring	245	348	1,670	OG
7	Janajagriti	Shantinagar	Rehab			800			OG
8	Krishne khola Bandh	Gauradaha- 3,5,8,9	Rehab		Krishne khola	1,000			OG
	Sub Total					4,500	2,081	13,924	
Project Completed under AMIS									
1	Kankai	Satasidham, Shiv- gunj, Panchgachhi, Mahabhar, Baigun dhra, Topgachhi, Dharanpur	New	1979	Kankai Mai	7,000	17,131	112,893	Joint Managed IWRMP support
2	Bahundangi		New		Shivalik River	388			N-CARE Support
	Sub Total					7,388	17,131	112,893	
Project Completed Under FMIS									
1	Bhutlung		New	1996	Bhutlung Khola	338			
2	Dharke Gauda		New	1993	Dharke Khola	233			
3	Paliya Khola		New	1994	Sivalik River	263			
4	Ninda Dhobi Khola		New	1994	Ninda Khola	314			
	Sub Total					1,148	22,359	144,559	
	Total					24,665			

Source: EIDD 1, Jhapa & Development of Database for Irrigation Development in Nepal, Final Report March 2007

Note: CCA - Net Irrigation Area

SP-C-14 (3/5) List of Medium and Large Irrigation Schemes in Morang

District: Morang

No.	Name of the Project	Location	Type of Work	Completion Year	Water Source	CCA (ha)	No of HH	Beneficiaries No.	Remarks
Project Completed under SISP Program									
1	Kamal Jhora IP.	Babiya-Birta-3	Rehab.	1997	Kamal Jhora Khola	230			Completed
3	Betauna IP	Dangihat-5,9		1997		220			Completed
4	Bhulke Muhan I.P.	Mirgaulia-4,5,6,7,8	Rehab.	1997	Bhulke Muhan	736			Completed
5	Hasina I.P.B5	Sundapur-7,8,9 & Dulari	Rehab.	1997	Hasina Khola	300			Completed
6	Janakalyan Paimi I.P.	Pathari-4,5	Rehab.	1997		244			Completed
7	Janta Bandh	Itahara-7,9 & Sjuwa-2	Rehab.	1997		300			Completed
9	Kocheni I.P.	Babiya-Birta-1,3	Rehab.	1997	Kocheni Khola	300			Completed
10	Bhaluwa		Rehab	1995	Bhaluwa Khola	233			Completed
11	Rateholi	Rajghat-5,7	Rehab.	1997		200			Completed
	Sub Total					2,763			
Project Completed under CMIASP									
1	Lohandra Dataram Paimi IP	Haraicha	Rehab.	2011		240			Completed
2	Devasthan ISP	Madhumalla	Rehab.			221			On-going
3	Janasahayog Paimi ISP	Kerabari	Rehab.			407			On-going
4	Nunsari Bakraha Rajghat ISP	Utlabari	Rehab.			212			On-going
	Sub Total					1,080			Completed
Project Completed under MIP									
1	Bhuwa Janata Paimi	Letang	Rehab	2006		285			Completed
2	Sisauli I.P.	Belbari, Amana	Rehab	OG		310			Completed
3	Kerabari, Bhogteni, Letang, Naxal I P (Ke.Bho. J.e.N.)	Kerabari, Bhogteni, Letang, Naxal	Rehab	OG		750			Completed
4	Kesaulya Dam I P	Kasaini	Rehab			215			On-going
5	Nunsari Raachana Kalidaha IP	Tnadi 1,6 & Madhumalla	Rehab	2013		300			On going
	Sub Total					1,860			

SP-C-14 (3/5) List of Medium and Large Irrigation Schemes in Morang

							District: Morang		
No.	Name of the Project	Location	Type of Work	Completion Year	Water Source	CCA (ha)	No of HH	Beneficiaries No.	Remarks
Project Completed under AMIS									
1	Sunsari Morang I P	20 VDCs west of and Sorabhag, Drabesh, Hoklabari VDCs	Rehab	OG		34,000			
2	Letang II		Rehab		Siwalki River	2,212			N-CARE supported
3	Bhuwa Chisang IP	Letang	New		Chisang Khola	300	213		Completed
4	Sukum Jana Sundar IP	Sanishar	New			200	121	1,225	Completed
5	Bhaluwa IP	Bayarban	New		Bhaluwa Khola	202	1,675	6,175	Completed
6	Kadiya Dhadra Paimi IP	Bayarban	New		Kadiya Dhara Khola	200	146	877	Completed
7	Kali Khola IP	Indrapur	New		Kalikhola	350			Completed
8	Kisan Channel IP	Jate	New		Teikhola	362	451	3,157	Completed
9	Padri Khola IP	Hasandada	New		Patharikhola	300			Completed
10	Padri Khola IP	Sanishchare	New		Patharikhola	250	235		Completed
11	Lohandra Datarum IP	Belari4, Indrapur	New		Lohandrakhola	500			Completed
12	Betauna IP	Belbari	New		Betaunakhola	200	128	996	Completed
13	Kalikoshi IP	Bayarban	New		Kalikoshi Khola	205	112	717	Completed
14	Khoriya IP	Dadarbari	New		Khoriya Khola	272	100	330	Completed
15	Daans Khola IP	Amardaha	New		Daans Khola	200	325		Completed
16	Dahi Khola IP	Bayarban	New		Dahi Khola	311	231	1,386	Completed
17	Jhalhale IP	Bayarban	New		Kali Koshi Khola	319	385	1,285	Completed
18	Bhibhare Paimi IP	Sanishchare	New		Patharikhola	300			Completed
19	BhajuwaDam Paimi IP	Namuna Babhya Birta	New		Chehaka Khola	363			Completed
20	Latikhola Trishakti Dam IP	Pathari	New		Latikhola	450	187	1,035	Completed
21	Trinath IP	Bahuni	New		Dhautikhola	205	163	990	Completed
22	Borabadh IP	Mrigauliya	New		Madamtha Khola	228	250	1,401	Completed
23	Janasayog IP	Kerabari	New		Khadam Khola	557	104	1,120	Completed
24	Devasthan IP	Madhumallaa	New		Nunsari Khola	325	187		Completed
25	Nunsari Bakraha IP	Urlabari	New		Nunsari Khola	350	165	1,650	Completed
	Sub Total					43,161	5,178	24,214	
Project Completed Under FMIS									
1	Bhuwa Khola		New	1990	Bhuwa Khola	265			
2	Bisnur Khola		New	1993	Bisnur Khola	267			
3	Kajala Khola		New	1993	Kajala Khola	246			
4	Kajala Khola		New	1993	Kajala Khola	246			
5	Kajala Khola		Rehab		Kajala Khola	230			
	Sub Total					1,254			
	Total					57,394	5,178	66,670	

Source: EIDD 2, Sunsari & Development of Database for Irrigation Development in Nepal, Final Report March 2007

Note: CCA - Net Irrigation Area

SP-C-14 (4/5) List of Medium and Large Irrigation Schemes in Dhanusha

No.	Projects	Location	Type of Works	Completion Year	Water Source	CCA (ha.)	District: Dhanusha		Remarks
							No. of HH	No. of Benefic.	
Project Completed under ISIP									
1	Dumariya IP	Jogimara, Gidha	rehab.	1997		1,000			Defuncton
2	Balganga IP	Makhanaha	rehab.	1995		1,000			Completed
3	Chamath IP	Bharatpur	rehab.	1996		1,000	1,000	5,581	Completed
	Sub Total					3,000	1,000	5,581	
Project Completed under SISP									
1	Balganga IP	Gobindapur, sapahi	rehab.	1997		200	300	2,000	Completed
2	Dudhnati IP	Janakpur-13	rehab.	1997		200	145	1,220	Completed
	Sub Total					400	445	3,220	
Project Completed under CMISAP									
1	Kajipani ISIP	Adukoha	rehab.			520	153	967	Completed
2	Bachharaja ISIP	Dhabauli	rehab.	2011		368	925	4,625	Completed
3	Mugaiya ISIP	Deopura, Rupaitha 1-9	rehab.			639	750	4,500	Ongoing
	Sub Total					1,527	1,828	10,092	
Project Completed under MIP									
1	Aurahi IP	Sakhuwa, Mahendranagar	rehab.	2007		240	160	1,441	Completed
2	Jalladh IP	Ramdaiya, Sakhuwa	rehab.	2009		500	633	4,431	Completed
3	Kamaladhari	Sapahi	rehab.	2007		210	207	1,863	Completed
4	Laxmipur Bagewa	Laxmipur, Bagewa	rehab.	2009		210	220	1,320	Completed
5	Jalladh IP	Baniya	rehab.	2012		315	350	2,100	Completed
6	Januni IP	Bahuwa	rehab.			2,000	1,540	22,000	On going
7	Bighi Gajariya IP	Kanchaban	rehab.			1,077	1,300	7,900	On going
8	Sinsgahi ip	Songama	rehab.			600	2,200	132,000	On going
	Sub Total					5,152	6,610	173,055	
Project Completed under AMIS Project									
1	Hardinath IP	Hansar	New	1967	Jalladh River	1,600	3,000		Completed
2	Kamala IP		New	1984	Kamala River	25,000			Completed
	Sub Total					26,600	3,000		
Project Completed under FMIS									
1	Chakkar		New		Siwalik River	250			
2	Dhanusha Dham		New		Siwalik River	250			
3	Rajaiya IP	Chakkar, Dhanusha	New		Rajaiya River	200			
4	Kagipain Yamba Bhari		New			281			
5	Dhadhar Ip	Binhi	New		Dhadhar River	200			
6	Asitwashi	Shantipur	New		Asitwashi River	300			
7	Brijganga	Shantipur-3	New		Brijganga Khola	200			
8	Baliwa IP	Prithvi-7	New		Baliwa River	200			
	Sub Total					1,881			
	Total					38,560	12,883	191,948	

Source: CIDD I, Mahotari & Development of Database for Irrigation Development in Nepal, Final Report March 2007

Note: CCA - Net Irrigation Area

SP-C-14 (5/5) List of Medium and Large Irrigation Schemes in Mahottari

							District: Mahottari		
No.	Projects	Location	Type of work	Completion Year	Water Source	CCA (ha.)	No. of HH	No. of Benefic.	Remarks
Project Completed under ISP									
1	Mahara I.P.	Gaushala	Rehab.	1991		400	1,500	9,000	completed
2	Bigi IP	Mahadaiya	Rehab.	1993		2,000	3,802	22,812	completed
3	Ladkawa IP	Meghnathi, Gorhanna	Rehab.	1991		300	164	815	completed
4	Kutumeshwori IP	Dharmapur	Rehab.	1993		200	222	1,554	completed
5	Jinja Gulariya IP	Kabilasha	Rehab.	1991		200	300	3,000	completed
	Sub Total					3,100	5,988	37,181	
Project Completed under SISP									
1	Pasijawa	Rangopalpur	Rehab.	1998		500	716	5,192	completed
	Sub Total					500	716	5,192	
Project Completed under CMISAP									
1	Kantawa ISP	Khairbani	Rehab.	2011		750	1,025	8,075	completed
2	Geruka ISP	Khuttaoparahi	Rehab.	2011		380	570	3,700	completed
3	Akusi Khola IP	Gonapura, 1-9	Rehab.			550	700	4,900	completed
	Sub Total					1,680	2,295	16,675	
Project Completed under MIP									
1	Rato IP	Leuri	Rehab.	2013		4,000	5,300	30,400	Incomplete
2	Pachain IP	Nigaul, Gaushala	Rehab.	1999		500	688	4,816	complete
3	Khopi IP	Basbiti	Rehab.			2,000	6,830	6,830	terminated
4	Bigi IP	Pigauna	Rehab.	2009		2,000	1,925	12,800	ongoing
5	Rato IP	Kisannagar	Rehab.	2000		200	1,200	8,700	ongoing
6	Akusi Khola Srinchiya IP	Balba	Rehab.			800	1,400	9,000	ongoing
7	Rupani IP	Magarthana	Rehab.			530	1,900	14,500	ongoing
	Sub Total					10,030	19,243	87,046	
Project Completed under FMIS									
1	Kantawa IP	Khesaha	New		Kantawa River	750			
2	Bigi Kutumeshwari IP	Pigauna	New		Bigahi Khola	620			
3	Gerunga Jangha IP	Balba	New		Jaha Khola	200			
4	Banke Khola IP	Khayarmara	New		Banke Khola	250			
5	Jebachhi Bandh IP	Haripur-9	New		Jebachhi	205			
6	Gorua IP	Kutta pipradi 1,9	New		Geruka	360			
7	Khachmara IP	Khayarmara	New		Banke Khola	200			
8	Bharaha nadi Shivnagar IP	Sundar nagar magarthan	New		Maratra Khola	1,000			
	Sub Total					3,585			
		TOTAL				18,895	28,242	146,094	

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Note: CCA - Net Irrigation Area

SP-C-15 Historical Background, Outline and Achievement of Pilot Project on Enhancement of Water Management

Pilot Projects	Irrigation Management Project	Special Program in Nepal	On-farm Management Sub Component	Integrated Crop and Water Management Program
	IMP	SPIN	OFWMSC	ICWMP
Implementation	1985-1992	1995-1998	1999-2002	On-going (2002/03 -)
Executing Body	Government	Government	DOI	DOI, DOA and NARC
Donor	USAID	FAO	-	-
Location	2 sites	10 VDC of 4 districts, Syangja, Nawalparasi, Illam and Jhapa	20 districts of 3 development regions, Western, Mid Western, Far Western regions	22 districts of 5 development regions, Eastern, Central, Western, Mid Western, Far Western regions
	Sirsia-Dushaus IP (2,000 ha), Bara District, Terai Handdetar IP (200 ha), Lamjung hill	19 demonstration sites (318 ha) FIMS in hills and Tube Well in Terai		
Agencies				
Central Level		ADB/N, NARC,	DOA	
District Level		DADO, AIC, DIO,	DTT consisting of JT/JTA	DCC and DTT
Objectives	Development of effective and sustainable irrigation water management practices			
Strategies	Increase of institutional capacity of DOI, other concerned agencies and farmer	Demonstration of integrated technology and its impacts on crop yield	Optimization of irrigation potential	To develop capacity of the District Technical Team (DTT)
			Introducing effective O & M procedures by WUA Increase of irrigation area	
Approaches	(1) Development of systematic canal maintenance and operation procedures	(1) Reducing irrigation time by construction of field channels	(1) Development and improvement of on-farm irrigation infrastructures	Execution of Technical Staff Training (TST) program
	(2) Development of organization of water user groups	(2) Increase of irrigation area by water saving technique	(2) Introduction of optimized farm management of inputs, technology and knowledge	
	(3) Initiating monitoring, evaluation and feedback procedures	(3) Enhancement of Irrigation block-wise water rotation	(3) Improvement in operation and maintenance service by capacity building of WUA	
	(4) Institutionalizing training and research capabilities within DOI	(4) Adopting water budgeting approach-based on crop water needs		
	(5) Identification of training subjects and research approaches to development of	(5) Establishment of monitoring practices for field irrigation water supply		
		(6) Improvement of field irrigation methods over		
Remarks			Project is discontinued 3 years after operation	
Achievement	(1) Establishment of WUA	(1) Increase of crop yield from 0.9 ton/ha to 6.2 ton/ha, crop intensity by 300 % , irrigation area by 25 %	Crop yield increases well such as paddy; 1.59 times, wheat ; 1.5 times	Field demonstration in 5 District, Illam, Morang, Saptari, Terhathum and Okhaldhau (1,177 ha)
	(2) User involvement and participatory approaches designed by IMP are adopted in the programs of ILC (WB) and ISP (ADB)		execution of "Furrow irrigation method" for upland crops	
	(3) Establishment of Irrigation Management Division (IMD) of DOI with permanent position of AO			
	(4) to contribute development concept on WUA and water management in preparation of Irrigation Regulation 1988/89			

SP-C-16 Lesson learned from Pilot Projects on Water Management Improvement in Nepal

Pilot Projects	Irrigation Management Project	Special Program in Nepal	On-farm Management Sub Component	Integrated Crop and Water Management Program
	IMP	SPIN	OFWMSC	ICWMP
Implementation	1985-1992	1995-1998	1999-2002	2002/03 -
Lessons learned	(1) Importance of learning the approaches on O & M implementation at the field	(1) Necessity of policy reform to maximize fertilizer input and to minimize production cost	(1) Necessity of strengthening adjustment and coordination on agriculture inputs from various agencies	(1) Improvement of budget flow of DOA and DDC to DTT to facilitate unified and harmonized activities of the
	(2) Necessity on more clear clarification of role and responsibility of water management between farmers and government agency	(2) Necessity of quality management of seed production and improvement of on-farm water management	(2) Necessity of paying careful attention on gaps of awareness, skill and other resources among farmers	(2) Necessity of institutional improvement for NARC's supporting to the field directly
	(3) Necessity of extension for field staff on training program at field	(3) Necessity of strengthening optimization of irrigation area/block and construction of distribution structure at on-farm level	(3) Much external support escalated dependency syndrome among the farmers and WUA member	
	(4) Necessity of establishment of association organizations (AOs) with farmers at field	(4) Necessity of enhancing adjustment between overall irrigation system management and water distribution plan at on-farm level	(4) Necessity of strengthening technical training for DTT to deal with the requirements of farmers	
	(5) Necessity of development on management information system with field staff	(5) Necessity of strengthening the role and function of WUA	(5) Necessity of enhancing coordination and adjustment of the inputs among agriculture management and water management aspects	
	(6) Appreciated training method (farmer to farmer method)	(6) Urgent requirement of establishing organized market at village and district level	(6) Necessity of strengthening particularly approaches and management under umbrella of WUA	
		(7) Necessity of enhancing the coordination and linkage between DOI and DOI staff	(7) Necessity to strengthening ownerships of WUA for implantation of all on-farm development programs and activities of agencies under umbrella management system of WUA	
			(8) Activities for irrigated agriculture should be led by water sector	

SP-C-17 Irrigation and Agriculture Development Projects with Assistance of Donors in Terai Plain, Nepal, after 1990

No.	Project	Fund		Implementation Period		Executing Agencies	Location of Project
		Agency	Loan (million)	from	by		
(I) Irrigation Sector							
1	Irrigation & Water Resources Management Project (IWRMP)	World Bank	US \$ 50.0	2007	2013	DOI	Large scale Irrigation project areas of Kankai. Sunsari Morang, Narayani and Mahakali irrigation systems, Terai plain of Eastern, Central and Far Western regions
2	Community Managed Irrigated Agriculture Sector Project (CMIASP)	ADB	US \$ 20.0	2006	2013	DOI / DOA	35 districts of Japha Morang Saptari, Sunsari, Ilam, Dankuta, Panchthar. Chitwan, Dhanusa, Mohattari, Parsa, Bhaktapur, Dhading, etc (Western to Eastern Terai)
3	Second Agriculture Program Loan(SAPL) for Agriculture Perspective Plan(APP)	ADB	US \$ 50.0	1997	2015	DOI	Ground water Irrigation development (Shallow and Deep Tube Well), Eastern to Far-Western Regions
4	Nepal Irrigation Sector Program	World Bank	US \$68.4	1997	2004	DOI	Districts along Gandak Tinau West Rapti Babai, Kamali river basin (Wester to Far Western Region areas) and Ground water irrigation project (STW) in Western and Far-Western regional area
5	Community Ground Water Irrigation Sector	ADB		1996	2007	DOI/GWRDB	STW development in Eastern -Western Region areas
6	Irrigation Sector II Project (SISF)	ADB	US \$ 33.0	1996	2002	DOI	35 districts of central and eastern Terai
7	Irrigation Management Transfer Project	ADB	SDR 9.0	1994	2001	DOI	
8	Irrigation Development Project	EU	ECU8.35	1997	2001	DOI	
9	Bhainmati Irrigation II Project	Saudi Fund	Riyals 74.0	1995	2000	DOI	
10	Ground Water Irrigation Project (Community Shallow Tube well Project)	IFAD	US \$ 7.6	1994	2000	DOI / GWRDB	Ground water irrigation development (Shallow tube well) in Eastern to Central region area
11	Rajapur Irrigation Project	ADB	SDR 12.2	1992	2000	DOI	
12	Bhairawa Lumbini Irrigation III	World Bank	US \$ 51.9	1990	1999	DOI	Shallow TW in Kanchanpur District, Mid western region
13	Chanda Mohana Irrigation Project	OPEC	US \$ 8.5	1995	1999	DOI	
14	East Rapti Irrigation Project	ADB	SDR 7.53	1992	1998	DOI	Chitwan/Gandak river basin, Western Region
15	Mahakali Irrigation II Project	World Bank	US \$ 42.5	1988	1998	DOI	
16	Sunsari Morang Head works Project	World Bank	US \$ 23.4	1992	1997	DOI	
17	Irrigation Line of Credit Project	World Bank	US \$ 16.0	1988	1997	DOI	Small to medium scale irrigation schemes in Kapilvastu, Nawalparasi Rupandehi, Kanchanpur Districts , Western to Far Western, regions, hill side to Terai Plain , Ground water irrigation development (STW and DTW) in Western to Far - Western Region areas)
18	Baghmatti Irrigation I Project	Saudi Fund	Riyals 30.0	1988	1997	DOI	
19	Irrigation Sector I Project (ISP)	ADB	US \$ 33.1	1989	1996	DOI	Japha, Morang Saptari, Siraha Sunsari, Dhanusa Mohattari, Chitwan Districts Eastern to Central regions, hill side to Terai plain
20	Narayani Irrigation III Project	World Bank	US \$ 24.5	1986	1995	DOI	
21	Bhairawa Lumbini Irrigation II Project	World Bank	US \$ 16.0	1983	1990	DOI	
(II) Agriculture Sector							
1	Commercial Agriculture Development Project for Agriculture Commercialization and Trade	ADB		2007	2013	DOA	
2		World Bank	US \$ 26.55	2009	2015	MOAD	
3	Nepal Food Crisis Response Program (NFCRP)	World Bank	NA	2010	2013	MOFALD, DOA and NARC	
4	Crop Diversification Project	ADB	NA	2001	2006	DOA	
5	Agriculture Research and Extension Project	World Bank	US \$ 23.8	1998	2003	DOA	

No.	Project	Fund		Implementation Period		Executing Agencies	Location of Project
		Agency	Loan (million)	from	by		
6	Vegetable Seed Production Project	SDC/TC	US \$ 5.0	1996	2001	DOA	
7	Third Live Stock Development Project	ADB	US \$ 28.2	1996	2001	DOA	
8	Vegetable and Potato Seed Project	SDC/TC		1986	1996	DOA	
9	Strengthening of Veterinary Services and Live Stock Disease Control	EU	US \$ 11.0	1995	2001	DOA	
10	Promotion of Livestock Breeding Project	GTZ	US \$ 10.0	1992	1997	DOA	
11	Secondary Crop Development Project	ADB	US \$ 7.0	1989	1997	DOA	
12	Improvement of Research Management Agro-enterprise Technology Systems	USAID	US \$ 12.0	1991	1996	DOA	
13	Vegetable Seed Production and Fruit Improvement in Western Region -Market Access for Rural Development	USAID	US \$ 7.2	1991	1996	DOA	
14	Janakpur Agriculture Development Project	JICA	JPY 2,018	1971	1984	DOA	STW and DTW development in Central region area

SP-C-18. Summary of Issues, Problems and Lessons learned from Agriculture Development Projects

Projects	Implementation Period	Management for Project	Agriculture	Marketing	Community / Linkage	Planning / Management	Technology / Technique	Institutional Arrangement	Extension Services
Commercial Agriculture Development Project	2007-2013	(1) Delay in scheduling of sub-project activities especially of infrastructures development (2) Lack of counterpart funds and lack of clarity on roles and responsibilities of stakeholders.	None of the Project related documents speaks about the operational modalities of Commercial Agriculture Alliance (CAA) after the Project completion.	Web-based monitoring framework for marketing is incomplete, and it is still required the completeness, consistency and the quality of the data/information.	not reported	not reported	not reported	not reported	not reported
Project for Agriculture Commercialization and Trade	2009 - 2015	Change in financial disbursement from conventional activity based financing system to output-based financing system	not reported	not reported	not reported	not reported	not reported	not reported	not reported
Nepal Food Crisis Response Program (NFCRP)	2010 - 2013	Providing service on ad-hoc basis to satisfy demands of all farmers, even provision of lesser quantity has not been well appreciated by recipients.	not reported	not reported	Inadequate coordinated effort between DOA-SSNP and NARC-SSNP in the districts limits the attainment of effective results and impact.	(1) No systematic seed planning and production without clear demand and commitment from district line agencies, market link, distribution and seed use (2) No availability of fertilizer with the desired quantity and improper delivery time	not reported	not reported	not reported
Crop Diversification Project	2001 -2006	not reported	not reported	not reported	not reported	Conflict situation in the project are severely affected the timely delivery of agriculture inputs and technology	(1) Inadequate technical knowhow in application of modern technologies reduced the production potential of secondary crops including roots and tuber crops (2) Inadequate irrigation facility in project site	Social inclusiveness in the project was limited because of low literacy in women and disadvantaged groups.	Coordination on research and extension systems among stakeholders was limited between private and government sectors
Agriculture Research and Extension Project	1007 - 2002	Cancellation of funds affectively precluded the extension of the project.	not reported	not reported	Roles and responsibilities of stakeholders for project implementation were not specified.	(1) Project design without participation of stakeholders (2) Potential project agencies was not conducted to ensure appropriate project implementation arrangements.	not reported	Very short time frame for institutional reform and the Bank (fund) supported only initiate	not reported

Projects	Implementation Period	Management for Project	Agriculture	Marketing	Community / Linkage	Planning / Management	Technology / Technique	Institutional Arrangement	Extension Services
Secondary Crop Development Project	1989 - 1994	not reported	not reported	Inadequate market and marketing functionaries hindered the growth of secondary crops in the project area.	not reported	Unavailability of seed for secondary crops in national seed system was the major limitation to popularize the crops in all the six districts.	not reported	not reported	(1) Weak agricultural extension services in the project reduced farmers access to extension services. Especially, limited number of extension staff was not in position to deliver extension services to needed farmers. (2) Weak research and extension linkage slowed down the modern technologies transfer and dissemination process. Both research and extension system systems' annual plan and activities were concentrated on major crops and limited activities were undertaken in secondary crops.
Janakpur Zone Agriculture Development Project	1971 - 1984	not reported	not reported	Weakness of market competitiveness due to higher production cost influenced power supply, higher maintenance cost of pumps, generator and its spare parts	not reported	not reported	Shortfall of technically and timely satisfied service of tube wells of concerned agencies and other stakeholders	not reported	not reported
Summary of Issues, Problems and Lesson learned		(1) Delay in scheduling of sub-project activities especially of infrastructures development (2) Budget disbursement or allocation problems	No further action and performance on operational modalities	(1) Inadequate market and marketing functionaries (2) Weakness of market competitiveness due to higher production cost (3) Web-based monitoring framework for marketing is incomplete	(1) Roles and responsibilities of stakeholders for project implementation were not specified. (2) Inadequate coordinated effort among stakeholders	(1) No systematic seed planning and production (2) No availability of fertilizer and seed with the desired quantity and improper delivery time (3) Project design without participation of stakeholders	(1) Inadequate technical knowhow in application of modern technologies	(1) Social inclusiveness in the project was limited because of low literacy (2) Very short time frame for institutional reform and the Bank (fund) supported only initiate	(1) Weak agricultural extension services in the project reduced farmers access (2) limited number of extension staff was not in position to deliver extension services to needed farmers. (3) Weak research and extension linkage slowed down the modern technologies transfer and dissemination process.

SP-C-19 (1/2) Summary of Issues, Problems and Lesson learned from Irrigation Development Projects for the 2 Decade

Projects	Implementation Period	Dissemination on project stakeholders and communities	Land acquisition	Water resource	Soil erosion and land sliding	Flood	Construction / Supply of construction materials
Irrigation and Water Resource Management Project (IWRMP)	2007-2013	(1) Farmers' participation to consultation is low because of consultation suffers farmers' agricultural activities. (2) Main committee members of WUA hesitate to involve lower level member of WUAs. And, Government staff hesitate to open programs during dissemination on projects (3) Demonstration activities of on-farm were not properly coordinated among WUAs and irrigation project office. This results their individual and separate activities	(1) In many cases land acquisition tasks appeared where farmer demanded for compensation which was not provisioned in project paper (2) Land acquisition problems appeared but solved by WUAs themselves	Decreasing trend of river water during winter due to deforestation in watershed area	not reported	(1) Frequent flood attacks in paddy field located along river course in Kankai, Mahakali and Sunsari Morang projects areas	not reported
Community Managed Irrigated Agriculture Sector Project (CMIASP)	2006-2013	Management of sub project unit has passive activities for dissemination and negatively affect the streamlining project activities and resolving inter and intra group conflict.	(1) Land acquisition problems occurred along canal alignment in the initial stage of the project, but later WUA resolved it by themselves (2) No major problems observed. Minor ones are usually solved by farmers	No problems on water resources,	Soil erosion and land sliding frequently suffered work progress of the project implementation	not reported	Weakness on quality control of construction works were identified in many projects, because of poor knowledge and skills of WUA
Medium Irrigation Project	2006 -	Farmers does not well obtained adequate information on the project in dissemination	No major problem, usually solved by farmers. It is rehabilitation programs of old FMIS.	(1) Shortage of water resource for year-round irrigation winter and spring seasons, (2) Water resource for irrigation suffered from much sedimentation in front of intake and in main and branch canals	(1) Inadequate water distribution to paddy field due to much soil erosion in canal system in hillside areas as well as Terai (2) Ineffective water use due much irrigation water leakage due to eroded canal embankment	(1) Poor drainage system suffered from river flood and inundation in drain affected irrigation area in monsoon season	not reported
Nepal Irrigation Sector Program (NISIP)	1997-2004	New technology research is not disseminated to farmers, government conducted research works at Kathmandu only	No reported	(1) Water shortage absolutely (2) No effective water utilization in winter and spring seasons due to no systematic water delivery	not reported	not reported	not reported

Projects	Implementation Period	Dissemination on project implementation to stakeholders and communities	Land acquisition	Water resource	Soil erosion and land sliding	Flood	Construction / Supply of construction materials
Community Ground Water Irrigation Sector Project	1996-2007	Dissemination on project implementation was initially conducted to farmers. But after delay of project implementation due to change in subsidy policy, no dissemination was not conducted to framers, and farmers were in confusion for participation to the implementation.	Not major problem, small problems are usually solved by farmers.	No problems on water resources,	not reported	flood frequently suffered paddy cultivation and affected irrigation area in monsoon season	not reported
Irrigation Sector II Project (SISP)	1996-2002	Inadequate dissemination on the project activities was conducted prior to the commencement of implementation, and these dissemination affected the strengthening activities/program for WUA and weakened WUA	not reported	not reported	Much soil erosion and land sliding affected canal system in hill side areas.	Floods have repeatedly undermined improvements works of subprojects as well as irrigation areas in monsoon season	not reported
Irrigation Management Transfer Project	1994-2001	not reported	Not major problem, minor problems are usually solved by farmers.	No problems on availability of water resources	Much soil erosion and land sliding affected canal system in hillside areas and sediment in canal and erosion of canal bank affected distribution of irrigation water.	flood frequently suffered paddy cultivation and affected irrigation area in monsoon season	not reported
Summary of Issues, Problems and Lesson learned		(1) Passive activities of executing body on dissemination (2) Weak participation for the farmers' participation for the project due to inadequate and weak dissemination activities (3) No consistent of dissemination and inadequate information materials	Minor and small problems on land acquisition, but solving the problems by WUAs themselves, especially, in case of FMIS	(1) Decreasing trend of river water resource affected for deforestation in the watershed area (2) water shortage of water resource disregard effective water utilization	(1) Much soil erosion of canal bank (2) Canal system affected and suffered from land sliding in hill side areas (3) poor water management suffered from sediment in canal and erosion of canal embankment	Damages of irrigation facilities, crops and farm land. due to flood and inundation in paddy field and flood in monsoon season.	Weakness on quality control of construction works

SP-C-19 (2/2) Summary of Issues, Problems and Lesson learned from Irrigation Development Projects for the 2 Decades

Projects	Implementation Period	Agriculture and farm management including agricultural input	Market and relevant facilities / infrastructures	Human resource	Institutional aspects of government agencies for implementation	Institutional aspect of WUA	Legal aspects for project implementation
Irrigation and Water Resource Management Project (IWRMP)	2007-2013	Poor coordination between DOA and DOI for component-D	No reported	No equity of participation for DOI staff and the same DOI staff attends different trainings as resource person	(1) Institutional arrangement of the project is too complicated, and horizontal and / vertical coordination among diverse stakeholders is often a cumbersome and herculean task. Sub project Management Unit hardly meets to resolve problems/issues faced at local level during project implementation. (2) Project level staff are loaded with other programs also .So less care to IWRMP (3) Delays in the flow of funds from central to project sites , and this resulted delay of rehabilitation works.,	(1) The same members of WUA participate every training, and traditional approach of training did not become very effective. (2) There is no functions on work sharing among the members (3) WUA capacity development program focused in training only, didn't meet the requirement of overall development of WUA (4) Government budget allocation for WUA capacity development works were not timely and adequate (5) Every time during training same single person association organization for all types of training gave to be sent by Government	WUAs could not become effective in collecting ISF because of no legal base to them
Community Managed Irrigated Agriculture Sector Project (CMIASP)	2006-2013	Poor coordination between DADO and DOI	Farmers are deprived of marketing benefit due to trading of middle man	DOI has qualified staff, but the limited number of staff for field works	(1) Institutional arrangement of the project is too complicate. Horizontal /vertical coordination among diverse stakeholders is often a cumbersome and herculean task. Sub project Management Unit hardly meets to resolve problems/issues faced at local level during project implementation. (2) WUAs should not be assigned with multifunctional roles apart from the normally assumed customary roles of supervision of construction, system management, operation and maintenance, water distribution and participation in improved agriculture practices. (3) Difficulty to coordinate diverse stakeholders including government agencies. (4) Timely collection and arrangement of financial documents such as 'Statement of Expenditure (SOE) was difficult, often times it is incomplete with wrong data inputs and mismatched budget category (5) Difficulty to supervise project implementation timely because of remoteness of the projects	(1) A large number of WUAs are not registered, (2) Ambiguity concerning the legal entity of WUA has to be sorted out by setting up an institutional mechanism for establishing functional links between agriculture production activities and irrigation service delivery. (3) WUAs do not have office for management (4) WUA capacity development could not be implemented timely (component -A)	not reported

Projects	Implementation Period	Agriculture and farm management including agricultural input	Market and relevant facilities / infrastructures	Human resource	Institutional aspects of government agencies for implementation	Institutional aspect of WUA	Legal aspects for project implementation
Nepal Irrigation Sector Program	1997-2004	No adequate extension effort for crop yield diversification	not reported	not reported	(1) Post operational supports are not sufficient to cope with the demands of canal breaching and land slide in hill irrigation systems. Periodic monitoring and evaluation is essential for completed irrigation systems to look after (2) There is less activities to provide technical support of completed irrigation systems. (3) Low attention was given to monitoring and assessment (M & E) activities (4) Project level staff of DOI are loaded with other programs	Less attention was given to capacity building of WUA	No reformation of public sector management policy
Community Ground Water Irrigation Sector Project	1996-2007	(1) No regular services of DADO on agriculture extension services (2) Services provided through government agencies remained limited and less effective due to staff and resource constraints.	Farmers are generally deprived of potential gain due to trading of middle man.	DOI has qualified manpower, but limited number are fielded.	DOI has capability to administer project implementation. Usually the limited budget and flexible policy confuse people to participate in the project which is not desirable.	No technical support programs to upgrade / enhance capability of WUA	not reported
Irrigation Sector II Project (SISP)	1996-2002	not reported	not reported	No well implementation of training on maintenance (O&M) not to realize in the field because of broader membership group of the WUAs, but further demand on O&M training was high.	Weak coordination and individual activities of agencies concerned: The Coordination Committee to direct agricultural support and extension services did not operate as expected, and resulted the less achievement than satisfactory for agriculture extension services, but, DOI had made progress in constructing irrigation and the implementation of training program did not match with the progress of construction on irrigation canal.	(1) No explicit rules of WUAs (2) Unclear rules led to compromise in various aspect in WUAs, especially, the early implementation stage of subprojects (3) Trained persons in WUA in construction management and O & M were in adequate for quality control (4) After completion of the construction works, WUA are defunct in most of the sub-projects due to lack function of work sharing among WUA members	Low collection rate of ISF because of undefined policy

Projects	Implementation Period	Agriculture and farm management including agricultural input	Market and relevant facilities / infrastructures	Human resource	Institutional aspects of government agencies for implementation	Institutional aspect of WUA	Legal aspects for project implementation
Irrigation Transfer Management Project	1994-2001	(1) No special / intensive agriculture extension service is provided through the limited number of agriculture service centres (ASCs) with out any linkage among agencies and other stakeholders (2) Only regular DADO extension service which is focused to their farmers group (3) Fertilizer availability and higher quality seed, are not assured, and also is limited.	Insufficient development of farm to Market road with the limited length.	DOI has qualified manpower, but limited number are fielded and manpower shortage is complained by Division chief.	(1) Small contract packages involving local contractors and community groups have minimal conflict risks. (2) The limited budget often spanning many years to complete the project is not desirable.	No special support programs to upgrade / enhance capability of WUA	No strong policy for sustaining ISF collection functions of WUAs
Summary of Issue, Problems and Lessons learned		(1) No special / intensive agriculture extension service, (2) Only regular DADO extension service without linkage among all stakeholders (3) Availability of fertilizer and higher quality seed are limited and not assured.	(1) Generally , most projects do not make provisions of market development activities . (2) A few projects had very limited provisions up to Collection centres. (3) Middleman dominantly carried out the trading and farmers are generally deprived of potential gain.	(1) DOI has qualified manpower, but very limited numbers. (2) The same resource persons participate to trainings several times	(1) Difficulty to coordinate among the diverse stakeholders including government agencies. (2) DOI has capability to administer project implementation. But, implementation is spanning for many years due to the limited budget and it takes long time to complete the project (3) .Project level staff are loaded with other programs and also had to make decision under political pressure. Low attention was given to M&E activities	(1) Large number of WUAs is not registered. (2) WUAs do not have office space (3) No special support programs to upgrade / enhance capability of WUA. (4) WUAs become defunct after project construction. due to lack function of work sharing among WUA members. (5) Less attention is given for WUA capacity building activities.	Government regulation and act have not legally empowered functions of WUAs such as collection of ISF., stopping vandalism and protecting canal and structures. Public sector management policy is lacking.

Supporting Data D

Agriculture

SP-D-1 Edible Cereal Grain Production and Requirement of Nepal, 1989/90 - 2012/13

Unit: Mt. Total

Year	Crops								Total Production	Total Requirement	Balance
	Rice	Maize	Wheat	Millet	Barley	Buckwheat					
1989/90	1,831,713	857,846	667,972	184,546	7,510			3,549,587	3,559,011	-9,424	
1990/91	1,892,105	877,075	651,956	190,177	7,642			3,618,955	3,486,776	132,179	
1991/92	1,738,013	836,564	603,592	187,700	7,579			3,373,448	3,561,838	-188,390	
1992/93	1,393,697	1,100,452	595,998	194,407	7,572			3,292,126	3,633,724	-341,598	
1993/94	1,827,110	837,653	687,426	224,958	7,965			3,585,112	3,723,722	-138,610	
1994/95	1,577,820	883,267	709,304	219,262	8,107			3,397,760	3,882,915	-485,155	
1995/96	1,949,761	929,513	786,936	236,478	11,190			3,913,878	3,948,229	-34,351	
1996/97	2,002,747	894,779	827,438	236,982	10,641			3,972,587	4,079,135	-106,548	
1997/98	2,035,725	940,767	806,849	233,764	10,244			4,027,349	4,178,077	-150,728	
1998/99	2,074,193	920,094	855,647	238,968	8,710			4,097,612	4,279,491	-181,879	
1999/00	2,259,393	1,007,178	934,559	242,331	8,478			4,451,939	4,383,443	68,496	
2000/01	2,356,646	1,001,478	914,885	231,915	8,255			4,513,179	4,430,128	83,051	
2001/02	2,294,205	999,831	1,008,827	231,714	8,472			4,543,049	4,463,027	80,022	
2002/03	2,271,914	1,059,751	1,069,257	231,931	8,613			4,641,466	4,565,820	75,646	
2003/04	2,455,971	1,082,455	1,105,087	232,373	8,485			4,884,371	4,671,344	213,027	
2004/05	2,358,540	1,186,840	1,151,282	237,778	8,113			4,942,553	4,779,710	162,843	
2005/06	2,314,065	1,097,612	1,211,445	238,651	7,667			4,869,440	4,890,993	-21,553	
2006/07	2,060,280	1,292,259	1,211,898	242,333	8,514			4,815,284	4,995,194	-179,910	
2007/08	2,336,694	1,348,140	1,263,912	238,711	7,754			5,195,211	5,172,844	22,367	
2008/09	2,461,204	1,383,647	1,069,167	240,030	6,358			5,160,406	5,293,316	-132,910	
2009/10	2,185,936	1,282,438	1,248,333	243,231	7,529			4,967,469	5,297,444	-329,972	
2010/11	2,427,980	1,416,248	1,404,114	247,749	9,649			5,512,875	5,069,818	443,057	
2011/12#	2,766,894	1,503,091	1,491,818	255,954	11,856		5,274	6,037,727	5,151,420	886,307	
2012/13#	2,432,432	1,379,317	1,524,598	247,526	12,571		5,330	5,601,774	5,207,177	394,597	

Note: - # Preliminary, MOAD

Source: Agribusiness Promotion and Marketing Development Directorate, DOA, & National Population and Housing Census 2011, CBS

SP-D-2 Area, Production and Yield of Cereal Crops in Nepal

Area in Hectare, Production in Metric Ton and Yield in Kg. per Hectare

YEAR	PADDY			MAIZE			MILLET			BUCKWHEAT			WHEAT			BARLEY		
	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD
1990/91	1,455,170	3,502,160	2,407	757,710	1,230,950	1,625	198,570	231,630	1,166	592,740	855,970	1,410	29,610	27,840	940			
1991/92	1,411,810	3,222,540	2,283	754,090	1,204,710	1,598	198,240	228,660	1,153	571,260	761,960	1,334	29,660	27,640	932			
1992/93	1,262,110	2,584,900	2,048	775,220	1,290,500	1,665	201,770	236,750	1,173	613,980	765,000	1,246	29,680	27,610	930			
1993/94	1,450,449	3,495,589	2,410	754,099	1,253,830	1,663	225,207	245,957	1,092	611,309	898,892	1,470	37,385	35,157	940			
1994/95	1,368,423	2,906,184	2,124	771,410	1,302,116	1,688	228,061	252,843	1,109	624,329	941,680	1,508	39,096	37,108	949			
1995/96	1,496,790	3,578,830	2,391	791,700	1,331,060	1,681	260,090	282,440	1,086	653,500	1,012,930	1,550	39,400	41,340	1,049			
1996/97	1,511,230	3,710,650	2,455	793,720	1,316,840	1,659	259,940	289,480	1,114	667,120	1,071,970	1,607	35,280	36,690	1,040			
1997/98	1,506,340	3,640,860	2,417	799,060	1,367,340	1,711	262,440	285,120	1,086	640,030	1,030,320	1,610	35,590	37,150	1,044			
1998/99	1,514,210	3,709,770	2,450	802,290	1,345,910	1,678	263,950	291,370	1,104	640,802	1,086,470	1,695	31,843	31,798	999			
1999/00	1,550,990	4,030,100	2,598	819,010	1,445,450	1,765	263,450	295,380	1,121	660,040	1,183,530	1,793	28,196	30,817	1,093			
2000/01	1,560,044	4,216,465	2,703	824,525	1,484,112	1,800	259,888	282,852	1,088	641,030	1,157,865	1,806	28,194	30,488	1,081			
2001/02	1,516,980	4,164,687	2,745	825,980	1,510,770	1,829	258,120	282,570	1,095	667,077	1,258,045	1,886	27,722	30,790	1,111			
2002/03	1,544,660	4,132,500	2,675	836,190	1,569,140	1,877	259,130	282,860	1,092	669,014	1,344,192	2,009	27,555	31,711	1,151			
2003/04	1,559,436	4,455,722	2,857	834,285	1,590,097	1,906	258,597	283,378	1,096	664,589	1,387,191	2,087	27,467	28,151	1,091			
2004/05	1,541,729	4,289,827	2,782	849,892	1,716,042	2,019	258,839	289,838	1,120	675,807	1,442,442	2,134	26,428	29,341	1,110			
2005/06	1,549,447	4,209,279	2,717	850,947	1,734,417	2,038	261,673	290,936	1,112	672,040	1,394,126	2,074	26,227	27,786	1,059			
2006/07	1,439,525	3,680,838	2,557	870,401	1,819,925	2,091	265,160	284,813	1,074	702,664	1,515,139	2,156	26,580	28,293	1,064			
2007/08	1,549,262	4,299,246	2,775	870,166	1,878,648	2,159	265,496	291,098	1,096	706,481	1,572,065	2,225	26,106	28,082	1,076			
2008/09	1,555,940	4,523,693	2,907	875,428	1,930,669	2,205	265,889	292,683	1,101	694,950	1,343,862	1,934	25,817	23,224	900			
2009/10	1,481,289	4,023,823	2,716	875,660	1,855,184	2,119	268,473	299,523	1,116	731,131	1,556,539	2,129	26,600	27,587	1,037			
2010/11	1,496,476	4,460,278	2,981	906,253	2,067,522	2,281	269,820	302,691	1,122	10,304	8,841	858	28,461	30,240	1,063			
2011/12	1,531,493	5,072,248	3,312	871,387	2,179,414	2,501	278,030	315,067	1,133	10,339	10,021	969	27,966	34,830	1,245			
2012/13*	1,420,570	4,504,503	3,171	849,635	1,999,010	2,353	274,350	305,588	1,114	10,681	10,056	941	28,929	36,973	1,278			

Note: A news in Daily News on 17th May 2013 based on DOA information

Source: Statistical Information on Nepalese Agriculture 2011/2012, Agri-Business Promotion and Statistics Division MOA and the News above.

SP-D-3

Cultivation Area and Production of Crops, and Other Agricultural Data

in

Target Districts (Jhapa, Morang, Dhanusa & Mahottari)

List of Table:

Table 1: Area, Production & Yield of Cereal Crops

Table 2: Area, Production & Yield of Cash Crops (1/2)

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Table 4: Area, Production & Yield of Pulse

Table 5: Area, Production & Yield of Major Spice Crops

Table 6: Productive Area, Production and Yield under Tropical (Summer) Fruits

Table 7: Livestock Population and Their Distribution

Table 8: Milk Animal and Milk Production

Table 1 Area, Production and Yield of Cereal Crops in the Target Districts
 [Area in ha., Prod. in Mt. and Yield in Kg/ha.]

District	Year	Paddy			Maize			Millet			B. wheat			Wheat			Barley		
		Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
Jhapa	2011/12	89,400	321,840	3,600	24,600	72,460	2,946	1,800	2,160	1,200	1,300	1,000	1,300	1,300	25,150	3,353	8	6	750
	2010/11	82,400	271,920	3,300	24,600	62,310	2,533	1,800	2,160	1,200	1,300	1,000	1,300	1,300	24,150	2,100	9	7	778
	2009/10	80,000	264,000	3,300	22,600	58,600	2,593	1,800	2,160	1,200	-	-	-	-	34,000	2,429	8	6	750
Morang	2011/12	78,200	277,610	3,550	15,100	45,300	3,000	1,510	1,812	1,200	62	954	62	62	40,438	2,396	0	0	0
	2010/11	78,200	258,060	3,300	16,100	45,300	2,814	1,430	1,716	1,200	-	-	-	-	52,500	2,365	-	-	-
	2009/10	77,120	244,500	3,170	19,220	42,130	2,192	1,455	1,746	1,200	-	-	-	-	50,500	2,275	-	-	-
Dhanusa	2011/12	65,000	185,250	2,850	2,019	6,461	3,200	300	300	1,000	0	0	0	0	90,357	2,350	1	1	1,000
	2010/11	61,972	173,521	2,800	2,365	4,967	2,100	425	425	1,000	-	-	-	-	96,119	2,500	5	5	1,000
	2009/10	54,462	164,124	3,014	2,065	4,085	1,978	425	430	1,012	-	-	-	-	62,400	2,269	-	-	-
Mahotari	2011/12	34,776	97,373	2,800	2,435	6,452	2,649	215	215	1,000	0	0	0	0	64,820	2,420	10	10	1,000
	2010/11	34,776	78,440	2,256	1,935	4,050	2,093	232	232	1,000	-	-	-	-	45,250	2,101	50	50	1,000
	2009/10	36,195	67,791	1,873	2,585	5,785	2,238	355	426	1,200	-	-	-	-	45,250	2,101	50	50	1,000
Nepal	2011/12	1,531,493	5,072,248	3,312	871,387	2,179,414	2,501	278,030	315,067	1,133	10,339	969	10,021	10,021	1,846,142	2,412	27,966	34,830	1,245
	2010/11	1,496,476	4,460,278	2,981	906,253	2,067,522	2,281	269,820	302,691	1,122	10,304	858	8,841	8,841	1,745,811	2,275	28,461	30,240	1,063
	2009/10	1,481,289	4,023,823	2,716	875,660	1,855,184	2,119	268,473	299,523	1,116	-	-	-	-	1,556,539	2,129	26,600	27,587	1,037

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

Table 2 Area, Production and Yield of Cash Crops (1/2) in the Target Districts
 [Area in ha, Production in Mt and Yield in Kg/ha]

District	Year	OIL SEEDS			POTATO			TABACO			SUGERCANE		
		AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD
Jhapa	2011/12	3,500	3,852	1,100	10,140	163,820	16,156	3	2	667	205	6,500	31,707
	2010/11	3,450	3,450	1,000	9,100	125,000	13,736	4	3	750	195	5,460	28,000
	2009/10	3,250	2,750	846	11,500	155,250	13,500	12	9	755	140	3,920	28,000
Morang	2011/12	13,250	12,470	940	5,750	11,025	1,917	0	0	0	2,150	141,900	66,000
	2010/11	13,220	13,425	1,016	5,670	68,700	12,116	0	0	0	2,030	133,980	66,000
	2009/10	7,360	5,136	698	5,670	62,205	10,971	68	59	863	1,855	83,880	45,218
Dhanusa	2011/12	3,402	2,006	590	2,325	30,225	13,000	300	425	1,417	3,605	151,410	42,000
	2010/11	2,885	4,425	1,534	2,275	32,532	14,300	300	300	1,000	3,590	136,420	38,000
	2009/10	3,000	2,100	700	2,275	32,532	14,300	368	439	1,193	3,400	137,149	40,338
Mahotari	2011/12	3,115	2,676	860	3,550	41,180	11,600	33	50	1,515	6,500	260,250	40,039
	2010/11	2,967	2,078	700	3,467	38,137	11,000	33	50	1,515	5,600	210,000	37,500
	2009/10	3,000	2,000	667	3,467	38,137	11,000	325	366	1,127	5,000	217,995	43,599
Nepal	2011/12	214,835	179,145	834	190,250	2,584,301	13,584	1,893	2,557	1,350	64,472	2,930,047	45,447
	2010/11	213,706	176,186	824	182,600	2,508,044	13,735	1,135	1,238	1,091	62,998	2,718,226	43,148
	2009/10	198,540	155,050	781	185,342	2,517,696	13,584	2,534	2,491	989	58,310	2,495,098	42,790

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

SP-D-3 (3/8)

**Table 3 Area, Production and Yield of Cash Crops (2/2) in the Target Districts
[Area in Hectare, Production in Metric Ton and Yield in Kg. per Hectare]**

District	Year	JUTE			COTTON			TEA			COFFEE		
		AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD	AREA	PROD.	YIELD
Jhapa	2011/12	650	660	1,015	0	0	0	9,500	15,955	1,679	0	0	0
	2010/11	700	700	1,000	0	0	0	9,179	15,195	1,655	0	0	0
	2009/10	700	700	1,000	0	0	0	9,088	14,471	1,592	0	0	0
Morang	2011/12	7,453	10,500	1,409	0	0	0	0	0	0	0	0	0
	2010/11	7,400	10,200	1,378	0	0	0	0	0	0	0	0	0
	2009/10	7,400	8,880	1,200	0	0	0	0	0	0	0	0	0
Dhanusa	2011/12	0	0	0	0	0	0	0	0	0	0	0	0
	2010/11	0	0	0	0	0	0	0	0	0	0	0	0
	2009/10	0	0	0	0	0	0	0	0	0	0	0	0
Mahotari	2011/12	0	0	0	0	0	0	0	0	0	0	0	0
	2010/11	0	0	0	0	0	0	0	0	0	0	0	0
	2009/10	0	0	0	0	0	0	0	0	0	0	0	0
Nepal	2011/12	10,540	14,424	1,369	135	133	1,000	18,149	18,726	1,032	1,780	425	239
	2010/11	10,559	14,418	1,635	135	135	1,000	17,451	17,438	999	1,752	402	229
	2009/10	10,513	12,959	1,233	121	109	901	17,127	16,607	969	1,650	308	187

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

Table 4 Area and Production of Pulse in the Target
[Area in ha and Production in Mt]

District	Year	LENTIL		CHICKPEA		PIGEON PEA		BLACK GRAM		GRASS PEA		HORSE GRAM		SOYABEANS		OTHERS		TOTAL	
		AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.	AREA	PROD.
Jhapa	2011/12	2,005	2,187	105	131	459	423	1,275	1,079	220	235	108	255	143	101	2,456	2,214	6,917	6,477
	2010/11	2,001	2,198	110	132	459	411	1,275	1,079	225	235	255	108	143	101	2,456	2,214	6,923	6,477
Morang	2009/10	1,071	669	229	156	459	411	1,275	1,079	255	154	255	108	143	101	2,957	2,737	6,644	5,414
	2011/12	5,700	6,345	133	120	350	580	680	612	725	477	17	15	315	535	1,109	985	9,029	9,669
Dhanusa	2010/11	5,700	6,500	133	118	350	730	680	612	744	483	17	13	315	535	985	888	9,048	9,976
	2009/10	4,793	3,924	133	118	331	308	673	576	744	483	17	13	148	179	1,275	1,079	8,115	6,681
Mahotari	2011/12	2,565	1,961	53	65	816	575	51	46	540	514	102	91	17	16	101	104	4,246	3,373
	2010/11	2,565	1,961	53	65	816	575	51	46	540	514	102	92	17	16	101	104	4,246	3,374
Nepal	2009/10	2,142	1,490	51	72	816	575	51	46	540	514	102	92	17	16	92	113	3,811	2,919
	2011/12	4,125	3,659	59	49	1,050	529	229	209	303	253	204	185	82	70	1,102	1,025	7,154	5,978
Nepal	2010/11	4,125	3,659	59	49	1,050	529	229	209	303	253	204	185	82	70	1,102	1,025	7,154	5,978
	2009/10	3,226	3,168	56	34	1,050	529	229	209	303	253	204	185	82	70	1,423	1,227	6,573	5,674
Nepal	2011/12	207,630	208,201	9,154	8,192	17,471	14,082	27,496	22,482	9,176	8,671	7,867	5,855	29,282	28,270	26,247	24,018	334,323	319,770
	2010/11	207,591	206,869	9,124	8,130	17,469	14,107	27,518	22,530	9,213	8,674	7,901	5,808	29,317	28,318	26,248	23,924	334,380	318,362
2009/10	187,437	151,758	8,647	7,065	21,296	18,648	33,779	26,673	5,986	4,453	8,000	5,532	22,042	23,943	30,383	26,186	319,472	262,356	

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

Table 5 Area, Production & Yield of Major Spice Crops in the Target Districts

[Area in ha, Production in Mt, Yield in Mt/ha.

District	Year	Cardamom			Ginger			Garlic			Turmeric			Chilli		
		Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
Jhapa	2011/12	0	0	0.00	374	4,562	12.20	43	374	8.70	60	480	8.00	135	665	4.93
	2010/11	0	0	0.00	325	3,965	12.20	37	321	8.68	48	478	9.96	117	585	5.00
	2009/10	0	0	0.00	305	4,513	14.80	30	258	8.60	32	245	7.66	109	512	4.70
Morang	2011/12	55	91	1.65	1,250	13,125	10.50	380	1,140	3.00	310	1,085	3.50	260	1,108	4.26
	2010/11	50	25	0.50	715	8,580	12.00	60	510	8.50	120	1,129	9.41	260	1,108	4.26
	2009/10	60	55	0.92	700	9,400	13.43	50	450	9.00	120	960	8.00	245	980	4.00
Dhanusa	2011/12	0	0	0.00	53	424	8.00	79	228	2.89	121	242	2.00	244	292	1.20
	2010/11	0	0	0.00	72	601	8.35	130	828	6.37	105	735	7.00	155	667	4.30
	2009/10	0	0	0.00	22	237	11.00	47	405	8.62	85	468	5.50	140	210	1.50
Mahotari	2011/12	0	0	0.00	15	180	12.00	N.A	N.A	N.A	40	520	13.00	145	405	2.79
	2010/11	0	0	0.00	55	660	12.00	205	920	4.49	135	1,678	12.43	220	706	3.21
	2009/10	0	0	0.00	48	572	11.92	203	1,714	8.44	125	1,537	12.30	218	654	3.00
Nepal	2011/12	11,665	6,026	0.52	20,256	255,208	12.60	5,911	40,630	6.87	4,325	35,351	8.17	6,691	27,429	4.10
	2010/11	12,584	5,517	0.44	19,081	216,289	11.34	5,773	41,183	7.13	4,080	35,295	8.65	6,349	27,203	4.28
	2009/10	11,766	5,232	0.44	18,042	210,790	11.68	5,381	39,483	7	4,161	37,926	9	6,394	26,712	4.18

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

Table 6 Productive Area, Production and Yield under Tropical (Summer) Fruits in the Target District

District	Year	Mango				Banana				Guava			
		Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha
Jhapa	2011/12	1,245.0	1,200.0	19,173.0	16.0	1,776.0	1,750.0	35,520.0	20.3	335.0	225.0	2,010.0	8.9
	2010/11	1,245.0	1,200.0	18,000.0		1,776.0	1,750.0	22,225.0		335.0	225.0	1,339.0	
	2009/10	768.1	506.9	4,410.4		125.7	100.6	1,609.0		78.5	58.1	650.2	
Morang	2011/12	658.0	470.0	3,770.0	8.0	1,025.0	750.0	9,050.0	12.1	68.0	50.0	564.0	11.3
	2010/11	658.0	428.0	3,764.0		785.0	628.0	10,611.0		68.0	50.0	564.0	
	2009/10	652.9	430.9	3,792.0		782.0	625.6	10,572.6		68.0	50.3	563.8	
Dhanusa	2011/12	2,150.0	2,000.0	19,000.0	9.5	100.0	80.0	1,040.0	13.0	75.0	64.0	384.0	6.0
	2010/11	1,922.0	1,974.0	5,922.0		100.0	80.0	1,040.0		50.0	37.0	433.0	
	2009/10	1,222.9	807.1	6,618.4		206.3	165.0	2,475.6		51.3	38.0	444.2	
Mahotari	2011/12	1,500.0	1,000.0	11,000.0	11.0	88.0	88.0	1,330.0	15.1	40.0	29.0	344.0	11.9
	2010/11	1,300.0	832.0	6,822.0		110.0	88.0	968.0		40.0	29.0	344.0	
	2009/10	1,335.0	854.4	7,005.9		199.0	159.2	2,324.3		39.7	29.4	344.0	
Nepal	2011/12	40,110.0	32,228.0	328,883.0	10.2	12,503.0	11,063.0	168,484.0	15.2	5,283.0	3,905.0	37,406.0	9.6
	2010/11	30,513.0	20,378.0	176,756.0		9,990.0	7,992.0	121,742.0		4,418.0	3,132.0	32,326.0	
	2009/10	25,673.5	16,667.5	127,315.1		7,266.9	5,813.5	91,042.3		4,393.8	3,251.4	37,402.4	

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

District	Year	Papaya				Jackfruit				Pineapple			
		Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha
Jhapa	2011/12	120.0	60.0	600.0	10.0	30.0	20.0	220.0	11.0	140.0	120.0	3,500.0	29.2
	2010/11	75.0	60.0	816.0		30.0	20.0	220.0		140.0	120.0	2,800.0	
	2009/10	75.0	60.0	816.0		30.0	21.3	272.6		81.0	60.4	974.6	
Morang	2011/12	73.0	58.0	789.0	13.6	38.0	30.0	360.0	12.0	57.0	43.0	687.0	16.0
	2010/11	73.0	58.0	789.0		29.0	20.0	262.0		57.0	43.0	687.0	
	2009/10	72.5	58.0	789.2		28.9	20.5	262.4		57.1	42.6	686.7	
Dhanusa	2011/12	117.0	93.0	1,409.0	15.2	80.0	57.0	568.0	10.0	25.0	18.0	264.0	14.7
	2010/11	117.0	93.0	1,409.0		80.0	57.0	568.0		21.0	15.0	229.0	
	2009/10	116.5	93.2	1,407.3		87.0	61.8	778.3		20.5	15.3	231.2	
Mahotari	2011/12	90.0	72.0	1,080.0	15.0	56.0	40.0	503.0	12.6	22.0	16.0	244.0	15.3
	2010/11	90.0	72.0	1,080.0		56.0	40.0	503.0		22.0	16.0	244.0	
	2009/10	124.5	99.6	1,504.0		56.3	39.9	503.2		21.8	16.3	246.2	
Nepal	2011/12	2,565.0	1,872.0	30,695.0	16.4	2,523.5	1,866.0	22,123.0	11.9	1,597.0	1,222.0	17,040.0	13.9
	2010/11	2,323.0	1,826.0	24,702.0		2,198.0	1,620.0	19,262.0		1,059.0	828.0	10,073.0	
	2009/10	2,764.2	2,211.4	31,060.0		2,245.9	1,594.6	18,971.5		949.4	708.3	10,073.2	

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

District	Year	Litchi				Arecanut				Coconut			
		Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha	Area (ha)	Prodv. Area (ha)	Prodn. (Mt)	Mt/ha
Jhapa	2011/12	125.0	90.0	910.0	10.1	2,585.0	2,490.0	7,634.0	3.1	93.0	88.0	1,206.0	13.7
	2010/11	80.0	46.0	356.0		2,333.0	2,060.0	6,473.0		93.0	88.0	1,206.0	
	2009/10	76.6	43.6	340.4		2,364.0	1,986.0	3,833.0		37.3	18.7	47.1	
Morang	2011/12	225.0	208.0	2,080.0	10.0	801.0	720.0	1,326.0	1.8	210.0	195.0	5,518.0	28.3
	2010/11	124.0	71.0	552.0		514.0	398.0	951.0		54.0	27.0	66.0	
	2009/10	121.7	69.3	540.9		266.0	198.0	316.8		53.8	26.9	66.3	
Dhanusa	2011/12	402.0	385.0	1,964.0	5.1	4.0	4.0	5.0	1.3	13.0	7.0	13.0	1.9
	2010/11	108.0	62.0	511.0		4.0	4.0	5.0		13.0	7.0	13.0	
	2009/10	107.6	61.3	508.8		4.3	3.6	5.4		13.3	6.6	13.3	
Mahotari	2011/12	113.0	64.0	534.0	8.3	9.0	7.0	11.0	1.6	13.0	7.0	13.0	1.9
	2010/11	113.0	64.0	534.0		9.0	7.0	11.0		13.0	7.0	13.0	
	2009/10	111.3	63.4	526.3		8.6	7.2	10.7		13.5	6.7	13.5	
Nepal	2011/12	6,480.0	5,026.0	37,394.0	7.4	3,687.0	3,459.0	9,188.0	2.7	567.0	417.0	6,994.0	16.8
	2010/11	4,668.0	2,996.0	22,164.0		3,139.0	2,698.0	7,620.0		411.0	247.0	1,519.0	
	2009/10	450.5	2,558.2	19,713.0		2,727.0	2,264.5	4,266.4		353.7	176.8	354.6	

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

SP-D-3 (7/8)

Table 7 Livestock Population and Their Distribution in the Target Districts

Unit: Number

District	Year	CATTLE	BUFFALOES	SHEEP	GOAT	PIGS	FOWL	DUCK
Jhapa	2011/12	328,014	135,257	30	228,166	47,611	1,164,302	11,506
	2010/11	323,204	131,976	27	230,149	48,991	922,050	10,992
	2009/10	314,946	121,151	27	232,149	50,411	552,415	10,500
Morang	2011/12	273,329	148,588	0	240,335	44,104	1,308,981	54,065
	2010/11	274,080	144,330	0	240,500	46,618	1,142,700	54,918
	2009/10	282,057	106,981	0	245,778	49,276	584,500	55,784
Dhanusa	2011/12	90,691	68,979	1,275	182,174	5,796	438,299	8,001
	2010/11	89,012	64,334	367	178,114	6,782	368,045	7,980
	2009/10	82,645	65,334	1,264	168,040	6,782	281,832	7,570
Mahotari	2011/12	87,366	65,205	515	133,410	7,078	475,932	6,083
	2010/11	86,033	62,467	528	128,010	5,748	432,000	5,991
	2009/10	92,044	57,481	528	118,370	5,490	293,761	5,900
Nepal	2011/12	7,244,944	5,133,139	807,267	9,512,958	1,137,489	45,171,185	376,916
	2010/11	7,226,050	4,993,650	805,070	9,186,440	1,108,465	39,530,620	378,050
	2009/10	7,199,260	4,836,984	801,371	8,844,172	1,064,858	25,760,373	379,753

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

SP-D-3 (8/8)

Table 8 Milk Animals and Milk Production in the Target Districts

Prod.: Mt.

District	Year	MILK COW (Nos.)	MILK BUFF (Nos.)	COW MILK	BUFF MILK	TOTAL MILK
Jhapa	2011/12	47,516	29,400	26,965	31,261	58,227
	2010/11	46,819	28,687	26,570	30,503	57,073
	2009/10	45,623	26,334	25,891	28,001	53,892
Morang	2011/12	36,495	36,011	19,826	34,735	54,561
	2010/11	35,595	34,979	19,337	33,740	53,077
	2009/10	35,601	25,927	18,337	25,009	43,346
Dhanusa	2011/12	13,200	18,257	6,824	16,513	23,337
	2010/11	12,956	17,028	6,698	15,401	22,099
	2009/10	12,029	17,293	6,219	15,641	21,860
Mahotari	2011/12	10,863	17,029	6,017	21,290	27,307
	2010/11	10,697	16,314	5,925	20,396	26,321
	2009/10	10,375	15,012	5,747	18,768	24,515
Nepal	2011/12	998,963	1,331,037	468,913	1,153,838	1,622,751
	2010/11	974,122	1,291,644	447,185	1,109,325	1,556,510
	2009/10	954,680	1,252,770	429,129	1,068,300	1,497,429

Source: Statistical Information on Nepalese Agriculture, Agri-Business Promotion and Statistics Division, MOA

Supporting Data E

Rural Development

SP-E-1 DADO Service Network

District	Name of Service Center	Address	
Jhapa (District office provides agriculture service to 1 municipality and 5 VDC from Bhadrapur)	1. Agriculture Service Center	Prithwinagar (8VDC)	
	2. Agriculture Service Center	Charali (1 municipality + 10 VDC)	
	3. Agriculture Service Center	Chakachaki (9 VDC)	
	4. Agriculture Service Center	Gauradah (1 municipality + 15 VDC)	
	1. Agriculture Service Contact Center	Gauriganj	
	2. Agriculture Service Contact Center	Damak	
	3. Agriculture Service Contact Center	Shibganj	
	4. Agriculture Service Contact Center	Surunga	
	5. Agriculture Service Contact Center	Anarmani	
	6. Agriculture Service Contact Center	Budhbare	
Morang	1. Agriculture Service Center	Rangeli (15 VDC)	
	2. Agriculture Service Center	Urlabari (11 VDC)	
	3. Agriculture Service Center	Bahuni (7 VDC)	
	4. Agriculture Service Center	Indrapur (11 VDC)	
	1. Agriculture Contact Center	Katahari (1 municipality +12 VDC)	
	2. Agriculture Contact Center	Tankisinwari (4 VDC)	
	3. Agriculture Contact Center	Jhorahat (5 VDC)	
Dhanusha	1. Agriculture Service Center	Phoolgama (15 VDC)	
	2. Agriculture Service Center	Janakpur (3 VDC, 1 municipality)	
	3. Agriculture Service Center	Vaidehi (13 VDC)	
	4. Agriculture Service Center	Yadukuha (12 VDC)	
	5. Agriculture Service Center	Dhalkewar (12 VDC)	
	6. Agriculture Service Center	Dhanushadham (10VDC)	
	1. Agriculture Contact Center	Khajuri (9 VDC)	
	2. Agriculture Contact Center	Goddar (3 VDC)	
	3. Agriculture Contact Center	Laxmipur bagewa (6 VDC)	
	4. Agriculture Contact Center	Tarapatti (11 VDC)	
	5. Agriculture Contact Center	Raghunathpur (8 VDC)	
	Mahottari	1. Agriculture Service Center	Loharpatti (10 VDC)
		2. Agriculture Service Center	Pipara (19VDC, 1 municipality)
3. Agriculture Service Center		Balawa (22 VDC)	
4. Agriculture Service Center		Gaushala (18 VDC)	
1. Agriculture Contact Center		Bardibas (4 VDC)	
2. Agriculture Contact Center		Bhangaha (3 VDC)	

SP-E-2 DLSO Service Network (1/4)

District	Name of service Center	Address
Jhapa	1. Livestock Service Center	Charali (4 VDC)
	2. Livestock Service Center	Anarmani (2 VDC)
	3. Livestock Service Center	Prithwinagar (4 VDC)
	4. Livestock Service Center	Surunga (2 VDC)
	5. Livestock Service Center	Shivganj (2 VDC)
	6. Livestock Service Center	Gauradah (2 VDC)
	1. Livestock Service Sub-center	Kankadbhare (1 Municipality and 1 VDC)
	2. Livestock Service Sub-center	Budhbare (2 VDC)
	3. Livestock Service Sub-center	Shanishcare (3 VDC)
	4. Livestock Service Sub-center	Ghailadubba (3 VDC)
	5. Livestock Service Sub-center	Topgachhi (2 VDC)
6. Livestock Service Sub-center	Damak (1 Municipality and 1 VDC)	
7. Livestock Service Sub-center	Gauriganj (3 VDC)	
8. Livestock Service Sub-center	Paanchganchhi (3 VDC)	
9. Livestock Service Sub-center	Kumarkhod (2 VDC)	
10. Livestock Service Sub-center	Chakachaki (3 VDC)	
11. Livestock Service Sub-center	Pathariya (4 VDC)	

cont.

SP-E-2 DLSO Service Network (2/4)

Morang	1. Livestock Service Center	Rangeli (7 VDC)
	2. Livestock Service Center	Urlabari (4 VDC)
	3. Livestock Service Center	Bahuni (5 VDC)
	4. Livestock Service Center	Indrapur (6 VDC)
	5. Livestock Service Center	Katahari (1 VDC+ 8 wards)
	6. Livestock Service Center	Dangraha (4 VDC)
	1. Livestock Service Sub-center	Lentang (4 VDC)
	2. Livestock Service Sub-center	Sijuwa (4 VDC)
	3. Livestock Service Sub-center	Hasandah (3 VDC)
	4. Livestock Service Sub-center	Tandi (2 VDC)
	5. Livestock Service Sub-center	Sorabhad (4 VDC)
6. Livestock Service Sub-center	Kadamaha (5 VDC)	
7. Livestock Service Sub-center	Kerabari (5 VDC)	
8. Livestock Service Sub-center	Thalaha (3 VDC)	
9. Livestock Service Sub-center	BhathiGacha (3 VDC+ 4 Wards of Biratnagar municipality)	
10. Livestock Service Sub-center	Jhorahat 2 VDC+ 10 wards of Biratnagar municipality)	
11. Livestock Service Sub-center	Tetariya (4VDC)	

cont.

SP-E-2 DLSO Service Network (3/4)

Dhanusha	1. Livestock Service Center	Yadukuha (7 VDC)
	2. Livestock Service Center	Dhanusham (5 VDC)
	3. Livestock Service Center	Mahendranagar (7 VDC)
	4. Livestock Service Center	Baidehi (7 VDC)
	5. Livestock Service Center	Phoolgama (5 VDC)
	1. Livestock Service Sub-center	Goddar (4 VDC)
	2. Livestock Service Sub-center	Dhalkebar (6 VDC)
	3. Livestock Service Sub-center	Laxmipur Bagewa (5 VDC)
	4. Livestock Service Sub-center	Basahiya (4 VDC)
	5. Livestock Service Sub-center	Nagarain (5 VDC)
	6. Livestock Service Sub-center	Sonigama (6 VDC)
	7. Livestock Service Sub-center	Kanakpatti 8 VDC
	8. Livestock Service Sub-center	Kurtha (1 municipality + 2 VDC)
9. Livestock Service Sub-center	Tarapatti Sirsiya (7 VDC)	
10. Livestock Service Sub-center	Raghunathpur Bhatithan (8 VDC)	
11. Livestock Service Sub-center	Tinkauriya (5 VDC)	
12. Livestock Service Sub-center	Singiyahi Madan (3 VDC)	
13. Livestock Service Sub-center	Khajuri (7 VDC)	

cont.

SP-E-2 DLSO Service Network (4/4)

Mahottari	1. Livestock Service Center	Loharpatti (6 VDC)
	2. Livestock Service Center	Pipara (8 VDC)
	3. Livestock Service Center	Balaba(6 VDC)
	4. Livestock Service Center	Yekdara (6 VDC)
	5. Livestock Service Center	Gaushala (5 VDC)
	6. Livestock Service Sub-center	Bhangaha (5 VDC)
	7. Livestock Service Sub-center	Bardibas (6 VDC)
	8. Livestock Service Sub-center	Khayarmara (1 VDC)
	9. Livestock Service Sub-center	Matihani (5 VDC)
	10. Livestock Service Sub-center	Parkauli Fulhatta (5 VDC)
	11. Livestock Service Sub-center	Damhi Madai (3 VDC)
	12. Livestock Service Sub-center	Pokharbhinda (6 VDC)
	13. Livestock Service Sub-center	Sonama (5 VDC)
	14. Livestock Service Sub-center	Basbitti (6 VDC)
	15. Livestock Service Sub-center	Laxminiya (4 VDC)
	16. Livestock Service Sub-center	Ramgopalpur (4 VDC)

SP-E-3 Caste And Ethnicity Classified By Major Groups

Major Groups	Caste/ethnic sub groups	All caste and ethnic group
Brahmin, Chhetri	Hill Brahman	Hill Brahman
	Hill Chhetri	Chhetri, Thakuri, Snyasi
	Tarai/Madhesi Brahman/ Chhetri	Madhesi Brahman, Nurang, Rajput, Kayastha
Tarai/Madhesi other castes	Tarai/Madhesi other castes	Kewat, Mallah, Lohar, Nuniya, Kahar, Lodha, Rajbhar, Bing, Malli, Kamar, DHuniya, Yadav, Teli, Koiri, Kurmi, Sonar, Baniya, Kalwar, Thakur/Hazam, Kanu, Sudhi, Kumhar, Hluwai, Badhai, Barai, Bhediyar/Gaderi
Dalits	Hill Dalits	Kami, Damai/Dholi, Sarki, Bodi, Gaine, Unidentified Dalits
	Tarai/Madhesi Dalits	CHamar/Harijan, Musahar, Dushad/Paswan, Tatma, Khatwe, Dhobi, Baantar, Chidimar, Dom, Halkhor
Newar	Newar	Newar
Janajati	Hill Janajati	Tamang, Kumal, Sunuwar, Majhi, Danuwar, Thami/Thangmi, Darai, Bote, Baramu/Bramhu, Pahari, Kusumda, Raji, Raute, Chepang/Praja, Hayu, Magar, Chhantal Bankarya, Rai, Sherpa, Bhujel/Garti, Yakha, Thakali, Limbu, Lepcha, Bhote, Byansi, Jirel, Hyalmo, Walung, Gurung, Dura
	Terai/Madhesi Janajati	Tharu, Jhangad, Dhanuk, Rajbansi, Gangai, Santhal/Satar, Dhimal, Tajpuriya, Meche, Koche, Kisan, Munda, Kusbdiya/Patharkata, Unidentified Adibasi (indigenous) Janajatis
Muslim	Muslim	Madhesi Muslim, Churoute
Other	Other	Marwari, Bangali, Jain, Punjabi/Sikh, unidenrifed others

Supporting Data F

Marketing

SP-F-1 Three Programs under ABPM&MDD

1. Marketing Research & Statistics Management Program

Marketing Research and Statistics Management Program was established in 2007 as a program office under the APM&MDD after restructuring under DOA. The mission of the Program is to conduct various researches in agricultural economics alone and in collaboration with other commodity programs within the DOA and other agencies.

Under the Program, economic surveys related to cost of cultivation, agriculture markets and market margins of agricultural goods and commodities are conducted. Based on the survey, the Minimum Support Price was recommended to the GoN in 2012 November first time in Nepal, although it has not been applied yet.

Various agriculture related data that could be helpful to planning, monitoring and evaluation of the agricultural programs and policies are also compiled and published. The Program also functions to guide DADO at district level to conduct various kinds of Socio-economic surveys as per the local developmental needs of the districts.

Its achievement and plans are as follows;

- It has allocated budget of Rs. 10 crores (Rs. 100million) to conduct F/S in 7 places including Birtamod and Dhalkebar for establishing cold storage in four wholesale markets. In Dhalkebar, however, there is no land available for establishing cold store at present, so the market committee and government are working on acquiring/purchasing land for the wholesale market.
- It has developed Information system, web site (agri-biz.gov.ne), and ICT system for dissemination of market price to farmers.
- It provides training to district level agriculture officers on policy & Program of government on marketing, infrastructure planning, market rules and regulations, market information services, etc.
- It plans to establish and develop market facilities on the East-West Highway

2. Agribusiness Promotion Program

Nepal is an agrarian country employing nearly 65% of the economically active population and contributing about 32% in GDP. Despite the fact that agriculture is one of the promising sectors in economic development of the country, agriculture system is still operating in subsistence level. Thus, transformation of agricultural system into commercial, intensified and competitive form is one of the prerequisite for overall development of the nation. Marketing of agro-produce is the major key for increasing agricultural production and productivity. Agribusiness Promotion Program has been established in the FY 2004/05 under ABP&MDD for supplementing national economy through harnessing the potential of internal market by effective market management.

Objective

- 1) To provide training and extension services to the farmers for market oriented and competitive agriculture production.
- 2) To assist in agro-based industries' development for domestic market promotion.

- 3) To help in poverty reduction through agriculture commercialization.

Working Strategies

Identification, development and extension of economically, socially and technically potential agribusiness sectors through public private partnership and provide solution to the problems associated with the implementation.

- 1) Implement necessary programs for establishing inter-linkage between agriculture production and agro based industries.
- 2) Conduct capacity building programs for developing entrepreneurship for agribusiness establishment.
- 3) Establish co-ordination between GOs, NGOs, cooperatives and private sectors for agribusiness promotion.
- 4) Conduct economic analysis of agri-business to provide information to the related sectors for preparing business plans/schemes based on comparative advantage.
- 5) Encourage all the actors involved in agribusiness (production, processing, storage and distribution) for import substitution and export promotion of agri-commodities.
- 6) Collection, publication and dissemination of information related to agri-business.
- 7) Assist in technical feasibility study for establishment of agro based processing industries.

3. Agricultural Commodity Export Promotion Program

Agriculture sector contributes to one-third of the nation's economy and has further potential with the production of exportable agricultural commodities facilitated by the diverse geographical niche with micro climate. The advent of the National Agricultural Policy 2004 and Agri-business Promotion Policy 2004 along with the inclusion of Nepal into the WTO calls for the promotion in the production of commercial, competitive and quality agro-commodities as well as their export in the national and international markets. This aims to develop a competitive agriculture system to decrease the trade deficit and make Nepal a front runner in the regional and global market.

Recognizing export of the agricultural products as the base for decreasing the national trade deficit, the Agricultural Commodity Export Promotion Program was established under the DOA, ABP&MDD in FY 2004/5 for developing the pre-requisites of domestic market to link with international market.

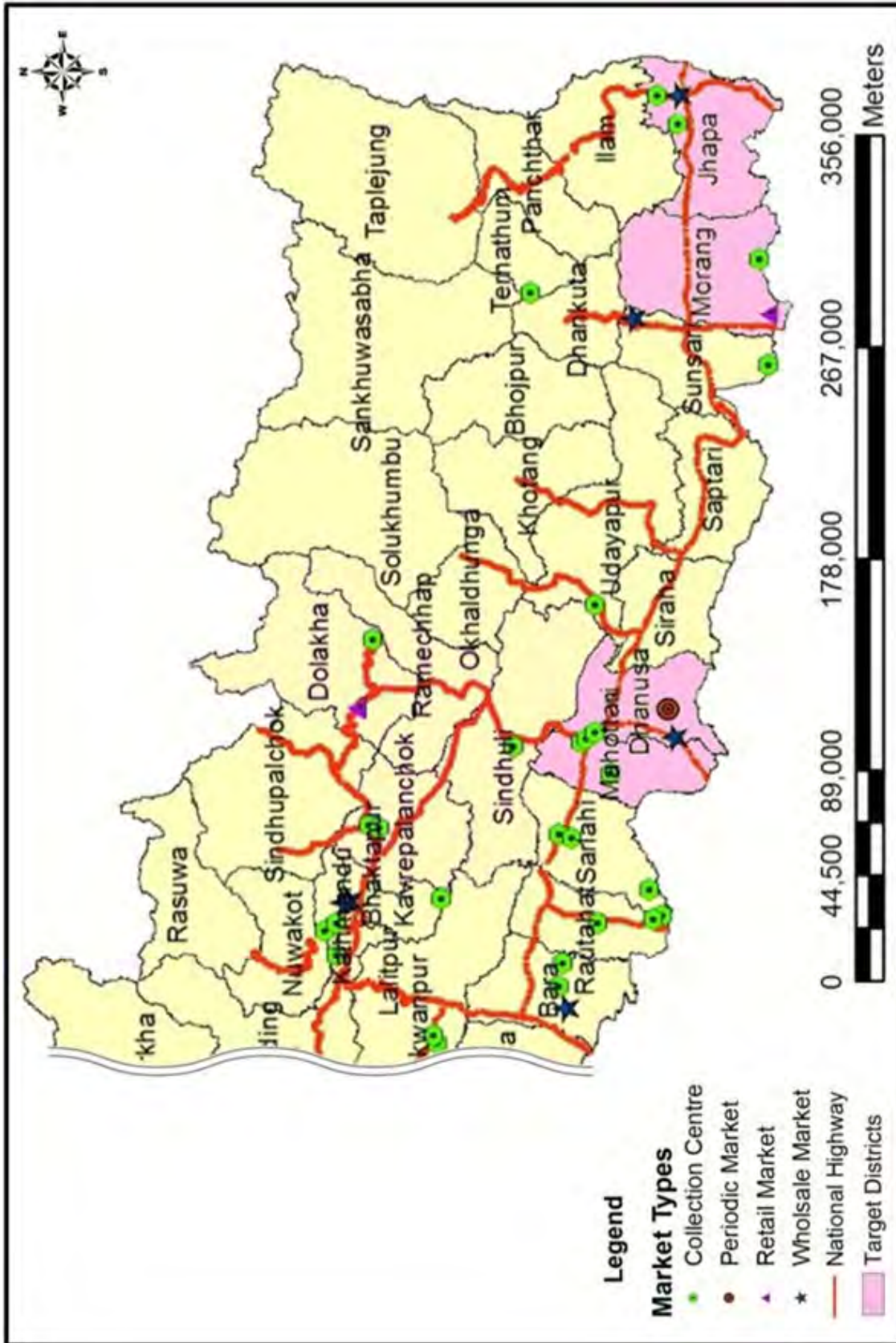
Objectives

- 1) To identify exportable agricultural commodities and develop prerequisites for commercialization and competitiveness.
- 2) To support exposure of agricultural commodities in the international market.
- 3) To conduct study/research for the identification of the problems relating to agricultural commodity export and recommend measures for solution.
- 4) To support processing of exportable agricultural products and enhance international market access.
- 5) To facilitate the growth of agricultural commodity export and the subsequent reduction in the trade deficit.

Working Areas

- 1) Study demand and supply situation of the agricultural commodities in the international markets and make those information available to entrepreneurs and policy makers.
- 2) Dissemination of necessary information about the export markets to the exporters of the agricultural commodities.
- 3) Collaboration with Trade and Export Promotion Center, Department of Commerce, and other related organizations for formulating agriculture export policy.
- 4) Collaboration with national /international organization for getting technical and financial assistance for the promotion of agricultural export and trade.
- 5) Establishment of regular communication with the national, regional and international trade promotion organization.
- 6) Organization of workshop/seminar, training on promotion of nationally recognized exportable agricultural commodities.
- 7) Subsidization of the equipment required for the processing of the exportable agricultural commodities.
- 8) Promotion of organic agriculture.
- 9) Publication of updated data on export and import of agricultural commodities.
- 10) National focal point for the promotion of exportable agricultural commodities.

SP-F-2 Major Agriculture Markets and Road Network



Source: Prepared by JICA Survey Team based on the Project for the Master Plan Study on High Value Agriculture Extension and Promotion in Sindhuli Road Corridor in Nepal, Progress Report, Dec.2011, JICA, P2-46

SP-F-3 Development Plan of target districts in FY 2011/2012

(i) Jhapa

Project name (pocket areas)	Major activities	budget/area
Food Security Program		
1. Food Crop Seed Increment Project (Gauradaha, Shivaganji, Budhabare, Manepa)	<ul style="list-style-type: none"> • Group formation/ reformation • Distribution of seeds and fertilizers through grants • Distribution of metal bin, sewing machines, jute bags packaging, tent distribution • Sample seed collection, crop supervision • Seed storage 	Rs.520,000
2. Food Crop Density and Productivity Development Project (pocket area:n.a.)	<ul style="list-style-type: none"> • Group formation/ reformation • Training/ exhibition • Seed kit distribution • Expansion of SRI technology • Soil test camp • IPNS farmers school • Emergency crop protection service • Sample soil exhibition • Monitoring and evaluation 	Rs.540,000
Commercial agriculture development (Pocket development) Program		
1. Commercial and cash crops productivity increment program (pocket areas: Charpane, Chandragadhi, Anarmani, Garamani)	<ul style="list-style-type: none"> • Group reformation • Service center level mobile leader farmer training • Chemical fertilizer grant, exhibition program • Publication of cash crop statistics book • Emergency crop protection • Monitoring and evaluation 	Rs.250,000
2. Commercial Fresh Vegetables Production Project (Pocket Areas: Prithvinagar, Chakchaki, Maheshpur, Jyamirgadhi)	<ul style="list-style-type: none"> • Group Formation/ reformation • Training, visits, seminars • Vegetable seed distribution through grants • Extension of vegetable producing pocket areas • Movement for problem solving • Distribution of equipment at subsidy • Trainings • Contests • Monitoring and evaluation 	Rs.450,000

(ii) Dhanusa

Project name (pocket areas)	Major activities	Budget/area
Food Crop Production Program (as Food Security Program)		
(Raghunathpur, Barmajhiya, Sabaila, Makhanaha, Satokhar, Kharihani, Gopalpur, Baniniya, Sapahi, Ramdaiya, Mahuwahi)	<ul style="list-style-type: none"> • Production demonstration • Result demonstration • Seed kit distribution • Service center training • Micro nutrient demonstration • Rice day celebration • Crop harvest 	<ul style="list-style-type: none"> • Rs.153,000 • Total area: 20200 ha. • Total production: 60200 Mt
Commercial agriculture development (Pocket development) Programme		
Seed Production Program (Phulgama, Lagama, Sapahi, Digambarpur, Raghunathpur, Sabaila, Baniniya, Umapurempur)	<ul style="list-style-type: none"> • Seed production program • Mobile location on specific training, • Seed Sellers training • Transportation 	<ul style="list-style-type: none"> • Rs.87,000
Vegetable Production Program (Phulgama, Lagama, Nagaraine, Dhalkebar, Mahendranagar, Begadabar, Puspapur, Dhanushadam)	<ul style="list-style-type: none"> • District level training • Mini-kit • Crop Protection Service • Package demonstration Training • Service Center training & Competition 	<ul style="list-style-type: none"> • Rs.210,000 • Total area: 400 ha. • Total Production: 3200 Mt
Commercial Fruit development Program (pocket areas: 8)	n.a.	<ul style="list-style-type: none"> • Total area: 250 ha

(iii) Mahottari

Project name (pocket areas)	Major activities	Budget/area
Food Security Program		
a) Kisannapar, Gaushala, Ratauli, Gauribas Bhangaha, Nigaul)	a) District level	Not available
b) Multi-location in districts	<ul style="list-style-type: none"> • Rice seed production • Wheat seed production b) Cereal crop production & productivity enhancement	
Commercial Fresh Vegetable Production Program (as Commercial agricultural development Program)		
a)pocket areas: Dhirapur, Matihani, Laxmaniya, Bijalpur, Kisan nagar, Paghulale nagar, Dhamaura b)Gauribas, Bhangaha c)Bhangaha d)Maishan e)Laxminiya	a)Main & off-season vegetable production b)Commercial mushroom production c)Commercial ole (elephant yam) production d)Commercial pointed gourd production e)Commercial fresh vegetables & vegetable seed production	Not available for 2011/12 (1,300ha in 2010/11)

Source: District Development Plan of Respective Districts (DDC Jhapa, 2012, DDC Morang 2012, DDC Dhanusha 2012, and DDC Mahottari, 2012, Annual Report of DADO Mahottari 2010/11, and presentation from DADO Mahottari and Dhanusha at the Workshop in the Survey in August 2013.

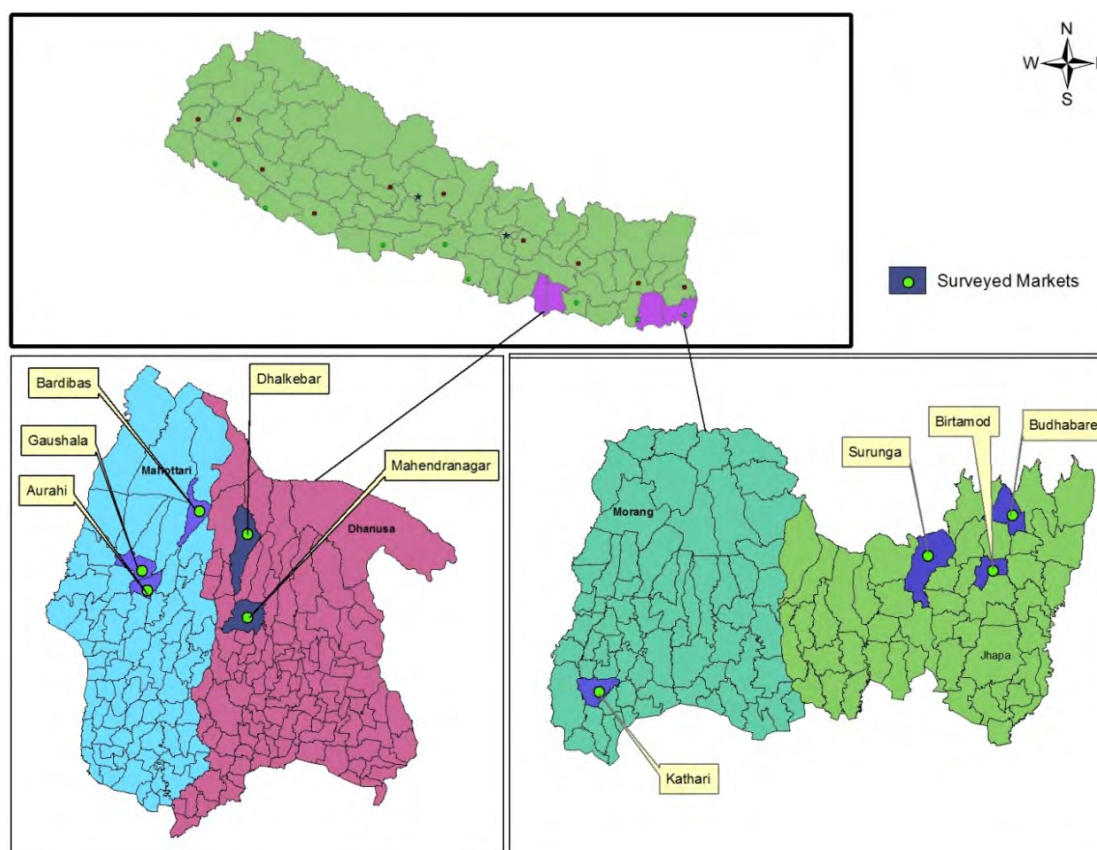
SP-F-4 Major Activities and Plan at CC&I District Office in Target Districts

Name	Major Activities	Plan
Morang Merchants' Association	<ul style="list-style-type: none"> - Construction of Maternity ward and Emergency ward of Tribhuvan Memorial Koshi Anchal Hospital, Janta Law Campus, and Ghinaghat Birat chowk road - Provision of support during natural disasters, financial support towards sports, literacy and religious activities. - Management of Charitable homeopathy clinic 	-Grain silos with 3,000t capacity and latest storing technology are under construction. The company will start business in 2013, in which grains are purchased directly from farmers and sold to the mill after pre-cleaning.
Dhanusha chapter of FNCCI	<ul style="list-style-type: none"> -Information dissemination to farmers on government rules and regulations when they start business -Implementation of market management training for farmers who want to start agri-business 	-Submitted proposals to the central FNCCI on OVOP programs for mango production and aquaculture development by collaboration with DADO

Source: Interview to CC&I district office in Morang and Dhanusha districts

SP-F-5 Detail Information of Markets in Kankai and Hardinath Areas

The following are the 9 markets surveyed; 1) Budhabare, Birtamod, Surunga in Jhapa District, 2) Kathari in Morang District, 3) Dhalkebar, Mahendranagar in Dhanusa District, and 4) Bardibas, Gaushala, and Aurahi in Mahottari District.



Source: NARMA Sample Survey on Agriculture Distribution and Marketing by JICA Survey Team

For market analysis specifically for TCP, 5 markets of Kankai and Hardinath irrigation area are selected from 9 targeted markets in Jhapa and Dhanusa Districts. The followings are the results of each market information.

(a) Operation and management

Market Name	Major Commodities	Operation	Area (ha)	Business Hour	Management
K1	vegetable, fruit, spices	Daily	2.7	12	Committee
K2	Vegetables	Seasonal, daily	n.a.	11	Committee
K3	Vegetables	Daily,	0.2	11	Committee
H1	Vegetables, fruits, spices	Thrice a week	4	12	Committee
H2	Live animals, vegetable, fruits	Twice a week	1.43	12	Committee

K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar

(b) Composition of market management committee

Unit: % of members

Market	Traders	Farmers	Government/ Local government	Other	Total
K1	33.3	33.3	13.1	20.2	100.0
K2	-	100.0	-	-	100.0
K3	33.3	33.3	13.1	20.2	100.0
H1	33.3	33.3	12.1	21.2	100.0
H2	-	-	11.1	88.9	100.0

*K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar***(c) Different categories of traders**

Traders	K1	K2	K3	H1	H2
Traders (No)	274	32	4	250	60
Breakdown (%)					
-Traders - Bulk trading	-	-	-	6.0	-
-Wholesalers	32.1	-	100.0	14.0	8.3
-Retailers	67.9	-	-	40.0	8.3
-Farmers (Producers)	-	100.0	-	40.0	83.3
Total	100.0	100.0	100.0	100.0	100.0

*K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar***(d) Business transaction**

S.N.	Market	Business amount (000/year)			Daily transaction (Rs 000)	Share (%)	
		Wholesale	Retail	Total		Wholesale	Retail
1	K1	56,60,714	-	56,60,714	15,508.8	100.0	-
2	K2	1,200	-	1,200	3.3	100.0	-
3	K3	19,200	-	19,200	52.6	100.0	-
4	H1	4,836	1,31,400	1,36,236	373.3	3.6	96.4
5	H2	35,200	12,130	47,330	129.7	74.4	25.6

K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar

(e) Sales volumes by products

Market Name	Wholesale (Approx.)		Retailing (Approx.)		Total	
	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1) Vegetables						
K1	2,06,173	36,96,601			2,06,173	36,96,601
K2	12	1,200	-	-	12	1,200
K3	1,664	19,200			1,664	19,200
H1	6,332	3,113	-	-	6,332	3,113
H2	40	800	50	1,500	90	2,300
2) Fruits						
K1	25877	913671			25877	913671
H1	2347	434			2347	434
H2	30	2100	40	4000	70	6100
3) Spice						
K1	3,479	8,51,219			3,479	8,51,219
H1	1914	1289	-	-	1914	1289
H2	2	300	4	600	6	900
4) Live Animals						
H2	2800	21000	-	-	2800	21000
5) Meat						
K1	416	147325	0	0	416	147325
H1	-	-	292	131,400	292	131400
H2	20	6000	10	3000	30	9000
6) Fish						
K1	285	51897			285	51897
H2	20	4000	10	2500	30	6500

K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar

(f) Origin of agriculture produce traded on the market and Place of sale of produce

(%)

S.N.	Particulars	K1		K2		K3		H1		H2	
		O	S	O	S	O	S	O	S	O	S
1	Adjoining area	-	31.7	100.0	100.0	10.0	10.0	33.3	100.0	22.5	72.5
2	Within district	26.7	31.7	-	-	30.0	30.0	13.3	-	25.0	3.8
3	Nearby districts	30.8	10.0	-	-	30.0	30.0	13.3	-	10.6	12.5
4	Other districts	9.2	5.8	-	-	-	-	6.7	-	7.5	11.3
5	India	31.7	11.7	-	-	30.0	30.0	33.3	-	34.4	-
6	China	1.7	9.2	-	-	-	-	-	-	-	-
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar

(g) Buyers of agriculture commodities

S.N	Particulars	K1	K2	K3	H1	H2
1	Consumers (Individuals/business)	40.0	0.0	20.0	86.7	68.8
2	Wholesaler (local)	19.0	10.0	10.0	0.0	0.0
3	Wholesaler (outsiders)	16.0	50.0	40.0	0.0	25.0
4	Retailers	13.0	40.0	0.0	13.3	6.3
5	Traders (India)	12.0	0.0	30.0	0.0	0.0
	Total	100	100	100	100	100

K1: Birtamod, K2: Surunga, K3: Budhabare, H1: Dhalkebar, H2: Mahendra Nagar

Supporting Data G

Result of Sublet Works

SP-G-1 Sample Surveys on Water Management, Agriculture and Marketing

1. Concept of Sample Survey

In the study, sample surveys on water management and WUA, Agriculture, Marketing and Households (HH) was planned to carry out as soon as the Study Team mobilized in Nepal in early April 2013. The Surveys have been carried out by entrusting to a Nepalese Consultant, NARMA Consultancy Pvt. Ltd., to grasp the present conditions on agriculture in the 4 districts. It was specified in the Study that the sample surveys should be conducted in approximately 10 villages, which are differed in geographically, economically and socially and the HH survey should be conducted for 120 HH (30 HH in each district), whom shall be randomly selected in the villages to be surveyed.

2. Procedure of the Survey

The sample surveys entrusted to NARMA have been carried out in the following headings:

- Sample Survey on Water Management and WUA
- Sample Survey on Agriculture
- Household Survey
- Agriculture Market and Marketing Survey

The procedures of each survey are explained in detail hereunder.

1) Sample Survey on Water Management and WUA

(a) Selection of Projects for the Survey

The selection of target MIPs¹ and WUAs has been made at first to start the surveys since the objective is to grasp the present agricultural conditions and the irrigation is the one of the most important factors for agriculture. The selection of the target MIPs and WUAs has been conducted first by preparing inventory of irrigation projects on the following points through the reconnaissance field visit.

- Name of Irrigation Scheme
- Location (District and VDC)
- Command Area- Caste of WUA (dominant caste of VDC)

The selection further is conducted in 4 categorized areas based on the inventory of irrigation projects taking the following aspects into account:

- There are two major categories of irrigation, surface irrigation and ground water irrigation,

¹In the specifications of the study, as only MIP was designated for the objective irrigation scheme, the surveys in the initial period were made only on MIPs for surface irrigation scheme.

• MIP is surface irrigation schemes, of which command area is between 200 to 2000 ha, and ground water irrigation scheme consists of shallow tube well (STW) and deep tube well (DTW).

On the other hand, in case of MIPs in the 4 districts, irrigation scheme of conjunctive use of surface water and ground water was not found in the reconnaissance survey; sample from conjunctive use was not selected for samples for the survey.

Therefore, the samples for the survey on WUA were selected as shown in the following Table 1.

Table 1 Samples for Survey on WUA

District	Sample Irrigation Scheme (nos.)				
	Total	Surface Irrigation		Ground Water	
		Command Area (200 – 1000 ha)	Command Area (1000 – 2000 ha)	STW	DTW
Jhapa	4	1	1	1	1
Morang*1	4	2	0	1	1
Dhanusa*2	4	1	1	0	2
Mahottari	4	1	1	1	1
Total	16	5	3	3	5

Note: *1 As there is no MIP in Morang, of which command area is more than 1000 ha, sample number is changed.

*2 As the most of STW in Dhanusa is privately owned and no WUA under STW is formed, sample under DTW become two.

Source: The Sample Survey Report

Further, the sociological characteristic in ethnicity and caste group of each district is summarized in the following Table 2.

Table 2 Sociological Characteristic of 4 Districts

District	Jhapa	Morang	Dhanusa	Mahottari
Characteristic	Hill Society*1 or Mixed Society*3	Hill Society or Mixed Society	Terai Society*2 or Mixed Society	Terai Society, Hill Society or Mixed Society

Note: *1 Hill society; Hill society in Terai includes those communities which have migrated from nearby or adjoining mountain and hill districts for better livelihoods opportunities. This mostly includes Brahmin/Chettri, Janajati and Dalit caste. These communities are mostly involved in farming and have relatively large farm size. These communities have nuclear family. *2 Terai Society; Terai society includes those communities which are local inhabitants of the area. This mostly belong to Teria caste origin such as Jha, Yadav, Tharu, Kayastha, Mandal, Tatma, Bantar, Mushahar, Chamar etc. These groups have four distinct languages such as Maithili, Bajika, Bhojpuri, and Awadhi. Teria societies mostly have joint family. These communities have less land with large family size. These communities especially women are generally backward from education. They are poor compared to hill society. There are many migrated from India. *3 Mixed society; the society is mixed with hill society and Terai society.

Source: The Sample Survey Report

Annexes 4.1.1 - 4.1.4 show that the VDC wise ethnicity maps. The topographical conditions in the 4 districts are similar as land gradient in the north is steeper than that in the south and soils in the north is coarser as containing more gravel and sand and those in the south is finer as mainly silt and clay.

The target irrigation projects for the sample survey of WUAs are selected based on the extent of the command area, economic conditions of villages observed by the inventory survey and the taking the sociological and geographical conditions as discussed above into account.

The following Tables 3 and 4 are the list of the selected irrigation projects for the survey and for the surface and ground water irrigation projects respectively:

Table 3 List of Surface Irrigation Projects Selected for the Study

District	Name of scheme (IP)	VDC	Command area (ha)	Dominant society	Selection basis
Jhapa	LowerKisniKhola	Gaurigunj	1,500	Open*1 (Hill caste)	Size
	Bhuteni Sainik Khola	Garamani	350	Open (Hill caste)	Size & open society
Morang	Ke.Bho.Le.Na	Kerabari,	780	Open (Hill caste)	Location & geographic coverage
	Musarghatta	Amardaha	600	Open (Hill caste)	Location & geographic coverage
Dhanusa	Hardinath	Harsar Banimiya	1,000	Closed (Teria caste)	Size
	Jallad	Ramdaiya	700	Closed (Teria caste)	Size & society
Mahottari	Bighi	Mahadaiya	2,000	Closed (Teria caste)	Size
	Kalapani	Gauribas	200	Open (Hill caste)	Size, society & location

Note: *1 Open means that this society is open to outsiders, new ideas and innovations. *2 Close means that this society is generally close to outsiders and new things.

Source: The Sample Survey Report

Table 4 List of Ground Water Irrigation Projects Selected for the Study

District	Name of WUCs	Location (VDC)	Type	HHs	Command area (ha)	Dominant society*	Selection basis
Jhapa*	Surodaya WUC	Ghailadhubba	STW	2 2	14.2	Open (Hill caste)	Society and Location
	Prithivinagar MaheshpurJal	Prithivinagar	DTW	4 0	40.0	Open (Hill caste)	Society and Location
Morang	Sundar Samuhik Kisan	Sundarpur	DTW	6 4	44	Open (hill caste)	Society and Location
	Sansarimai	Aamgachhi	STW	18	14.2	Closed (Teria caste)	Pump number & society
Dhanusa	Binihi Deep tubewell*	Binihi	DTW	111	50	Closed (Teria caste)	Society and Location
	Naktajhij tubewell*	Naktajhij	DTW	150	43	Closed (Teria caste)	Society and Location
Mahottari	Sanakishan	Paraul	STW	200	130	Closed (Teria caste)	Pump number & society
	Shiva Parbati	Laxmaniya	DTW	82	70	Closed (Teria caste)	Society and Location

Note: * DTW developed Janakpur Agriculture Development Project

Source: The Sample Survey Report

The locations of the above sites are indicated in the Annexes 4.1.5 to 4.1.8

(b) Major Survey Items

Major Survey items of the survey for the water management and WUA are listed as follows:

- Present Situation of WUA and WUA' performance
- Irrigation System and water management
- Management and government's technical service
- Irrigation service fee and budget allocation
- Water delivery conditions
- Situation of maintenance works on irrigation facilities

(c) Methodology of the Survey

Methodology of the Survey is carried out in following sequence:

- Questionnaires of the survey drafted are finalized after initial trial survey is conducted, and translated to Nepal language for field survey.
- Interviews to stakeholders such as WUA leaders, community leaders, VDC secretary and so on are conducted
- Group discussions are organized for focus WUA and WUG
- Data is analyzed and the report is prepared.

2) Sample Survey on Agriculture

(a) Purpose of the Survey

Sample survey on agriculture is conducted to grasp the general agriculture conditions in the 4 districts before preparing HH survey. Data of this survey is complimentary to the HH survey and some data which are not available in the HH survey could be extracted in this survey.

(b) Selection of the Project and Villages for the Survey

It was decided by the Team to select 12 villages for the survey among the 16 irrigation projects surveyed for the water management and WUA, though the specifications of the Study prescribed 10 villages. Considering the area extent, the 8 surface irrigation projects and 4 ground water projects are selected for the agricultural survey. The list of selected projects and villages shown in the following Table 5:

Table 5 List of Survey Projects and Villages

No.	Irrigation Project	Name of Village	Cultivat ed Area	Number of HH	Location	
					District	VDC
1	DTW, Prithivinagar -Maheshpur	Ghalechowk Bichline	15	28	Jhapa	Prithivinagar
2	Surface, Tallo Kishini Khola	Telgani	330	300	Jhapa,	Gauriganji
3	Surface, Bhuteni Sainik	Meena Chowk	24	35	Jhapa	Garamani
4	STW, Sansarimai	Musaharitole	53	58	Morang	Amgachchi
5	Surface Musahar Ghatta Paini	Kamini Khadi	20	35	Morang	Amardaha
6	Surface, Chisyang K.V.Le.Na	Dhobi	39	65	Morang	Letang
7	DTW, Nakatajhijh	Nakatajhijh	1,800	1,900	Dhanusa	Nakatajhijh
8	Surface, Hardenath	Thera	70	75	Dhanusa	Kachurithera
9	Surface, Jalad	Ramaidaiya Bhawadi	330	400	Dhanusa	Ramaidaiya Bhawadi
10	STW, Sanakishan	Kuhi Tole	150	175	Mahottari	Paraul
11	Sirface, Palapani	Kalapani	339	199	Mahottari	Gauribas
12	Surface, Hardiya	Hardiya	200	300	Mahottari	Sahorawa

Source: The Sample Survey Report

(c) Major Survey Items

Major survey items for the agriculture survey are listed as follows:

- Crops cultivated
- Income and cost of farming
- Storage facilities
- Marketing of products
- Agriculture service delivery
- Others

(d) Methodology of Survey

Methodology of the survey is similar to the survey for the WUA discussed in the preceding sub-chapter as follows:

- Interviews to stakeholders such as WUA leaders, community leaders, VDC secretary and so on are conducted
- Group discussions are organized for focus villages
- Data is analyzed and the report is prepared.

3) Household Survey

(a) Purpose of the Survey

The purpose of the household survey is to understand general agriculture conditions in the objective area and farmers' agriculture activities and outcome precisely for making the project planning by grasping issues and constraints in present agriculture.

(b) Sample of Household for the Survey

The number of HH surveyed is 30 in each District; hence total number of the HH survey is 120. Taking the distribution of HH numbers in different land holding areas in the statistics and depending on the results of the reconnaissance survey, sample distributions were determined as shown in the following Table 6:

Table 6 Distribution of Samples for Household Survey

Description	Jhapa	Morang	Dhanusa	Mahottari	Total
Irrigation facility					
Surface (up to 1000 ha)	10	18	10	10	48
Surface (more than 1000 ha)	8	0	8	8	24
Deep tube well	4	4	8	4	20
Shallow tube well	4	4	0	4	12
Rain fed	4	4	4	4	16
Land holding					
Less than 0.5 ha	10	8	10	11	39
0.5 to 1 ha	9	8	9	13	39
1 to 2 ha	5	7	4	4	20
2 to 5 ha	3	4	4	1	12
Above 5 ha	3	3	3	1	10
Total	30	30	30	30	120

Source: The Sample Survey Report

(c) Major Survey Items

Major survey items of the HH survey are listed in the following Table 7:

Table 7 List of Items on Household Survey

Part	Item	Contents
1	General	(1) Demographic Information (2) Land, livestock and asset situation (3) Income and expenditure
2	Agriculture	(1) Crop production (2) Rice cultivation (3) Food consumption / self sufficiency (4) Input supply (5) Irrigation and drainage (6) Energy and environment (7) Post-harvest activities (8) Marketing (9) Access to services and utilities
3	Others	(1) Household decision making and role of women

		(2) Institutional affiliation
--	--	-------------------------------

Source: The Sampla Survey report

(d) Methodology

Methodology of the Survey is similar to the other surveys in following sequence:

- Questionnaires of the survey drafted are finalized after conducting pre-testing 10 samples in the sites, and translated to Nepal language for field survey.
- Training of enumerators and carry out the HH survey
- Editing Information collected for consistency
- Data analysis and report preparation

4) Agriculture Market and Marketing Survey

(a) Purpose of the Survey

The agriculture market and marketing survey was not included in the NARMA's contract initially, but in mutual agreement NARMA has prepared the report separately.

The purpose of the Agriculture Market and Marketing survey is to assess market and market situation in the study area and to study major market center operation.

(b) Major Survey Items

Major survey items are collected on each market registered at the Bossiness Promotion and Market

Division of MOA as follows:

- Office for registration
- Location
- Year of establishment
- Number of Employee
- Market area extent
- Major facilities
- Major agricultural produces handling
- Number of wholesalers and retailers
- Components of source products handling (% of domestic/import) if there is there is wholesalers /retailers of imported/exported produce
- Specify the country for items in 1) above
- Volume of transactions per days (ton and NRs.)

In addition to the market survey above, assessment of marketing situation of paddy and vegetables in the study area is carried out.

(c) Methodology

Survey on the registered market is conducted by the interview of market manager and market management committee members of each market, while assessment of paddy and vegetable marketing have been carried out through interviews on traders, collectors, mills, in addition to market managers and market management committee members.

3. Schedule of the Sample Survey

The contracts of the sample surveys, consisting of the following 3 surveys, have been entrusted to NARMA as soon as the Study Team mobilized in Nepal in early April in accordance with the JICA procurement guideline.

NARMA has commenced the works in the 3rd week of April and the draft final report was submitted in May. After the comments provided from the Survey Team, it was amended and the final report was submitted in June.

4. Results of the Survey

The NARMA Consultancy Firm has completed the reports and the Study Team have been incorporated the outcomes of the sample surveys in the respective portion of the Final Report.

The reports prepared by the NARMA Consultancy Firm and accepted by the Survey Team are submitted to JICA together with the completion report of the sub-contract.

Nippon Koei Co. Ltd.
Team Leader, JICA Study Team
Preparatory Survey on JICA's Cooperation Program for Agriculture
and Rural Development (*Food Production and Agriculture in Terai*)

Farm Household Survey

FINAL REPORT

June 2013



NARMA

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Abbreviations and Acronyms

DTW	Deep Tube well
ha	hectare
HHs	Households
IP	Irrigation Project
JICA	Japan International Cooperation Agency
Kg	Kilogram
Qty	Quantity
Rs	Nepalese Rupees
STW	Shallow Tube well
VDC	Village Development Committee
WUC	Water User Committee

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1. INTRODUCTION

1.1 Background

Japan International Cooperation Agency (JICA) entrusted Nippon Koei Co. Ltd, Vision and Spirit for Overseas Development (VSOC) Co. Ltd and CDC International Cooperation, hereafter JICA Study Team (JST) to undertake preparatory survey on JICA's Cooperation Programme For Agriculture and Rural Development (Food Production and Agriculture in Teria). The study intends to analyze current situation and critical issues in agriculture and rural development in Teria plains of Nepal and intends to identify feasible and adequate approaches for "Integrated Agriculture and Strengthening Project".

JST sub-contracted NARMA Consultancy Pvt Ltd (hereafter NARMA) to undertake farm household survey under JICA preparatory survey on the agriculture and rural development program in the Terai region. This report presents findings of the household survey together with output tables produced from survey.

1.2 Objective and Scope

The main objective of the study is to conduct farm household survey to understand agriculture and rural development in Terai of Nepal. The scope of the work includes:

- Amend and finalize questionnaire format based on the format drafted by JST,
- Conduct pre-testing/field trial of questionnaire for 10 samples,
- Conduct questionnaire survey and prepare report

1.3 Methodology

1.3.1 Survey questionnaire finalization

JICA study team provided farmer household survey questionnaire covering following aspects (table 1.1). The questionnaire prepared by JST was re-arranged for making data collection work and data entry work easy. The revised survey questionnaire was translated into Nepali language for data collection. The study conducted pre-testing/field trial of questionnaire for 10 samples questionnaire representing all irrigation scheme and rain fed area. **Annex 1** presents findings of the pre-testing along with implications. Survey methodology and instruments was revised based pre-testing findings. Survey questionnaire was further improved based on pre-testing and discussions with the JST. **Annex 2** presents revised household survey questionnaire.

Table 1.1: Outline of HHs survey questionnaire

Part	Item	Contents
1	General	(1) Demographic Information (2) Land, livestock and asset situation
2	Agriculture	(1) Crop production (2) Rice cultivation (3) Food consumption / self sufficiency (4) Input supply (5) Irrigation and drainage (6) Energy and environment (7) Post-harvest activities (8) Marketing (9) Access to services and utilities
3	Others	(1) Household decision making and role of women (2) Institutional affiliation

1.3.2 Selection of irrigation system

Water user Associations survey was conducted in those areas where other two components of the study were executed, i.e. (a) Village Survey and (b) Water User Association Survey. This means that the irrigation system was same for all three studies but focusing on different aspects according to the objective and the scope of work. Table 1.2 presents list of irrigation system selected for the study. **Annex 3** presents methods followed for selection of irrigation system. Map 1.1, Map 1.2, Map 1.3 and Map 1.4 shows study irrigation projects of Jhapa, Morang, Dhanusa and Mahottari districts respectively where farm household survey were carried.

Table 1.2: List of irrigation project selected for the study

District	Name of scheme	VDC	Command area (ha)	Dominant society*	Type	Size of scheme
Jhapa	Lower Kisni Khola	Gaurigunj	1500	Open (Hill caste)	Surface	Above 1000 ha
	Bhuteni Sainik Khola	Garamani	350	Open (Hill caste)	Surface	Upto 1000 ha
	Surodaya WUC	Ghaila dhubba	14.2	Open (Hill caste)	Ground water	STW
	Prithivinagar Maheshpur Jal	Prithivinagar	40.0	Open (Hill caste)	Ground water	DTW
Morang	Ke.Bho.Le.Na.	Kerabari,	780	Open (Hill caste)	Surface	Above 500 ha
	Musarghatta	Amardaha	600	Open (Hill caste)	Surface	Above 500 ha
	Sundar Samuhik Kisan	Sundarpur	44	Open (hill caste)	Ground water	DTW
	Sansarimai	Aamgachhi	14.2	Closed (Teria caste)	Ground water	STW
Dhanusa	Hardinath	Harsar Banimiya	2000	Closed (Teria caste)	Surface	Above 1000 ha
	Jallad	Ramdaiya	700	Closed (Teria caste)	Surface	Upto 1000 ha
	Binihi Deep tubewell	Binihi	50	Closed (Teria caste)	Ground water	DTW
	Naktajhij tubewell	Naktajhij	43	Closed (Teria caste)	Ground water	DTW
Mahottari	Bighi	Mahadaiya	2000	Closed (Teria caste)	Surface	Above 1000 ha
	Kalapani	Gauribas	200	Open (Hill caste)	Surface	Upto 1000 ha
	Sanakishan	Paraul	130	Closed (Teria caste)	Ground water	STW
	Shiva Parbati	Laxmaniya	70	Closed (Teria caste)	Ground water	DTW

1.3.3 Farmers survey

Sample size: The study planned to survey of 30 farmers from each district representing different farm size and irrigation system. Hence, study surveyed 120 farmers/farm households from four study districts. Table 1.3 presents number of farmers planned for survey from each study districts by farm size and irrigation scheme. The study intended to ensured representation of different farm size in case of ground water irrigation as well as rain fed agriculture. Of 120 farm households planned for survey 104 farm households have

irrigation facility whereas 16 are don't have any irrigation facility or rain fed farmers. Rain fed farmers include those farmers who don't have any irrigation facility. These farmers were selected randomly from adjoining villages of irrigation system or from same villages of irrigation scheme but have no access to irrigation. Number of sample were divided equally by district depending upon type of irrigation facility surveyed

Table 1.3: Number of farmers/farm household planned for survey

Farm size	Surface irrigation		Ground water		Rain fed	Total
	Upto 1000 ha	Above 1000 ha	Deep	Shallow		
Less than 0.5 ha	10	6	10	6	8	40
0.5 to 1 ha	10	6	10	6	4	40
1 to 2 ha	10	6			4	24
2 to 5 ha	9	3				12
Above 5 ha	9	3				12
Total	48	24	20	12	16	120

In few irrigation facility, there was no farmers with required land holding size. Hence, upward or downward adjustment of the land categories were made on selection of table. Table 1.4 below presents total number of farmers/farm households surveyed.

Table 1.4: Number of farmers/farm household surveyed

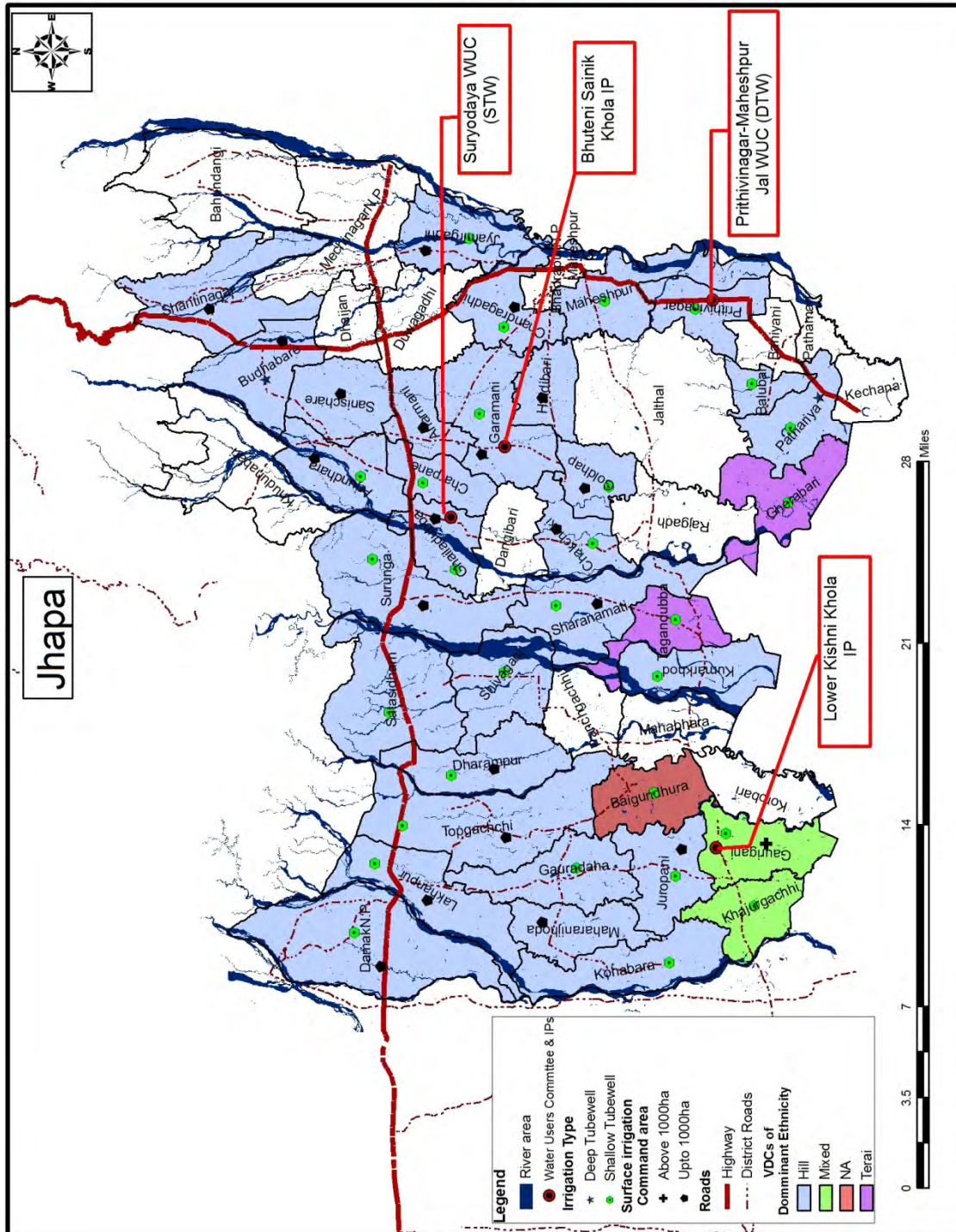
Farm size	Surface irrigation		Ground water		Rain fed	Total
	Upto 1000 ha	Above 1000 ha	Deep	Shallow		
Less than 0.5 ha	11	6	10	4	8	39
0.5 to 1 ha	14	6	10	5	4	39
1 to 2 ha	8	6		2	4	20
2 to 5 ha	8	3		1		12
Above 5 ha	7	3				10
Total	48	24	20	12	16	120

Selection of farmers: List of famers who were benefitted from particular irrigation scheme together with irrigated area was prepared in consultations with irrigation users/water user associations. Farm households were selected randomly for the list representing each farm size. Table below presents number of farmers surveyed by district representing different land size and irrigation facility.

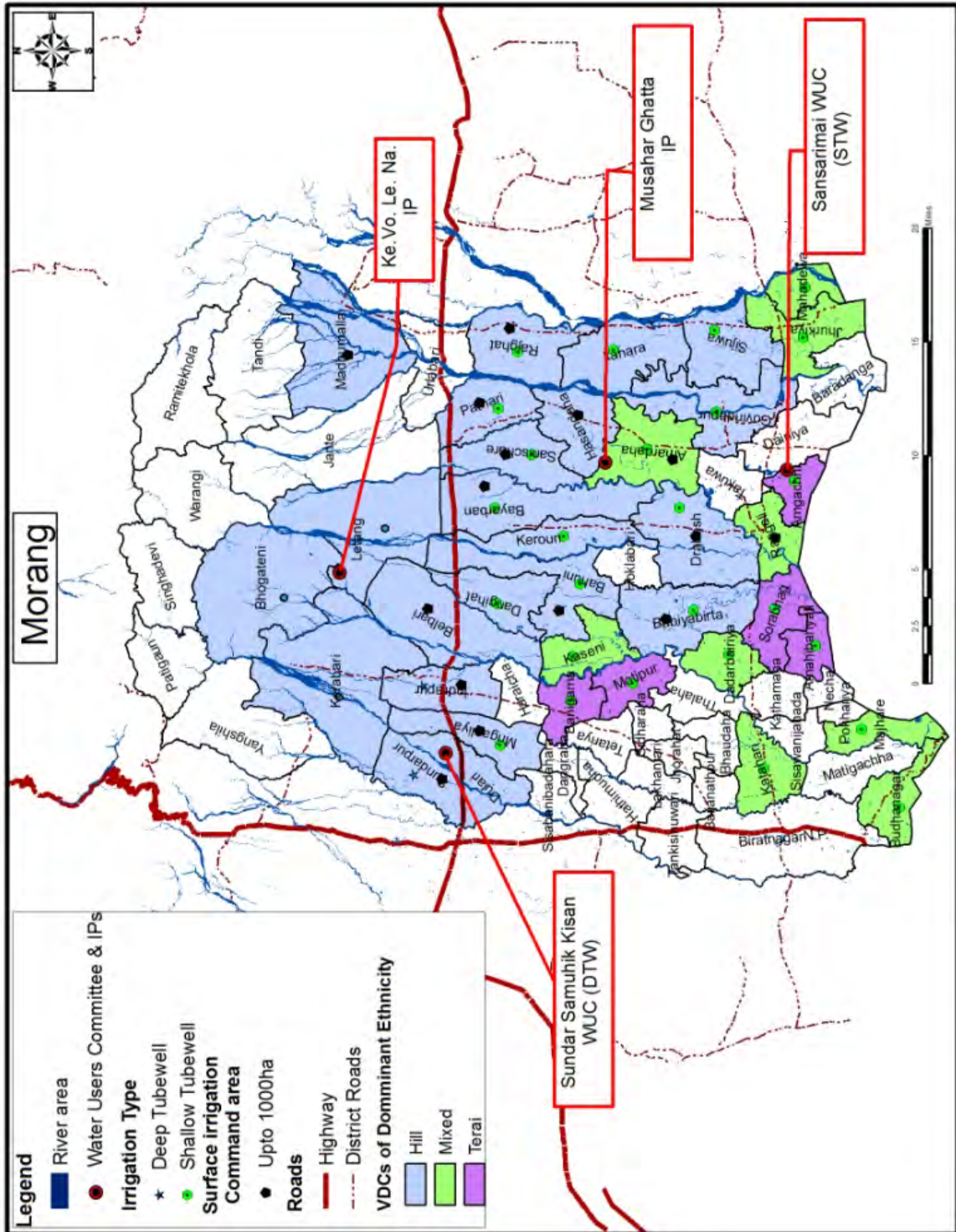
Table 1.5: Number of farmers/farm household survey from study districts

	Jhapa	Morang	Dhanusa	Mahottari	Total
Irrigation facility					
Surface (upto 1000 ha)	10	18	10	10	48
Surface (more than 1000 ha)	8		8	8	24
Deep tube well	4	4	8	4	20
Shallow tube well	4	4		4	12
Rain fed	4	4	4	4	16
Land holding					
Less than 0.5 ha	10	8	10	11	39
0.5 to 1 ha	9	8	9	13	39
1 to 2 ha	5	7	4	4	20
2 to 5 ha	3	4	4	1	12
Above 5 ha	3	3	3	1	10
Total	30	30	30	30	120

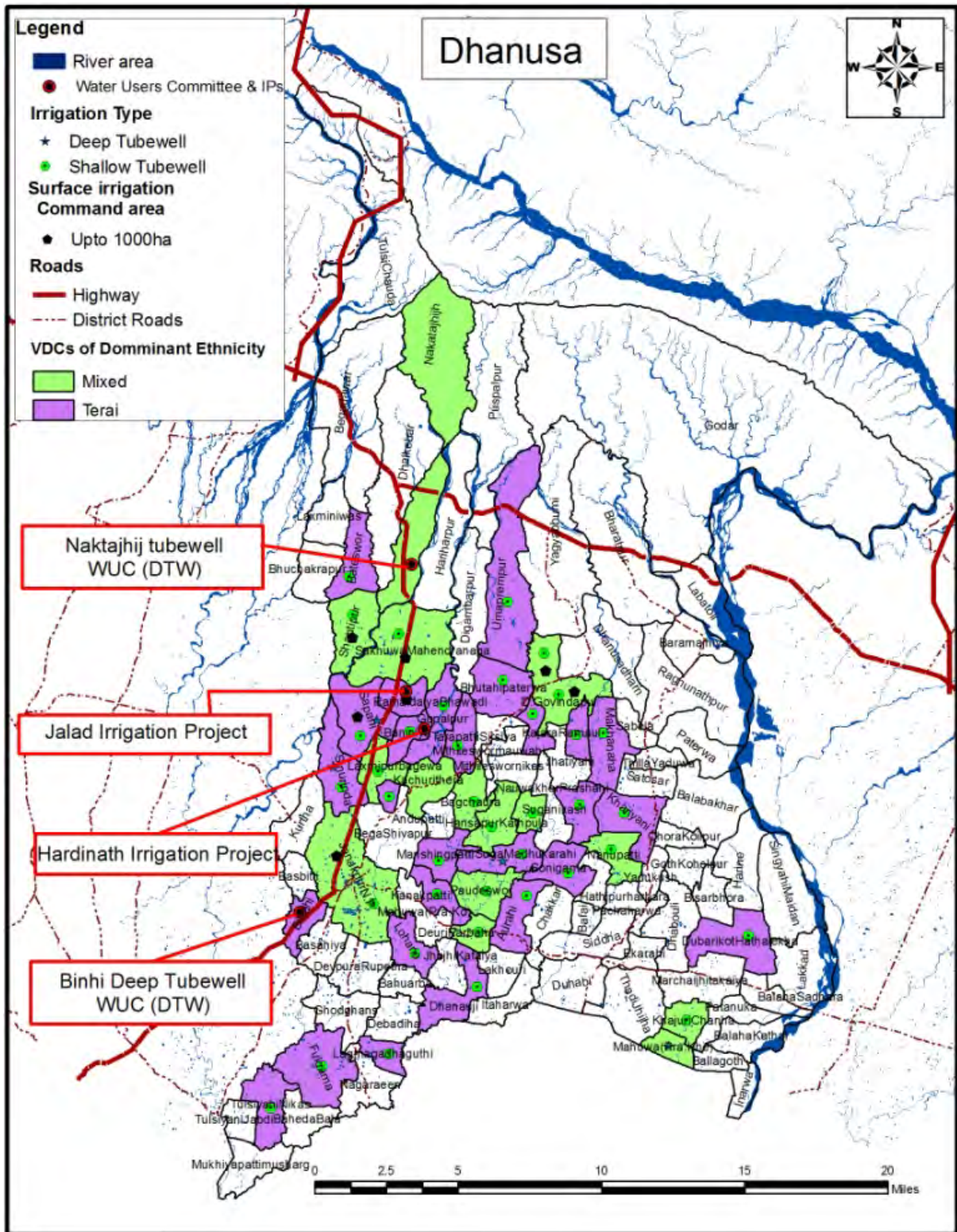
Map 1.1: Irrigation schemes/water user associations studied from Jhapa district



Map 1.2: Irrigation schemes/water user associations studied from Morang district



Map 1.3: Irrigation schemes/water user associations studied from Dhanusa district



Field survey execution: NARMA hired field supervisors having extensive work experiences in surveys. Two teams comprising of one supervisor and four enumerators were formed for the survey. Enumerators were hired either from survey districts only. One day orientation training was provided to supervisors and enumerators. Orientation training was given on the study objectives and methods of filling questionnaires.

Enumerators were responsible for collection of field information, especially household survey whereas field will be responsible for supervising field study and ensuring quality of the survey. The questionnaire then filled by enumerators will be cross checked and edited in the field by field supervisors to avoid discrepancies and data inconsistencies. The enumerators will be requested to visit respondents again if any discrepancies are observed either due to negligence or human error.

1.4 Data Analysis and Reporting

Making things visible was the main strategy of data analysis and reporting. The study adopted both the qualitative and quantitative analysis. Qualitative data were analyzed following the content analysis whereas quantitative were analyzed following descriptive statistics such as percentage, mean, average etc.

Information collected through the questionnaire was edited for consistency at the field following the techniques of random check, comparison of inter- and intra ward responses and discussions with the key informants. The questionnaire was once again edited and open-ended questions were coded prior to entering into computer. Edited information were entered into CS-programme and thoroughly checked to remove entry errors and inconsistencies. The data was then processed and dummy tables was developed in SPSS programme. All outputs and raw data was produced on Ms Excel.

Post survey stratification was carried out in data analysis. Household survey data was analyzed by irrigation system and farm size (operated land). Operated land holding includes both rented in land and land owned by the farmers/households. Household data were divided into five groups based on irrigation facility which includes (a) Surface (upto 1000 ha); (b) Surface (more than 1000 ha); (c) Deep tube well (d) Shallow tube well and (e) Rain fed. Likewise, respondents were further divided into five groups based on operated land holding. Operated land holding includes both rented in land and land owned by the farmers/households.

2. FARM HOUSEHOLD SURVEY

This section presents key findings of farm household survey. Detailed outputs of the survey is appended on report. This report is prepared based on survey of 120 farm households surveyed from 4 districts representing different irrigation system and land size.

The study divided farmers into five categories based on land size, up to 0.5 ha as marginal farmer; 0.5 to 1 ha as small farmer; 1 to 2 ha as medium farmer; 2-5 ha as large farmer and above 5 ha as very large farmer. Discussions are made on following sections considering farmer category as one of the important parameter.

2.1 Respondent Characteristics

Section A presents data on respondents characteristics disaggregated by irrigation facility and land size. Following section briefly summarizes on key findings.

Of the total respondents, male constitute 88.3% while rest (11.7%) are female. Male dominates the respondent categories irrespective of irrigation facility and farm size. **Table A 2** presents respondent categories by sex.

Respondents are from different ethnic/caste group. Nearly one third of respondents (33.3%) are Hill-Brahmin Chettri, followed by Terai-Brahmin/Chettri (26.7%), Hill Janajati (15.0%), Terai Janajati (10.8%), Terai backward caste (7.5%), Muslim (5.0%) and Terai Dalit 1.7%). **Table A 3** presents respondent categories by caste.

2.2 Demographics

Section B presents data on demographic situation of the farm households disaggregated by irrigation facility and land size. Following section briefly highlights major findings.

Male dominated the household head. More than nine tenth (95.0%) of households are headed by men. This situation remain similar by irrigation facility and farm size. **Table B1** presents sex of the household head.

More than one third of HHs (43.3%) have migrated to recent place/village from other places. However, year migration is more than 50 years. At-least two generations of family are living on same village. Better agriculture opportunities along with easy livelihoods such as road access, health facility was main reason for migration. Most of the people are have migrated from adjoining hill districts or India. Of the total respondents, only one respondent has migrated to this place recently. Farmers migrated from nearby area. **Table B2, Table B2.1 and Table B3** assess situation of migration among survey farmers.

Average family size is 6.6 persons. Large famers have more family size (8.4 person) compared to small and marginal farmer 6.2 persons. Likewise, rain fed farmers have smaller family size (5.94 persons) compared to surface irrigation farmers above 1000 and upto 1000 ha (7.76 & 7.08 persons) respectively. Population share of male and female is 53.4% and 46.6%. This situation remain similar by irrigation facility and land size. **Table B4** presents household size and sex composition.

Dependent population is relatively high among survey households irrespective of land size and type of irrigation facility. Of the total population, 9.8 percent are children under 5, 16.8 percent are children between 5 to 14 years of age, 28.4% are youth (16 - 29 years), 35.2% are adult (30 - 59 years) and 9.8% elder people (60 years & above). There is no mark able

differences on population composition among farmers by irrigation facility and land size. **Table B.5** presents age composition of family members.

Literate are those population who can read & write or have at-least completed primary education. More than four fifth (82.0) of population above 5 years are literate. Literate population is relatively high among big farmers and households with irrigation facility. **Table B 6 and Table B 6.1** presents literacy situation of family members.

Households economic activities are grouped into four categories which includes farm, non-farm, study and dependent. Non-farm includes, service, business, wage earning, others etc. Large farmers have more population dependent on agriculture compared to smaller farmers. Of the total population above 10 years of age, majority (42.2%) are dependent on farm followed by study (25.5%), non-farm (18.9%) and dependent/household activities (11.1%). There is no clear difference observed among farmers economic activity by type of irrigation facility. **Table B 7 and Table B 1.7.1** presents occupation of family members.

Migration for employment on gulf countries is quite common. Nearly one tenth (7.9%) of population have migrated outside for employment. This situation remain similar by irrigation facility and farm size. Employment is main reasons of migration. Of those family members migrating, more than half (52.4%) have migrated to gulf countries followed by Kathmandu (27.0%) and other country (9.5%). **Table B 8, Table B 8.1 and Table B 8.2** presents migration situation of family members.

2.3 Households Assets

Section C presents data on households assets, mainly houses, land holding and tenancy, household facility, agriculture equipments, livestock holdings and fruit trees of the farm households disaggregated by irrigation facility and land size. Following section briefly highlights major findings of survey.

All surveyed farmers are living on their own houses. Average number of house per family is 1.4. Number of house is more than one because farmers are constructing small houses within same premises to accommodate more family members. Likewise, cattle shed or temporary houses are also constructed for cooking. Large farmers have more number of houses compared to small farmers. There is no remarkable difference among households based on irrigation facility. Of total houses, more than two third of houses (69.2%) have tile roof (cemented) followed by zinc sheet/concrete (20.9%) and thatch (2.9%). This situation remain similar by irrigation facility and farm size. **Table C1 and Table C 1.1** presents housing and housing condition of farmers.

Farmers have own land. Average number of plot owned by each farmer is 2.39 which is slightly higher on irrigated area (2.41) compared to non-irrigated area (2.00). Average land operated by HHs is 1.41 ha, of which 1.18 ha is irrigated and 0.24 ha is un-irrigated. High proportion of irrigated area is mainly because farmers are surveyed from irrigated area. However this does not mean area is irrigated for the whole area. **Table C2 and Table C 2.1 and Table C 2.2** presents operated land holding size of respondents

Very few farmers are renting in or tenting out land. Of 120 HHs surveyed, only 10 have rented in land. The average size of rented in land is 0.49 ha. Only one household have rented out land. Rented out land is very less, mainly because of presence of irrigation facility where farmers can grow at-least one crop a season. Of 9 farmers renting in land, one paid on the basis of land area, 7 on the basis of share of crop production and one on the basis of fixed output per Kattha. Generally land owner charge 50% of production output share, especially for one main crops (paddy). One farmers reported that s/he is sharing 40 kg of output per kattha or 1200 kg per ha with land owner. One farmer had taken land at fixed amount of Rs 700/kattha or 21,000 per ha. This is quite high when considered to local

situation. S/he had paid big amount because land is being used for construction of fish pond. Land owner generally does not share inputs on tenancy arrangements. **Table C3**, presents renting situation of land.

Livestock is integral part of farming system in Nepal. Livestock rearing is subsistence and mostly kept for supplementing household income. More than two third of households (69.2%) are rearing cattle followed by goat (55.0%), buffaloes (44.2%) and chicken (20.8%). This situation remain similar by type of irrigation facility and land size. Of total cattle and buffalo, nearly one fourth are milking animal. Average number of cow, goat, buffalo and chicken reared by farmers is 2.6, 4.4, 1.8 and 17.2 respectively. Number of cattle appears high because farmers are rearing oxen for ploughing and carrying carts. Goat, chicken and cattle are main live animals which are traded on market. Households are also selling live animals to raise additional income. Average income generated from sale of live animal is Rs 10,623. There is no clear distinctive pattern of livestock keeping by irrigation facility or land size. However, value of sale of live animal is relatively high among small farm households compared to bigger land size households. However, no clear distinctive pattern is observed among irrigation facility. This is mainly because small farmers are dependent livestock for income. **Table C3, Table C3.1 and Table C 3.2** presents livestock holding situation.

Farmers are producing different livestock produce such as milk, ghee, egg, meat etc. Of the different livestock, milk is main commodities traded on the market. Milk are sold easily on village or nearby road head markets. Likewise, milk collection center are also operating on study or nearby village as well. Most of the livestock produce are consumed at household level however, milk is sold on market. More than half (54.5%) of milk produce was sold on the market. Ratio of sale of milk don't vary by type of irrigation facility and land size. However value of share varies significantly. Rain fed and small land holding farmers are selling less value of livestock produce compared to shallow tube well and surface irrigation farmers. Likewise, value of sale of livestock produce is higher among large farmers compared to small farmers. **Table C4, Table C4.1 and Table C 4.2** presents production and sale of livestock produce.

Very few HHs have agriculture equipments. Nearly one sixth (16.2%) of farmers own pump set followed by tractor (10.8%) and sprayer (7.5%). Most of the farmers are using tractor to plough the land, hence households having tractor is relatively high. There is no clear distinctive pattern on ownership of agriculture equipments by type of irrigation facility, however it varies by land size. Large land holding farmers own tractor while if it is relatively less among small farmers. Average value of agriculture equipments owned by farm households Rs 123,155. There is large variations on value of agriculture equipments posed by households having irrigation facility and land holding size. Rain fed households have agricultural equipments value of Rs 2500 whereas that of households with large surface irrigation facility have assets value of Rs 221,000. Likewise small and marginal farmer have less value of agriculture equipments compared to large farmers. This is mainly because large farmers have tractor for ploughing. **Table C5, Table 5.1 and Table C 5.2** presents situation of households owning farm equipments.

Major households assets are radio, television, refrigerator, bicycle, motorbike sewing machine etc. Large majority of households have television (85.0%) followed by bicycle (80.0%), radio (55.8%) and motor-cycle (40.7%) and sewing machine (23.3%). Television and bicycle are the main households assets possessed by households having access to different type of irrigation facility and land size. Average value of assets owned by each HHs is Rs 94450 varying from Rs 67238 among rain fed households to Rs 158654 among those households living on surface area irrigation above 1000 ha. Assets possessed by households vary significantly based on land size. Small and marginal farmer have less households assets value while that of large farmers have more assets value. This is mainly

because of possession of expensive or high quality standard assets. **Table C6 and Table C 6.1** presents situation of households facilities.

Mango, banana, jack fruit, guava and litchi are the main fruits which are cultivated by the farmers. Of the total farmers surveyed, more than four fifth (85.8%) have mango tree followed by banana (47.5%) and Guava (39.2%). Of those households having fruits tree, more than two third are producing fruits. While the household selling fruits is very less. It vary from 45.3% in case of mango to none in case of pomegranate. Mango, banana, jack fruit are the main fruits planted by households belonging to different irrigation facility and land size. Average number of plants per households is very less which depicts that fruit are also cultivated for fulfilling their households need. Except for mango, no fruit orchards were seen on study area/villages. Large farmers have more number of fruit trees compared to small farmers. This is mainly because large farmers had established mango orchards. Average value of sale of fruits is Rs 14,836 per households varying form Rs 76245 among large farmers to 6,260 among small farmers. There is no clear distinct pattern on value of sale of fruits among households with different categories of irrigation facility. **Table C7, Table 7.1 and Table C 7.2** presents households having fruit trees and sale of fruits.

Nearly one tenth of the households have fish pond. Large farmers tend to have more fish pond compared to small and medium farmers. Farmers having access to surface irrigation with above 1000 ha have more fish ponds. Average area of fish pond is 0.31 ha. Average HHs income from selling of fish is Rs 10,167 per year varying from 61,000 among large farmers to none among marginal farmers. Likewise, rain fed households have no income from fish pond where as farmers with surface irrigation above 1000 ha are making income of Rs 21250 per year. **Table C8 and Table C 8.1** presents fish farming situation of farmers.

2.4 Cropped Area and Cropping Intensity

2.4.1 Cropped area and cropping intensity

Table 2.1 below presents cropping intensity by type of irrigation facility and land holding size. Cropping intensity is calculated as ratio of cropped area to operated agriculture area. Operated area includes total land owned by household and rented in land while rented out land is deducted. Average operated land size of each households is 1.45 ha varying from 2.01 ha on surface irrigation to 0.74 ha to 0.75 ha.

Table 2.1: Operated land size and cropping intensity

	Operated land per HHs (ha)	Operated area (ha)	Cropped area (ha)	Cropping intensity (%)
Overall	1.45	173.41	281.2	162.2
Irrigation type				
Surface (< 1000 ha)	2.01	96.60	159.3	164.9
Surface (>1000 ha)	1.74	41.72	60.4	144.8
Deep tube well	0.60	12.06	20.5	170.3
Shallow tube well	0.91	10.97	22.5	205.0
Rain fed	0.75	12.06	18.5	153.1
Land holding				
Marginal (up to 0.5 ha)	0.39	15.15	29.6	195.6
Small (0.5 to 1 ha)	0.84	32.95	53.8	163.3
Medium (1 to 2 ha)	1.40	27.90	47.2	169.1
Large (2 to 5 ha)	3.05	36.54	54.9	150.4
Very large (Above 5 ha)	6.15	61.53	95.7	155.5

Cropping intensity is 162.2% varying from 205% on shallow tube well area to 144.8% on surface area (>1000 ha). Likewise, cropping intensity of marginal farmers is relatively high (195.6%) compared to large and very large farmers. Cropping intensity goes on decreasing as farm size increase. This is mainly because of shortage of labor. Likewise, cropping intensity on shallow tube well appears high which is because of easy availability of water.

2.4.2 Crop diversification

Table 2.2 presents crop area under different commodities. Of the total operated land, farmers are growing paddy on more than half of land (57.5%) followed by wheat (16.0%) and maize (10.1%). Oilseeds, sugarcane and pulses are other crops which are grown on study area. Early paddy is grown on very limited area. However, it is grown substantially on area with shallow tube well. Paddy, wheat and maize are main crops irrespective of irrigation facility and land holding size (table 2.2). However, early paddy growing is quite common on shallow tube area compared to other irrigation facility. **Table D1, Table D2, Table D3, Table D4** presents cropped area including production and sale.

Table 2.2: Area under different crops by irrigation facility and land holding size...

Unit: % of area

Area	Overall	Irrigation facility				
		Surface (Upto 1000 ha)	Surface (Above 1000 ha)	Deep Tube well	Shallow Tube well	Rain fed
Main Paddy	57.5	55.8	68.8	45.5	48.0	60.4
Early Paddy	1.9	0.0	2.4	0.0	17.0	0.0
Wheat	16.0	16.3	17.7	14.0	12.9	13.6
Maize	10.1	12.9	1.0	16.7	8.7	10.1
Potato	1.5	0.9	2.4	2.0	3.5	0.7
Vegetables	1.1	0.3	2.2	1.5	1.2	2.9
Pulses	0.5	0.3	0.8	0.4	0.3	0.6
Lentil	3.2	2.5	3.1	6.4	2.4	6.7
Oil seeds	4.1	6.0	1.2	3.1	1.8	0.7
Sugar Cane	2.5	2.6	0.3	10.2	3.9	2.8
Jute	0.3	0.0	0.0	0.0	0.1	0.0
Spices	0.1	0.2	0.1	0.2	0.2	1.5
Other Crops	1.3	2.1	0.0	0.0	0.0	0.0
Overall	100.0	100.0	100.0	100.0	100.0	100.0

Table 2.2: Area under different crops by irrigation facility and land holding size

Unit: % of area

Area	Land holding size				
	Upto 0.5 ha	0.5 to 1 ha	1 - 2 ha	2-5 ha	Above 5 ha
Main Paddy	55.4	55.4	58.7	59.0	60.5
Early Paddy	0.8	0.8	4.0	3.7	0.0
Wheat	16.1	16.1	13.4	15.2	17.3
Maize	14.2	14.2	12.3	8.3	6.0
Potato	1.5	1.5	1.7	2.6	0.5
Vegetables	1.1	1.1	3.0	1.1	0.3
Pulses	0.4	0.4	0.4	2.9	0.2
Lentil	4.2	4.2	2.7	3.7	2.7
Oil seeds	2.2	2.2	2.7	2.7	6.0
Sugar Cane	3.5	3.5	0.4	0.6	2.8
Jute	0.4	0.4	0.7	0.0	0.0
Spices	0.1	0.1	0.0	0.2	0.1
Other Crops	0.0	0.0	0.0	0.0	3.5
Overall	100.0	100.0	100.0	100.0	100.0

2.5 Production and Sale of Major Crops

Section D presents data on crop production, productivity and sale of major crops. This section briefly summarizes on production, yield and sale of major crops. Likewise, crop production practices in general and paddy production practices is also discussed.

2.5.1 Paddy

Table 2.3 below summarizes paddy production on study area with details on **Table D 5, Table D 5.1, Table D 5.2, Table D 5.3 and Table D 5.4**. Almost all households (99.2%) are involved on paddy production. Average paddy cultivation area among those farmer growing paddy is 1.40 ha varying from 0.74 ha on rain fed area to 1.85 ha on surface irrigation (<1000 ha). Average yield of paddy is 3267 kg/ha varying from 2237 kg/ha on rain fed area to kg/4402 ha on shallow tube well area. Both area and production of paddy is less in deep tube well area because farmers of these locality are involved on cultivation of sugarcane (Dhanusa and Mahottari) and banana in Morang.

Table 2.3: Paddy production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	99.2	1.40	3267	55.5	51.2	44300
Irrigation type						
Surface (< 1000 ha)	100.0	1.85	3155	72.9	57.1	65565
Surface (>1000 ha)	100.0	1.79	3408	70.8	50.6	55520
Deep tube well	100.0	0.47	3148	20.0	14.1	5244
Shallow tube well	100.0	1.22	4402	58.3	58.7	51867
Rain fed	93.8	0.74	2237	20.0	12.0	4320
Land holding						
Marginal (upto 0.5 ha)	97.4	0.39	3273	21.1	11.2	2127.8
Small (0.5 to 1 ha)	100.0	0.78	3010	43.6	23.5	10621
Medium (1 to 2 ha)	100.0	1.48	3382	95.0	39.8	35234
Large (2 to 5 ha)	100.0	2.87	3405	100.0	66.4	125262
Very large (Above 5 ha)	100.0	5.78	3260	100.0	71.6	256880

Nearly nine tenth of farmers (85.8%) felt that area under wheat cultivation is similar to last year. Likewise, majority of the farmers (above 50%) felt that production and productivity of wheat is same compared to previous year.

More than half of farmers (55.5%) involved on paddy production are selling paddy varying from 21.1% among marginal farmer to cent percent among large and very large farmer. Relatively less farmers from rain fed area are selling paddy compared to households with irrigation facility. Farmers are selling more than half of their paddy (51.2%) varying from 71.6% among very large farmers to 11.2% among marginal farmer. Average income of farmer from selling of paddy is Rs 44300 varying from 256880 among large farmers to 2128 among marginal famers.

Following paragraphs summarizes on paddy production practices:

- Nearly four fifth (79.3%) are changing paddy seeds on every two years. Majority of large farmers are changing seeds within every two while such proportion is less among marginal farmers. **Table D 6 and Table D 6.1** presents changing of seed use. Farmers generally buy seeds from nearby agro-vet for changing seeds, especially certified seeds.
- More than 90% of farmers are selecting seeds before planting. Of those farmers selecting seed, majority are following selection of panicle of crops (70.4%) and simple winnowing by using of Nanglo/Supo (69.4%). Other methods followed for selection of crop includes use water to remove floating seed (33.3%) and Use of brine water to remove floating seed (3.7%). **Table D 7 and Table D 7.1** presents seed selection methods.
- More than nine tenth of farmers plough field before/during summer for planting. Farmers plough field to make soil fertile, make soil loose and reduce problems of weeds. Nearly three fourth (74.8%) of farmers plough field two-three times followed by 4-5 times (19.8%) whereas very few farmers plough field once (3.6%) and more than six time (1.8%). Farmers plough field nearly 3 times before planting paddy. This situation remain similar irrespective of irrigation facility and land size. Majority of farmers (53.2%) are using tractor (4 wheel) followed use of oxen plough (44.4%). Very few households (5.9%) are using two wheel tractors (hand). **Table D 8, Table D 8.1 and Table D 8.2** presents ploughing practice on paddy .
- All farmers are transplanting paddy. Average day of transplanting of paddy is 28 days. The transplanting days of paddy varies from 21 to 35 days. Farmers reported increased on transplanting days of paddy compared to past, because of shortage of water. **Table D 9, and Table D 9.1** presents paddy transplanting practice .
- Normally, high incidence of weeds is associated with rain fed/upland environment where access to water is a problem. More than nine tenth (92.5%) of farmers reported the problem of weeds on paddy. Weeds is reducing about 19.9% of production varying from 23% among farmers with surface irrigation (>1000 ha) and 16.0% among rain fed farmers. Of those farmers reporting problems of weeding, almost all (96.4%) are weeding their paddy. Nearly nine tenth of farmers (87.4%) are doing manual weeding followed by use of herbicides (54.1%). Use of herbicides is relatively higher on large farmers compared to small farmers. This might be mainly because of labor shortage. Of those farmers applying herbicides, majority are using after transplanting (85.0%). Likewise, more than one fifth of respondents are applying herbicide Days before seeding (20.0%). Days before transplanting (31.7%) and Days after seeding (21.7%). **Table D 10, Table D 10.1, Table D 10.2, Table D 10.2.1 and Table D 10.2.2** presents weeding problems and treatment practice of paddy.
- Almost all farmers (95.0%) reported problems of insects on paddy. Insects problems was high at flowering stage (77.2%) followed by tillering (63.2%), booting (48.2%), milking stage (44.7%) and seeding stage (21.9%). Of those farmers reporting problems of insects, more than three fourth (78.1%) have applied insect control method varying from 90.0% among very large farmers to 77.1% among small farmers (77.1%). Relatively lesser rain fed farmers (61.5%) are applying insect control method compared to farmers with shallow tube well (100%). Of those farmer applying insect control method, more than four fifth (84.3%) have applied spraying followed by dusting (51.7%). Very few farmers (6.7%) are following IPM. **Table D 11, Table D 11.1, Table D 11.2, and Table D 11.2.1** presents insect problems and treatment practice of paddy.

- Almost all farmers (95.8%) reported problems of diseases on paddy. Blast, Sheath blight and bacterial leaf blight are the major production hazards among the diseases. **Table D 12** presents diseases problems of paddy.
- All farmers are cutting paddy manually. Use of other methods such as reaper harvester and combined harvester is not existent. Rice power thresher (51.7%) is main methods of threshing paddy followed by manually (46.7%), tractor trampling (35.8%) and bullock trampling (20.0%). Rice power threshing and manually are major methods followed for threshing of paddy among farmers belonging to different categories based on land size and access to irrigation facility. **Table D 13, and Table D 14** presents paddy harvesting and threshing practices.

2.5.2 Wheat

Table 2.4 summarizes wheat production on study area with details on **Table D 15, Table D 15.1, Table D 15.2, Table 15.3, Table D 15.4 and Table D. 15.5**. Nearly two third (61.7%) of farmers are cultivating wheat. Average wheat cultivation area among those farmer growing wheat is 0.61 ha varying from 0.28 ha on rain fed area to 0.81 ha on surface irrigation (<1000 ha). Average yield of wheat is 1805 kg/ha varying from 1201 kg/ha on rain fed area to 1878 kg/ha on surface area (< 1000 ha). Area under wheat cultivation is less in deep tube well area because farmers of these locality are involved on cultivation of sugarcane (Dhanusa and Mahottari) and banana in Morang.

Table 2.4: Wheat production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	61.7	0.61	1805	45.9	57.8	27902
Irrigation type						
Surface (< 1000 ha)	66.7	0.81	1878	68.8	64.7	28189
Surface (>1000 ha)	66.7	0.67	1791	43.8	54.2	29571
Deep tube well	45.0	0.32	1643	33.3	40.2	14667
Shallow tube well	66.7	0.36	1887	25.0	56.4	38750
Rain fed	56.3	0.28	1201	0.0	0.0	-
Land holding						
Marginal (upto 0.5 ha)	53.8	0.24	1700	28.6	17.2	5150
Small (0.5 to 1 ha)	64.1	0.35	1545	40.0	35.5	9676
Medium (1 to 2 ha)	70.0	0.45	1683	35.7	32.1	12800
Large (2 to 5 ha)	66.7	1.04	1843	87.5	61.6	28429
Very large (Above 5 ha)	60.0	2.77	2001	100.0	83.7	93000

More than two third of farmers (63.8%) felt that area under wheat cultivation is similar to last year. There is mix perception regarding yield and production of wheat. Almost equal proportion of farmers felt that production and yield of wheat of had either decreased or remain similar.

Nearly half of farmers (45.9%) involved on wheat production are selling wheat varying from 17.1% among marginal farmer to 83.7% among very large farmer. None of farmers from rain fed area are selling wheat while 68.8% of farmers from Surface (< 1000 ha) are selling wheat. Farmers are selling more than half of their wheat production (57.8%) varying from 83.7% among very large farmers to 17.2% among marginal farmer. Average income of

farmer from selling of wheat is Rs 27902 varying from Rs 93,000 among very large farmers to Rs 5150 among marginal famers.

2.5.3 Maize

Table 2.5 summarizes maize production on study area with details on **Table D 16, Table D 16.1, Table D 16.2, Table D 16.3, Table D 16.4 and Table D 16.5.** Nearly half (45.8%) of farmers are cultivating maize. Average maize cultivation area among those farmer growing maize is 0.52 ha varying from 0.34 ha on deep tube well area to 0.62 ha on surface irrigation (<1000 ha). Average yield of maize is 2366 kg/ha varying from 1611 kg/ha on rain fed area to 3676 ha on deep tube well area.

More than nine tenth of farmers (94.4%) felt that area under maize cultivation has decreased compared to last year. Likewise, nearly two third of the farmers growing maize reported that production (63.0%) and productivity (64.8%) of maize has decreased.

Table 2.5: Maize production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	45.8	0.52	2366	45.5	35.6	17530
Irrigation type						
Surface (< 1000 ha)	68.8	0.62	2231	51.5	37.4	18441
Surface (>1000 ha)	12.5	0.19	2345	0.0	0.0	-
Deep tube well	50.0	0.34	2842	10.0	9.3	18000
Shallow tube well	41.7	0.39	3676	100.0	76.2	20120
Rain fed	25.0	0.47	1611	50.0	10.7	3080
Land holding						
Marginal (upto 0.5 ha)	48.7	0.24	2689	47.4	28.6	7067
Small (0.5 to 1 ha)	43.6	0.45	2344	52.9	27.9	10562
Medium (1 to 2 ha)	40.0	0.73	2204	37.5	40.0	30867
Large (2 to 5 ha)	50.0	0.76	3482	50.0	45.6	42333
Very large (Above 5 ha)	50.0	1.15	1424	20.0	36.6	60000

Nearly half of farmers (45.5%) involved on maize cultivation are selling maize varying from 20.0% among very large farmer to 52.9% among small farmer. Large farmers generally keep maize to feed livestock hence, proportion of farmers selling maize is less. None of farmers from surface irrigation (>1000 ha) area are selling maize while 100% of farmers from shallow tube well are selling maize. Farmers are selling nearly one third of their maize production (35.6%) varying from 45.6% among large farmers to 28.6% among marginal farmer. Average income of farmer from selling of maize is Rs 17530 varying from Rs 60,000 among very large farmers to Rs 7067 among marginal famers. Value of sale of maize per farmer is lowest among rain fed farmers (Rs 3080) whereas highest among Shallow tube well farmer (Rs 20120).

2.5.4 Potato

Table 2.6 summarizes potato production on study area with details on **Table D 17, Table D 17.1, Table D 17.2, Table D 17.3, Table D 17.4 and Table D 17.5.** More than two third (40.8%) of farmers are cultivating potato. Average potato cultivation area among those

farmer growing potato is 0.09 ha varying from 0.05 ha on rain fed area to 0.19 ha on shallow tube well area. Average yield of potato is 8652 kg/ha varying from 6201 kg/ha on deep tube well area to 11683 ha on shallow tube well area. Area under potato cultivation is very less, which is mainly because of irrigation facility and shortage of labor.

Table 2.6: Potato production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	40.8	0.09	8652	42.9	52.4	13610
Irrigation type						
Surface (< 1000 ha)	47.9	0.06	7500	43.5	46.2	7720
Surface (>1000 ha)	45.8	0.13	8804	36.4	55.5	27775
Deep tube well	40.0	0.05	6201	37.5	38.9	6833
Shallow tube well	33.3	0.19	11683	75.0	61.5	23000
Rain fed	18.8	0.05	8859	33.3	33.3	8000
Land holding						
Marginal (upto 0.5 ha)	38.5	0.04	7466	46.7	41.6	5457
Small (0.5 to 1 ha)	35.9	0.06	7136	21.4	20.7	4533
Medium (1 to 2 ha)	35.0	0.11	7960	28.6	53.2	25500
Large (2 to 5 ha)	75.0	0.16	10839	55.6	64.1	27400
Very large (Above 5 ha)	40.0	0.13	7481	100.0	65.8	11500

More than four fifth of farmers (81.6%) felt that area under potato cultivation has remain unchanged compared to last year. Likewise, nearly half of the farmers growing potato reported that production (49.0%) and productivity (49.0%) of potato has remained similar compared to last year.

More than two third of farmers (42.9%) involved on potato cultivation are selling potato varying from 100% among very large farmer to 21.4% among small farmer. Nearly one third of farmers (33.3%) from rain fed area are selling potato while 75.0% of farmers from shallow tube well are selling potato. Farmers are selling nearly half of their potato production (52.4%) varying from 65.8% among very large farmers to 20.7% among small farmer. Average income of farmer from selling of potato is Rs 13610 varying from Rs 27400 among large farmers to Rs 4533 among small famers. Value of sale of potato per farmer is lowest among deep tube well farmers (Rs 6833) whereas highest among surface irrigation (>1000 ha) farmer (Rs 27775).

2.5.5 Vegetables

Respondents were asked whether they are growing vegetables for sale or not. If farmers have cultivated vegetables on more than 0.01 ha or about 100 sq meter of land, then it is considered as commercial vegetable cultivation. Table 2.7 summarizes vegetables production on study area with details on **Table D 18, Table D 18.1, Table D 18.2, Table D 18.3, Table D 18.4 and Table D 18.5**. Very few farmers (16.7%) of farmers are cultivating vegetables for sale. Major vegetables grown in the study area are tomato, cucurbits, cauliflower, cabbage, Chilly, Ladies finger, Brinjal etc. Average vegetables cultivation area among those farmer growing vegetables is 0.15 ha varying from 0.08 ha on surface irrigation (<1000 ha) to 0.27 ha on rain fed area. Average yield of vegetables is 6813 kg/ha varying from 11715 kg/ha on deep tube well area to 3045 kg/ha on rain fed area.

More than four fifth of farmers (80.0%) felt that area under vegetables cultivation has remain unchanged compared to last year. Likewise, nearly half of the farmers growing vegetables reported that production (55.0%) and productivity (55.0%) of vegetables has remained similar compared to last year.

Table 2.7: Vegetables production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	16.7	0.15	6813	100.0	73.7	12968
Irrigation type						
Surface (< 1000 ha)	14.6	0.08	9136	100.0	82.8	12586
Surface (>1000 ha)	25.0	0.22	5883	100.0	78.3	14225
Deep tube well	15.0	0.10	11715	100.0	75.3	19033
Shallow tube well	16.7	0.13	8707	100.0	70.2	10100
Rain fed	12.5	0.27	3045	100.0	25.5	4300
Land holding						
Marginal (upto 0.5 ha)	15.4	0.08	11853	100.0	73.7	13700
Small (0.5 to 1 ha)	10.3	0.15	7830	100.0	66.0	10200
Medium (1 to 2 ha)	30.0	0.23	4340	100.0	76.7	12542
Large (2 to 5 ha)	8.3	0.20	13534	100.0	83.6	49400
Very large (Above 5 ha)	30.0	0.10	3773	100.0	65.2	3900

All farmers involved on vegetables cultivation are selling vegetables. Farmers are selling nearly two third of their vegetables production (73.7%) varying from 83.6% among large farmers to 65.2% among very large farmer. Average income of farmer from selling of vegetables is Rs 12968 varying from Rs 49400 among large farmers to Rs 3900 among marginal famers. Value of sale of Vegetables per farmer is lowest among rain fed farmers (Rs 4300) whereas highest among deep tube well farmer (Rs 19033).

2.5.6 Pulses

Table 2.8 summarizes pulses production on study area with details on **Table D 19, Table D 19.1, Table D 19.2, Table D 19.3, Table D 19.4 and Table D 19.5**. Very few farmers (13.3%) are cultivating pulses. Average pulses cultivation area among those farmer growing pulses is 0.08 ha varying from 0.13 ha on surface irrigation (<1000 ha) to 0.06 ha on rain fed area. Average yield of pulses is 728.8 kg/ha varying from 9744.9 kg/ha on deep tube well area to 421.8 kg/ha on rain fed area.

Table 2.8: Pulses production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	13.3	0.08	728.8	5.2	6.3	1500
Irrigation type						
Surface (< 1000 ha)	12.5	0.09	670.3	0.0	0.0	
Surface (>1000 ha)	16.7	0.13	846.5	0.0	0.0	
Deep tube well	15.0	0.03	944.9	62.5	33.3	1500
Shallow tube well	8.3	0.07	590.6	0.0	0.0	
Rain fed	12.5	0.06	421.8	0.0	0.0	

Land holding						
Marginal (upto 0.5 ha)	15.4	0.06	590.6	23.8	16.7	1500
Small (0.5 to 1 ha)	7.7	0.07	545.2	0.0	0.0	
Medium (1 to 2 ha)	10.0	0.08	1654	0.0	0.0	
Large (2 to 5 ha)	33.3	0.10	624.2	0.0	0.0	
Very large (Above 5 ha)	10.0	0.17	590.6	0.0	0.0	

More than nine tenth of farmers (93.8%) felt that area under pulses cultivation has remain unchanged compared to last year. Likewise, more than half of the farmers growing pulses reported that production (62.5%) and productivity (62.5%) of pulses has remained similar compared to last year.

Of those farmers growing pulses, very few farmers are selling (5.2%). Farmers from Deep tube well area and marginal land holding size is selling pulses. Average income of farmers from selling of pulse is Rs 1500 among those farmers selling produce. This reveals that pulses are mostly grown to fulfill household need.

2.5.7 Lentils

Table 2.9 summarizes lentils production on study area with details on **Table D 20, Table D 20.1, Table D 20.2, Table D 20.3, Table D 20.4 and Table D 20.5**. More than one third of farmers (39.2%) of farmers are cultivating lentils. Average lentils cultivation area among those farmer growing lentils is 0.19 ha varying from 0.09 ha on shallow tube well area to 0.26 ha on surface irrigation (<1000 ha). Average yield of lentils is 595.6 kg/ha varying from 479.8 kg/ha on shallow tube well area to 744 kg/ha on deep tube well area.

More than two third of farmers (66.0%) felt that area under lentils cultivation has remain unchanged compared to last year. Likewise, nearly half of the farmers growing lentils reported that production (51.1%) and productivity (51.1%) of lentils has decreased compared to last year.

Table 2.9: Lentils production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	39.2	0.19	595.6	14.9	23.2	11229
Irrigation type						
Surface (< 1000 ha)	31.3	0.26	521.8	13.3	23.4	11300
Surface (>1000 ha)	41.7	0.19	619.6	30.0	34.0	13667
Deep tube well	50.0	0.13	744	10.0	10.3	5000
Shallow tube well	50.0	0.09	479.8	0.0	0.0	-
Rain fed	37.5	0.21	687.7	16.7	29.4	10000
Land holding						
Marginal (upto 0.5 ha)	33.3	0.09	705.4	0.0	0.0	-
Small (0.5 to 1 ha)	41.0	0.14	686	18.8	25.9	6000
Medium (1 to 2 ha)	25.0	0.26	396.3	20.0	9.8	5000
Large (2 to 5 ha)	58.3	0.23	559.5	14.3	22.2	10000
Very large (Above 5 ha)	60.0	0.42	586.6	33.3	38.9	22800

Nearly one sixth of farmers (14.9%) are selling lentils varying from none on shallow tube well to 30% on surface irrigation (>1000 ha). Farmers are selling nearly one fourth of their lentils production (23.2%) varying from 38.9% among very large farmers to none among marginal farmers. Average income of farmer from selling of lentils is Rs 11229 varying from Rs 22800 among very large farmers to none among marginal farmers. Value of sale of Lentils per

farmer is lowest among shallow tube well (none) whereas highest (Rs 19033) among surface irrigation farmer (>1000 ha).

2.5.8 Oil crops

Table 2.10 summarizes oil crops production on study area with details on **Table D 21, Table D 21.1, Table D 21.2, Table D 21.3, Table D 21.4 and Table D 21.5**. Nearly one fourth of farmers (26.7%) of farmers are cultivating oil crops varying from 6.3% on rain fed area to 39.6% on surface irrigation (<1000 ha). Average oil crops cultivation area among those farmer growing Oil crops is 0.36 ha varying from 0.50 ha on surface irrigation (<1000 ha) to 0.13 ha on deep tube well area. Average yield of oil crops is 650.6 kg/ha varying from 892.7 kg/ha on surface irrigation (> 1000 ha) area to 147.6 kg/ha on rain fed area.

Table 2.10: Oil crops production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	26.7	0.36	650.6	6.3	37.4	77500
Irrigation type						
Surface (< 1000 ha)	39.6	0.50	664.7	10.5	44.0	77500
Surface (>1000 ha)	16.7	0.18	892.7	0.0	0.0	
Deep tube well	25.0	0.13	388.5	0.0	0.0	
Shallow tube well	25.0	0.14	467.5	0.0	0.0	
Rain fed	6.3	0.14	147.6	0.0	0.0	
Land holding						
Marginal (upto 0.5 ha)	20.5	0.16	486.8	0.0	0.0	
Small (0.5 to 1 ha)	20.5	0.15	657.1	0.0	0.0	
Medium (1 to 2 ha)	25.0	0.26	668.3	0.0	0.0	
Large (2 to 5 ha)	41.7	0.41	620.1	20.0	47.6	45000
Very large (Above 5 ha)	60.0	0.95	691.9	16.7	55.6	110000

More than four fifth of farmers (87.5%) felt that area under oil crops cultivation has remain unchanged compared to last year. Likewise, nearly half of the farmers growing oil crops reported that production (46.9%) and productivity (46.9%) of oil crops has remained similar compared to last year.

Very few farmers (6.3%) cultivating oil crops are selling their produce. Farmers are selling nearly one third of their oil crops production (37.4%) varying from 55.6% among large farmers to none among marginal farmers. Average income of farmer from selling of oil crops is Rs 77,500 varying from Rs 110,000 among very large farmers to none among marginal farmers.

2.5.9 Sugarcane

Table 2.11 summarizes sugar cane production with details on **Table D 22, Table D 22.1, Table D 22.2, Table D 22.3, Table D 22.4 and Table D 22.5**. Very few farmers (11.7%) of farmers are cultivating sugar cane. Average sugar cane cultivation area among those farmer growing Sugar cane is 0.5 ha varying from 1.05 ha on surface irrigation (<1000 ha) to 0.25 ha on rain fed area. Average yield of sugar cane is 24799 kg/ha varying from 17717 kg/ha on surface irrigation (>1000 ha) to 35435 kg/ha on rain fed area. Farmers are using motor pump to irrigate sugarcane on rain fed area as well, hence productivity is higher.

More than four fifth of farmers (85.7%) felt that area under sugar cane cultivation has remain unchanged compared to last year. Likewise, more than two third of farmers growing sugar

cane reported that production (71.4%) and productivity (71.4%) of sugar cane has remained similar compared to last year.

Table 2.11: Sugar cane production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	11.7	0.50	24799	100.0	100.0	58280
Irrigation type						
Surface (< 1000 ha)	8.3	1.05	24171	100.0	100.0	121050
Surface (>1000 ha)	4.2	0.17	17717	100.0	100.0	15000
Deep tube well	35.0	0.30	24052	100.0	100.0	33451
Shallow tube well						
Rain fed	12.5	0.25	35435	100.0	100.0	41280
Land holding						
Marginal (upto 0.5 ha)	7.7	0.25	27516	100.0	100.0	31280
Small (0.5 to 1 ha)	15.4	0.31	25771	100.0	100.0	37147
Medium (1 to 2 ha)	5.0	0.17	17717	100.0	100.0	15000
Large (2 to 5 ha)	16.7	0.75	21140	100.0	100.0	75600
Very large (Above 5 ha)	20.0	1.35	25838	100.0	100.0	166500

All farmers involved on sugar cane cultivation are selling sugar cane and selling most of their produce. Average income of farmer from selling of sugar cane is Rs 58,280 varying from Rs 166,500 among large farmers to Rs 31280 among marginal famers. Value of sale of Sugar cane per farmer is lowest (Rs 15003) among surface irrigation (>1000 ha) whereas highest (Rs 121050) among surface irrigation (<1000 ha) farmer.

2.5.10 Jute

Table 2.12 presents jute production and sale with details on **Table D 23, Table D 23.1, Table D 23.2, Table D 23.3, Table D 23.4 and Table D 23.5**. Very few farmers (4 out of 120) are involved on production of Jute. Average jute cultivation area among those farmer growing Jute is 0.22 ha varying from 0.34 ha among large famers to 0.17 ha among medium farmers. Average yield of jute is 1567 kg/ha varying from 1378 kg/ha among medium farmers to 1772 kg/ha among large farmers. Majority of the farmers felt that area, production and productivity of jute had remained unchanged.

Table 2.12: Jute production and sale

	Cultivation			Sale		
	% of HHs cultivating	Area per HH (ha)	Yield (kg/ha)	% of HHs selling	Sale ratio (%)	Income (Rs/HHs)
Overall	3.3	0.22	1567	89.9	100.0	10225
Irrigation type						
Surface (< 1000 ha)						
Surface (>1000 ha)						
Deep tube well						
Shallow tube well	33.3	0.22	1567	100.0	89.9	10225
Rain fed						
Land holding						
Marginal (upto 0.5 ha)						
Small (0.5 to 1 ha)	2.6	0.20	1378	100.0	100.0	9800
Medium (1 to 2 ha)	10.0	0.17	1476	100.0	92.0	8050
Large (2 to 5 ha)	8.3	0.34	1772	100.0	83.3	15000
Very large (Above 5 ha)						

All farmers involved on jute cultivation are selling jute. Farmers are selling nearly nine tenth of their jute production (89.9%) varying from 83.3% among large farmers to 100% among small farmer. Average income of farmer from selling of jute is Rs 10225 varying from Rs 15000 among large farmers to Rs 8050 among medium famers.

2.6 Food Consumption/Self Sufficiency

Section E presents status of the food consumption/self sufficiency of farmers. This section summarizes on food consumption and self sufficiency situation.

Nearly nine tenth of households (87.5%) have food sufficiency for the whole year from their own farm production followed by 6-9 months (7.%%), 9-11 months (4.2%). Only one households have food sufficiency for less than 1 months. Of those households who are food in-sufficient, they generally go bed without food for 1 days on a month. Households are adopting wide range of coping strategies to meet food deficiency. Majority of households are working as wage labor (46.7%) followed by non-farm activities (26.7%) and selling of livestock (26.7%) to meet food deficiency. **Table E1, Table E.1.1 and Table E.1.2** presents food sufficiency situation.

More than four fifth (82.5%) of farmers are eating meat/fish. Of those households eating meat, more than half (53.5%) are eating meat once a week followed by once a month (25.3%), twice a week (18.2%) and once in two months (3.0%). Of those HHs consuming meat/fish, each household consume 7.4 kg of meat/fish per month varying form 6.6 kg/HHs among small farmers to 10.1 kg among very large farmers. Deep tube well farmers (10.3 kg/HHs) are consuming more quantity of meat compared to rain fed farmers (5.4 kg/HHs). **Table E2, Table E.2.1 and Table E.2.2** presents situation of farmers eating fish/meat.

More than half (53.5%) of farmers are eating egg varying from 45.0% among small farmers to 58.3% among medium farmers. Of those households eating egg, each household consume 4.3 egg per week varying form 3.9 among small farmers to 8.3 among very large farmers. **Table E3 and Table E.3.1** presents situation of farmers eating egg.

More than four fifth (85.8%) of farmers are consuming milk varying from cent percent among large farmers to 85.0% among small farmers. Each households is consuming 1.4 liter of milk per day varying from 2.0 liter among large farmer to 1.2 liter among medium farmer. There is no mark able difference on milk consumption by irrigation facility, however deep tube well farmers are consuming less quantity compared to others. **Table E4 and Table E.4.1** presents situation of farmers consuming milk.

Nearly half of the respondent (47.5%) reported that food security situation have remained similar while nearly one fourth reported on either improved (27.5%) or diminished (25.0%). Increase on production, remittances, employment opportunities, livestock farming, diversification of income sources/less dependent on farming, use of modern technology/improved seeds are major reasons for improvement on food security situation. Poor irrigation, pest and diseases problem, less production, high cost of cultivation and inadequate supply of production inputs are main reasons of diminishing food security situation. **Table E5** assess food security situation of farmers.

2.7 Input Supply

Section F presents status of input supply while focusing on availability of improved seeds, fertilizers, plant protection materials and agricultural labor.

2.7.1 Seeds

Farmers were asked about availability and quality of seeds irrespective of crops. Nearly one third (36.7%) of farmers reported on timely availability of seeds varying from 66.7% among large farmers to 20.5% among marginal farmers. Likewise, one third of farmers (30.8%) are satisfied with quality of seeds varying from 23.1% among marginal farmers to 41.7% among large farmers. More than one third of farmers (35.8%) reported on easy availability of seeds varying from 66.7% among large farmers to 25.6% among marginal farmers. Similarly, one fourth of farmers (25.0%) felt that seeds are available on adequate quantity varying from 17.9% among marginal farmers to 33.3% among large farmers. **Table F.1** presents availability and quality of seeds.

More than two third of farmers (66.7%) are using seed from their own sources followed by agro-vet (45.0%), village market (39.2%) and main market (30.8%). Other source of seeds are market of other VDC 21.7%, Indian market (18.3%), Cooperative (14.2%) and Indian trader (3.3%). Agro-vet and own source remain main source of seed for farmers having access to different type of irrigation facility and land holding size. **Table F.1.1** presents place of source of seeds.

More than two third of farmers (69.2%) use seed from their own followed by purchase from agro-vet (50.8%) and agriculture and research farm (30.8%). Farmers also purchase seed from local traders (31.7%), India (19.2%), Indian businessman (13.3%) and neighbors (16.7%). Indian businessman come from neighboring border cities and drop seeds on farmer places. Own source and purchase from agro-vet remain main source of seed for farmers having access to different type of irrigation facility and land holding size. **Table F.1.2** presents source of seeds.

2.7.2 Fertilizers

Fertilizer refer here as chemical fertilizers. Nearly one third (31.7%) of farmers reported on timely availability of fertilizer varying from 20.0% among very large farmers to 33.3% among marginal farmers. Likewise, nearly one fourth of farmers (19.2%) are satisfied with quality of fertilizer varying from 15.4% among small farmers to 33.3% among medium. More than one third of farmers (34.2%) reported on easy availability of fertilizer varying from 43.6% among small farmers to 20.0% among very large farmers. Similarly, one fourth of farmers (23.3%) felt that fertilizer are available on adequate quantity varying from 33.3% among small farmers to 8.3% among medium farmers. **Table F.2** presents availability and quality of fertilizers.

More than half of farmers (66.7%) are purchasing fertilizers from village market (53.0%), Agro-vet (40.0%) and main market and Indian market (39.2% each). Other source of fertilizer are market of other VDC (35.8%), Cooperative (15.0%) and District head quarter (8.3%). Agro-vet and village market remain main source of fertilizer for farmers having access to different type of irrigation facility and land holding size. **Table F.2.1** presents source of fertilizer.

2.7.3 Plant protection material

More than one fourth of farmers (28.3%) reported on timely availability of plant protection material varying from 20.5% among small farmers to 40.0% among medium farmers. Likewise, very few farmers (13.3%) are satisfied with quality of plant protection materials varying from 7.7% among marginal farmers to 30.0% among very large farmers. More than one third of farmers (38.3%) reported on easy availability of plant protection materials varying from 45.0% among medium farmers to 25.0% among large farmers. Similarly, one third of farmers (30.8%) felt that plant protection materials are available on adequate quantity

varying from 35.9% among small farmers to 16.7% among medium farmers. **Table F.3** presents availability of plant protection materials.

More than two third of farmers (73.3%) are purchasing plant protection materials from Agro-vet followed by village market (46.7%) and main market (33.3%). Other source of plant protection material are market of other VDC (30.8%), Indian market (29.2%) Cooperative (10.0%) and District head quarter (8.3%). Agro-vet and own source remain main source of fertilizer for farmers having access to different type of irrigation facility and land holding size. **Table F.3.1** presents source of plant protection material.

2.7.4 Labors

More than four fifth (8.17%) of respondents felt labor shortage problem varying from 71.8% among small farmer to cent percent among very large farmers. Of those farmers reporting labor shortage problems, more than two third (66.3%) reported shortage during peak farming season varying from 53.3% among marginal farmers to 84.2% among medium farmers. Likewise, nearly one third of farmers reported shortage of labor throughout the year. Large majority of farmers felt that labor shortage is quite evident on transplanting (89.8%) and harvesting season (96.9%). **Table F 4, Table F4 .1 and Table F 4.2** presents assessment of labor availability.

2.8 Irrigation and Drainage

Section G presents status of irrigation and drainage, focusing on access to different irrigation facility, irrigation condition, water availability, repair and maintenance of canal, problems of flooding, river cutting and siltation, awareness about irrigation office and services from irrigation office etc.

2.8.1 Functioning of irrigation system

Very few households have multiple source of irrigation. The shallow and deep tube well farmers generally don't have access to surface irrigation. Only one deep tube well farmer have access to surface water irrigation as well. However, higher proportion of surface irrigation farmers have access to ground water especially shallow tube well. Nearly 20.8% farmers with surface irrigation (<1000 ha) and 45.8% of farmers with surface irrigation (>1000 ha) have installed shallow tube well. Likewise, 1 farmers from deep tube well have installed shallow tube well as well. Tendency of farmers to install alternative sources of irrigation is high on surface irrigation which might be mainly because of poor functioning of system and supply of water during winter and spring seasons. Only one farmers have drip irrigation and treadle pump for irrigation. **Table G 1** presents source of irrigation on farm.

Majority of farmers (56.7%) felt that irrigation is functioning well varying from 85.0% on deep tube well to 37.5% on surface irrigation (>1000 ha). Likewise, higher promotion of marginal farmers (61.3%) reported well functioning of irrigation facilities compared to medium farmers (43.8%). **Table G 1.1** presents functioning of irrigation system.

Water scarcity is quite evident on surface water compared to ground water irrigation facility. Majority of farmers (59.6%) felt that water is not sufficient for irrigation varying from 70.8% each from surface irrigation (> & < 1000 ha) to 20% on deep tube well. Likewise, higher proportion of medium farmers (81.3%) reported shortage of water compared to marginal farmers (48.4%). Water scarcity started from Feb/March and last till May/June, until monsoon starts. Of those farmers facing problems, more than nine tenth reported water scarcity problems on March/April (91.9%) followed by Feb/March (90.3%) and May/June (85.5%). Farmers have less water shortage on June/July because of rain. Likewise, none of the farmers mentioned water shortage problems on Sept/Oct and Oct/Nov because of

harvesting season of paddy. Farmers also need water after third week of wheat plantation, hence they don't complain about water shortage on these two months.

Electricity is main problems for ground water, especially for shallow tube well Other problems are expensive to use diesel pump set, no support for installation of pump set from government/poor affordability of farmers etc. High siltation and sedimentation, damage of main and canal, poorly developed field canal, water scarcity due to untimely rain are main reasons for shortage of water on surface irrigation. Farmers managed water through rotation (33.9%), followed by equal time allocation & time allocation according to area (22.6% each) and others. The other mostly mean no any formal rule but committee or farmers decide depending on water availability. This is more visible on big surface water where branch committee took decision to supply water considering water available to them, generally irrigating from head to tail. For shallow tube well farmers, no distribution rule applies. However, problems of electricity, especially load shedding problems is causing scarcity of water. **Table G 1.2, Table G 1.2.1 and Table G 1.2.2** presents availability of water, water shortage months and management practices.

More than two third (71.2%) of farmers participated on repair and maintenance of canal/irrigation system varying from 33.3% among Shallow tube well to 83.3% among surface irrigation (<1000 ha). Very large farmers (90.0%) participated more on repair and maintenance of canal compared to small (68.6%) and marginal (54.8%) farmers. Farmers generally participate two times for repair and maintenance of canal, before rainy seasons to clean canal (before paddy cultivation) and summer season to repair and maintain canal (before wheat cultivation). Of those farmers participating on repair and maintenance, they contributed nearly 2.5 days per year varying from 2.6 days among small farmers to 2.4 days among large farmer. Likewise, labor participation is high on surface irrigation system compared to ground water irrigation. **Table G 1.4**, presents participation of farmers on repair and maintenance of canal.

2.8.2 Problems

Very few farmers reported damage of crop by floods varying from 12.5% each on surface irrigation to 16.7 percent on Shallow tube well. Marginal farmers (12.8%) faced more problems of flooding followed by large and medium farmers (10.0% each) and small farmers (7.7%). The flood damage about 0.35 ha of land of each farmers varying from 1.69 ha among large farmers to 0.14 ha among marginal farmers. Likewise damage from surface irrigation is high compared to shallow tube well. Average land area flooded of shallow tube well farmer is 0.08 ha. Flooding causes loss of 735 kg of crop production per farmer varying from 5000 kg among large farmers to 104 kg among small farmers. Likewise damage of crop on surface irrigation above 1000 ha is 1767 kg while it is 120 kg/farmer among surface irrigation. Each farmers faced problems of flooding at 2.2 times over the last five years varying from 1.7 times among small farmer to 3.0 times among medium farmer. **Table G 2, Table G 2.1, Table G 2.2, Table 2.3** presents problems due to flooding.

Very few farmers (5.8%) reported problems due to sand/silt deposition varying from 20.0 among very large farmers to 2.6% among medium farmers. Sand deposition problem was noted on surface irrigation only. Farmers employ labor clear sand. However, such problem is not severe. Only 2 farmers reported problems of river cutting/soil erosion while only one farmers reported loss of crops due to erosion. This reveals that farmers are facing less problems from erosion and sand deposition. **Table G 3, Table G 4, Table G 5, G Table 5.1** presents problems due to flooding.

2.8.3 Services from Irrigation Office

Nearly one fourth of farmers/irrigation users know about location of irrigation office varying from 58.3% among shallow tube well to 25.0% among surface irrigation (>1000 ha). Likewise large farmers are more aware of location of irrigation office (41.7%) compared to 23.1% among small farmers. This reveals poor awareness about the Irrigation office. Large majority of farmers (81.7%) have not visited irrigation office varying from 66.7% on Shallow tube well to cent percent among rain fed farmers. Likewise, 70.0% of very large farmers have not visited irrigation office compared to 89.7% among marginal farmers. Nevertheless 12.% of farmers have rarely visited Irrigation office followed by occasional (5.0%). Only one farmers reported regular visit of Irrigation Office. Of those farmers visiting irrigation office, only 8 farmers (36.4%) reported the meeting with the Irrigation Official varying from 50% on surface irrigation (<1000 ha) to none on shallow tube well. Likewise number of farmers meeting irrigation official is high on large farmers while none on marginal farmers. Of 8 farmers meeting irrigation official, 3 have meet half yearly, 2 each had made quarterly and yearly and one had met once a month. Of 22 farmers visiting Irrigation Office only one reported service provided by Irrigation Office is sufficient. This reveals poor institutional development support from Irrigation Office. **Table G 6, Table G 6.1, Table G 6.2, Table G 6.5** presents access of farmers to irrigation office and support service received.

2.9 Water User Association

Section H presents on condition and functioning of water user association.

Almost all farmers are aware about water user association/group. Likewise, more than nine tenth (96.1%) reported that they are member of water user association/group. Of those farmers reporting member of group, nearly three fourth of farmers (73.7%) are aware about rule and regulations of the water user association/group. Large farmers are more aware of rule compared to small and marginal farmers. Likewise, 72.7% of farmers felt that representative are equally/reasonably from various backgrounds. More than half of farmers (59.6%) having membership in WUAs/group have participated on general assembly varying from 73.3% among deep tube well to 8.3% among shallow tube well. Large majority of farmers (44.4%) don't know when the executive committee of the groups are organized. Nevertheless, 26.3% farmers reported it is organized 1-5 times a year, 16.2 % 6-10 times a year and 13.1% above 10 times. This reveals that executive committee meeting are not regular and organized as and when required. **Table H 1.1, Table H 1.2, Table H1.3, Table H1.4, Table H1.5 and Table H1.6** presents awareness and functioning of water user association and group.

Two third of farmers (64.6%) are satisfied with functioning of the WUAs/group varying from 66.7% among shallow tube well farmers to 86.7% among deep tube well farmers. Water distribution, repair and maintenance of canal, effective management of irrigation system is main reasons for satisfaction will poor transparency of function or activities and shortage of water are main reasons for dissatisfaction among the farmers. **Table H 1.7** presents perception of farmers on functioning of WUAs/groups.

Two third of farmers are participating on activities of WUAs varying from 90.0% among large farmers to 54.8% among marginal farmers. Participation of farmers is high on surface irrigation (<1000 ha) whole lowest on shallow tube well (0.0%). Of those farmers participating on WUAs activities, nearly half (50.7%) participated regularly, followed by occasionally (46.3%) and rarely (3.3%). **Table H 1.8 and Table H 1.9** presents participation of farmers on WUAs activities.

Of the 120 farmers survey, only 8 farmers reported payment of annual membership fee. This payment mechanism exists on One irrigation project. Farmers are making payment on cash at Rs 5 per year for renew of membership. **Table H 1.10, Table H.10.1 and Table H 10.2** presents payment of annual membership fee.

More than half of farmers (53.8%) are making payment of irrigation service fee varying from 58.3% on surface irrigation (<1000 ha) while none on shallow tube well. There is no marked difference on payment of irrigation fee by land size. Farmers are paying Rs 49.2/Kattha (0.03 ha) as irrigation service fee varying from Rs 8.4 on surface irrigation (>1000 ha) to Rs 192.8 on deep tube well. Small and marginal farmers are making more irrigation service fee per kattha compared to large and very large farmers. Almost all farmers making payment felt that irrigation service fee is reasonable. **Table H 1.11, Table H.11.1** and **Table H 12** presents payment of irrigation service fee.

2.10 Energy and Environment

Section I presents energy and environment situation. This section mainly discusses on household access to electricity, source of drinking water, energy source for cooking, condition of soil fertility, effect of chemical fertilizers on soil, salinity of soil etc.

Almost all farmers (97.5%) have access to electricity. 3 farmers from surface irrigation (<1000 ha) have no electricity facility. Tube well/hand pump remain main source of drinking water (78.3%) followed by piped water supply (19.2%) and well (2.5%). Tube well/ hand pump remain main source of drinking water irrespective of irrigation facility and land size. Large majority of farmers (56.7%) are using firewood as main source of energy for cooking followed by dung cake (25.8%), biogas (12.5%), LPG gas (3.3%) and others such as straw/crop residue and coal. **Table I 1, Table I 2** and **Table I 3** presents farmers access to electricity and source of drinking water and energy for cooking.

Majority of farmers (60.8%) reported problems of soil fertility varying from 90.0% among large farmers to 56.4% among marginal farmers. Likewise, 31.3% of rain fed farmers reported problems of soil fertility compared to 75% among farmers with surface irrigation (>1000 ha). High use of chemical fertilizers, inadequate use of compost fertilizer and inadequate irrigation, poor quality chemical fertilizer are main reasons for reduction of soil fertility. **Table I 4** presents number of farmers reporting declining soil fertility.

Only 4 out of 120 farmers have conducted soil test. Of 4 farmers, 2 have conducted soil test last year while other 2 have conducted before 3 to 5 years. Of four test of soil, two recommended for using lime, one have no problem with soil and remaining one have problems of termites/insects. **Table I 5 and Table I 6** presents number of farmers conducting soil test.

Only 5 out of 120 farmers have applied lime last year. However, use of lime is very limited and not as per the prescription or recommendations. Nearly one fourth (23.3%) of farmers have applied green manure varying from 35.4% on surface irrigation (<1000 ha) to Deep tube well (10.0%). Use of green manure is relatively high on large farmer compared small and marginal farmers. *Sesbania* is the main green manure crops grown on Terai of Nepal. Average area of cultivation of green manure is 0.70 ha per farmers varying from 2.37 among very large farmers to 0.08 among marginal farmers. Likewise, surface area farmer (<1000 ha) have cultivated more green manure compared to shallow and deep tube well farmer. **Table I 7 and Table I 7.1** presents application of green manure.

More than one third of farmers reported on adverse effect of chemical fertilizers varying from 10% among very large farmers to 41.0% among small farmers. Likewise, 50.% of farmers with surface irrigation (>1000 ha) faced problems of chemical fertilizers whereas such proportion is 8.3% among farmers with deep tube well. Of those farmers reporting problems, nearly three fourth (73.3%) farmers observed problems from 3-5 years followed by last year (17.8%), more than five years (6.7%) and this year (2.2%). This reveals that farmers started reported problems of chemical fertilizers from last 3 years or more. **Table I 9 and Table I**

9.1 presents adverse effect of chemical fertilizer use. Low production, hardness/dryness of soil, increase on acidic content of soil are main problems.

Only 3 farmers observed soil salinity problem due to groundwater use. Likewise, only 2 farmers reported problem of sand and mud deposition due to canal irrigation. Nevertheless 13.3% farmers reported depletion of underground aquifer due to excessive extraction of ground water. **Table I 10, Table 1 10.1 Table I 11, Table 1 11.1, Table I 12, Table I 12.2** presents problems due to use of ground water.

Nearly one sixth of farmers (14.2%) reported shortening duration between seed sowing and grain harvesting in winter crops such as wheat whereas 11.7% farmers reported shortening duration between flowering and grain harvesting in winter crops. Likewise, more than two third of farmers (67.5%) noticed shrunk or small grain or under-developed grain in wheat. Nearly two third of farmers (65.0%) observed no grain on wheat spike. **Table I 13, Table I 13, Table I 15 and Table 1.16** summarizes on major problems encountered on winter crops like wheat.

2.11 Post Harvest Activities

Section J presents post harvest activities of major section. This section mainly presents number of farmer storing different crops, type of vessels used for storage, place of storage, number of days of storage, storage loss, mode of transport etc.

Farmers are storing commodities for self consumption as well as selling of produce when price is high. Almost all farmers are storing paddy (98.3%) followed by wheat (62.5%), potato (50.0%) and maize (45.0%). Farmers are also storing pulses (12.5%) and oil crops (21.7%). **Table J 1 and Table J.1.1** present proportion of farmers storing different commodities by irrigation facility and land size. Paddy is stored by most of farmers irrespective of land size and irrigation facility, however it varies for other commodities.

Farmers are using different type of storage facilities or vessels such as earthen bin, metal bin, bamboo basket, wooden rack/plank, sack, cold store etc for storage of produce. The use of storage facilities varies by type of commodities. Paddy are mostly stored on bamboo basket (73.7%) followed by sack (9.3%) and mid bin (8.5%). Farmers are also using wooden box to store paddy (6.8%). Likewise majority of farmers are using bamboo basket to store maize (42.6%) and wheat (48.0%) followed by sack (31.4% and 24.0%) respectively. Farmers are also storing maize by making hanger (16.7%) while wheat is store on metal bin (14.7%). Sack and metal bin are mostly used to store pulses and oil crops. Farmers are using wooden plank, sack, mud bin and small bamboo basket to store potato. This reveals farmers are storing most of the commodities by packing on mud sack. Use of cold storage facility is very limited. **Table J 2 and Table J.2.1** present proportion of farmers using different vessels/utensils to different commodities by irrigation facility and land size.

Farmers are mostly using home to store agriculture produce. This situation remain similar among all commodities. Nevertheless, very few farmers are using storage facility such as cold storage for facility, mainly for potato. **Table J 3 and Table J.3.1** present place of storage of agriculture produce by irrigation facility and land size

Average days of storage varies by type of commodities depending upon storage methods. Farmers store produce not only for selling but also for self consumption. As a result of this, storage days appear high. Farmers are generally storing paddy for 256 followed by 214 days for wheat, 167 days for maize, 165 days for oil crops, 150 days for pulses and 120 days for potato. Farmers generally sell potato within 60 days of harvest but they kept part of potato

for seeds and self consumption. This has resulted on increase on storage days. Likewise, cereal, pulses and oil seeds are also kept for self consumption. Farmers generally sale produce when they need cash. **Table J 4 and Table J.4.1** present average days of storage of commodities by irrigation facility and land size.

Storage loss varies by commodities. According to farmers, storage loss is high on potato (15.5%) followed by wheat (7.3%), maize (6.1%), paddy (4.9%), pulse (1.8%) and oil crops (0.5%). Loss is relatively high for all commodities which is mainly because of poor storage facility and poor management and handling of commodities during storage. **Table J 5 and Table J.5.1** present storage loss of commodities by irrigation facility and land size.

Carrying is main methods of bringing produce for storage followed by use of tractor, cart and bi-cycle. Farmers generally bring agriculture produce on tractor or cart from agriculture field to house. After bringing, they do cleaning, winnowing and dry produce. Later on they bring for storage. **Table J 6 and Table J.6.1** present methods of brining produce for storage by irrigation facility and land size. Large farmers generally use tractor while small farmer use cart.

None of the farmers are conducting processing and value addition of cereals, fruits and vegetables for commercial use. However, local level rice mill and flouring mills are operated on village. Villagers use this for milling their produce, especially paddy and wheat and use for self consumption. Farmers sale paddy directly, hence milling is not carried out for commercial use.

2.12 Marketing

Despite of marginal production., large ,majority (88.3%) of farmers are selling agriculture produce varying from cent percent among medium, large and very large farmers to 75% among marginal farmers. Proportion of farmers selling agriculture produce is highest on farmers with surface irrigation (<1000 ha) and shallow tube well (cent percent) followed by surface irrigation (> 1000 ha) and deep tube well and rain fed farmers. This reveals that almost all farmers are selling their produce on market. Of those farmers selling agriculture produce, nearly two third are selling paddy (62.3%), followed by other cereals such as maize and wheat (50.0%), fruit (42.5%), potato (19.8%), vegetable (18.9%) and others (17.0%). Proportion of farmers selling agriculture commodities is relatively high on large and very large farmers compared to small and marginal farmers. Farmers selling paddy and cereals is high on surface irrigation facility compared to ground water and rain fed farmers. **Table K 1** present farmers selling different agricultural produce by irrigation facility and land size.

Farmers are selling their produce on different market places as well as on village itself. Major place of sale includes (a) village/homestead (b) village market (c) Rural haat bazaar, weekly or bi-weekly market (d) Market center (road head market or organized market) (e) District market (district head quarter) and (f) outside district. Of the total farmers selling their produce, more than half of farmers are selling their produce on village market (52.8%) followed by village (33.0%), market center (23.6%), local market (11.3%) and outside district (7.5%). This reveals that most of the produce are sold on village level market only. Average distance travel by farmers to bring their produce to village is 1.46 km, village market is 1.42 km, haat bazaar is 3.25 km, market center is 7.04 km and outside district is 24.75 km. This reveals that market are located within the periphery of villages. Farmers had to travel less distance to sale their produce. **Table K 2 and Table K 2.1** present proportion of farmers bringing produce to different market places and distance travel by irrigation facility and land size. There is no mark able difference on place of sale of agriculture produce by irrigation facility and land size. Majority of farmers are selling their produce on village market followed by

village and market center. However, large farmers generally tend to sale their produce center compared to small and marginal farmers.

Sale of paddy: Of the 120 farmers surveyed, 66 farmers are selling paddy. Of those farmers selling paddy, more than half are selling paddy on village market (54.5%) followed by main market (27.3%), village market (24.2%) and rural haat bazaar (1.5%). Of the total volume of sale, more than half is sold on village market (51.4%) followed by village and main market (25.2%) and village (22.7%) and Haat. This shows that more than two third of paddy are sold within the village level market. Village market remain main place of mail of agriculture produce for farmers having access to different irrigation facility and land size. Likewise more than half of the sale of paddy occurs on village market itself irrespective of land size and irrigation facility. **Table K 3 and Table K 3.1** present number of farmers selling paddy on different market place and sale proportion on market.

Sale of other cereals: Of the 120 farmers surveyed, 53 farmers are selling other cereals. Of those farmers selling other cereals, more than half are selling on village market (50.4%) followed by village market (24.5%) and main market (20.8%) Of the total volume of sale, more than half is sold on village market (56.8%) followed by village (22.7%) and main market (25.2%) and village (22.7%). This shows that more than two third of other cereal crops are sold within the village level market. Village market remain main place of mail of agriculture produce for farmers having access to different irrigation facility and land size. Likewise more than half of the sale of other cereal occurs on village market itself irrespective of land size and irrigation facility. **Table K 3 and Table K 3.1** present number of farmers selling other cereal crops on different market place and sale proportion on each market.

Sale of vegetables: Of the 120 farmers surveyed, 20 farmers are selling vegetables. Of those farmers selling vegetables, nearly one third are selling on village market and local haat bazaar (30% each) followed by village (25.0%) and main market (20.0%). Of the total volume of sale, nearly one third is sold on village market (30.0%) followed by haat bazaar (27.5%), village (25.0%) and main market. This shows that more than two fourth of vegetables are sold within the village level market. Village market and haat remain main place of mail of agriculture produce for farmers having access to different irrigation facility and land size. Likewise more than one third of the sale of vegetables occurs on village market itself irrespective of land size and irrigation facility. **Table K 3 and Table K 3.1** present number of farmers selling vegetables on different market place and sale proportion on market.

Sale of fruits: Of the 120 farmers surveyed, 45 farmers are selling fruits. Of those farmers selling fruit, more than one third are selling on village market (42.2%) followed by village market (33.3%), main market (13.3%) and rural haat bazaar (12.8%). Of the total volume of sale, nearly half is sold on village (40.6.4%) followed by village market (33.3%), main market (13.3%) and Haat (12.8%). This shows that nearly nine-tenth of fruits are sold within the village level market. Village remain main place of mail of fruits among farmers having access to different irrigation facility and land size. Likewise more than third of sale of fruits occurs on village itself irrespective of land size and irrigation facility. **Table K 3 and Table K 3.1** present number of farmers selling paddy on different market place and sale proportion on market.

Sale of potato: Of the 120 farmers surveyed, 21 farmers are selling potato. Of those farmers selling paddy, nearly half are selling paddy on village market (47.6%) followed by main market (23.8%) and village and rural haat bazaar (14.3% each). Of the total volume of

sale, nearly half of potato is sold on village market (47.6%) followed by main market (23.8%) and village and Haat (14.3%). This shows that more than two third of potato are sold within the village level market. Village market remain main place of sale of potato for farmers having access to different irrigation facility and land size. Likewise nearly half of the sale of paddy occurs on village market itself irrespective of land size and irrigation facility. **Table K 3 and Table K 3.1** present number of farmers selling potato on different market place and sale proportion on market.

Market information: Farmers are getting market information from different sources such as friends/neighbors, radio/newspaper, Local Shop/Trader, Telephone /mobile, Agriculture Technician, Mills/Industry etc. Of different sources, Local Shop/Trader (79.2%) remain source of market information followed by friends/neighbors (50.9%) and mill/industry (24.5%). Other source of market information includes radio/newspaper (7.5%), agricultural technicians (0.9%). This reveals that farmers still rely on informal sources for market information. This situation remain similar among farmers belonging to different irrigation facility and land size. **Table K 4** presents source of market information among farmers.

Price determination: During the survey, farmers were also asked about who determine or decide price of produce. Large majority of farmers (81.1%) reported that traders/middle man decide price of agriculture produce followed by own (8.5%) and mill owner (7.1%). Other agents involved on deciding market price are wholesalers, retailers and Nepal Food Corporation. This reveals that farmers have less control on deciding their price of produce. This situation remain similar irrespective of land size and irrigation facility. **Table K 5** presents price determination methods among farmers.

Sale of crop: Large majority of farmers (85.8%) are selling their produce to traders/middle followed by mill owner (28.3%), wholesaler (22.6%), retailers (17.9%) and others (7.9%). Others include company and consumers. Very few farmers are selling produce to cooperative. This situation remain similar irrespective of land size and irrigation facility. **Table K 6** presents sale of crop to different marketing agents.

Time of sale: More than two third of farmers (66.0%) are selling their produce when they need cash followed by immediately after harvest (24.5%) and when price is high (9.4%). This situation remain similar irrespective of land size and irrigation facility. **Table K 7** presents time of sale of agriculture produce.

Problems on marketing: Almost equal proportion of respondents selling agriculture produce reported they face problems on marketing and vice versa. Major problems faced by farmers on marketing includes (a) low price of their produce; (b) less controlled on price (price fixed by traders); (c) inadequate market facility, (d) absence of storage and transport facility and (e) distance to market.

Large majority of farmers are selling their produce on village level market with highly dependent on traders and relatives for market information. Likewise, traders are controlling price. However, they are not still aware with the marketing problems. This is mainly related to awareness about market and functioning. For majority of them, selling produce without difficulty means no market problem. They are less concern about market functioning. **Table K 8** presents price determination methods among farmers. Major reasons for farmers reporting no problems of marketing are (a) easy to sale (can be sold at village itself) (b) price fixed according to the market price, less margin (Rs 1 per kg) taken by collectors (c) choices of traders at village (10-12 collectors are operating) (d) existence of collection center/DHQ market nearby (e) price information can be obtained from traders/mill-owner

2.13 Access to Services

2.13.1 Financial Service

More than half of farmers (51.7%) have taken loan varying from 56.4% among marginal farmers to 30.0% among large farmers. Likewise relatively higher proportion of deep tube well farmers have taken loan (65.0%) followed by surface irrigation (>1000 ha) farmer (62.5%), shallow tube well farmer (58.3%), rain fed farmer (43.8%) and surface irrigation (<1000 ha). Farmers are taking loan from different sources such as commercial bank, development bank, finance company, cooperatives, merchants/money lenders and friend and relatives. Of those farmers taking loan, majority have taken loan from cooperatives (37.1%) followed by merchant/money lenders & cooperatives (17.7% each), development bank (21.0%) and commercial bank (8.1%). This reveals that farmers access to financial services have improved after cooperatives, however non-formal source still remain main source of credit. Cooperative and financial institution such as development bank, commercial bank and financial institutions remain main source of credit for farmers belonging to different irrigation facility and land size. **Table L 1, Table L 1.1 and Table L1.1.1** presents proportion of farmers taking loan and source of loan.

Of those farmers taking loan, more than one third have taken for household affairs (37.3%) such as purchase of assets, consumable expenses followed by agriculture purpose (35.8%) and business/enterprise (26.9%). Majority of small, marginal, medium and large farmers have taken loan for agriculture purpose while that of large farmers take loan for business/enterprise and very large farmer had taken loan for household affairs such as purchase of tractors, child education, marriage etc. Average amount of loan taken by farmers among those farmer taking loan is Rs 270,065 varying from Rs 1,03,333 among medium farmers to Rs 23,00,000 among very large farmers. Likewise rain fed farmer are taking lowest amount of loan (Rs 61,429) while that of farmers with surface irrigation (<1000 ha) is highest (Rs 4,55,600). **Table L1.1.2** presents loan amount and source of loan.

Source of loan of farmers are further grouped into three categories, which include (a) financial institutions such as commercial bank, development bank and finance company (b) cooperatives and (c) informal sources such as friends, relatives and money lender/merchants etc. Of the total loan taken by farmers, more than half (60.4%) is taken from financial institutions followed by informal sources (26.5%) and cooperative (13.1%). Financial institutions remain main source of loan for farmers having irrespective of land size. However share of loan of deep tube well farmers and rain fed farmers is high from cooperative while it financial institutions for rest of the farmers. **Table L1.1.2** presents loan amount and source of loan.

Interest rate of loan varies from 14.8% to 33.0% per annum. Interest rate of financial institutions is almost half that that of informal sources. For example, commercial bank, development bank and finance company is providing loan at 15.4%, 14.8% and 16.7% per annum to farmers while interest rate of Merchant and friend and relatives is 32.5% and 33.0% percent per annum respectively. Likewise, cooperative is providing loan at interest rate of 18.3% per annum. **Table L1. 2** presents interest rate of different financial institutions.

Of those farmers taking loan, nearly half have taken loan last year (47.8%) followed by this year (34.3%) and 2-5 years (17.9%). **Table L1. 3** presents duration of loan by respondent categories. Of those farmers taking loan, nearly half of the farmers (47.%%) reported loan are available easily varying from 66.7% among large farmers to 40.0% among medium farmers. **Table L1. 4** presents availability of loan by respondent categories.

2.13.2 Technical Service

Farmers were asked whether they receive any technical services or technical knowledge and/or information, or both from different service delivery institutions and individuals. Very few farmers (12.5%) have received technical service or technical knowledge for both varying from 5.0% among medium farmers to 30% among very large farmers. Of those farmers receiving technical service/knowledge, majority have received from television/radio (53.3%) followed by radio & Agro-vet(46.7% each) and government extension agency- District Agriculture Development Office/District Livestock Development Office (40.0%). Other sources of technical service/ information are NGOs/INGOs, traders and newspaper. Of those farmers receiving support, more than three fourth have received counseling (73.3%) followed by training (33.3%), technical knowhow (26.7%) and farm visit (13.3%). **Table L 2, Table L 2.1 and Table L 2.2** presents technical services and type of technical services received by farmers.

Large majority of farmers (91.7%) have never visited Service Center/JTA followed by as and when required (7.5%) and once a week (0.8%). Large majority of farmers felt that service provided by ASC/JTA are neither adequate and nor of good quality **Table L 3 and Table L 3.1** presents visit to ASC/JTA and services received from them.

2.14 Household Income and Expenditure

2.14.1 Income

Source of income: Farmers are generating income from several sources such as farm and non-farm sources. Farm income are further grouped into (a) income from sale of livestock produce (b) fishery (c) sale of fruits (d) crops such as cereals, pulses, vegetables, lentils, oil crops etc. Non-farm income is further grouped into permanent and temporary income. Temporary income includes income of wage (farm and non-farm) and remittances whereas permanent income includes income from trade/business, service and rent of property, land or agriculture machinery, interest or pension, cottage industry.

Table 2.13 presents sources of household income of farmers. Farmers are deriving income from more than one sources. Major source of income of farmers is sale of agriculture crops (81.7%) followed by temporary income (70.0%), sale of livestock produce (58.3%), permanent income (41.7%),m fruits (37.%%) and fishery (6.7%). Sale of crop and temporary income remain main source of among farmers with different irrigation facility and land holding size.

Table 2.13: Proportion of households having different source of income

Unit: Percent of HHs

	Livestock	Fruit	Fishery	Crops	Forests	Permanent income	Temporary income
Overall	58.3	37.5	6.7	81.7	3.3	41.7	70.0
Irrigation facility							
Surface (< 1000 ha)	72.9	45.8	6.3	93.8	2.1	43.8	66.7
Surface (> 1000 ha)	37.5	20.8	16.7	79.2	8.3	50.0	62.5
Deep tube well	65.0	45.0	0.0	70.0	0.0	45.0	70.0
Shallow tube well	66.7	33.3	8.3	83.3	0.0	16.7	91.7
Rain fed	31.3	31.3	0.0	62.5	6.3	37.5	75.0
Land holding size							
Less than 0.5 ha	53.8	33.3	0.0	69.2	5.1	35.9	74.4
0.5 to 1 ha	64.1	33.3	2.6	74.4	0.0	35.9	76.9
1 to 2 ha	45.0	35.0	15.0	100.0	5.0	45.0	65.0
2 to 5 ha	58.3	41.7	8.3	100.0	0.0	33.3	50.0
Above 5 ha	80.0	70.0	30.0	100.0	10.0	90.0	60.0

Average income: Non-farm sources remain main source of household income of farmers. Table 2.14 presents household income and contribution from different sources. Average household income of farmers Rs 345,049 varying from 214,605 among small farmers to Rs 920,075 among very large farmers. Likewise, income of rain fed farmers is lowest (Rs 182,488) while that of farmers from surface irrigation (>1000 ha) is highest (Rs 457,235). Non-farm sources such as permanent (34.7%) and temporary sources (30.4%) contribute to nearly two third of household income followed by sale of crop (20.5%), sale of livestock produce (6.9%), fruit (4.3%) and fishery (2.9%). More than half of income of small, marginal and medium farmers come from non-farm sources while that of large and very large farmers come from farm sources. This reveals that non-farm sources remain main source of income

Table 2.14: Household income and contribution by source

	Average income (Rs/HHs)	Contribution by sources (% of income)						
		Livestock	Fruit	Fishery	Crops	Forest	Permanent income	Temporary income
Overall	345,049	6.9	4.3	2.9	20.5	0.2	34.7	30.4
Irrigation facility								
Surface (< 1000 ha)	367,008	7.6	2.6	2.9	27.9	0.1	36.6	22.3
Surface (> 1000 ha)	457,235	4.9	5.6	4.6	16.3	0.1	39.4	29.0
Deep tube well	326,781	6.1	5.7	0.0	7.4	0.0	41.8	38.9
Shallow tube well	280,035	13.8	4.0	6.0	33.6	0.0	6.5	36.0
Rain fed	182,488	4.1	6.6	0.0	6.2	1.4	22.2	59.6
Land holding size								
Less than 0.5 ha	335,720	4.8	3.7	0.0	4.5	0.2	46.5	40.3
0.5 to 1 ha	214,605	9.2	2.9	2.4	10.9	0.0	24.6	49.9
1 to 2 ha	254,018	7.8	2.4	2.2	20.1	0.8	35.0	31.7
2 to 5 ha	471,838	15.4	2.9	5.3	39.6	0.0	20.7	16.1
Above 5 ha	920,075	2.1	8.3	6.6	40.6	0.1	35.6	6.8

2.14.2 Expenditure

Farmers are making expenditure on wide range of activities from food, schooling, health, education, purchase of assets, transportation, repayment of loan etc. Like income, household expenditure are also grouped into flowing categories, which includes (a) Food (cereals, oils, spices, tea, coffee, vegetables, fruits, fishers, meat etc (b) utilities such as cosmetics, transportation, fuel, entertainment, alcohol, tobacco, communication etc (c) education (d) health (e) purchase of assets, (g) agriculture equipments, input purchase and machinery (g) celebration of festivals and (i) irrigation.

All farmers are making expenses on food & utilities. Likewise, large majority of farmers are also making expenses on child education, health, social work and irrigation and assets purchase. Table 2.15 presents expenditure items of each households. **Table M 1 together with Table M2, Table M3 and Table M4** presents household income and expenditure.

Table 2.15: Expenditure items of households

Unit: Percent of HHs

	Food	Utilities	Education	Health	Agriculture inputs & equipment	Assets purchase	Social/ festival	Irrigation
Overall	100.0	100.0	88.3	96.7	76.7	35.0	92.5	75.0
Irrigation facility								
Surface (< 1000 ha)	100.0	100.0	93.8	93.8	79.2	33.3	91.7	79.2
Surface (> 1000 ha)	100.0	100.0	83.3	100.0	100.0	45.8	100.0	95.8
Deep tube well	100.0	100.0	85.0	100.0	60.0	50.0	90.0	80.0
Shallow tube well	100.0	100.0	75.0	91.7	75.0	16.7	83.3	75.0

Rain fed	100.0	100.0	93.8	100.0	56.3	18.8	93.8	25.0
Land holding size								
Less than 0.5 ha	100.0	100.0	87.2	97.4	76.9	25.6	84.6	71.8
0.5 to 1 ha	100.0	100.0	92.3	100.0	66.7	38.5	94.9	71.8
1 to 2 ha	100.0	100.0	85.0	85.0	85.0	35.0	95.0	80.0
2 to 5 ha	100.0	100.0	91.7	100.0	91.7	50.0	100.0	83.3
Above 5 ha	100.0	100.0	80.0	100.0	80.0	40.0	100.0	80.0

Table 2.16 presents expenditure of households. Average expenditure of households is Rs 160,009 varying from Rs 97,931 among rain fed farmers to Rs 188,971 among surface irrigation (>1000 ha) farmer). Average household expense of very large farmer is (Rs 430,612), which is almost 4 times higher than that of small farmers (Rs 104,081). Of the total household expenditure, nearly one third are made on household utilities (32.2%), followed by food (20.5%), education (16.2%), agriculture inputs & equipments (11.7%), social festival (8.4%) and health (7.1%). More than half of expense is made on food and utilities. This situation remain similar by irrigation facility and land holding size.

Table 2.16: Household expenditure

	Average expense (Rs/HHs)	Expense by sources (% of total expense)							
		Food	Utilities	Education	Health	Agriculture inputs & equipment	Assets purchase	Social/ festival	Irrigation
Overall	160,009	20.5	32.2	16.2	7.1	11.7	2.5	8.4	1.4
Irrigation facility									
Surface (< 1000 ha)	181,944	16.9	33.1	18.2	9.2	10.8	2.1	9.1	0.6
Surface (> 1000 ha)	188,791	18.2	24.8	20.1	4.7	20.5	2.2	7.8	1.8
Deep tube well	150,328	29.0	43.1	8.0	4.1	2.7	5.0	6.6	1.4
Shallow tube well	113,613	21.6	26.5	12.8	7.8	18.0	0.9	6.2	6.2
Rain fed	97,931	30.4	33.1	12.3	7.0	2.9	2.0	11.4	0.8
Land holding size									
Less than 0.5 ha	136,550	29.0	33.7	11.5	7.3	5.4	2.3	9.7	1.1
0.5 to 1 ha	104,081	24.0	31.9	12.3	7.3	8.6	4.1	10.2	1.5
1 to 2 ha	128,040	21.4	25.2	20.7	5.9	13.6	2.7	9.1	1.5
2 to 5 ha	245,798	12.4	17.9	29.0	8.2	20.5	2.7	6.8	2.5
Above 5 ha	430,612	11.7	44.6	14.2	6.5	15.3	1.0	5.7	0.9

Large majority of farmers (85.5%) felt that their income is sufficient to meet household expenses varying from cent percent among very large farmers to 82.1% among small farmers. Of 15 farmers, who reported problems on meeting households, 7 farmers (46.6%) have been taken loan from friend/relatives, followed by loan from cooperative (6 farmers or 40.0%), sale of livestock (26.7%), sale and mortgage of property (20% each). Of 15 farmers, 5 faced problems this year only, 7 are facing continuously while 3 faced for last year only. **Table M3, and M 4** presents perception of farmers about managing their income and expenditure.

2.14.3 Poverty

Poor and non-poor definition is taken on the basis of poverty line definition of the National Living Standard Survey (NLSS) III 2010/11. NLSS III estimated the poverty line of the country at NRs 19,261 using the cost of basic need methods. Likewise, this study estimated the poverty line for 2012/13 based on poverty line definition of NLSS III adjusted based on

inflation (Consumer price index). The poverty line increased based on ratio of increment of Consumer price index. The new poverty lone for 2012/13 is NRs 22473. Households with per capita income less than NRs 22,473 is considered poor whereas HHs with per capita income up to or above NRs 22,473 is considered non-poor.

Table 2.15 presents poverty incidence of surveyed farmers. Of the total farmers more than one third are poor (44.2%) varying from none among large farmer to 53.8% among small farmers. Likewise, poverty incidence is high among rain fed farmers (75.0%) while lowest among shallow tube well farmers (25.0%). However, this poverty does not take account of food sufficiency from own farm production. If food sufficiency from own farm production is taken, none of the farmers will be poor.

Table 2.17: Poverty incidence among respondent categories

		Poor		Non-Poor		Total	
		No.	%	No.	%	No.	%
Irrigation System	Surface (< 1000 ha)	24	50.0	24	50.0	48	100.0
	Surface (> 1000 ha)	8	33.3	16	66.7	24	100.0
	Deep tube well	6	30.0	14	70.0	20	100.0
	Shallow tube well	3	25.0	9	75.0	12	100.0
	Rain fed	12	75.0	4	25.0	16	100.0
Land Area	Less than 0.5 ha.	18	46.2	21	53.8	39	100.0
	0.5 to 1 ha.	21	53.8	18	46.2	39	100.0
	1 to 2 ha.	10	50.0	10	50.0	20	100.0
	2 to 5 ha.	4	33.3	8	66.7	12	100.0
	Above 5 ha.			10	100.0	10	100.0
Overall		53	44.2	67	55.8	120	100.0

2.15 Institutional Affiliations/Membership

Apart from irrigation or water user group, farmers are having membership on other community development groups such as agriculture/farmer group, saving and credit group, cooperatives, forests user groups, women groups, drinking water groups etc. Of the total farmers survey, majority of farmers (40.9%) have membership on cooperatives (saving/credit & commodity specific) followed by farmer groups (25.0%), forest user group (23.3%), women groups (18.3%), drinking and water user group (15.8%) etc. Involvement of male members is high on these groups compared to female members. Similar situation observed among composition of executive committee as well. **Table N1 and Table N 1.1** presents affiliations of farmers on different groups. Large farmers reported that they have not been able to derive any benefits obtaining membership on groups. Farmers don't consider access to community resources such as forests, water as benefits. None of them had received any training or support from government line agencies. Nevertheless, farmers felt their access to credit have increased after become members on group. Likewise, social cohesion and leadership capacity have developed after obtaining membership on group.

Very few farmers (4.2%) reported that their group is network of some bigger organizations. Large farmers reported that none of the agencies are building their capacity and providing technical support when needed. Nevertheless, very few farmers have received support from district level NGOs on building capacity and technical knowledge. Nearly one tenth of farmers reported that they have represented in VDC/District/national level meeting varying from 40% among large farmers to 2.6% among marginal and small farmers. This represent poor representation of farmers on VDC/District/national level meeting. Of 120 farmers surveyed, only 2 farmers have received program/support given by Government Agency,

Donor. I/NGOs and PAF. **Table N2, Table N3, Table N4 and Table N5** presents networking and affiliations with the higher groups, representation on meetings and support from programme.

2.16 Gender Issues

Women members of each surveyed farmers were asked about gender division of work among male and female members. Following section briefly describes on gender relation among male and female considering (a) work division (b) assets ownership and (c) decision making. Likewise, women involvement on economic activities were also explored.

2.16.1 Gender division of labor

Women respondent are asked to identify about who perform following activities related to households and agriculture. Table 2.18 presents gender division of labor. Major work performed by women includes water collection, collection of firewood & fodder, food cooking, care of elderly aged & children, cleaning/washing clothes, winnowing/cleaning and grinding. Likewise, major worked performed by male includes Livestock caring, Purchase of goods, Land preparation, Seed broadcasting/seeding, Uprooting of seedlings, Manuring, Spraying, Irrigation, Harvesting, Grading and Selling of agri. produces. This reveals that most are mainly involved on productive or economic activities while women are responsible on reproductive or unproductive work. **Table O 1 and Table O 1.1** presents gender division of labor by respondent categories.

Table 2.18: Gender division of labor

	Male		Female		Total	
	No.	%	No.	%	No.	%
Water collection	3	2.5	117	97.5	120	100.0
Collection of firewood & fodder	28	23.3	92	76.7	120	100.0
Food cooking	1	0.8	119	99.2	120	100.0
Care of elderly aged & children	12	10.0	108	90.0	120	100.0
Livestock caring	67	55.8	53	44.2	120	100.0
Purchase of goods	94	78.3	26	21.7	120	100.0
Cleaning/washing clothes	11	9.2	109	90.8	120	100.0
Land preparation	115	95.8	5	4.2	120	100.0
Seed broadcasting/seeding	112	93.3	8	6.7	120	100.0
Uprooting of seedlings	101	84.2	19	15.8	120	100.0
Weeding	86	71.7	34	28.3	120	100.0
Manuring	113	94.2	7	5.8	120	100.0
Spraying	117	97.5	3	2.5	120	100.0
Irrigation	113	94.2	7	5.8	120	100.0
Harvesting	89	74.2	31	25.8	120	100.0
Threshing	88	73.3	32	26.7	120	100.0
Winnowing/cleaning	29	24.2	91	75.8	120	100.0
Grading	68	56.7	52	43.3	120	100.0
Storing	73	60.8	47	39.2	120	100.0
Grinding	29	24.2	91	75.8	120	100.0
Selling of agri. produces	101	84.2	19	15.8	120	100.0

2.16.2 Involvement on economic activities

Of the 120 women surveyed, only 4 each of women reported that they are involved on other income generation activities and employed in any of government, and Non-government

organization. The women are mostly working as school teacher on village level schools, who reported of being employed. This reveals poor economic empowerment of women. **Table O 2 and Table O3** presents involvement of women on economic activities.

2.16.3 Ownership of assets

Large majority of women felt that man own or have control over most of the household assets or belongings. Majority of women felt that assets such as land, house, cash, cash in Bank, machinery/vehicle are owned by men, while ornaments is owned by female. Majority of women felt that ownership of livestock lies with both. This reveals that women have less ownership of household assets or property. **Table O 4 and Table O 4.1** presents ownership of assets by respondent categories.

Table 2.19: Ownership of assets

	Male		Female		Both		Total	
	No.	%	No.	%	No.	%	No.	%
Land	74	61.7	6	5.0	40	33.3	120	100.0
House	83	69.2	13	10.8	24	20.0	120	100.0
Cash	72	60.0	5	4.2	43	35.8	120	100.0
Livestock	45	37.5	13	10.8	62	51.7	120	100.0
Cash in Bank	65	54.2	12	10.0	43	35.8	120	100.0
Ornaments	6	5.0	74	61.7	40	33.3	120	100.0
Machinery/vehicle	101	84.2	7	5.8	12	10.0	120	100.0

2.16.4 Decision making

Women are also ask who make decisions on following related activities. Male took decisions on Crop/Seed selection, Labor mobilization, Sale of Agri./livestock produce, Sale of land house, taking loan while decisions related to Education, health service, family planning, ornament purchase and sale, foreign employment, religious activities and social work are taken jointly. **Table O 5 and Table O 5.1** presents decision making on household activities.

Table 2.20: Decision making on household activities

	Male		Female		Both/Jointly		Total	
	No.	%	No.	%	No.	%	No.	%
Crop/Seed selection	70	58.3	4	3.3	46	38.3	120	100.0
Labor mobilization	94	78.3	3	2.5	23	19.2	120	100.0
Sale of Agri./livestock produce	75	62.5	3	2.5	42	35.0	120	100.0
Sale of land house	61	50.8	2	1.7	57	47.5	120	100.0
Taking loan	60	50.0	3	2.5	57	47.5	120	100.0
Education	17	14.2	4	3.3	99	82.5	120	100.0
Health service	4	3.3	4	3.3	112	93.3	120	100.0
Family planning	8	6.7	45	37.5	67	55.8	120	100.0
Ornament purchase & sale	12	10.0	18	15.0	90	75.0	120	100.0
Foreign employment	43	35.8	3	2.5	74	61.7	120	100.0
Religious activities			7	5.8	113	94.2	120	100.0
Social works	2	1.7	4	3.3	114	95.0	120	100.0

3. SUMMARY AND CONCLUSIONS

- Farming remain main source of livelihoods. However, migration in search of work is high. Nearly one tenth of people have migrated outside village for work. This may result on shortage of agriculture labor for farming.
- All the survey households have own land. Renting of land is not much common. Very few farmers have rented in land while only one farmer has rented out land. Tenant generally share half of their crop production, especially paddy with land owner. Large land holding size, presence of irrigation facility and migration of young people is main reasons for less renting of land.
- Farmers have different households assets such as houses, land, agriculture equipments, livestock, household assets and fishery pond. Majority of farmers have own houses and mostly living on semi-permanent houses (tile roof). However, each farmers own more than one houses. Large farmers relatively own more houses compared to marginal farmers.
- Agriculture mechanization started but very limited. Large populations are still dependent on human labor and small farm equipment for farming. Very few households have different type of agriculture equipments. Sprayer and tractors are most common assets which few farmers possessed. Very few farmers have thresher and harvester.
- Livestock rearing is integral part of farming. Majority of farmers are keeping cattle, buffalo and goat. However, average number of livestock is very less. Likewise, production and sale of livestock produce is very less. Farmers are generally keeping local breeds. Farmers are keeping livestock to supplement household income, green manure and draught power.
- Despite of high access to irrigation, cropped area and cropping intensity is less. Large proportion of land on winter and spring remains fallow. Nevertheless, cropping intensity at present is 162.2% varying from 205% on shallow tube well area to 144.8% on surface area (>1000 ha). Likewise, cropping intensity of marginal farmers is relatively high (195.6%) compared to large and very large farmers. Cropping intensity goes on decreasing as farm size increase. This is mainly because of shortage of labor and poor availability of water for irrigation. Likewise, cropping intensity on shallow tube well is high which is because of easy availability of water and under direct control of farmer.
- Farmers are still dependent on cereals based production and commercialization of agriculture is limited. Large majority of farmers are cultivating paddy, maize and wheat. These three commodities almost cover nine tenth of cropped area. Nevertheless, high value crops such as vegetables, lentils, oilseeds and sugarcane are also cultivation. Scale of production or area under high value crops is very less. Farmers are cultivating to supplement household income. This situation remain similar irrespective of land size and irrigation facilities.
- Farmers are growing different crops, however farming is still subsistence. Average yield of crops on irrigated area is relatively better compared to rain fed area. However, there is no mark able differences on productivity by land size. Productivity of agriculture crops is very low when compared with irrigation facility or with national/district average for most of the commodities. This is mainly because of poor availability of production inputs including irrigation and shortage of labor. The study found that contribution to irrigation, especially surface irrigation is very is limited on improving productivity of crops. Nevertheless, productivity of crops is relatively higher on farmers who have access to irrigation facility.

- Large proportion of farmers are selling their produce to market. More than half of the total produce are traded on market, which vary by type of commodities. Value of sale of high value crops is higher among large and very large farmers.
- Very few farmers are facing problems of food insecurity from own farm production. They are adopting different strategies to cope with food scarcity, such as wage earning, sale of livestock produce, remittances etc to. Large majority of farmers are consuming milk, egg and meat. Majority of farmers felt that their food security situation have remained similar while nearly one fourth reported on improvement or deterioration of food security. Increase on production, remittances, employment opportunities, livestock farming, diversification of income sources/less dependent on farming, use of modern technology/improved seeds are major reasons for improvement on food security situation. Poor irrigation, pest and diseases problem, less production, high cost of cultivation and inadequate supply of production inputs are main reasons for increasing food insecurity.
- Production inputs such as seeds, fertilizers and plant protection materials are not available timely. Likewise it is of poor quality and inadequate. Farmers are dependent on Indian traders or agro-vets for most of the production inputs. Labor shortage problems is also high during main farming season such as planting and harvesting.
- Functioning of surface irrigation is poor while that of ground water is relatively better. Farmers faced water scarcity problems mainly because of poor water management and poor conditions of canal. Farmers faced acute water shortage from February to June.
- Institutional, capacity building and technical support from irrigation office is poor. Majority of farmers are not aware of office location. Likewise very few farmers have visited irrigation office. Almost all farmers complained about less support. Poor performance can be attributed to poor capacity building efforts as well.
- Performance of water user association/group is poor. Farmers are less aware about rules and functioning. Though majority of farmers are satisfied with functioning, however payment of irrigation service is very limited. Likewise, payment amount is very less and inadequate to sustain and maintain irrigation system.
- Very few farmers are conducting soil test and applying necessary measures for improving fertility. Likewise more than one third of farmers observed adverse effect of chemical fertilizers. Intervention need to be designed for improving soil fertility. Apart from this, majority of farmers are less aware of ground water extraction and its adverse effect on soil.
- All farmers are storing their produce, however duration of storage varies by commodities. Farmers generally store produce for self consumption. Farmers are storing agriculture commodities using traditional storage facility such as bamboo basket, sack, earthen and metal bins, etc. Use of modern technologies or facilities for storage is virtually non-existent. Likewise, value addition and processing of agriculture produce is very limited. None of the farmers reported of conducting such practices.
- Majority of farmers are selling their produce. They are mostly selling their produce on village or local level market. This is mainly because of less marketable surplus. Farmers are less concern or aware about marketing problems. They fully rely on traders or middleman to sale their produce. Farmers have less control on price, which is often fixed by middle man/traders. Likewise, farmers are selling immediately after harvest or as and when cash required. There is need for improvement of marketing system

especially focusing on paddy. Storage facility and capacity need to be improved such that farmers can sale their produce when price is high.

- More than half of farmers are taking loan from different sources. The study noted dependency on informal sources such as money lenders & merchants is less. Financial institutions and bank appears as main source of loan followed by cooperative. Interest charged by financial institutions is almost half that of informal sources. However, loan is mostly used for meeting household affairs. Investment on economic activities is less.
- Extension services of government line agencies is very poor. Almost all farmers have not visited ASC/JT. Of those farmers who visited, most of them complained on poor quality and inadequate support services.
- Non-farm sources remain main source of household income. Likewise, farmers are making almost two third of expense on foods and utilities. Farmers felt that their income is adequate to meet household income. Analysis of income and expenditure of farmers show that farmers are having saving from income. They are also investing on households assets and equipments. Likewise, poverty incidence among farmers is also less.
- There are several community development groups which are operating on villages. However, very few farmers have taken membership on those groups. Representation of women is relatively less compared to men. Despite of improving access to community resources, majority of farmers don't recognize or recall benefit of obtaining membership on these groups.
- Women are mostly performing unproductive work, such as cooking, child caring, water collection while most of economic activities are performed by men. Very few women are involved on other economic activities such as enterprise/business operation or employment. Most of the households assets are owned by men. Men are taking major decision related to both farming and household activities. Women are less economically and socially empowered compared to men.

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Sample Survey on
Agricultural Activities, Agriculture Distribution,
Input Supply System and Marketing

FINAL REPORT

June 2013



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Abbreviations and Acronyms

Ag	:	Agriculture
BCH	:	Brahmin Chhetri Hills
BCT	:	Brahmin Chhetri Terai
CDR	:	Central Development Region
CoP	:	Cost of Production
DH	:	Dalit Hills
DT	:	Dalit Terai
DTW	:	Deep Tube Well
EDR	:	Eastern Development Region
Ha	:	Hectare
HH	:	Household
IP	:	Irrigation Project
Irrig	:	Irrigated
IS	:	Irrigation System
JADP	:	Japan Agricultural Development Project
JH	:	Janajati Hill
JICA	:	Japan International Cooperation Agency
JPST	:	JICA Preparatory Survey Team
JT	:	Janajati Terai
M	:	Muslim
Mt	:	Metric Ton
OTC	:	Other Terai Caste
Rs	:	Rupees (Nepali) (The selling rate of 1 US\$ in June 7,2012 was Rs 90.00)
SI	:	Surface Irrigation
STW	:	Shallow Tube Well
Un	:	Unirrigated
VDC	:	Village Development Committee

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1. INTRODUCTION

1.1 Background and Objective

As part of JICA preparatory survey on the agriculture and rural development program in the Terai region, the village surveys were conducted in 12 villages of four target Terai districts namely, Jhapa, Morang, Dhanusa and Mahottari. Of the four districts, first two are located in the Eastern Development Region (EDR) and the last two in the Central Development Region (CDR) (Table 1.1). The overall purpose of JICA preparatory survey is to analyze current situation and critical issues in agriculture and rural development in Terai plains of Nepal and to identify feasible and adequate approaches for the proposed "Integrated Agriculture and Irrigation Strengthening Project".

The main purpose of this village level study is to collect sample data on agricultural activities, agriculture distribution and input supply system and marketing in four target Terai districts.

1.2 Survey Methodology

The survey used qualitative methodology to collect data which included conducting focus group discussions and brainstorming with key informants, village based local leaders, VDC Secretary and government officials. Brainstorming methodology (BSM) is a method to obtain a final mutual and concrete result from independent and personal contributions of the participants through discussions and negotiations.

For selecting candidate villages for this study, before initiating the survey, first sample irrigation schemes were agreed with JICA Preparatory Survey Team (JPST) and their locations in the district and respective village development committees (VDCs) were mapped out. In the second step, villages within the selected VDCs were selected in consultation with the JPST. In the third step, having selected villages within the command area of the selected irrigation schemes, the village level survey team collected sample data on agricultural activities, agriculture distribution and input supply system and marketing as per the terms of reference (TOR) within the broad framework of aforementioned "Preparatory Survey on the Agriculture and Rural Development Program in the Terai Region". Before analysis and preparing this report, data were triangulated to ensure reliability and consistency. Data required by the JPST have been casted into user friendly Nepali questionnaire in order that the field researchers could collect data and information as accurately and reliably as possible. Since irrigation system survey report has provided details on each of the 12 irrigation schemes providing context for this survey, this village level report is focused on collecting the agriculture related data, type of crops grown, impact of irrigation schemes and access to agriculture related services and so forth. Data presented in this report is complimentary to household survey and some data which are not available in the HH survey could be extracted from this report.

1.3 Survey Sites

As stated earlier, the survey was carried out in 12 villages. These villages were selected to represent command areas of three major irrigation schemes/systems namely surface irrigation (SI), deep tube well (DTW) and Shallow Tube Well (STW) in four Terai districts namely, -Jhapa, Morang, Dhanusha and Mahottari as shown below in Table 1 (Map 1.1).

Map 1.1: Map of Nepal showing study districts and study villages

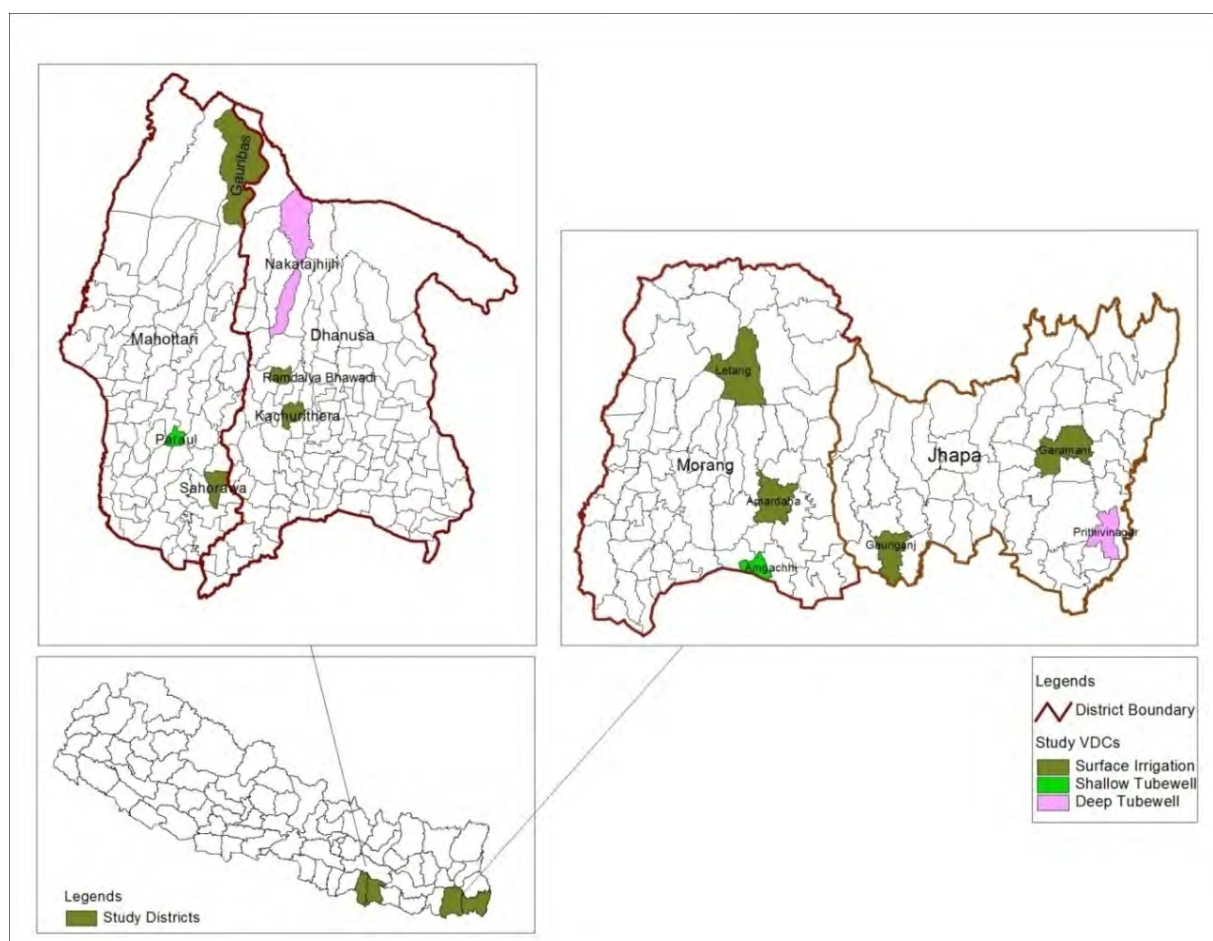


Table 1.1: Survey village by study irrigation schemes

SN	Name of the study village	Location of study village		Study Irrigation scheme
		District	VDC	
1	Ghalechowk Bichline	Jhapa	Prithivinagar	DTW, Prithivinagar-Maheshpur Jal Water Users Committee
2	Telgani	Jhapa	Gauriganj	Surface, Lower Kishni Khola Irrigation Project (IP)
3	Meena Chowk	Jhapa	Garamani	Surface, Bhuteni Sainik Water Users Committee
4	Musahari tole	Morang	Amgachhi	STW, Sansarimai Water Users Committee
5	Kamini Khadi	Morang	Amardaha	Surface, Musahar Ghatta Paini IP
6	Dhobi	Morang	Letang	Surface, Ke.Vo. Le. Na. Irrigation Project
7	Nakatajhijh	Dhanusha	Nakatajhijh	DTW, Nakatajhijh tubewell Water Management Committee,
8	Thera	Dhanusha	Kachurithera	Surface, Hardinath Irrigation West Canal
9	Ramaidaiya Bhawadi	Dhanusha	Ramaidaiya Bhawadi	Surface, Jalad Irrigation Water Users Organization
10	Kuhi Tole	Mahottari	Paraul	STW, Sanakistan Water Users Committee
11	Kalapani	Mahottari	Gauribas	Surface Kalapani Irrigation Water Users Group, Gauribas
12	Hardiya	Mahottari	Sahorawa	Surface, Shree Bigahi Irrigation Water Users Organization

Note: Location of VDCs of study village and irrigation scheme may differ in case of surface irrigation since it may cover more than one VDCs.

Since other details regarding the irrigation schemes/systems have been provided in separate report, Table 1.2 below shows overall status and year of system's operation (completion year) of the 12 irrigation schemes providing context for the village level study. The purpose is to set the context for this survey and to assess the extent of the integration between agriculture and irrigation in the study villages. It is needless here to emphasize that irrigation is important to agriculture in Nepal, not because rainfall is low¹, but because it is poorly distributed in time and particularly not adequate during winter and summer.

Table 1.2: Access of survey villages to the study irrigation schemes/systems

S N	Irrigation System	Type of Scheme	VDC	District	Completed year	Current Status	Access to survey village
1	Prithivinagar-Maheshpur Jal Management Committee	Ground water (DTW)	Prithivinagar	Jhapa	2011	Very Poor	High
2	Lower Kishni Khola Irrigation Project (IP)	Surface	Gauriganj	Jhapa	2002	Poor	Low
3	Bhuteni Sainik khola IP	Surface	Garamani	Jhapa	1975	Poor	Low
4	Sansarimai Water Users Committee	Ground water (STW)	Amgachhi	Morang	2011	Very poor	High
5	Musaharghatta IP	Surface	Amardaha	Morang	1995	Poor	Low
6	Ke.Vo. Le. Na. IP	Surface	Letang	Morang	2012	Poor	Medium
7	Nakatajhijh tubewell Water Management Committee,	Ground water (DTW)	Nakatajhijh	Dhanusha	1988	Poor	High
8	Hardinath Irrigation West Canal IP	Surface	Harsar Banimiya	Dhanusha	1967	Poor	Low
9	Jalad IP	Ground water (DTW)	Ramaidaiya Bhawadi	Dhanusha	2010	Very poor	Medium
10	Sanakisan Water Users Committee	Surface	Paraul	Mahottari	2009	Poor	High
11	Kalapani IP	Surface	Gauribas	Mahottari	2011	Poor	Medium (Conflict with DW Project in Bardibas)
12	Bighi IP	Mahadaiya	Sahorawa	Mahottari	1993	Very poor	Low (Polluted)

Note: Location of VDCs of study village and irrigation scheme may differ in case of surface irrigation since it may cover more than one VDCs.

1.4 Organization of the Report

The report is organized into the following nine sections as follows. The first section is introductory. The second section provides socio-economic overview of the survey villages. Third section depicts agricultural activities in the survey villages. Fourth section presents cost of cultivation. Fifth chapter is about storage facilities. Sixth chapter describes marketing practices. Seventh chapter presents processing of agricultural products in survey villages. Eighth chapter is about the agricultural service delivery services available in the survey villages. Finally, the ninth chapter summarizes key findings, draws conclusions and provides recommendations.

¹ In Nepal, rain is heavily concentrated in the monsoon season between June and September

2. SOCIO-ECONOMIC OVERVIEW OF SURVEY VILLAGES

Table 2.1 below presents socio-economic overview of the survey villages. This includes area occupied by the village, number of households (HHs), ethnic composition, key livelihood related activities and source of key cash income.

Table 2.1: Survey villages-Socio-economic conditions

SN	Name of the village	IS	Total Area (Ha)	HHs	Av arable land (Ha) per HH	Dominant ethnic groups (Descending Order)	Major livelihood activities (Three)	Key cash income source
1	Jhapa							
1	Ghalechowk Bichline	DTW	15	28	0.35	JHs, BCH	Rem, Wage Farming	Remitt
2	Telgani	SI	330	300	1.06	BCH, JH, JT	Farming, Wage Rem,	Ag Rem
3	Meena Chowk	SI	24	35	0.62	JH,BCH,JT	Farming, Wage	Ag, wage
2	Morang							
4	Musahari tole	STW	53	58	0.89	DT, JT	Farming Wage Rem	Ag Wage
5	Kamini Khadi	SI	20	35	0.47	JH, BCH, JT	Farming Service Rem	Ag Rem
6	Dhobi	SI	39	65	0.57	JH, BCH,DH	Farming Wage Rem	Ag Liv Serv
3	Dhanusa							
7	Nakatajhijh	DTW	1800	1900	0.91	OTC,JT, DT	Farming, Service Rem	Ag Rem
8	Thera	SI	70	75	0.64	OTC, JT,DT	Farming, Wage, Livestock	Ag Wage Rem
9	Ramaidaiya Bhawadi	SI	330	400	0.65	OTC, DT, M	Farming Wage Business	Ag Wage Rem
4	Mahottari							
10	Kuhi Tole	STW	150	175	0.80	JT,OTC,DT	Farming Wage Rem	Ag Rem
11	Kalapani	SI	339	199	0.93	BCH, JH, DT	Farming Liv Wage	Rem Ag
12	Hardiya	SI	200	300	0.63	OTC,DT, BCT	Farming Rem Liv	Ag Ser Rem

Note: JH- Janajati Hill, BCH-Brahmin Chhetri Hills, DH- Dalit Hills, JT-Janajati Terai, JT-Janajati Terai, OTC-Other Terai Caste, BCT-Brahmin Chhetri Terai, DT, Dalit Terai, M-Muslim
Rem: Remittances; Ser: Service; Liv: Livestock

As seen in Table 2.1 above, the survey villages were very heterogeneous in terms of characteristics such as key occupation, ethnic composition and facilities while, in terms of geographical situation, these villages were almost homogenous- situated in Terai region. Average landholding size ranged from 0.47 to 1.06 Ha per HHs. Of 12 survey villages,

Naktajhijh was very large with almost 1800 Ha. This village included 7 wards. On the other, the smallest village was Kamini Khadi of Amardaha VDC in Morang district. According to local people, it has approximately 20 Ha of land. However, the size of the village may not precisely correspond with the data given in above table. It should be emphasized here that data in the above table were collected through focus group discussions (qualitative) and data source was the key informants. Nevertheless, the survey revealed that dominant ethnic/caste groups vary by villages. Galelchowk Bichline village of Jhapa district (DTW village) was comprised of all hilly people migrated from neighboring Illam and Panchthar districts. On the other Kuhl Tole of Mahottari district comprised of Terai caste people only. In terms of average arable land per HHs, Kamini Khadi people reported to have smallest land holding size (0.47 Ha/HH) with highest among Telgani village (1.06 Ha).

Farming is the key occupation of all survey VDCs and constituted one of the major livelihood strategy. As seen from the data in the above table, the importance of agriculture has not decreased as some would expect. Yet, remittance is competing with farming for key cash income source. Of 12 villages, FGD participants in Galelchowk Bichline and Hardiya reported remittance as one the major cash income source. Having provided overview of the study villages, the following sections present agriculture related information as narrated by FGD participants from 12 survey villages. Table 2.2 below shows cultivated land by irrigation status in the survey villages.

Table 2.2: Irrigation status in the survey villages

SN	Name of the village	IS	Total Land Area (Ha)	Arable	Irrigable Khet	Un-irrigable Khet	Remark
1	Ghalechowk Bichline	DTW	15	10.7	2.8	7.2	Utilization of irrigation facility almost none
2	Telgani	SI	330	319	220	99	
3	Meena Chowk	SI	24	21.6	21.6	-	
4	Musahari tole	STW	53	51.4	41.7	9.7	
5	Kamini Khadi	SI	20	16.6	10	6.6	
6	Dhobi	SI	39	36.9	33.6	3.3	
7	Nakatajhijh	DTW	1800	1728	432	1296	
8	Thera	SI	70	48.1	16.1	32	
9	Ramaidaiya Bhawadi	SI	330	260	260	-	
10	Kuhl Tole	STW	150	139.5	37.5	102	
11	Kalapani	SI	339	185.7	101	84.7	
12	Hardiya	SI	200	190	190	-	

Above table shows the proportion of unirrigable lowland still high in Nakatajhijh, Tlagani and Kalapani villages. Their dependency on rainfall is high.

3. AGRICULTURAL ACTIVITIES

This section depicts agricultural activities of the farmers in the survey villages. Data and information provided by key informants during FGDs have been disaggregated by crops and irrigation status in order to understand the contribution of irrigation to the agricultural production and trace the changes in the cropping practices over the last five years. Key cropping patterns reported in the survey villages include the following: (a) Rice-Wheat; (b) Rice-Maize; (c) Rice-Wheat-Early Rice; (d) Rice-Potato-Maize; (e) Rice-Jute; (f) Rice-Oilseeds-Rice

3.1 Cereal Crops

3.1.1 Rice

Main rice: Rice has special position in Nepal's agriculture. It covers about 46 percent of the total cultivated area producing around 56 percent of total cereal outputs. Consistent with national scenario, all survey villages reported to have been growing main rice in both irrigated and unirrigated areas. Irrigated area, according to farmers, refers to those land area which has access to irrigation facilities but it may be fully or partially irrigated and year round or seasonal. On the other, unirrigated refers to those rainfed low land area which is suitable for rice growing but no access to any kinds of irrigation facilities. Table 3.1 below shows rice area in 12 villages over the last five years.

Table 3.1: Main rice area (Ha) in survey villages

SN	Name of the village	IS	2008		2009		2010		2011		2012	
			Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un
1	Ghalechowk Bichline	DTW	1.7	5.7	1.7	5.7	1.7	5.7	1.7	5.7	1.7	5.7
2	Telgani	SI	233	83	233	83	233	83	233	83	233	83
3	Meena Chowk	SI	21		21		21		21		21	
4	Musahari tole	STW	42	10	42	10	42	10	42	10	42	10
5	Kamini Khadi	SI	10	7	10	7	10	7	10	7	10	7
6	Dhobi	SI	33	3	33	3	33	3	33	3	33	3
7	Nakatajhijh	DTW	700	400	700	500	800	500	900	600	900	600
8	Thera	SI	400	950	400	700	400	800	400	600	400	350
9	Ramaidaiya Bhawadi	SI	267		267		267		267		267	
10	Kuhi Tole	STW	27	73	27	73	27	73	27	73	27	73
11	Kalapani	SI	193		193		195		195		195	
12	Hardiya	SI	190		190		190		190		190	

Note: Irrig: Irrigated; Un: unirrigated

Data and information presented in above table show that there has been no change in rice area over the last five years in all survey villages except Thera and Nakatajhijh where the key informants reported that the area has been changing every year subject to the rainfall condition. This suggests that the dependency of rainfall to Nepal's agriculture is high. Although the above table show that there has been no change in the areas of unirrigated rice in survey villages, many FGD participants reported to have kept a piece of their rice land either fallow or abandoned a part of rice transplanted areas without harvesting due to the shortage of water. In other areas, number of HHs and rice area was so small that the effect was not reported. Therefore, it was difficult to account actual yearly changes in area.

As seen in the Table 3.2 below, productivity of rice in irrigated area is high in all the survey villages by almost double although the FGD respondents reported some decline in the productivity of rice in unirrigated areas year by year subject to the rainfall condition. This change was explicitly noted in Musahari tole of Morang district where the productivity was reported almost constant in irrigated area due to STW facility but fluctuating in unirrigated areas.

Table 3.2: Productivity of rice (Mt/Ha) in survey villages over the last 5 years

SN	Name of the village	IS	2008		2009		2010		2011		2012	
			Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un
1	Ghalechowk Bichline	DTW	3.6	1.8	3.6	1.8	3.6	1.8	3.6	1.8	3.6	1.8
2	Telgani	SI	3.6	2.1	3.6	2.1	3.6	2.1	3.6	2.1	3.6	2.1
3	Meena Chowk	SI	3		3		3		3		3	
4	Musahari tole	STW	3.2	2.1	3.2	1.8	3.2	1.6	3.2	1.6	3.2	1.4
5	Kamini Khadi	SI	3	2	3	2	3	2	3	2	3	2
6	Dhobi	SI	3.6	2.6	3.6	2.6	3.6	2.6	3.6	2.6	3	2.6
7	Nakatajhijh	DTW	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2
8	Thera	SI	3	2	3	2	3	2	3	2	3	2
9	Ramaidaiya Bhawadi	SI	2.6		2.6		2.2		2.2		2.2	
10	Kuhi Tole	STW	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
11	Kalapani	SI	3.0		3.0		3.0		3.0		3.0	
12	Hardiya	SI	3.0		3.0		3.0		3.0		3.0	

Early rice: Of 8 villages with SI facilities, 5 villages namely Telgani, Meena Chowk, Kalapani, Musahari and Hardiya reported to have been growing early rice over the last 5 years, for which timely access to irrigation is crucial. However, among villages with ground water facilities, surprisingly, only one STW village (Musahari Tole of Morang district) reported to have grown early rice. Average productivity of early rice, as reported in FGDs, is 3.56 Mt/Ha. Nevertheless, average yield reported by Musahari Tole (STW) was the highest (4.8 Mt/Ha) followed by Kalapani, Meena Chowk and Tegani. Early rice is grown during March to June. All HHs do not grow early rice. This is subject to the secured irrigation facilities and quality of land. When asked why early rice is not grown in DTW villages despite of access to better water source with timely different FGD participants had different reasons, which include (a) high cost in using electricity (b) non-availability of electricity due to extremely high load shedding (c) shortage of labour and (d) lack of technical knowhow (technical knowledge and skills). A few farmers even reported of not received a high price for their products.

With regard to early rice, Thera farmers (users of Hardinath SI) reported that many years ago they used to grow early rice. However, they have now forgotten it due to extreme shortage of water in the system. According to Thera farmers, earlier they had almost monopoly to use Jallad river water throughout the year from Hardinath IP and then many grew early rice. However, the growing early rice has now become a history because other farmers living above the Hardinath Barrage and surrounding water head have constructed already more than 5 irrigation systems, irrespective of availability of water and caring for those who live at tail parts of the system. Table 3.3 below presents early rice situation in the survey villages.

Table 3.3: Early rice status in survey villages

Survey Village	Access to Irrigation	Percentage of irrigated Khet under early rice	Early Rice Area in Ha	Yield Mt per Ha
Telgani	SI	22.7	50.0	3
Meena Chowk	SI	34.0	7.3	3.3
Kalapani	SI	4.0	4.0	4.5
Hardiya	SI	3.6	6.8	2.3
Musahari tole	STW	79.5	33.2	4.8

From the data presented in above table, it can be concluded that the area and productivity of early rice could be increased substantially through ground water irrigation system when farmers' problems are addressed timely Major early rice varieties recommended for eastern and central Terai are Chaite 2, Chaite 4, Chaite 6, Hardinath 1, Hardinath 2. and Tarahara 1.

3.1.2 Maize

Next to rice, the other important cereal crop for Nepalese farmers is maize. It covers about 24 percent of the total arable land in Nepal. Maize is used for food and feed and is also an important cash crop. It can be grown in three seasons, summer, winter and spring season depending on the varieties, duration, land quality and availability of irrigation facilities. Khet land maize is planted in winter or spring in rotation with rice, while Bari land maize is planted in the summer in rotation with mustard or other cash crops. The sowing time for summer season maize is April-May, winter maize is December-January and spring maize is February-March. Irrigation is important for spring and winter maize as it is grown in low land area during dry months. Fertilizers and to a lesser extent hybrid maize seeds are used.

Summer Maize: Of 12 villages, four villages reported to have been growing summer maize but the area is almost constant suggesting little crop diversification happening even after provision of irrigation facility (Table 3.4). Farmers' efforts to diversify crops and undertake commercial agriculture using recently acquired irrigation facility is found weak, as illustrated by DTW facility developed in Ghalechowk Bichline, Jhapa district (see Box 1 below).

Table 3.4: Area (Ha) under summer maize in survey villages

SN	Name of the village	IS	2008		2009		2010		2011		2012		Remark
			Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	
1.1	Ghalechowk Bichline	DTW	1.2	5.6	1.2	5.6	1.2	5.6	1.2	5.6	1.2	5.6	No change
1.2	Telgani	SI	4	4	4	4	4	4	4	4	4	4	No change
1.3	Meena Chowk	SI	10		10		10		10		10		No change
2.1	Kamini Khadi	SI	2		2		2		2		2		No change

Major varieties of maize used in the survey areas include Rampur Composite, Rampur 2, Arun 3 and hybrid maize varieties illicitly imported from India (cross border trade and not registered as per the Seed Act of the Government of Nepal)

Box 1: Area coverage by a Deep Tubewell in Prithibinagar-Maheshpur, Jhapa?

In 1997, the Division Irrigation Office initiated to upgrade an existing artisan in Prithibinagar VDC of Jhapa district by installing a deep tube well in it. The improved system was supposed to provide irrigation facilities also to the residents of ward 1 Maheshpur VDC. An user committee was then formed. Key informant sources say that most of the committee members were not the water users but local contractors and others who would not benefit from the facility in any way after its completion. Perhaps, this could be one of the reasons why the system remains still incomplete today. However, local people claimed that they had given their contribution in cash and voluntary labour as sought by the office which includes the contribution of Maheshpur VDC residents as well. After almost 14 years, the system is nearly complete with the construction of physical structure such as water tank, pump installation and electricity provision. Meter reading house and pump house has also been complete. The pump gets electricity from 11 KVA line and TOD Meter has also been installed. However, at present, the survey found only seven people virtually using the system for about 1.5 Ha land through earlier artisan, and not the electricity. For this, they pay annual irrigation charge @ Rs 200 per Katha per year (Rs.6000 per Ha). Apart from seven people, other three also use DTW water for irrigation purpose but very little unless they have no other alternatives for two reasons (a) electricity tariff is too high compared to the STW and (b) they do not get the service when they need it due to electric load shedding. Therefore, the system which was supposed to provide irrigation facilities to 40 Ha of land is currently providing service to less than 2 Ha when artisan component is included. During FGD, many reported that most of the people in the areas have already installed their own private STWs. Yet they many others still could use the DTW provided that the electric tariff compares to the electric tariff. The current water user committee is composed of actual water users but they are more concerned with existing high electricity tariff which, according to them, has happened simply because the system was registered for industrial purpose. On the other, the committee has done little towards making efforts to extend the delivery pipes and provide irrigation facilities to targeted 150HHs with command area of 40 Ha.

Source: FGD

Data presented below in Table 3.5 shows productivity of summer maize in those villages reporting to have grown summer maize has decreased or remained constant over the last five years. As seen in this table, productivity of maize in unirrigated area has been declining in Ghalechowk Bichline, although villages reported no change. Yet the productivity is quite low beyond to the potentiality. Even under rainfed condition, farmers could increase productivity of summer maize substantially through adoption of packages of technologies which include good quality and reliable seeds, fertilizers and pesticides. Nevertheless, the productivity of maize in irrigated land is either declining as seen in Ghalechowk Bichline and Kamini Khadi or stagnating as reported in Telgani and Meena Chowk. Apart from the yield reported is lower to the potentiality. This further suggests the need not only for improving irrigation facilities but also simultaneous focus on strengthened coordination between agriculture and irrigation.

Table 3.5: Productivity (Mt/Ha) of summer maize over the Last 5 years in survey villages

S N	Name of the village	IS	2008		2009		2010		2011		2012	
			Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un
1	Ghalechowk Bichline	DTW	3.6	1.2	3.6	1.2	3	1.2	3	1.2	3	1.2
2	Telgani	SI	3	1	3	1	3	1	3	1	3	1
3	Meena Chowk	SI	2		2		2		2		2	
4	Kamini Khadi	SI	4.8		3.6		3.0		2.4		2.4	

Spring and winter Maize: Except Kalapani, SI command area, none of the survey villages reported to have cultivated spring maize which suggests that the majority of the farmers have not been utilizing available irrigation facilities adequately. Discussions with key respondents revealed that the spring maize is grown in more than 80% of the total irrigated area (approx. 83 Ha) in Kalapani. Average yield of maize in irrigated area is 3.1 Mt per Ha and that of unirrigated area is 2.1 Ha. Similarly, key respondents did not perceive any change in productivity over the last 5 years. With respect to winter maize none of the survey villages reported on winter maize cultivation in any survey villages.

3.1.3 Wheat

Table 3.6 and 3.7 present area and productivity of wheat crops respectively in the survey villages over the last 5 years

Table 3.6: Area under wheat (Ha) in survey villages

SN	Name of the village	IS	Arable land (Ha)	2008		2009		2010		2011		2012	
				Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un
1	Ghalechowk Bichline	DTW	2.8	-								0.03	
2	Telgani	SI	220	20		14.6		11.3		8		4	
3	Meena Chowk	SI	21.6	2		2		1		1		0.2	
4	Musahari Tole	STW	41.7	7		7		7		7		7	
5	Kamini Khadi	SI	10	2		2		2		2		2	
6	Dhobi	SI	33.6	13	1	13	1	13	1	13	1	13	1
7	Nakatajhijh	DTW	432	250		250		250		300		300	
8	Thera	SI	16.1	6		6		6		6		4	
9	Ramaidaiya Bhawadi	SI	260	67		67		67		67		67	
10	Kuhi Tole	STW	37.5	13	10	13		13		13		13	
11	Kalapani	SI	101	60		60		60		66.7		66.7	
12	Hardiya	SI	190	47		47		47		47		47	

Data in the above Table show that in 2012, all survey villages reported to have grown wheat. But area under wheat proportionate to irrigated land varied by villages with highest in Nakatajhijh (69.4%), a DTW village, followed by Dhobi (38.7%), Thera (37.3) and Kuhi Tole (34.7%), and almost none (about 1%) in Ghalechowk Bichline, a DTW village as well.

Table 3.7: Productivity (Mt/Ha) of wheat in survey villages

SN	Name of the village	IS	2008		2009		2010		2011		2012		Remark
			Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	Irrig	Un	
1	Ghalechowk Bichline	DTW									1.8		No substantial change
2	Telgani	SI	1.8		1.6		1.8		1.8		1.8		No change
3	Meena Chowk	SI	3		2		2		2		2		Declining
4	Musahari tole	STW	1.1		1.1		1.1		1.1		1.1		
5	Kamini Khadi	SI	1.8		1.5		1		1		1		Declining and low
6	Dhobi	SI	2.4	1.6	2.4	1.6	2.4	1.6	2.4	1.6	2.4	1.6	No change
7	Nakatajhijh	DTW	1.8		1.8		1.8		1.8		1.8		
8	Thera	SI	1.8		2.0		2.0		1.8		1.8		
9	Ramaidaiya Bhawadi	SI	1.6		1.6		1.6		1.6		1.6		
10	Kuhi Tole	STW	1.4		1.4		1.4		1.4		1.4		
11	Kalapani	SI	1.8		1.8		1.8		1.8		1.8		
12	Hardiya	SI	2.0		2.0		2.0		2.0		1.0		

On the other, the two STW villages, Musahari Tole and Kuhi Tole reported to have grown wheat. None of the villages, except Dhobi and Kuhi reported to have grown wheat in unirrigated area. Like area, productivity showed irregular and consistently demonstrating from village to village. As seen from the data below in Table 3.7, the yield of wheat in irrigated area of Dhobi is slightly higher in irrigated area compared to that of non-irrigated area. Generally, the yield of wheat in irrigated area ranged from 1.1 Mt/Ha to 3.0 Mt in 2008 in different survey villages. Likewise, the reported yield ranged between 1.0 Mt/Ha to 2.4 Mt/Ha in 2012 with clear fluctuations. However, both the STW villages, Musahari and Kuhi, reported almost constant yield from 2008 to 2012. Major wheat varieties grown in survey villages include RR21, Nepal 297, Gautam, UP 262 and so forth. However, majority of farmers reported to have been growing improved varieties.

3.2 Vegetables

3.2.1 Summer Vegetables

Of 12 survey villages, 11 villages reported to have grown summer vegetables (lady's finger, squash, beans, tomato etc) since last 5 years. However, no substantial increase in area has been reported over these years despite of improvements in irrigation facilities as seen in Table 3.8.

Table 3.8: Summer vegetable area (Ha) in survey villages

SN	Village	Arable land Area (Ha)		Area (Ha)									
		Irrig	unir	2008		2009		2010		2011		2012	
				Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Ghalechowk Bichline	2.8	7.2	0	0.9	0	0.9	0	0.9	0	0.9	0	0.9
2	Telgani	220	99	0	5.0	0	5.3	0	5.3	0	5.5	0	6.3
3	Meena Chowk	21.6	0	0	2.6	0	2.5	0	3.0	0	2.8	0	2.8
4	Musahari tole	41.7	9.7	2.4	0.5	2.6	1.0	2.6	0.4	3.0	0.5	3.0	0.4
5	Kamini Khadi	10	6.6	0	0	0	0	0	0	0	0	0	0
6	Dhobi	33.6	3.3	0	0	0	0	0	0	0	0	0	0
7	Nakatajhijh	432	1296	18.0	0	15.3	0	15.8	0	15.8	0	16.3	0
8	Thera	16.1	32	3.5	0	3.6	0	3.7	0	5.5	0	5.7	0
9	Ramaidaiya Bhawadi	260	0	7.0	0	8.3	0	8.6	0	8.6	0	8.3	0
10	Kuhi Tole	37.5	102	1.5	0	1.6	0	1.6	0	1.8	0	1.8	0
11	Kalapani	101	84.7	0.8	0	1.0	0	1.0	0	1.0	0	1.0	0
12	Hardiya	190	0	1.5	0	1.6	0	1.6	0	1.6	0	1.6	0

Productivity: The productivity of summer vegetable is low and its productivity in both the irrigated and unirrigated area ranges from 10 to 17 Mt/Ha (Table 3.9).

Table 3.9: Productivity (Mt/Ha) of summer vegetables in survey villages

SN	Village	Productivity (kg/kathha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Ghalechowk Bichline	0	13.9	0	13.9	0	13.9	0	13.9	0	13.9
2	Telgani	0	12.0	0	12.1	0	10.3	0	10.8	0	10.0
3	Meena Chowk	0	19.5	0	18.0	0	17.3	0	15.9	0	13.8
4	Musahari tole	14.19	11.01	12	13.14	12	18	14.01	16.4	14.3	14.19
5	Kamini Khadi	0	0	0	0	0	0	0	0	0.0	0
6	Dhobi	0	0	0	0	0	0	0	0	0.0	0
7	Nakatajhijh	16.68	0	0	20.43	0	20.43	0	19.0	0.0	16.68

SN	Village	Productivity (kg/kathha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
8	Thera	12	0	0	12.87	0	11.28	0	12.4	0.0	12
9	Ramaidaiya Bhawadi	13.56	0	0	12.45	0	14.76	0	14.1	0.0	13.56
10	Kuhi Tole	12	0	0	13.2	0	13.65	0	13.7	0.0	12
11	Kalapani	12.36	0	0	13.8	0	14.1	0	15	0.0	12.36
12	Hardiya	12.36	0	0	13.8	0	14.1	0	15	0.0	12.36

3.2.2 Winter Vegetables

As seen from the table 3.10 below, Ghalechowk Bichline, Nakatajihijh, Thera and Kuhi and Hardiya villages reported to have grown winter vegetables. However, area under the winter vegetables was very small proportionate to the arable land. This applies to Nakatajihij as well. This further suggests farmers' overall reluctance to use DTW and STW irrigation facilities and poor integration of agriculture and irrigation. Crop diversification has not taken place as anticipated.

Table 3.10: Winter vegetable area (Ha) in survey villages

S N	Village	Area (Ha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Ghalechowk Bichline	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0
2	Telgani	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0	0	0	0
7	Nakatajihijh	100	0	100	0	100	0	100	0	100	0
8	Thera	3	0	3	0	3	0	90	0	2.6	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0	0	0	0	0
10	Kuhi Tole	3	0	3	0	3	0	4	0	4	0
11	Kalapani	0	0	0	0	0	0	0	0	0	0
12	Hardiya	11	0	11	0	11	0	11	0	11	0

Productivity: Productivity of winter vegetables ranged between 12 to 13.3 Mt/ha in 2008/09 which increased to 18.7 Mt per ha in 2013. The increase in productivity was noted in Thera village (16.9Mt/Ha) and Kuhi Tole (18.7 Mt/Ha).

Table 3.11: Productivity (Mt/Ha) of winter vegetables in survey villages

SN	Village	Productivity (Mt/Ha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Ghalechowk Bichline	12	0	12	0	12	0	12.0	0	12.0	0
2	Telgani	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0	0	0	0

SN	Village	Productivity (Mt/Ha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
7	Nakatajhijh	12	0	9	0	10.9	0	9.9	0	9.9	0
8	Thera	13.3	0	13.9	0	13.0	0	16.8	0	16.9	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0	0	0	0	0
10	Kuhi Tole	13.3	0	12	0	22.4	0	16.0	0	18.7	0
11	Kalapani	0	0	0	0	0	0	0	0	0	0
12	Hardiya	12	0	12	0	12	0	12	0	12.0	0

3.3 Pulses (Lentil)

Of 12 villages, 2 villages, Musahari tole in Morang and Hardiya from Mahottari reported to have grown lentil pulse. However, as seen Table 3.12 below, area under lentil is too small to make any impact. According to farmers in the survey villages, productivity of lentil has decreased over the last five years in Musahari, notwithstanding with the STW facility and very low productivity in Hardiya.

Table 3.12: Lentil area (Ha) and productivity (kg/ha) in survey villages

SN	Village	Arable		Area (Ha)					Productivity, Kg/Ha				
		Irrig	Unirrig	2008	2009	2010	2011	2012	08	09	10	11	12
1	Ghalechowk Bichline	2.8	7.2	0	0	0	0	0	0	0	0	0	0
2	Telgani	220	99	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	21.6	0	0	0	0	0	0	0	0	0	0	0
4	Musahari tole	41.7	9.7	3	3	3	3	3	1.0	1.0	0.5	0.5	0.5
5	Kamini Khadi	10	6.6	0	0	0	0	0	0	0	0	0	0
6	Dhobi	33.6	3.3	0	0	0	0	0	0	0	0	0	0
7	Nakatajhijh	432	1296	0	0	0	0	0	0	0	0	0	0
8	Thera	16.1	32	0	0	0	0	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	260	0	0	0	0	0	0	0	0	0	0	0
10	Kuhi Tole	37.5	3.4	0	0	0	0	0	0	0	0	0	0
11	Kalapani	101	2.8	0	0	0	0	0	0	0	0	0	0
12	Hardiya	190	0	1.6	1.6	1.6	1.6	1.6	0.4	0.4	0.4	0.4	0.4

3.4 Oil Seeds

3.4.1 Rapeseed mustard

Area and productivity of mustard crop over the last 5 years in survey villages is shown in Table 3.13. As seen in this table, of 12 villages, 4 villages namely, Ghalechowk Bichline, Kamini Khadi Dhobi and Hardiya reported to have grown mustard. However, as seen Table 3.11 below, area under mustard is too small to make any impact. According to farmers in Ghalechowk Bichline, Kamini Khadi and Hardiya, productivity of this crop has decreased over the last five years. But Meena Chowk reported some increase in productivity which may require confirmation from independent source as the present study is based on recall method. It could just provide trend. This study is not an alternative to in-depth socio-economic quantitative survey. The importance of such study does not require over emphasis.

Table 3.13: Area (Ha) and productivity (Mt/Ha) of mustard in survey villages

SN	Village	Arable		Area (Ha)					Productivity (Mt/Ha)				
		Irrig	Unirrig	2008	09	10	11	2012	2008	09	10	11	2012
1	Ghalechowk Bichline	2.8	7.2	0.5	0.5	0.5	0.5	0.5	0.9	0.75	0.75	0.6	0.6
2	Telgani	220	99	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	21.6	0	1	1	1	1	1	1.0	1.2	1.0	1.0	0.87
4	Musahari tole	41.7	9.7	0	0	0	0	0	0	0	0	0	0
5	Kamini Khadi	10	6.6	1.8	1.8	2	1.5	1.5	1.0	1.0	0.9	0.1	1.0
6	Dhobi	33.6	3.3	2	2	2	2	3	1.0	1.0	1.0	1.0	1.0
7	Nakatajhijh	432	1296	0	0	0	0	0	0	0	0	0	0
8	Thera	16.1	32	0	0	0	0	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	260	0	0	0	0	0	0	0	0	0	0	0
10	Kuhi Tole	37.5	3.4	0	0	0	0	0	0	0	0	0	0
11	Kalapani	101	2.8	0	0	0	0	0	0	0	0	0	0
12	Hardiya	190	0	3.0	3.0	3.0	3.0	3.0	1.0	1.1	1.0	1.0	1.0

3.4.2 Sunflowers

None of the survey villages reported to have grown sunflower which is emerging as an important oilseed crop in Nepal with increased awareness of the most of the peoples against high cholesterol content in mustard.

3.5 Industrial Crops

3.5.1 Jute

Of 12 villages, only one Musahari tole reported to have grown jute crop. While area under this crop is substantially large to make impact, productivity is low and remained constant over the last 5 years, between 1.6 and 1.7 Mt per Ha. The reported area under jute is 10 Ha where as total arable area reported in Musahari village was 51.4 Ha.

3.5.2 Sugarcane

Of 12 villages, three villages in Dhanusha district, namely Nakatajhijh, Thera and Ramaidaiya Bhawadi reported to have grown sugarcane crop. While area under this crop in Nakatajhijh has remained constant over the last 5 years, Thera and Ramaidaiya Bhawadi reported to have taken this crop in 2012 only (Table 3.14).

Table 3.14: Cultivated area (Ha) of sugarcane in survey villages

S N	Village	Area (Ha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Nakatajhijh	26.6	33.3	26.6	33.3	26.6	33.3	26.6	33.3	26.6	33.3
2	Thera									3.1	
3	Ramaidaiya Bhawadi									33.3	

Productivity: Like area, productivity of sugarcane has remained almost constant in Nakatajhij, Ramaidaiya Bhawadi reported slightly higher productivity than Nakatajhij and Thera reported lower yield (Table 3.15). Nevertheless, productivity almost compares with the national average.

Table 3.15: Productivity (Mt/Ha) of sugarcane in survey villages

S N	Village	Productivity (Mt/ha)									
		2008		2009		2010		2011		2012	
		Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir	Irrig	unir
1	Nakatajhij	33	28.5	34	28.6	35	29	35	29	34	29
2	Thera									25	
3	Ramaidaiya Bhawadi									36	

3.6 Fruit Crops

Table 3.16 provides area (fruiting) and production of 5 key tropical and sub-tropical fruits in survey villages. These are Mango, Litchi, jackfruit, Guava and Banana. As seen in this table, area under fruit crop is too small to make any impact except for mango in Nakatajhij. Number of fruiting trees in other villages is so small and the productivity is also relatively low compared to the national average. Detail data on area and production by village for different fruit crops are given in Table 3.16.

Table 3.16: Fruit crops (Ha) and production (Mt) in survey villages

S N	Village	Mango (Fruiting)		Litchi (Fruiting)		Jackfruit (Fruiting)		Guava (Fruiting)		Banana (fruiting)	
		Area	Prod Mt	Area	Prod Mt	Area	Prod Mt	Area	Prod Mt	Area	Prod Mt
1	Ghalechowk Bichline	0.25	2.1	0.05	0.4	0.2	4		0		0
2	Telgani	6	55	0.5	3.5	0.6	9	0.25	1.5	0.6	8
3	Meena Chowk	0.3	2.9	0.07	0.65	0.03	0.6		0		0
4	Musahari tole	0.25	1.5		0	0.03	0.56	0.05	0.3	0.06	0.66
5	Kamini Khadi	0.6	6.5	0.04	0.36	0.1	1.5		0	0.5	7.5
6	Dhobi	0.3	2.5	0.25	2	0.1	1		0	0.03	0.6
7	Nakatajhij	30	260		0	6	120		0		0
8	Thera	3	28.8	0.2	1.8	0.05	1.25		0		0
9	Ramaidaiya Bhawadi	1.5	15	0	0		0		0		0
10	Kuhi Tole	11	95	0	0	0.4	9		0		0
11	Kalapani	0.7	6.5	0.15	1.5	0.6	10		0		0
12	Hardiya	6	65	0.5	3.8	1.2	24		0		0

3.7 Production of Livestock Products and Fish

Table 3.17 below provides estimates on annual production of key livestock products such as milk, milk, ghee, mutton and fowl egg based on the data provided by FGD participants in survey villages. Not only is the total production estimate of each village is small but also the proportion of sale to make any impact. Likewise, this table also provides details on number of fish ponds, area, annual production and sale of fish. As seen in this table, annual production and sale estimate of fish is highest in Hardiya (15 Mt) followed by Nakatajhij and Ramaidaiya Bhawadi (10 Mt per year) and Kuhi tole (5.4 Mt) and Kalapani (1.2 Mt).

Table 3.17: Annual production of livestock products and fish in survey villages

S N	Village	Milk		Ghee		Mutton		Fowl Egg Prod. '000	Fish			
		Prod, '000 L	Sale (%)	Prod, (Kg)	Sale (%)	Prod MT	Sale (%)		No of pond	Area (Ha)	Prod (Mt)	Sale (%)
1	Ghalechowk Bichline	3.8	50	20	-			3.2	0		0	0
2	Telgani	252.0	50	2100	47.6			42	0		0	0
3	Meena Chowk	8.0	0	20	0.0			6.4	0		0	0
4	Musahari tole	12.0	35	0				3	0		0	0
5	Kamini Khadi	4.2	0	30	0.0			1.2	0		0	0
6	Dhobi	5.4	37.0	20	0.0			2	0		0	0
7	Nakatajhijh	420.0	60	3360	44.6			950	6	4	10	95
8	Thera	58.1	86.1	0	-			3	0		0	0
9	Ramaidaiya Bhawadi	54.0	50	200	50.0			12	9	3	10	98
10	Kuhi Tole	48.6	92.6	0	-			6	5	5	5.4	98
11	Kalapani	47.3	69.8	400	75.0	3.7	81.8	15	0		1.2	98
12	Hardiya	216.0	80	0	-			80	6-7	4	15	98

4. COST OF CULTIVATION

With a view to trace the cost of production by different types of irrigation facilities, in all survey villages, FGD participants were asked about the different activities which they perform by crops and the corresponding associated costs as well. As seen from the data presented in Table 4.1 below, the average COP of rice is highest in Meena Chowk (Rs. 72,000 per Ha) followed by Ghalechowk Bichline and Telgani (Rs. 50,800/Ha) and Kuhu Tole (Rs.46,000 per Ha). Of these three villages, the first is SI village. On the other, of the two villages coming next to Meena Chowk, the first one is DTW and the second is SI village. Kuhu Tole with third highest CoP per Ha is SI village. Similar to Rice crop, Meena Chowk reported the highest CoP for wheat followed by Telgani and Ghalechowk Bichline.

Table 4.1: CoP, Gross income and net income of rice and wheat

S N	Village	Rice					Other cereals				
		Total CoP (Rs, 000 /Ha)	Gross income (Rs,000 /Ha)			Net incom e per Ha	CoP Rs/Ha	Gross income (Rs,000 /Ha)			Net income Rs, 000
			Sale of Main Product	Sale By- produ cts	Total			Sale of Main Product	Sale By- produ cts	Total	
1	Ghalechowk Bichline	50.8	63	9	72	21240	62.2	45	0	45	-17160
2	Telgani	50.8	54	4.5	58.5	7700	61.6	36	0	36	-25560
3	Meena Chowk	72	84	6	90	18000	78.0	84	6	90	12000
4	Musahari tole	45.4	60	6	66	20648	36.1	NA			
5	Kamini Khadi	35.6	39	3	42	6450	30.5	27	0	27	-3450
6	Dhobi	42.2	36	9	45	2850	57.2	36	9	45	-12150
7	Nakatajhijh	41.5	45	6	51	9480	NA	NA			
8	Thera	41.7	48	6	54	12330	36.5	45	0.1	45.1	8580
9	Ramaidaiya Bhawadi	41.5	45	6	51	9480	NA	0			
10	Kuhi Tole	46.0	48	6	54	7980	43.0	54	6	60.0	17040
11	Kalapani	41.5	45	6	51	9480	42.8	54	4.5	58.5	15750
12	Hardiya	41.5	48	6	54	12480	44.6	45	0	45.0	450

CoP- Cost of Production

As seen from the data presented in Table 4.1 to 4.5, the survey could not trace any distinct role of available irrigation facility in variation in cost of production among different crops. Nevertheless, data reveal that the average net income is highest among fruit crops followed by sugarcane and vegetables. While a few villages reported loss in wheat production, none of the survey villages reported net loss in vegetable, sugarcane, Jute . This suggests that there is plenty of opportunities for improving yields of cereals and reducing cost of production.

Table 4.2: CoP, Gross income and net income of maize and vegetables

Village	Maize					Vegetables				
	Total CoP (Rs, 000 /Ha)	Gross income (Rs,000 /Ha)			Net income per Ha	CoP Rs/Ha	Gross income (Rs,000 /Ha)			Net income Rs, 000
		Sale of Main Product	Sale By-products	Total			Sale of Main Product	Sale By-products	Total	
Ghalechowk Bichline	46.6	39.6	0	39.6	-6960					
Telgani	0.0	0	0	0	0					
Meena Chowk	0.0	0	0	0	0					
Musahari tole	57.2	96	0	96	38850					
Kamini Khadi	0.0	0	0	0	0					
Dhobi	0.0	0	0	0	0					
Nakatajhijh	0.0	0	0	0	0	79.6	84		84	4440
Thera	0.0	0	0	0	0	73.7	105		105	31350
Ramaidaiya Bhawadi	0.0	0	0	0	0	0	0		0	0
Kuhi Tole	47.6	60	0	60	12390	60.1	105		105	44940
Kalapani	0.0	0	0	0	0	76.6	80.0		80.0	3420
Hardiya	46.6	39.6	0	39.6		79.5	105		105	25500

Table 4.3: CoP, Gross income and net income of fruits, sugarcane and jute

Village	Fruits					Sugarcane and Jute				
	Total CoP (Rs, 000 /Ha)	Gross income (Rs,000 /Ha)			Net income per Ha	CoP Rs/Ha	Gross income (Rs,000 /Ha)			Net income Rs, 000
		Sale of Main Product	Sale By-products	Total			Sale of Main Product	Sale By-products	Total	
Ghalechowk Bichline										
Telgani										
Meena Chowk										
Musahari tole						59.97*	62.4*	0*	62.4*	24300*
Kamini Khadi										
Dhobi										
Nakatajhijh	45	187.5		187.5	142500	76.9	120		120	43140
Thera	28.5	187.5		187.5	159000		0		0	0
Ramaidaiya Bhawadi	45	187.5		187.5	142500	76.4	120		120	43620
Kuhi Tole	46.5	187.5		187.5	141000	0.0	0		0	0
Kalapani	0	0		0	0	0.0	0		0	0
Hardiya	45	187.5		187.5	142500	0.0	0		0	0

*- Jute crop

Table 4.4: CoP, Gross income and net Income of potato

S N	Village	Potato				Net income per Ha
		Total CoP (Rs, 000 /Ha)	Gross income (Rs,000 /Ha)			
			Sale of Main Product	Sale By- products	Total	
1	Ghalechowk Bichline	0	0		0	
2	Telgani	77.8	144		144	66200
3	Meena Chowk	127.5	240		240	112500
4	Musahari tole	0.0	0		0	0
5	Kamini Khadi	149.9	144		144	-5850
6	Dhobi	62.3	135		135	72750
7	Nakatajhijh					0
8	Thera	97.3	180		180	82680
9	Ramaidaiya Bhawadi					0
10	Kuhi Tole	119.8	180		180	60180
11	Kalapani					0
12	Hardiya	97.3	180		180	82680

Given the variation in the cost of production varies by the use of the production inputs and their prices, FGD participants were also asked to provide prices of the different agricultural inputs, particularly manures and chemical fertilizers, being paid by them currently in the different markets. As seen from the data presented in Table 4.5, different villages pay different prices to same production input, depending on the source of purchase, their locations/ distance and type of inputs. The findings further show that farmers receive production inputs from different sources. Nevertheless, the study found increased role and participation of agro-vets in making agricultural inputs, particularly fertilizers and pesticides, to the farmers. If the government appropriately uses them, often seen shortage of chemical fertilizers during the key production season could be minimized.

Table 4.5: Prices and source of organic manure and chemical fertilizers

S N	Village	Compost, (Price Rs/kg and sources)			Chemical fertilizers price (Rs/Kg)			Source of chemical fertilizer		
		Rs/ Kg	First	Second	Urea	DAP	MoP	First	Second	third
1	Ghalechowk Bichline	7.5	Home		30	40	40	Agrovet	India	
2	Telgani	2	Self	Local market	30	50	40	Agrovet	India	
3	Meena Chowk	7.5	Self		30	50	40	Sainik mode ko bazaar (Agrovets)		
4	Musahari tole	2			28	44	35			
5	Kamini Khadi				24	48	40	Cooperative	Agro-vet	
6	Dhobi	8			30	50	35	Cooperative		
7	Nakatajhijh	10	village	Neighboring villages	28	55	35	Mahendrana gar Agrovet	Janakpur Agrovet	
8	Thera	10	village	Self	26	50	30	Agrovet	Janakpur Agrovet	Sankuhwa Bazar
9	Ramaidaiya Bhawadi	10	village	Neighboring villages	25	55	35	Sakuhwa Agrovet	Janakpur Agrovet	
10	Kuhi Tole	10	village	Neighboring villages	28	55	35	India	Janakpur	
11	Kalapani	0			28	55	35			
12	Hardiya	100	village		22	50	30	India	janakpur	

Likewise, Table 4.6 presents the irrigation cost and daily wage rate by sexes in the survey villages. As seen from Table 4.5, irrigation cost per Ha is highest among DTW followed by STW and almost none for SI. Therefore, unless the production competency of DTW and STW users is increased through the use of appropriate modern technologies and the users own the system, users of DTW could remain in some disadvantageous position.

Table 4.6: Irrigation cost and daily wage rate in survey villages

SN	Village	Irrigation Rs per Ha			Daily wage rate, Rs			Source of labour	
		Cost	Type	Details	Both sexes	Male	female	First source	Second source
1	Ghalechowk Bichline	2520	DTW	Rs. 5.50/electricity unit plus demand fee @ Rs 360 per month	400			village	
2	Telgani	750			550	300	250	village	
3	Meena Chowk	300			500	300	200	village	
4	Musahari tole	1200	STW	Rs. 3.60/ unit electricity and no demand fee, based on electricity use (private)	200	120	80	village	
5	Kamini Khadi	300			550	300	250	village	
6	Dhobi	300			700	400	300	village	
7	Nakatajhijh	2160	DTW	Fee collected @ Rs360/Hr	300			village	
8	Thera	150	canal	pump-set	300			village	
9	Ramaidaiya Bhawadi	0	Surfece		300			village	neighbor village
10	Kuhi Tole	1200	STW		300				
11	Kalapani	52	Surface		300				
12	Hardiya	300	village		300			village	neighbor village

5. STORAGE

5.1 Storage Structures

Tables 5.1, Table 5.2, Table 5.3, Table 5.4, Table 5.5 and Table 5.6 below show storage practices adopted by farmers in survey villages by commodities. As seen from the data in these tables, still a large majority of farmers in all survey villages irrespective of the type of irrigation facilities available have been using traditional bamboo baskets (Bhakari in Nepali) instead of other structures which could protect their crops from rats (rodents) although some.

Table 5.1: Storage structures used for storage of rice in survey villages

	Village	Percentage by storage practice/structures for Rice						
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Suli or Thankro ²	Wood Box/drums
1	Ghalechowk Bichline	80	0	0	20	0	0	0
2	Telgani	80	0	0	20	0	0	0
3	Meena Chowk	50	0	0	50	0	0	0
4	Musahari tole	80	0	0	20	0	0	0
5	Kamini Khadi	60	0	0	20	0	0	20
6	Dhobi	100	0	0		0	0	0
7	Nakatajhijh	80	0	15	5	0	0	0
8	Thera	70	0	30		0	0	0
9	Ramaidaiya Bhawadi	70	10	0	20	0	0	0
10	Kuhi Tole	100	0	0	0	0	0	0
11	Kalapani	100	0	0	0	0	0	0
12	Hardiya	40	0	60	0	0	0	0

Table 5.2: Storage structures used for storage of other cereals in survey villages

	Village	Percentage by storage practice/structures for other cereals (maize & wheat)						
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Suli or Thankro	Wood Box/drums
1	Ghalechowk Bichline							
2	Telgani			80			20	
3	Meena Chowk							
4	Musahari tole							
5	Kamini Khadi						100	
6	Dhobi							
7	Nakatajhijh							
8	Thera							
9	Ramaidaiya Bhawadi							
10	Kuhi Tole							
11	Kalapani							
12	Hardiya							

² Open stores made of timber or bamboo poles

Table 5.3: Storage structures used for storage of pulses in survey villages

SN	Village	Percentage of HHs by storage practice/structures for pulses					
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Wood Box/drums
1	Ghalechowk Bichline	0	0	0	10	0	90
2	Telgani	0	0	100	0	0	0
3	Meena Chowk	0	0	0	0	0	100
4	Musahari tole	0	0	70	30	0	0
5	Kamini Khadi	0	0	20	80	0	0
6	Dhobi	0	0	0	0	0	100
7	Nakatajhijh	80	0	15	5	0	0
8	Thera	50	0	50	0	0	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0
10	Kuhi Tole	0	0	0	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	40	0	60		0	0

Table 5.4: Storage structures used for storage of fruits in survey villages

SN	Village	Percentage of HHs by storage practice/structures for fruits						
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Suli or Thankro	Wood Box/drums
1	Ghalechowk Bichline							
2	Telgani							
3	Meena Chowk							
4	Musahari tole							
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh		100					
8	Thera							
9	Ramaidaiya Bhawadi							
10	Kuhi Tole							
11	Kalapani		100					
12	Hardiya							

Table 5.5: Storage structures used for potato in survey villages

	Village	Percentage of HHs by storage practice/structures for potato						
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Suli or Thankro	Wood Box/drums
1	Ghalechowk Bichline					100		
2	Telgani		100					
3	Meena Chowk					95		5
4	Musahari tole					90		10
5	Kamini Khadi					100		
6	Dhobi							
7	Nakatajhijh		100					
8	Thera		100					
9	Ramaidaiya Bhawadi							
10	Kuhi Tole		100					
11	Kalapani		100					
12	Hardiya		100					

Table 5.6: Storage structures used for vegetables in survey villages

	Village	Percentage of HHs by storage practice/structures for vegetables						
		Bamboo baskets	Open Room	Metal bins	Packing in sacks	Wooden Flakes	Suli or Thankro	Wood Box/drums
1	Ghalechowk Bichline							
2	Telgani							
3	Meena Chowk							
4	Musahari tole							
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh							
8	Thera							
9	Ramaidaiya Bhawadi							
10	Kuhi Tole							
11	Kalapani		100					
12	Hardiya							

5.2 Days Stored and Storage Loss

Participants in the different survey villages reported to have been storing different crops for different duration after harvest based on the factors like amount required and consumed by the respective household, meeting HH cash requirements, prevailing market price and storability of the crop. While the average storage days of different crops in different villages were found almost constant as seen in Table 5.7 and 5.8 below, actual duration in storage varied by the economic condition of a particular HH, its immediate needs and priority and the nature of commodity as well. Therefore, participants were asked what the majority of the HHs in the survey villages do. Needless to say, if the majority of the people in a village store rice and other staple food crops for more than 6 months after harvest, the key conclusion which one may be tended to draw from this is that the economic condition of this village is good and that farmers have multiple sources of income to earn their livelihoods as they are not forced to sell their produces immediately after harvest. They could wait till the price of the produce would be generally high. However, as seen from the data in Table 5.2, a large majority of the HHs in the survey villages, irrespective of access to different type of irrigation facilities, reported to been storing rice and other cereal crops for 90 to 120 and 60 to 180 days respectively after the harvest with no substantial differences between the survey villages. This suggests that the economic condition of the majority of the people in the survey villages is not so good that they could store cereals for receiving a higher price when the supply of the commodity would be low and that the demand would be high. Likewise, survey participants were asked of any losses in storage by commodity. Surprisingly, extent of losses reported by participants was low which is within the acceptable level, something between 0 to 5% for rice among all survey villages.

Table 5.7: Average storage days of selected crops and estimated loss by survey villages

SN	Village	Rice		Other Cereal		Pulses		Fruits	
		Average days of storage	Loss (%)	Average days of storage	Loss (%)	Average days of storage	Loss (%)	Average days of storage	Loss (%)
1	Ghalechowk Bichline	90	0	90	15	0	0	0	0
2	Telgani	120	2	120	5	0	0	0	0
3	Meena Chowk	120	4	120	10	0	0	0	0
4	Musahari tole	120	4	120	3	0	0	0	0
5	Kamini Khadi	90	5	90	10	0	0	0	0
6	Dhobi	90	2	90	5	0	0	0	0
7	Nakatajihijh	180	5	180	5	0	0	90	20
8	Thera	120	1	120	5	0	0	0	0
9	Ramaidaiya Bhawadi	120	5	60	5	0	0	0	0
10	Kuhi Tole	120	1	60	0	0	0	0	0
11	Kalapani	90	5	120	10	60	10	0	0

Extent of loss reported by the survey villages by key commodities are shown in Table 5.2. Given perishable nature of vegetable crops, none of the villages except Nakatajihij reported to have stored vegetables for more than a week. According to Nakatajihij, generally, many farmers store vegetables with the objective of receiving good margin with no apparent loss and also to adjust supply based on demand. However, many reported that this is very difficult to adjust production (supply) with the demand. Therefore, they are often forced to sell vegetables at a much lower price and sometimes even by incurring a net loss. Most of the vegetables, particularly, tomato, is very perishable which is one of the key vegetables grown in this area. However, they tell that they have neither capacity nor skills to adjust production with the demand so that they could receive a fair price for their products. They further added that there is no reason for them to store vegetables to lose freshness which is the most needed quality for any type of vegetables except a few like onion and potato. Therefore, making any generalization about the average storage days and estimating loss is difficult. Nevertheless, the issue of post harvest loss was explicitly discussed during the discussions. Some even reported to have incurred 15 to 25% losses in storage.

Table 5.8: Average storage days of selected crops and estimated loss by survey villages

SN	Village	Potato		Vegetable		Mustard	
		Total days of storage	Loss (%)	Total days of storage	Loss (%)	Total days of storage	Loss (%)
1	Ghalechowk Bichline	90	10	0	0	0	0
2	Telgani	60	15	0	0	0	0
3	Meena Chowk	30	25	0	0	0	0
4	Musahari tole	60	30	0	0	0	0
5	Kamini Khadi	30	25	0	0	0	0
6	Dhobi	60	33	0	0	120	0
7	Nakatajihijh	0	0	0	0	0	0
8	Thera	60	24	0	0	0	0
9	Ramaidaiya Bhawadi	0	20	0	0	0	0
10	Kuhi Tole	30	25	0	0	0	0
11	Kalapani	60	3	7	0	0	0
12	Hardiya	60	5	0	0	0	0

6. MARKETING

This survey assessed the marketing related activities in the survey villages from the following six dimensions. The first is the sale of the agricultural products as proportionate to the production in the villages. The second dimension is the market locations. The third, fourth and fifth dimensions refer to the marketing agents used by the producers, type of market and source of market information respectively.

6.1 Ratio of Sale to Production

Table 6.1, Table 6.2, Table 6.3 and Table 6.4 show the proportion of production sold by the majority of HHs in the survey villages over the last 5 years by crops/commodities as revealed in FGDs held in the respective villages. As seen from the data presented in these tables, none of the survey villages irrespective of the access to the different types of the irrigation facilities, have been able to increase sale substantially measured in terms of ration between sale and total production over the last 5 years. This means that the village economy has not progressed towards prosperity. However, village reports show fluctuations in sale due to changes in production, mostly caused by the rainfall conditions. This suggests that the dependency of Nepalese farmers on rainfall has not decreased even in villages with GW sources for several reasons which, among others, include poor integration between irrigation facilities and agricultural programs and partly due to perceived high cost of electricity aggravated by high electric load shedding during the season and day when farmers need water. Government's effort to provide technological support service (agricultural extension) after the development of the irrigation facility was almost non-existent in almost all villages as exemplified by the case of Ghalechowk Bichline (Prithibinagar VDC, Jhapa district) with exception to Nakatajhij where the office of the Janakpur Agricultural Development Project (JADP) is located. Of the different commodities, the study revealed that early rice is generally produced for markets. However, of the five villages reporting to have produced early rice, Musahari reported that the proportion of sale against production is very minimal here and that the production is usually consumed by the producers themselves. The four villages namely, Telgani, Meena Chowk, Kalapani and Hardiya reported to have been selling 70 to 85% of their early rice production. On the other, the proportion of main rice sold by the villagers ranged from 50 to none with the highest percentage of sale reported by Meena Chowk (50%) followed by Mushahari Tole (40%) and 25% in Nakatajhij village. Of the five villages with the highest proportion of sale of main rice against the production, two belong to villages with ground water irrigation facilities and three to SI facilities which further confirms farmers' inability to benefit adequately from the improved irrigation facilities. Proportion of sale by crops and commodities are depicted in Tables 6.1 to 6.4. As seen from the data presented in these tables, except Kalapani of Mahottari district, none of other villages reported to have sold any proportion of spring maize for which irrigation is important. Of the different commodities, sugarcane, jute and oilseeds are produced exclusively for sale. These are the sources of cash income in the villages. Sugarcane is produced in Nakatajhij and jute in Mushari tole of Morang district.

Table 6.1: Proportion of sale of main rice, early rice and wheat by survey villages

SN	Village	Main Rice, % Sale					Early rice, % Sale					Wheat, % Sale				
		2008	09	10	11	12	08	09	10	11	12	08	09	10	11	12
1	Ghalechowk Bichline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Telgani	10	10	10	10	10		75	75	75	80					
3	Meena Chowk	50	50	50	50	50		60	60	60	70	20	20	20	20	20
4	Musahari tole	40	40	40	40	40						30	30	30	30	30
5	Kamini Khadi	20	20	20	20	20	0	0	0	0	0	20	20	20	20	20
6	Dhobi	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0
7	Nakatajihijh	25	25	25	25	25	0	0	0	0	0	40	40	40	40	40
8	Thera	5	5	5	5	5	0	0	0	0	0	13	8	9	5	5
9	Ramaidaiya Bhawadi	15	15	15	15	15	0	0	0	0	0	10	10	10	10	10
10	Kuhi Tole	5	5	5	5	5	0	0	0	0	0		5	5	5	5
11	Kalapani	15	15	15	15	15	80	80	80	90	90	15	15	15	15	15
12	Hardiya	5	5	5	5	5	70	70	70	70	75	4	4	4	4	4

Table 6.2: Proportion of sale of the maize by survey villages

SN	Village	Summer Maize % Sale					Winter Maize, % Sale					Spring Maize, % Sale				
		2008	09	10	11	12	08	09	10	11	12	08	09	10	11	12
1	Ghalechowk Bichline	0	0	0	0	0						0	0	0	0	0
2	Telgani	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Nakatajihijh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Thera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Kuhi Tole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Kalapani	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10
12	Hardiya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6.3: Proportion of sale of vegetables and lentils by survey villages

SN	Village	Winter vegetable, % Sale					Summer Vegetable, % Sale					Lentil, % Sale				
		2008	09	10	11	12	08	09	10	11	12	08	09	10	11	12
1	Ghalechowk Bichline	0	0	0	0	0										
2	Telgani	0	0	0	0	0	75	65	70	72						
3	Meena Chowk	0	0	0	0	0	70	60	65	65						
4	Musahari tole	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	Kamini Khadi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	Dhobi	0	0	0	0	0					0	0	0	0	0	
7	Nakatajihijh	60	70	70	70	70	45	55	55	65	0	0	0	0	0	
8	Thera	50	55	50	60	60	65	65	65	65	0	0	0	0	0	
9	Ramaidaiya Bhawadi	0	0	0	0	0	70	70	70	70	0	0	0	0	0	
10	Kuhi Tole	60	70	60	0	0	75	70	75	75	0	0	0	0	0	
11	Kalapani	70	50	50	50	50	80	75	75	75	0	0	0	0	0	
12	Hardiya	50	75	75	75	75	70	65	80	80						

Table 6.4: Proportion of sale of the oilseeds, sugarcane and jute by survey villages

SN	Village	,Oilseeds % Sale					,Sugarcane and Jute % Sale				
		2008	09	10	11	12	2008	09	10	11	12
1	Ghalechowk Bichline	90	90	90	90	90					
2	Telgani	0	0	0	0	0					
3	Meena Chowk	90	90	90	90	90					
4	Musahari tole	0	0	0	0	0	98\$	98\$	98\$	98\$	98\$
5	Kamini Khadi	95	95	95	95	95					
6	Dhobi	90	90	90	90	90					
7	Nakatajhijh	0	0	0	0	0	95*	95*	95*	95*	95*
8	Thera	0	0	0	0	0					
9	Ramaidaiya Bhawadi	0	0	0	0	0					
10	Kuhi Tole	0	0	0	0	0					
11	Kalapani	0	0	0	0	0					
12	Hardiya	90	90	90	90	90					

\$- Jute, *- Sugarcane

6.2 Market Locations

As seen from Table 6.5 below, most of the villagers carry out marketing of their produces within the survey village or village market centre followed by weekly markets or Haats depending on the type of commodities. Likewise, weekly markets are important for all villages except Jhapa districts. None of the survey villages in Jhapa district reported to have been sold their produces in weekly market. Marketing activities generally remain confined within the village followed by village market centre, weekly market and main market located in nearby areas. For example, Bardibas market for Kalapni and Dhaklebar market for Naktajhij. Selling produces in outside the district occurs for the industrial crops like Jute and Sugarcane. Either producers will need to take their producers to the factories or factories procure at the production site. Yet, none of the survey villages reported non-availability of the markets in their localities. Data in Table 6.5 show market locations, the distance from the survey village and the type of commodities sold.

Table 6.5: Market locations

Villages	Village	Village market centre	Weekly market	Main market	District Market	Outside district
Ghalechowk Bichline	Rice 100%, Fruit 100%					
Telgani		100% rice, 3 Km				
Meena Chowk	Fruit 100%	100% rice and other cereal, 1.5 km				
Kamini Khadi	Rice 100%					
Musahari tole	Rice 100%, Veg 100%		Potato 100%			
Dhobi		Rice 100%				
Nakatajhijh			Mahendra Nagar -7 Km Fruit and Veg-20%	Dhalkebar-3 Km, Fruit and Veg-80%		Ramnagar-25 Km, Sugar cane -100%
Thera	Fruit 100%, Veg 50%	Veg-20%	Veg-80%, Wheat 80%	Tarapati-8km, Wheat 20%, Veg 50%, Potato 80%,		Ramnagar (65 km)-Scane-100%

Villages	Village	Village market centre	Weekly market	Main market	District Market	Outside district
Ramaidaiya Bhawadi	10% rice, fruits and potato-100%	Rice-90%				Ramnagar (55 km), Sugarcane 100%
Kuhi Tole	Legumes 25%, Fruits 25%, Potato 25%		Parol Hat (2Km), 75% legumes, fruits and potato ; Veg 100%			Janakpur Rice and Pulses - 100%,
Kalapani	Rice, cereals, legumes, potato and veg 100%			Bardibas 12 KM, Fruit 100%		
Hardiya		Soharba 1 km, Potato, Veg and Legumes 50%, Fruit 20%	Pipra 2 Km, Legumes, Potato and Veg 50%, 20% fruit			Janakpur 8 Km- rice and wheat 100%, fruit 60%

6.3 Participation of Marketing Agents (Traders)

FGDs in survey villages attempted to identify access of survey villages to the six types of marketing agents by commodities namely retailers, collector, cooperatives, wholesalers, processor and traders which include exporters as well. Traders and exporters were put under the same category because the villagers might not be able to distinguish whether a particular trader is exporter or doing businesses within the country only. As seen from Table 6.3, traders and exporters seemed active in all survey villages for rice crops except Ghalechowk Bichline, Dhobi, ,Ramaidaiya Bhawadi, Kuhi Tole Kalapani and Hardiya but there were wholesalers in these villages except Ghalechowk Bichline where sale of rice is very limited, often consumed within the HHs. When there is very limited products, number and types of marketing agents will be obviously limited. Detail data by survey villages are shown below in Table 6.6 Table 6.7, Table 6.8 Table 6.9, Table 6.10 and Table 6.11 for different commodities.

Table 6.6: Active marketing agents in the survey villages for rice

SN	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							
2	Telgani						100	
3	Meena Chowk						100	
4	Musahari tole						100	
5	Kamini Khadi						100	
6	Dhobi		100					
7	Nakatajhijh						100	
8	Thera				90		10	
9	Ramaidaiya Bhawadi				100			
10	Kuhi Tole				100			
11	Kalapani				100			
12	Hardiya				100			

Table 6.7: Active marketing agents in the survey villages for other cereals

S N	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							100
2	Telgani							
3	Meena Chowk							
4	Musahari tole							
5	Kamini Khadi						100	
6	Dhobi							
7	Nakatajhijh							
8	Thera							
9	Ramaidaiya Bhawadi				100			
10	Kuhi Tole							
11	Kalapani				100			
12	Hardiya				100			

Table 6.8: Active marketing agents in the survey villages for potato

S N	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							
2	Telgani							
3	Meena Chowk							
4	Musahari tole							100
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh							
8	Thera							
9	Ramaidaiya Bhawadi							
10	Kuhi Tole	100						
11	Kalapani	100						
12	Hardiya	40			60			

Table 6.9: Active marketing agents in the survey villages for fruits

S N	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							
2	Telgani							
3	Meena Chowk		100					
4	Musahari tole						100	
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh	20	80					
8	Thera							100
9	Ramaidaiya Bhawadi							100
10	Kuhi Tole		100					
11	Kalapani				100			
12	Hardiya	20			80			

Table 6.10: Active marketing agents in the survey villages for vegetables

S N	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							100
2	Telgani							
3	Meena Chowk							
4	Musahari tole							
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh	20	80					
8	Thera							100
9	Ramaidaiya Bhawadi							
10	Kuhi Tole	100						
11	Kalapani				100			
12	Hardiya	20			80			

Table 6.11: Active marketing agents in the survey villages for other commodities

S N	Village	Retailer	Collector	Coop	Wholesaler	Processor	Traders and exporters	Consumer
1	Ghalechowk Bichline							
2	Telgani							
3	Meena Chowk							
4	Musahari tole						100	
5	Kamini Khadi							
6	Dhobi							
7	Nakatajhijh							
8	Thera					95		5
9	Ramaidaiya Bhawadi							
10	Kuhi Tole							
11	Kalapani							
12	Hardiya							

6.4 Markets for Agricultural Products

With a view to assess the markets for the different agricultural commodities in survey villages, FGD participants were further asked to depict the percentage of their total produces sold by market locations. Although this question appears similar to the first question, unlike the earlier, the key question asked here is where do you sale your commodities/produces, irrespective of the proportion of the produce sold out of total production. As seen from this table, rice is generally sold in four places (a) village (b) village market centre (c) Haat Bazar. and (d) District market. Export of the rice takes place but it is carried out by the wholesalers or rice mills. Collectors and wholesalers are often seen in the village, village market centre or Haat. For other cereals like wheat, sometimes, the producers will need to reach main market like Sankhua Bazar as in the case of Nakatajhij. Tables 6.12 to 6.27 provide details on market location of the different agricultural commodities and products produced in the survey villages for agricultural and livestock products. As seen from the data presented in these tables, most of the marketing take place within the villages. As these are Terai villages, local people have no

constraints regarding markets, but the problem remains with regard to the products available for sale in the markets. Selling the products within the village is indicative of small amount of produce available for sale. When the products will need to search other markers outside the VDC, then problems regarding enhancing market access emerge. This also means that these survey villages will need to intensify efforts to enhance productivity of key agricultural commodities, particularly rice, through proper and cost effective utilization of water, adoption of modern and improved technologies and effective use of labour and mechanization. Only promotion of agricultural mechanization through training could respond to the problem of labour shortage seen recently due to mass migration of youths from the villages to Gulf countries for searching better employment and working opportunities.

Table 6.12: Markets for rice in survey villages

S N	Village	Market location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	100	0	0	0	0	0
2	Telgani	100	0	0	0	0	0
3	Meena Chowk	0	100	0	0	0	0
4	Musahari tole	100	0	0	0	0	0
5	Kamini Khadi	100	0	0	0	0	0
6	Dhobi	0	100	0	0	0	0
7	Nakatajhijh	0	100	0	0	0	0
8	Thera	0		100	0	0	0
9	Ramaidaiya Bhawadi	10	90	0	0	0	0
10	Kuhi Tole	0	100	0	0		0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	0	0	0	0	100	0

Table 6.13: Markets for other cereals in survey villages

S N	Village	Market location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	100					
2	Telgani						
3	Meena Chowk		100				
4	Musahari tole	100					
5	Kamini Khadi	100					
6	Dhobi						
7	Nakatajhijh			80	20		
8	Thera						
9	Ramaidaiya Bhawadi						
10	Kuhi Tole	0	0	0	0		
11	Kalapani	100					
12	Hardiya					100	

Table 6.14: Markets for pulse in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0	0	
2	Telgani	0	0	0	0	0	
3	Meena Chowk	0	0	0	0	0	
4	Musahari tole	0	0	0	0	0	
5	Kamini Khadi	0	0	0	0	0	
6	Dhobi	0	0	0	0	0	
7	Nakatajhijh	0	0	0	0	0	
8	Thera	0	0	0	0	0	
9	Ramaidaiya Bhawadi	0	0	0	0	0	
10	Kuhi Tole	25	0	75	0	0	
11	Kalapani	100	0		0	0	
12	Hardiya	0	50	50	0	0	

Table 6.15: Markets for potato in survey villages

S N	Village	Market Location, %Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0	0	0
2	Telgani	0	0	0	0	0	0
3	Meena Chowk	0	0	100	0	0	0
4	Musahari tole	0	0	100	0	0	0
5	Kamini Khadi	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0
8	Thera	0	20	0	80	0	0
9	Ramaidaiya Bhawadi	100	0	0	0	0	0
10	Kuhi Tole	25	0	75	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	0	50	50	0	0	0

Table 6.16: Markets for Fruits in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	100					
2	Telgani						
3	Meena Chowk	100					
4	Musahari tole						
5	Kamini Khadi						
6	Dhobi						
7	Nakatajhijh			20	80		
8	Thera	100					
9	Ramaidaiya Bhawadi						
10	Kuhi Tole	25		75			
11	Kalapani				100		
12	Hardiya		20	20		60	

Table 6.17: Markets for Vegetables in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0		
2	Telgani	0	0	0	0		
3	Meena Chowk	0	0	0	0		
4	Musahari tole	0	0	0	0		
5	Kamini Khadi	0	0	0	0		
6	Dhobi	0	0	0	0		
7	Nakatajhijh	0	0	20	80		
8	Thera	50	0	0	50		
9	Ramaidaiya Bhawadi	0	0	0	0		
10	Kuhi Tole	0	0	100	0		
11	Kalapani	100	0	0	0		
12	Hardiya	0	50	50	0		

Table 6.18: Markets for Sugarcane in survey villages

S N	Village	Market Location, % Sale						
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District	Name of market, if outside district
1	Ghalechowk Bichline	0	0	0	0	0		
2	Telgani	0	0	0	0	0		
3	Meena Chowk	0	0	0	0	0		
4	Musahari tole	0	0	0	0	0		
5	Kamini Khadi	0	0	0	0	0		
6	Dhobi	0	0	0	0	0		
7	Nakatajhijh	0	0	0	100	0		
8	Thera	0	0	0	0		100	Ramnagar
9	Ramaidaiya Bhawadi	0	0	0	0		100	Ramnagar
10	Kuhi Tole	0	0	0	0	0		
11	Kalapani	0	0	0	0	0		
12	Hardiya	0	0	0	0	0		

Table 6.19: Markets for live animals in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	100	0	0	0	0	0
2	Telgani	50	25	25	0	0	0
3	Meena Chowk	0	0	0	0	0	0
4	Musahari tole	0	0	100	0	0	0
5	Kamini Khadi	0	100	0	0	0	0
6	Dhobi	0	0	0	0	0	0
7	Nakatajhijh	0	0	100	0	0	0
8	Thera	0	0	0	0	100	0
9	Ramaidaiya Bhawadi	0	100	0	0	0	0
10	Kuhi Tole	0	100	0	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	60	0	40	0	0	0

Table 6.20: Markets for milk in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	100	0	0	0	0	0
2	Telgani	0	100	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0
4	Musahari tole	100	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0
6	Dhobi	0	100	0	0	0	0
7	Nakatajhijh	100	0	0	0	0	0
8	Thera	50	0	0	50	0	0
9	Ramaidaiya Bhawadi	80	20	0	0	0	0
10	Kuhi Tole	100	0	0	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	0	0	0	0	100	0

Table 6.21: Markets for milk products in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0	0	0
2	Telgani	100	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0
8	Thera	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	80	0	20	0	0	0
10	Kuhi Tole	100	0	0	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	0	0	0	0	0	0

Table 6.22: Markets for meat in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0	0	0
2	Telgani	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0
6	Dhobi	100	0	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0
8	Thera	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0
10	Kuhi Tole	0	0	0	0	0	0
11	Kalapani	100	0	0	0	0	0
12	Hardiya	0	0	0	0	0	0

Table 6.23: Markets for fish in survey villages

S N	Village	Market Location, % Sale					
		Village	Village Market Centre	Haat (Weekly market)	Main Market	District Market	Outside District
1	Ghalechowk Bichline	0	0	0	0	0	0
2	Telgani	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0
7	Nakatajhijh	50	50	0	0	0	0
8	Thera	0	30	0	50	20	0
9	Ramaidaiya Bhawadi	0	0	100	0	0	0
10	Kuhi Tole	100	0	0	0	0	0
11	Kalapani	0	0	0	0	0	0
12	Hardiya	20	20	20	0	40	0

Table 6.24: Markets for live animals in survey villages

S N	Village	Market Location, % Sale						
		Hotel / Shops/ Restaurant	Consumer	Dairy/ Processing industry	Butcher Fresh House	Collector/ Collection center	Wholesaler	Trader
1	Ghalechowk Bichline	0	100	0	0	0	0	0
2	Telgani	0	0	0	40	0	0	60
3	Meena Chowk	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	100
5	Kamini Khadi	0	0	0	100	0	0	0
6	Dhobi	0	0	0	0	0	0	100
7	Nakatajhijh	0	40	0	0	0	0	60
8	Thera	0	0	0	0	100	0	0
9	Ramaidaiya Bhawadi	0	80	0	0	20	0	0
10	Kuhi Tole	0	0	0	0	0	100	0
11	Kalapani	0	0	0	0	0	0	100
12	Hardiya	0	0	0	0	0	100	0

Table 6.25: Markets for milk in survey villages

S N	Village	Market Location, % Sale						
		Hotel / Shop/ Restaurant	Consumer	Dairy/ Processing industry	Butcher Fresh House	Collector/ Collection center	Wholesaler	Trader
1	Ghalechowk Bichline	0	100	0	0	0	0	0
2	Telgani	100	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0
4	Musahari tole	0	100	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0
6	Dhobi	0	0	100	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0	100
8	Thera	0	0	0	0	0	100	0
9	Ramaidaiya Bhawadi	0	80	0	0	20	0	0
10	Kuhi Tole	0	0	0	0	0	0	100
11	Kalapani	0	0	100	0	0	0	0
12	Hardiya	80	0	20	0	0	0	0

Table 6.26: Markets for milk products in survey villages

SN	Village	Milk Products						
		Hotel / Shop/ Restaurant	Consumer	Dairy/ Processing industry	Butcher Fresh House	Collector/ Collection center	Wholesaler	Trader
1	Ghalechowk Bichline	0	0	0	0	0	0	0
2	Telgani	0	100	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0	0
8	Thera	0	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	0	80	0	0	20	0	0
10	Kuhi Tole	0	100	0	0	0	0	0
11	Kalapani	0	100	0	0	0	0	0
12	Hardiya	0	0	0	0	0	0	0

Table 6.27: Markets for meat in survey villages

SN	Village	Market Location, % Sale						
		Hotel/ Shop/ Restaurant	Consumer	Dairy/ Processing industry	Butcher Fresh House	Collector/ Collection center	Wholesaler	Trader
1	Ghalechowk Bichline	0	0	0	0	0	0	0
2	Telgani	0	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0
7	Nakatajhijh	0	0	0	0	0	0	0
8	Thera	0	0	0	0	0	0	0
9	Ramaidaiya Bhawadi	0	0	0	0		0	0
10	Kuhi Tole	0	0	0	0	0	0	0
11	Kalapani	0	100	0	0	0	0	0
12	Hardiya	0	0	0	0	0		0

6.5 Sources of Market Price Information

Given importance of timely availability of useful market information to producers, FGDs also attempted to identify key market related information. As seen from the data and information provided below in table 6.28, in all the survey villages, the most cited market information sources were television followed by radio, traders and neighbors. Surprisingly, none of the villages reported to have received market information using mobile phones. However, a few said that some have been using mobile to get market information informally through traders and neighbors. However, none of the villages indicated that they have been using mobiles to get daily wholesale price and other market related information from organized market committees/centres via SMS service. Therefore, using mobiles as landline telephones to know the price of products from traders and neighbors is not considered here as using mobiles for market related information.

Table 6.28: Sources of market price information

SN	Village	Source I	Source II	Source III	Source IV
1	Ghalechowk Bichline	Television	Radio		
2	Telgani	Trader			
3	Meena Chowk	Telephone	Local Trader		
4	Musahari tole	Trader			
5	Kamini Khadi	Trader			
6	Dhobi	Merchant	Trader	Local Trader	Neighbor
7	Nakatajhijh	Mobile	Neighbour	Market Committee	Radio
8	Thera	Neighbour	Trader		
9	Ramaidaiya Bhawadi	Trader			
10	Kuhi Tole	Neighbour	Farmer	Trader	
11	Kalapani	Trader	Neighbour		
12	Hardiya	Trader	Market		

6.6 Timing of Sale

The sixth element discussed in the survey villages about the sale of the produce is the time of the sale for different crops grown in the survey villages. As seen in Table 6.29 to Table 6.35, most of the villages reported that they would sell the product when they need the cash, sometimes it could be immediately after the harvest and sometime when the price is high. However, most of the time they would prefer to store for a while in order that they could receive a higher price for their products. Individual responses by survey villages for different commodities are shown in the following tables.

Table 6.29: Timing of sale of rice

SN	Village	Rice, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	0	0	0
2	Telgani	30	40	30
3	Meena Chowk	100	0	0
4	Musahari tole	40	40	20
5	Kamini Khadi	60	30	10
6	Dhobi	0	100	0
7	Nakatajhijh	0	0	0
8	Thera	0	100	0
9	Ramaidaiya Bhawadi	0	100	0
10	Kuhi Tole	0	100	0
11	Kalapani	0	100	0
12	Hardiya	0	100	0

Table 6.30: Timing of sale of other cereals

SN	Village	Other cereals, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	0	0	100
2	Telgani	0	0	0
3	Meena Chowk	0	0	100
4	Musahari tole	0	100	0
5	Kamini Khadi	60	30	0
6	Dhobi	0	100	0
7	Nakatajhijh	0	0	0
8	Thera	100	0	0
9	Ramaidaiya Bhawadi	0	0	0

SN	Village	Other cereals, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
10	Kuhi Tole	100	0	0
11	Kalapani	0	100	0
12	Hardiya	0	100	0

Table 6.31: Timing of sale of Pulses

SN	Village	Pulses, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	0	0	0
2	Telgani	0	0	0
3	Meena Chowk	0	0	0
4	Musahari tole	0	0	0
5	Kamini Khadi	0	0	0
6	Dhobi	0	0	0
7	Nakatajhijh	0	0	0
8	Thera	0	0	0
9	Ramaidaiya Bhawadi	0	0	0
10	Kuhi Tole	0	0	0
11	Kalapani	0	100	0
12	Hardiya	100	0	0

Table 6.32: Timing of sale of Fruits

SN	Village	Fruits, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	100	0	0
2	Telgani	100	0	0
3	Meena Chowk	0	0	0
4	Musahari tole	0	0	0
5	Kamini Khadi	0	0	0
6	Dhobi	0	0	0
7	Nakatajhijh	100	0	0
8	Thera	0	0	0
9	Ramaidaiya Bhawadi	0	100	0
10	Kuhi Tole	100	0	0
11	Kalapani	10	0	0
12	Hardiya	100	0	0

Table 6.33: Timing of sale of vegetables

SN	Village	Vegetables, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	0	0	0
2	Telgani	0	0	0
3	Meena Chowk	0	0	0
4	Musahari tole	0	0	0
5	Kamini Khadi	0	0	0
6	Dhobi	0	0	0
7	Nakatajhijh	100	0	0
8	Thera	100	0	0
9	Ramaidaiya Bhawadi	0	0	0
10	Kuhi Tole	100	0	0
11	Kalapani	100	0	0
12	Hardiya	100	0	0

Table 6.34: Timing of sale of potato

SN	Village	Potato, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline	0	0	0
2	Telgani	0	0	0
3	Meena Chowk	0	0	0
4	Musahari tole	0	100	0
5	Kamini Khadi	0	0	0
6	Dhobi	0	100	0
7	Nakatajhijh	0	0	0
8	Thera	0	0	0
9	Ramaidaiya Bhawadi	0	0	0
10	Kuhi Tole	0	100	0
11	Kalapani	100	0	0
12	Hardiya	20	80	0

Table 6.35: Timing of sale of Sugarcane and Jute

SN	Village	Sugarcane and Jute, Percentage of Produce Sold		
		Immediately after harvest	When cash is needed	When price is high
1	Ghalechowk Bichline			
2	Telgani			
3	Meena Chowk			
4	Musahari tole	0	0	0
5	Kamini Khadi			
6	Dhobi			
7	Nakatajhijh	100	0	0
8	Thera			
9	Ramaidaiya Bhawadi			
10	Kuhi Tole			
11	Kalapani			
12	Hardiya			

6.7 Mode of Transport to the Market

Tables 6.36 to Table 6.39 below provides information on farmers' (producers) practices to transport produces (crops, fish and animals/live animals) from the village to the village market or other market centres. As seen from the data presented below, depending on the facilities available in the village, type of animals or birds and number of animals to be transported, different people would use different practices. Therefore, it is very difficult to generalize the mode of transport facilities used in the villages. Yet, the most popular means of transport for cereals happened to be tractor and cart and for animals either dragging or driving by humans or using trucks based on the distance of the market and number of animals to be transported. As the amount available for sale happened to be small in most of the villages, producers generally used tractors followed by labour except Nakatajihij

Table 6.36: Means of transport for rice and other cereals

SN	Village	Rice					Other Cereals				
		Tractor	Laborer	Cycle	Cart	Rickshaw	Tractor	Laborer	Cycle	Cart	Rickshaw
1	Ghalechowk Bichline	60	40	0	0	0	0	60	40	0	0
2	Telgani	70	0	30	0	0	0	70	30	0	0
3	Meena Chowk	2	60	9	10	0	0	80		20	0
4	Musahari tole	70	10		30	0	70	10		30	0
5	Kamini Khadi	40		60		0	40	0	70	0	0
6	Dhobi	50	10	40		0					0
7	Nakatajihijh	20	30	0	50	0	20	30	0	50	0
8	Thera	10	65		20	0		70	10	20	0
9	Ramaidaiya Bhawadi	50			50	0	50	0	0	50	0
10	Kuhi Tole	10	90	0	0	0		0	0	0	0
11	Kalapani	40	40	10	10	0	40	40	10	10	0
12	Hardiya		93		5	2		93		5	2

Table 6.37: Means of transport for pulses and fruits

SN	Village	Pulses					Fruit				
		Tractor	Laborer	Cycle	Cart	Rickshaw	Tractor	Laborer	Cycle	Cart	Rickshaw
1	Ghalechowk Bichline	0	0	0	0	0	0	0	0	0	0
2	Telgani	0	0	0	0	0	0	0	0	0	0
3	Meena Chowk	0	0	0	0	0	0	0	0	0	0
4	Musahari tole	0	0	0	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	0	0	0	0	0	0	0	0
6	Dhobi	0	0	0	0	0	0	0	0	0	0
7	Nakatajihijh	0	0	0	0	0	0	0	0	0	0
8	Thera	0	100	0	0	0	0	100	0	0	0
9	Ramaidaiya Bhawadi	0	0	0	0	0	0	0	0	100	0
10	Kuhi Tole	0					10	90	0	0	0
11	Kalapani	0	0	0	0	0	100	0	0	0	0
12	Hardiya	0	0	0	0	0	0	0	0	0	0

Table 6.38: Means of transport for potato and vegetables

SN	Village	Potato					Vegetables				
		Tractor	Laborer	Cycle	Cart	Rickshaw	Tractor	Laborer	Cycle	Cart	Rickshaw
1	Ghalechowk Bichline	0	100	0	0	0	0	0	0	0	0
2	Telgani	0	60	40	0	0	0	0	0	0	0
3	Meena Chowk	0	100	0	0	0	0	0	0	0	0
4	Musahari tole	0	100	0	0	0	0	0	0	0	0
5	Kamini Khadi	0	0	100	0	0	0	0	0	0	0
6	Dhobi	0	90	10				20	80		
7	Nakatajhijh	0	100	0	0	0	0	100	0	0	0
8	Thera	0	100	0	0	0	0	100	0	0	0
9	Ramaidaiya Bhawadi	0	100	0	0	0	0	0	0	0	0
10	Kuhi Tole	0	0	0	0	0	0	0	0	0	0
11	Kalapani	0	100	0	0	0	0	100	0	0	0
12	Hardiya	0	93		5	2	0	93	7	0	0

Table 6.39: Means of transport for live animals

SN	Village	Mode of transport				
		Cycle	Motor Cycle	Cart	Laborer	Truck
1	Ghalechowk Bichline	0	0	0	100	0
2	Telgani	50	0	0	50	0
3	Meena Chowk	0	0	0	100	0
4	Musahari tole	0	0	0	100	0
5	Kamini Khadi	0	0	0	100	0
6	Dhobi	0	0	0	100	0
7	Nakatajhijh	0	0	0	100	0
8	Thera	15	10	0	100	0
9	Ramaidaiya Bhawadi	0	0	0	100	0
10	Kuhi Tole	0	0	0	100	0
11	Kalapani	0	0	0	100	0
12	Hardiya	0	0	0	100	0

7. PROCESSING OF AGRICULTURAL PRODUCTS

When discussed about the processing practices, none of the villages except Nakatajihij, Kuhu Tole and Hardiya reported to have been engaged in processing activities (Table 7.1). Nakatajihij talked about processing of sugarcane to produce raw sugar at domestic level, Kuhu tole reported about drying of tobacco leaves and a rice mill was operating in Hardiya. This suggests that the survey villages are primarily engaged in production of primary products. Value addition to the primary products was generally not in practice in the survey villages.

Table 7.1: Processing of agricultural products in survey villages

Village	Processing (Yes/No)	Processing details, if undertaken				
		Name of the processed product	Commodities used for processing	Place of processing	What is processed product used for	Who are the main players in processing?
Ghalechowk	no					
Bichline	no					
Telgani	no					
Meena Chowk	no					
Musahari tole	no					
Kamini Khadi	no					
Dhobi	no					
Nakatajihij	yes	Raw sugar	Sugarcane	Home	Feeding animals	HH member
Thera	no					
Ramaidaiya	no					
Bhawadi	no					
Kuhu Tole	yes	Dried tobacco leaf	Tobacco	Home	Dried leaf for chewing- HH consumption	HH member
Kalapani	no					
Hardiya	yes	Rice (Chamal)	Paddy (Dhan)	Village	Daily food/part of main course	Rice mill

8. AGRICULTURE SERVICE DELIVERY

As seen in the table 8.1 below, none of the villages except Nakatajhij, Thera and Ramaidaiya Bhawadi in Dhanusha district reported to have received any technical support services for enhancing competitiveness in agriculture production. Positive responses in these villages are understandable as these villages are located within the command area of JADP. Besides this, access of DADO and DLSO to these villages is high due to location advantage. On the other, Ghalechowk Bichline, Telgani, Meena Chowk, Musahari Tole and Kamini Khadi reported to have received microfinance service. This could be one of the reasons why farmers have not been able to improve their agricultural productivity despite of good access to irrigation facilities, including Ghalechowk Bichline, a DTW village. During the survey, none of the villages expressed their satisfaction with the quality and timeliness of the agricultural technology service. This reveals that there is urgent need to improve agriculture service delivery with technical know-how.

Table 8.1: Service Providers in study villages/MDCs

SN	Name of Org	Org type	Survey villages														
			Ghalechowk Bichline	Telgani	Meena Chowk	Musahari Tole	Kamini Khadi	Dhobi	Nakatajnih	Thera	Rmaid. Bhawadi	Kuhi Tole	Kalapani	Hardiya			
1	Sahara Nepal	NGO/MFI	M. finance (MF)	MF	MF												
2	Jiwan Bikas Samaj	NGO/MFI	MF		MF												
3	Ramnagar sugar mill	Sugarcane Factory Private Mill									Technical service Procurement of sugarcane						
4	Dhobi S&C coop	Coop								Credit							
5	DDC (Small irrigation)	Local Bodies									Technical service						
6	VDC	Local Bodies									Finance						
7	DADO, Dhanusha	Govt Line Agency									Technical service						
8	DLSO, Dhanusha	Govt Line Agency									Technical service						
9	National Federation of Water Users Group	NGO															
10	Agrovet	Private Firm															

9. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Carried out as part of JICA Preparatory Survey on Agriculture and Rural development Program in the Terai region, the objective of this village level survey was to collect the sample data on agricultural activities, agriculture distribution and input supply system and marketing in the survey villages. The survey used qualitative method to collect data through focus group discussions with key informants, village based local leaders, VDC Secretary and government officials. The survey was implemented in 12 villages of four target districts (Jhapa and Morang in the EDR and Dhanusha and Mahottari of the CDR) comprising 3 villages from each district. Twelve villages were selected in such a way that there would be at least 1 GW irrigation system from each district. Finally, the study included 2 villages with DTW, 2 villages with STW and 8 villages with SI. Since a separate study was carried out to study the operation of selected irrigation systems, which included these 12 irrigation systems as well, this report is focused on providing detail overview and sample data on agricultural activities, agriculture distribution and input supply system and marketing in the survey villages. This section summarizes key findings, draws conclusions and provides some recommendations based on the key findings and conclusions drawn.

Agricultural Activities

All the 12 survey villages are located in Terai region which is an extension of the Gangetic plains into the southern part of Nepal and regarded as food basket of Nepal. In all survey villages, cereal crops, particularly main rice including early rice, maize and wheat are extensively grown. Because of the tropical and sub-tropical climate in the survey villages, food crops, vegetables and fruits of tropical and sub-tropical nature (mango, litchi, jack fruit, banana, guava etc.) are the main agricultural produce. Apart from crops, farmers have been keeping livestock for milk and draught purposes. Government, both central and local, has worked in Terai region of Nepal intensively to improve the irrigation facilities as exemplified by Hardinath Irrigation System, the construction of which was started in 1960 and completed in 1967, initiation of JADP in 1970s and implementation several ground water development projects in addition to large and medium irrigation projects like Morang-Sunsari Irrigation Project and Kankai Irrigation Project.

The survey villages are predominantly agricultural villages with majority of the people deriving their livelihoods from agriculture, although recent years has seen increased outmigration of youths from these villages like other parts of Nepal as well to gulf countries in search of employment and providing cash income for their families remaining at home. A large majority of farmers in the survey villages were small with average landholding size ranging between 0.47 and 1.06 Ha per HH. Farming is the key occupation of all survey villages and constituted as one of the major livelihood strategies. As discussed in this report, the importance of agriculture has not decreased in the survey villages despite of remittance obviously competing with farming for key cash income source. Effective agriculture mechanization program is required to address the problem of labour shortage.

With regards to the situation of crops grown in the survey villages, the survey found productivity of all cereal crops low and fluctuating from year by year despite of the provision of year round irrigation facilities through DTW and STW in recent years. While rice is the most important cereal crop for these survey villages, its productivity is low in both irrigated and unirrigated areas compared to its potentialities. Data and information presented in this survey reveal that there has been no change in rice area over the last five years in all survey villages except Thera and Nakatajhijh where the key informants reported that the area has been changing every year depending on the rainfall condition. Generally most of the farmers have refrained from using DTW facilities due to high electricity charge with imposition of additional demand fee by classifying its uses for industrial purposes (e.g. Ghalechowk

Bichline, Prithivinagar VDC, Jhapa district) aggravated by electricity load shedding. While these villages have also high potential for winter and spring maize, neither its area nor productivity increased commensurating to the improved irrigation facilities. This suggests that agriculture in these areas is still dependent on rainfall condition and farmers have not been able to benefit sufficiently from the developed irrigation facilities. Lentil is other most important pulse crop which is grown in the Terai region of the country and grown even in rain-fed condition. However, the survey found area under lentil in survey villages very limited and not increasing over the last five years. Major cropping patterns observed in the areas are:

- **Irrigated low land areas:** (a) Rice-Wheat-Maize (b) Rice-Maize-Rice (c) Rice-Wheat-Rice and (d) Rice-Potato-Vegetables
- **Unirrigated low land areas:** (a) Rice-Wheat-Fallow (b) Rice-Lentil-Fallow (c) Rice-Fallow (d) Rice-Maize

In irrigated areas also, majority of farmers have been following cropping pattern of unirrigated low land areas due to poor irrigation facilities or not being able to use the facility due to high irrigation cost caused by high electricity tariff as discussed above. In survey villages, majority of the farmers reported increase in cost of production due to increase in cost of production inputs such as seeds, farm labour and fertilizers in recent years. However, they do complain that there has been no increase in prices of the outputs/crops corresponding to the increase in cost of production. If the cost of the family labor is considered, farming will be a losing enterprise. None of the survey villages have been able to increase sale substantially over the last five years with the improvements in the irrigation system.

The survey also found almost non-existence of coordination between the irrigation service providers and the agricultural technology service providers (extension service). The study concluded that there is plenty of opportunities for improving yields of cereals and reducing cost of production in survey villages.

The survey noted that still a large majority of farmers in all survey villages irrespective of the type of available irrigation facilities have been using traditional storage practices and that the proportion of HHs using modern storage practices is very small. Shortages of labour and mass exodus of youths from the villages have led many farmers to leave land fallow during winter season and adopt less intensive practices. Generally, survey villages were found primarily engaged in production of primary products. Value addition was almost non-existent in the survey villages except the production of raw sugar in Nakatajhij.

Agriculture Distribution and Input Supply System

This study revealed that farmers in the survey villages receive production inputs from different sources. However, it found increased role and participation of agro-vets in making agricultural inputs, particularly seeds, fertilizers and pesticides, available to the farmers. If the government appropriately uses them, often observed shortage of chemical fertilizers and improved seeds during the key production season could be minimized. This survey shows that most of the farmers have been getting their production inputs from the agro-vets. If quality training is provided to selected agro-vets owners after rigorous needs and capacity assessment and later mobilized them effectively, number of grassroots extension workers could be reduced.

The study found irrigation cost per Ha highest among DTW followed by STW and almost none for SI. Therefore, unless the production competency of DTW and STW users is increased through the use of appropriate modern technologies, users of DTW could remain in some disadvantageous position.

Agricultural Marketing

The survey revealed that farmers in the survey villages generally sell their produces in four places namely, (a) village (b) village market centre (c) Haat Bazar. and (d) District market. Most of the farmers in the survey villages reported that they have been selling their products to meet their immediate cash needs, some amount right after harvest and some amount later on. However, FGDs confirmed that local people's capacity to store longer to receive higher price in the future is low. Many farmers indicated that they do have no capacity and skills to adjust production with the demand so that they could receive a fair price for their products. With regards to the market price information, the survey revealed that most of farmers in the survey villages are receiving information from television followed by radio/FM, traders and neighbors. Surprisingly, none of the villages reported to have received market information through mobile phones suggesting little use of modern information communication technology (ICT) in agriculture.

Of the different commodities produced in the survey villages, the early rice is generally produced for markets. 70 to 85% of early rice is sent to markets for sale. Except Kalapani of Mahottari district, no other villages reported to have produced and sold spring maize. Likewise, sugarcane, jute and oilseeds are produced exclusively for sale. These are the sources of cash income in the villages. Sugarcane is produced in Nakatajhij and jute in Musahari village of Morang district.

Recommendations

Based on the key findings and conclusions drawn above, this survey report suggests the following:

- There is an urgent need not only to improve and rehabilitate the old irrigation facilities and construct new facilities but also to provide simultaneous focus on strengthening coordination between agriculture and irrigation. Failure to sufficiently integrate agriculture technology service providers with irrigation service providers from the beginning to the handover of the facilities will not bring about anticipated results. After the rehabilitation of the existing system or development of new facilities, let the system be handed over to farmers/users witnessed by the agriculture extension service providers with time-bound action plan and targets (objectively verifiable) to both the farmers and agricultural extension, The performance of the extension service should be measured in terms of the production increase in newly developed or rehabilitated irrigation command area. Development of irrigation facilities is necessary but not sufficient for increasing production.
- Poor utilization of the irrigation facilities, particularly DTW and STW, is due to the weak or fragile ownership of the system on the part of the irrigation users. When the system is handed over to an unorganized group which has not undergone rigorous social mobilization process, it is very likely that the majority of users would not own the system wholeheartedly. The users would look upon government or external assistance for even a small works which they could have done very easily in short time when they are united and acted collectively. Therefore, like the case of rural drinking water system being practiced in most of developing countries including Nepal, it is high time for the government to undertake social mobilization activities first for a few months in a proposed irrigation development/rehabilitation site with a view to facilitate the evolution of water users group from the grassroots level by themselves. Thus evolved water users groups should be given responsibility for undertaking construction and rehabilitation of the system and thereafter follow-up activities including the crop diversification and intensification processes to effectively utilize water . The old system should not be

rehabilitated unless the users are able to plead their case. Even when the old water user group is present, it is essential to assess the performance of the group from the perspective of good governance and other performance related indicators after social mobilization. The rehabilitation works should be carried out only thereafter. Key to social mobilization is the evolution of strengthened, responsible and democratic organizations which are not only able to establish but also claim for better coordination and linkages with the government agencies.

- Agriculture in the survey villages show increased shortages of labor as a result of outmigration of youths in search of employment opportunities. Government should consider providing price subsidies and grants to active farmer groups and cooperatives to enable them to use agricultural machineries like tractors (4 wheels and two wheels), rotavators, seed drills, combine harvesters harrows, pump sets and tillage equipment. Targeted subsidies like credit support to help rural women purchase small-scale tractors and pump sets could be useful against the universal subsidy.
- As this village level study was carried out in some selected irrigation command areas on sample basis, it is very important to undertake a rigorous socio-economic survey in the final proposed irrigation command areas so as to establish baseline indicators against which to measure performance of the irrigation system in the future and provide data and information for strengthening coordination between agriculture and irrigation. The proposed socio-economic study could be used as a tool for interaction between farmers and extension workers and between irrigation facility developer and extension workers.
- Returns from the agriculture sector have remained low. High cost of production and low income for majority of the crops suggest the need for promoting agricultural mechanization and taking effective policy and institutional measures to lower the cost of production with a view to support farmers to enhance productivity per unit land by appropriate and proper utilization of irrigation facilities. Therefore, the survey suggests to implement agriculture development programs in the survey districts characterizing VDCs within it based on the extent of access to irrigation facilities (high access, medium access and low access) and simultaneous improvements in agriculture service delivery. Strong and effective linkage of extension service with national research system is crucial.
- Unless the present agricultural extension system is reformed, the objective of enhancing agricultural productivity by effective utilization of irrigation facilities would remain remote. Therefore, the survey strongly recommends to reform the present dominant conventional top-down government agricultural extension system with a view to promote client orientation, participatory and accountable extension service capable to use modern ICT facilities and advice farmers effectively. The cooperative extension system could be an alternative to consider in the present context or effectively receive the participation of local government body, the Village Development Committees, in agricultural extension.

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Preparatory Survey on JICA's Cooperation Program for Agriculture
and Rural Development (*Food Production and Agriculture in Terai*)

Sample Survey on
Water Management and Water User Associations

FINAL REPORT

June 2013



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Abbreviations

DTW	Deep Tube well
GWIP	Ground Water Irrigation Project
ha	hectare
IP	Irrigation Project
ISF	Irrigation Service Fee
JICA	Japan International Cooperation Agency
STW	Shallow Tube well
VDC	Village Development Committee
WMC	Water Management Committee
WUA	Water User Association
WUC	Water User Committee
WUG	Water User Group

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1 INTRODUCTION

1.1 Background

Japan International Cooperation Agency (JICA) entrusted Nippon Koei Co. Ltd, Vision and Spirit for Overseas Development Co. Ltd and CDC International Cooperation, hereafter JICA Study Team (JST) to undertake preparatory survey on JICA's Cooperation Programme for Agriculture and Rural Development (Food Production and Agriculture in Terai). This study intends to analyze current situation and critical issues in agriculture and rural development in Terai plains of Nepal and intends to identify feasible and adequate approaches for the proposed "Integrated Agriculture and Strengthening Project".

JST sub-contracted NARMA Consultancy Pvt Ltd to undertake a study on "**Sample Survey on Water Management and Water User Association**" as part of its aforementioned "JICA Preparatory Survey on the Agriculture and Rural Development program in the Terai Region". This report has been prepared based on information collected on sample data on water management and water users' association in four target Terai districts namely, Jhapa, Morang, Dhanusa and Mahottari.

1.2 Objective of the Study

The main objective of the study is to collect sample data on water management and water users' association (WUAs) in four target Terai districts namely, Jhapa, Morang, Dhanusa and Mahottari. The scope of the work includes:

- Review, amend and finalize questionnaires
- Collect inventory data on irrigation schemes and water user associations in the target districts (Jhapa, Morang, Dhanusa and Mahottari)
- Select 16 water user association for sample survey
- Organize and facilitate focus WUA discussions with select water users' association
- Analyze data and prepare report

1.3 Study Methodology

1.3.1 Survey questionnaire finalization

JICA study team has prepared a draft survey questionnaire/checklist covering (a) Irrigation condition (b) Water management (c) institutional governance and (d) water resource mobilization. NARMA study team further elaborated the survey questionnaire/checklist for computerization of data entry, data analysis and making it survey friendly. Pre-testing/field trial of questionnaire was carried out in one irrigation project of Dhanusa district. Questionnaire and checklists was revised based on field level interaction. **Annex 1** presents preliminary findings of the checklists together with methods adopted for ensuring **Annex 2** presents elaborated checklist which was used for the study.

1.3.2 Sample size

Water user Associations survey was conducted in those areas where other two components of the study were executed, i.e. (a) Village Survey and (b) Farm Household Survey. This means that the irrigation system was same for all three studies but focusing on different aspects according to the objective and the scope of work.

The study intended to conduct 16 water user association/water user WUA survey representing different type of irrigation system, surface, ground water and conjunctive use. Preliminary field visit shows that none of the district have conjunctive use irrigation, hence sample from these area was discarded. Table 1.1 below presents number of water user association planned for survey. The attempt to ensure fair representation of different irrigation system.

Table 1.1: Number of water user association initially planned for survey

	Surface irrigation		Ground Water		Total
	Less than 1000 ha	1000 – 2000 ha	Shallow tube well	Deep tube well	
Jhapa	1	1	1	1	4
Morang	1	1	1	1	4
Dhanusa	1	1	1	1	4
Mahottari	1	1	1	1	4
Total	4	4	4	4	16

The sample size was further revised from Morang and Dhanusa district after preliminary field visit because Morang district don't have surface irrigation scheme above 1000 ha. Likewise, sample size of Dhanusa was replaced with deep tube well because shallow tube well are operating on individual basis and WUA is virtually non-existent. Table 1.2 below presents revised sample size for each district. Hence, study studied 16 water user associations, four from each districts. Eight were selected from surface irrigation and 8 were from ground water.

Table 1.2: Number of water user association initially planned for survey

	Surface irrigation		Ground Water		Total
	Less than 1000 ha	1000 – 2000 ha	Shallow tubewell	Deep tube well	
Jhapa	1	1	1	1	4
Morang	2	-	1	1	4
Dhanusa	1	1	-	2	4
Mahottari	1	1	1	1	4
Total	5	3	3	5	16

1.3.3 Sample selection

Following sequential steps were followed for selection of sample for study.

Step I: Reconnaissance field visit to identify operational irrigation schemes in the target districts: The study conducted reconnaissance field visit on each district to obtain list of irrigation projects which are operational. The study rely on information provided by the Divisional Irrigation Office, Ground Water Field Office and Janakpur Agriculture Development Project for obtaining list of irrigation project.

The inventory of the irrigation project was prepared while focusing on:

- Name of Irrigation Scheme
- Location (VDC and district)
- Command area
- Dominant Caste (Dominant caste on WUA)

Step II: All irrigation project/scheme were classified on the basis of type, society and size (area or number). Sample are expected to selected representing all above area in terms of size and society, representing both close, open and mix society. Guided by above criteria, study team and JICA study team jointly selected 16 irrigation scheme/project randomly for the water management and water user association survey. Discussions were also held with the Divisional Irrigation Office and Ground Water Field Office for finalization of sample.

Type	Size (Area and number)	Society
Surface irrigation system	Upto 1000 ha	Open society (Hill caste) & close society (terai caste)
	Above 1000 ha	
Ground water irrigation system	Shallow tube well	Open society (Hill caste) & close society (terai caste)
	Deep tube well	

Table 1.3 presents list of surface irrigation project selected for the study along with their characteristics. Very limited choice was available for large scale surface irrigation (above 1000 ha), hence they were selected on the basis of size. However, small scale irrigation (upto 1000 ha) are selected on the basis of size and society. Attempts have been made to represent all type or category of society living on the study districts. Map 1.1, Map 1.2, Map 1.3 and Map 1.4 shows study irrigation projects of Jhapa, Morang, Dhanusa and Mahottari district respectively.

Table 1.3: List of surface irrigation project selected for study

District	Name of scheme (IP)	VDC	Command area (ha)	Dominant society*	Size of scheme	Selection basis
Jhapa	Lower Kisni Khola	Gaurigunj	1500	Open (Hill caste)	Above 1000 ha	Size
	Bhuteni Sainik Khola	Garamani	350	Open (Hill caste)	Upto 1000 ha	Size & open society
Morang	Ke.Bho.Le.Na.	Kerabari,	780	Open (Hill caste)	Above 500 ha	Location & geographic coverage
	Musarghatta	Amardaha	600	Open (Hill caste)	Above 500 ha	Location & geographic coverage
Dhanusa	Hardinath	Harsar Banimiya	1000	Closed (Teria caste)	Above 1000 ha	Size
	Jallad	Ramdaiya	700	Closed (Teria caste)	Upto 1000 ha	size & society
Mahottari	Bighi	Mahadaiya	2000	Closed (Teria caste)	Above 1000 ha	Size
	Kalapani	Gauribas	200	Open (Hill caste)	Upto 1000 ha	Size, society & location

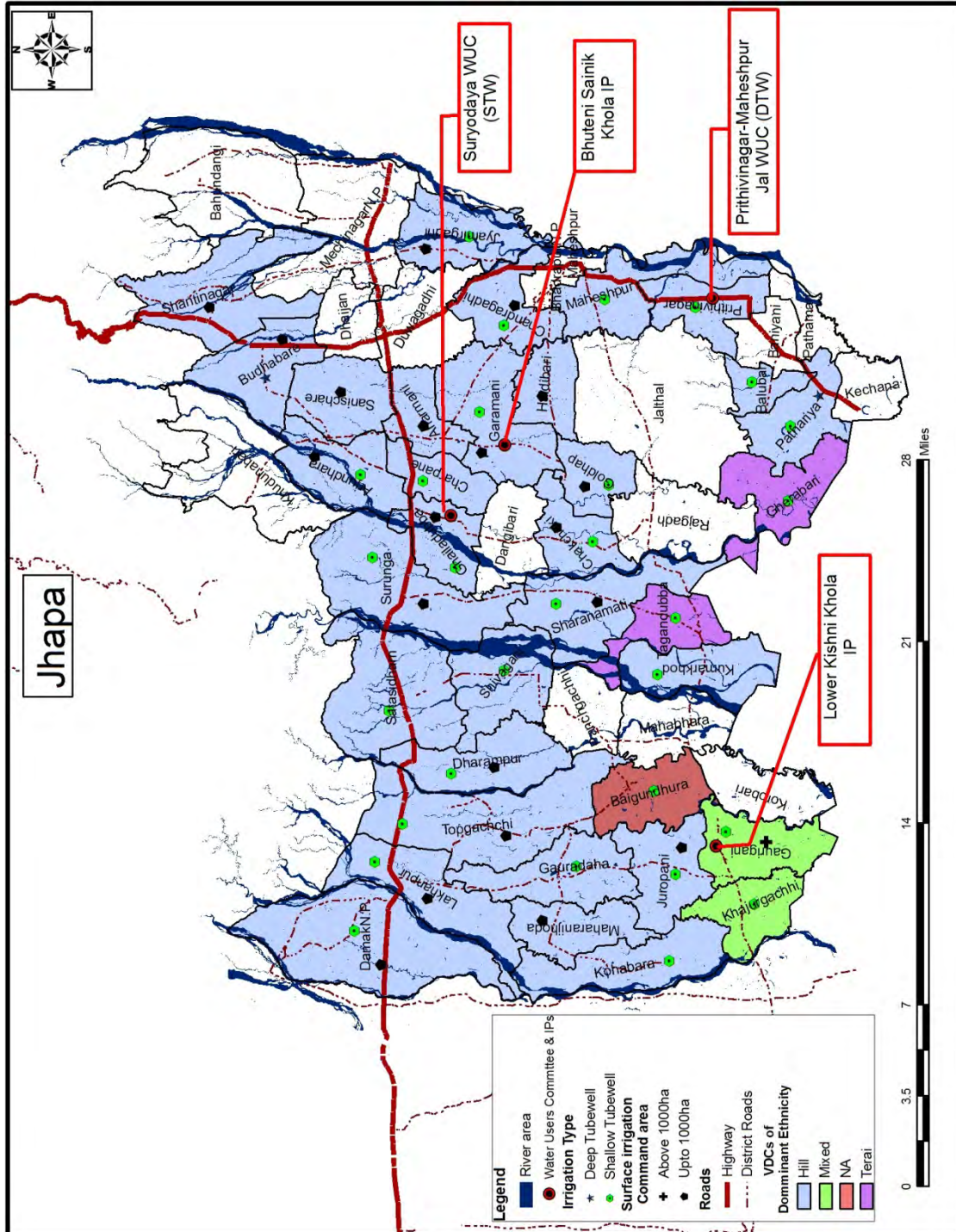
Table 1.4 presents list of ground water irrigation user WUA selected for the study. Of 8 ground water user WUA selected, five were from Deep tube well (DTW) and rest were from Shallow Tube Well (STW).

Table 1.4: List of ground water irrigation project selected for study

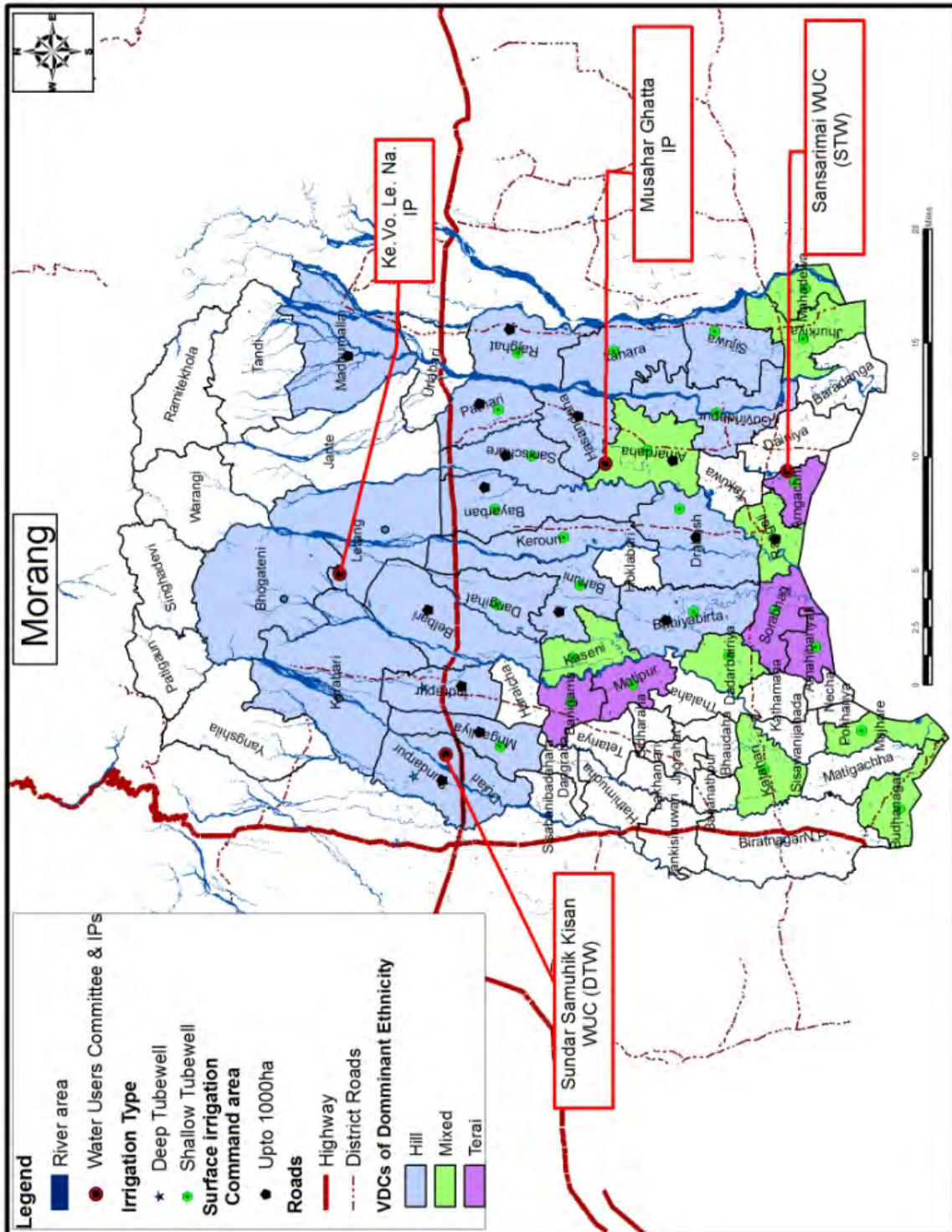
District	Name of WUCs	Location (VDC)	Type	HHs	Command area (ha)	Dominant society*	Selection basis
Jhapa*	Surodaya WUC	Ghaila dhubba	STW	22	14.2	Open (Hill caste)	Society and Location
	Prithivinagar Maheshpur Jal	Prithivinagar	DTW	40	40.0	Open (Hill caste)	Society and Location
Morang	Sundar Samuhik Kisan	Sundarpur	DTW	64	44	Open (hill caste)	Society and Location
	Sansarimai	Aamgachhi	STW	18	14.2	Closed (Teria caste)	Pump number & society
Dhanusa	Binihi Deep tubewell*	Binihi	DTW	111	50	Closed (Teria caste)	Society and Location
	Naktajhij tubewell*	Naktajhij	DTW	150	43	Closed (Teria caste)	Society and Location
Mahottari	Sanakishan	Paraul	STW	200	130	Closed (Teria caste)	Pump number & society
	Shiva Parbati	Laxmaniya	DTW	82	70	Closed (Teria caste)	Society and Location

Note: * DTW developed Janakpur Agriculture Development Project

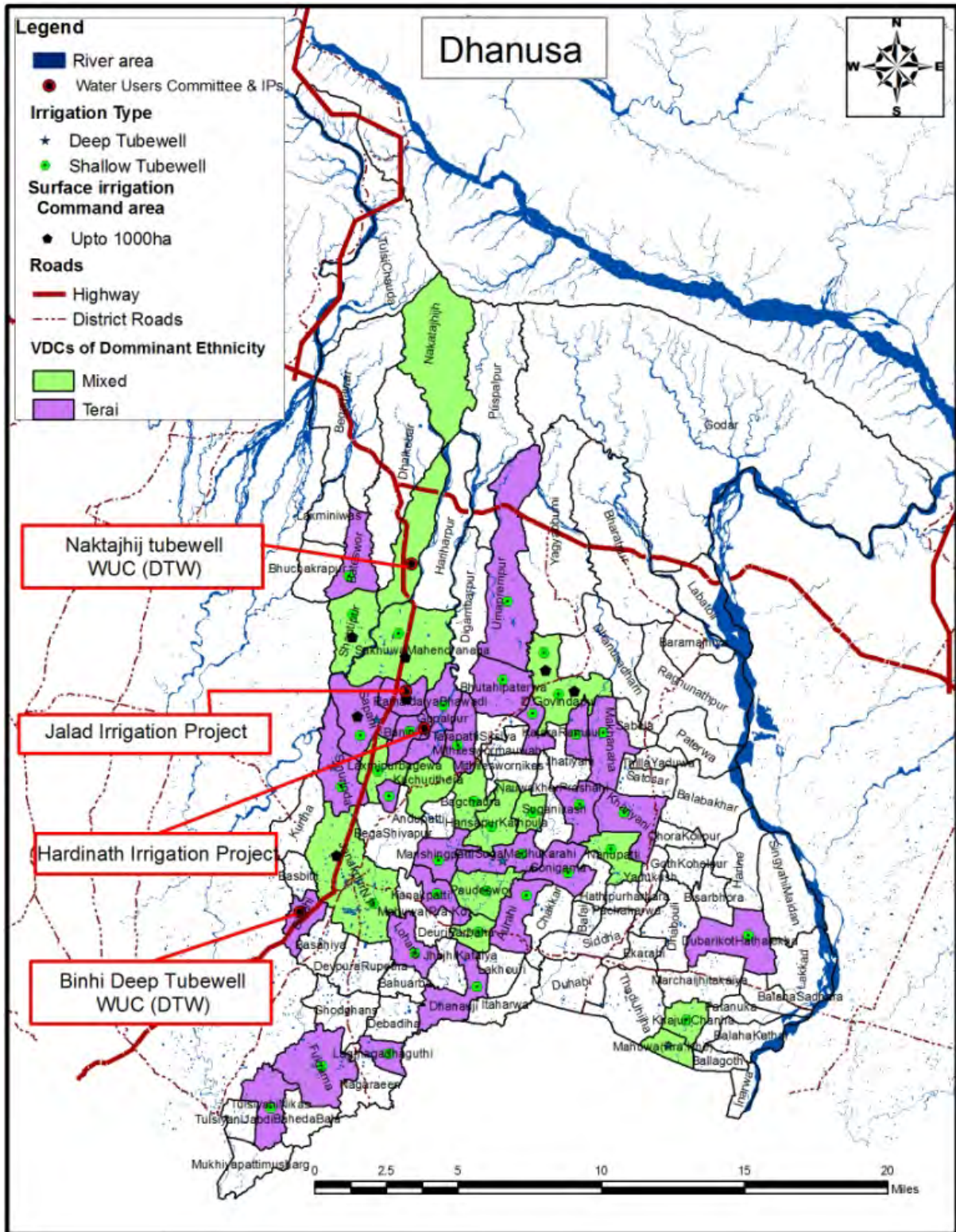
Map 1.1: Irrigation schemes/water user associations studied from Jhapa district



Map 1.2: Irrigation schemes/water user associations studied from Morang district



Map 1.3: Irrigation schemes/water user associations studied from Dhanusa district



1.3.4 Consultation procedure

The study adopted following procedures for village level survey.

Kick-off meeting/entry point meeting with the key office bearers of the WUAs/WUGs was carried out to explain purpose of the study, collect preliminary information and finalize date of consultations, venue of consultation.

Water user association were requested to invite potential participants together with explaining the purpose of consultations. List of invitees were from (a) office bearers of WUAs/WUGs (b) Village based organization leaders (c) watch man/water master (d) Leaders of agriculture WUAs (e) water users etc (f) local leaders

Facilitation of consultations: The survey coordinator will facilitate consultations with the help of checklist. Annex II presents checklists used for survey.

Validation of consultations results: Depending upon the study findings, survey coordinators may further conduct small one to one personal discussions with few participants to further validate study findings.

1.4 Data Analysis and Reporting

Making things visible was main strategy of data analysis and reporting. The study adopts both the qualitative and quantitative analysis. Qualitative data were analyzed following the content analysis whereas quantitative were analyzed following descriptive statistics. Each water user level information was on the report while on summary of water user WUA is presented on main volume by area of enquiry.

2 SURFACE IRRIGATION

2.1 Introduction

Table 2.1 presents list of irrigation project studied under the surface irrigation with irrigation scheme information from **Annex 2 to Annex 10**. The study studied 8 surface irrigation project (IP). All studied irrigation project are traditional or operational from more than a decade. Few irrigation project has also got support for rehabilitation as well. Number of benefitting households varies from 199 to 4000 HHs. This is mainly related with size the project. The number presented here might be quite high than recorded number because farmer/user also counted those households who benefitted from flooding water of canal during rainy season. Mainly households at the tail end of canal benefitted from flooding water during summer season. Number of VDCs covered by irrigation project varies from 7 in Bigihi to 1 in Kalapani and Bhuteni Sainik. The number of VDC coverage of the IP directly correlates with size of irrigation project and number of households benefitting.

Table 2.1: Year of construction and benefited households of irrigation project

SN	Name of IP	Year of construction	Major repair/ rehabilitation year	No of HHs benefitting	No of VDC covered
1	Kalapani Irrigation WUA	1971	2008	199	1
2	Bigihi Irrigation WUA	1993	-	4000	7
3	Hardinath Western Irrigation WUA	1967	1997	2500	6
4	Jallad WUA	1950, traditional	2007	1381	1
5	Bhuteni Sainik Irrigation WUA	1976	1994	272	1
6	Lower Kisni Khola Irrigation WUA	2002	2011	1096	2
7	Ke.Bho.Le.Na Irrigation WUA	traditional	On-going	780	4
8	Musarghatta Paini Irrigation WUA	1987		305	2

Source: Focus group discussions with WUA

2.2 Irrigated Area

During focus WUA discussions, users are requested to provide irrigated area of each studied irrigation project over last five years. Users are either poorly keeping records of irrigated area or records of irrigation are not maintained properly. This is mainly because of less poor performance of irrigation system. Table 2.2 presents irrigated area under each studied project. Irrigation coverage is very less on winter and spring however, it is relatively high on summer. However, it is very difficult ascertain summer irrigation area since water flooded from canal. Farmers accounted them as irrigation as well. This reveals poor coverage of the irrigation across all the studied irrigation project

Table 2.2: Irrigated area of studied irrigation project

SN	Name of IP	Irrigable area (ha)	Irrigated area (ha)		
			Summer	Winter	Spring
1	Kalapani Irrigation WUA	201	180-201	60-70	10-35
2	Bigihi Irrigation WUA	3000	1800-2000	400-500	-
3	Hardinath Western Irrigation WUA	1000	900- 1000	150-200	-
4	Jallad WUA	700	500-700	150-200	75-100
5	Bhuteni Sainik Irrigation WUA	300	200-225	100-110	70-80
6	Lower Kisni Khola Irrigation WUA	1100	1000-1100	350-400	100-200
7	Ke.Bho.Le.Na Irrigation WUA	780	680-750	100-150	100-150
8	Musarghatta Paini Irrigation WUA	550	450-550	250-325	80-100

Source: Focus group discussions with WUA

As a result of poor coverage of irrigation, farmers generally cultivate only on crop per year, mostly paddy. Large proportion of land remain fallow, especially during winter and summer season. Cropping intensity vary from 120 to 140 percent. This reveals poor contribution of irrigation on crop intensification. Table 2.3 presents major crops and cropping intensity on study area.

Table 2.3: Major crops and cropping intensity

SN	Name of IP	Cropping intensity (%)	Cropping intensity (%)		
			Summer	Winter	Spring
1	Kalapani Irrigation WUA	150	Paddy	Wheat, potato	Early paddy, maize
2	Bigihi Irrigation WUA	125	Paddy	Wheat, potato	Early paddy, maize
3	Hardinath Western Irrigation WUA	125	Paddy	Wheat, Oil crops	
4	Jallad WUA	120	Paddy	Wheat, Oil crops	
5	Bhuteni Sainik Irrigation WUA	140	Paddy	Wheat, Oat, maize	Early paddy, maize, vegetables
6	Lower Kisni Khola Irrigation WUA	140	Paddy	Wheat	Early paddy
7	Ke.Bho.Le.Na Irrigation WUA	140	Paddy	Wheat	Early paddy
8	Musarghatta Paini Irrigation WUA	140	Paddy	Wheat	Early paddy

Source: Focus group discussions with WUA

2.3 Water Source

Water source for all studied irrigation project is river, which have round the year discharge. Water is available throughout year, however volume of discharge differs by season. Flow of water on river is high from July to October while low from March to June. Water availability is very high across all the studied project during summer season. Excess water flow from canal because of leakage or flooding from main canal. Water flooded from irrigation canal during summer. Water supply is limited during winter season, hence farmers regulate and control supply of water for irrigation such that every farmers get water at-least once to irrigate crop. Water remain scare during spring, mainly because of limited amount of water flow from canal. Apart from this, siltation and sedimentation in-front of canal often result on acute shortage of water for irrigation. This situation remain similar across all the studied project. However, water diversion at up-stream of Hardinath (nearly 1 km upstream from barrage) resulted on less flow of water. This had significantly reduced water availability.

Table 2.4: Water availability for irrigation by season

SN	Name of IP	Water quality	Source	Water availability		
				Summer	Winter	Spring
1	Kalapani Irrigation WUA	Good	River, Perennial	High	Limited	Scare
2	Bigihi Irrigation WUA	Poor, , polluted by paper factory	River, Perennial	High	Limited	Scare, but water polluted
3	Hardinath Western Irrigation WUA	Good	River, Perennial	High	Limited	Scare, water tapped at upstream
4	Jallad WUA	Good	River, Perennial	High	Limited	Scare
5	Bhuteni Sainik Irrigation WUA	Good	River, Perennial	High	Limited	Scare
6	Lower Kisni Khola Irrigation WUA	Good	River, Perennial	High	Limited	Scare
7	Ke.Bho.Le.Na Irrigation WUA	Good	River, Perennial	High	Limited	Scare
8	Musarghatta Paini Irrigation WUA	Good	River, Perennial	High	Limited	Scare

Source: Focus group discussions with WUA

Water is less polluted and no remarkable solid particles were observed on water source along all the studied irrigation project. Hence water quality was rated good. However, water of Bigihi is highly polluted by paper factory. Paper factory is discharging water without any treatment. Water is dark and blackish. Farmers complained about dying of plant and animal health problems due to poor quality water in river.

2.4 Irrigation Condition

Table 2.5 presents condition of head work and canal. Table reveals that all the head work are not functioning properly. Head work are either damage or need major rehabilitation. High sedimentation and siltation on head work were observed across all the studied project. Likewise canal are not on designed structure. Water regulation structure are either damaged or not stalled. There is high leakage of water for irrigation. There is no scientifically constructed field channel. This is one of the major problems, which have not only decreased irrigated area but has also created unbalances on crop water (water supply is either high or low). This may contribute for reducing crop yield. Farmer field canal are temporary and not well developed. Field to field irrigation are being carried out. Farmer construct temporary field canal for irrigating winter crops which even get damage during summer season. Flooding on canal is quite common due to poor functioning of water regulation structure at head as well as branch canal. Water are tapped directly from branch canal. The condition of irrigation remain same across all the studied irrigation project. The study could not found farmers' permanent field channel is in the field. Farmers' made temporary field channels as per requirement only for dry season and collapsed it in paddy season.

Table 2.5: Irrigation condition of studied project

SN	Name of IP	Head work	Canal condition		
			Main	Branch	Farmer
1	Kalapani Irrigation WUA	Water diversion, damage, sedimentation, siltation	Poor, eroded, sediment	Poor, no water regulate structure, water leakage, erosion	Not developed
2	Bigihi Irrigation WUA	Weir, sedimentation, flooding	Poor, eroded, broken, damage	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed
3	Hardinath Western Irrigation WUA	Barrage, sedimentation, damage of gate	Poor, eroded, sediment, leakage, berm damaged	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed,
4	Jallad WUA	Water diversion, mud, damage by flood	Poor, eroded, broken, damage	Poor, no water regulation structure, leakage	Not scientifically constructed
5	Lower Kisni Khola Irrigation WUA	Weir, sedimentation, damage of gate	Poor, eroded, broken, damage,	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed
6	Bhuteni Sainik Irrigation WUA	Weir, sedimentation, damage of gate	Poor, eroded, broken, damage, broken at road side	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed
7	Ke.Bho.Le.Na Irrigation WUA	Water diversion, construction being done	Poor, eroded, broken, damage, broken at road side	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed
8	Musarghatta Paini Irrigation WUA	Weir, sedimentation, damage of gate	Poor, eroded, broken, damage	Poor, water regulation structure damage, water leakage, erosion	Not scientifically constructed

Source: Focus WUA discussions with water user association

Guided by above, table 2.6 presents assessment of irrigation condition while considering condition of head work, main canal, field canal and farmer canals. Irrigation condition is poor across all the studied project but operational. It is very difficult to ascertain whether they are operational or not since very less area is irrigated. Water don't flow adequately from head to tail. Irrigation projects are working seasonally, mainly on summer season. It is mostly used for paddy crop while utilization for winter and spring crop is limited. There is leakages on canal along with bank erosion and sedimentation.

Table 2.6: Assessment of irrigation condition

SN	Name of IP	Assessment
1	Kalapani Irrigation WUA	Poor, but operational. Irrigation can be done on summer season with limited water supply on winter and spring; need major rehabilitation of head work, main canal and branch canal
2	Bigihi Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need removal of sedimentation and maintenance of head work, main canal and branch canal
3	Hardinath Western Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need rehabilitation of head work, main canal and branch canal
4	Jallad WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need rehabilitation of main canal and branch canal
5	Bhuteni Sainik Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need removal of sedimentation and maintenance of head work, main canal and branch canal
6	Lower Kisni Khola Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need removal of sedimentation and maintenance of head work, main canal and branch canal
7	Ke.Bho.Le.Na Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need maintenance main canal and branch canal
8	Musarghatta Paini Irrigation WUA	Poor, but operational. Irrigation done on summer season with limited water supply on winter and none in spring; need removal of sedimentation and maintenance of head work, main canal and branch canal

Source: Focus group discussions with WUA

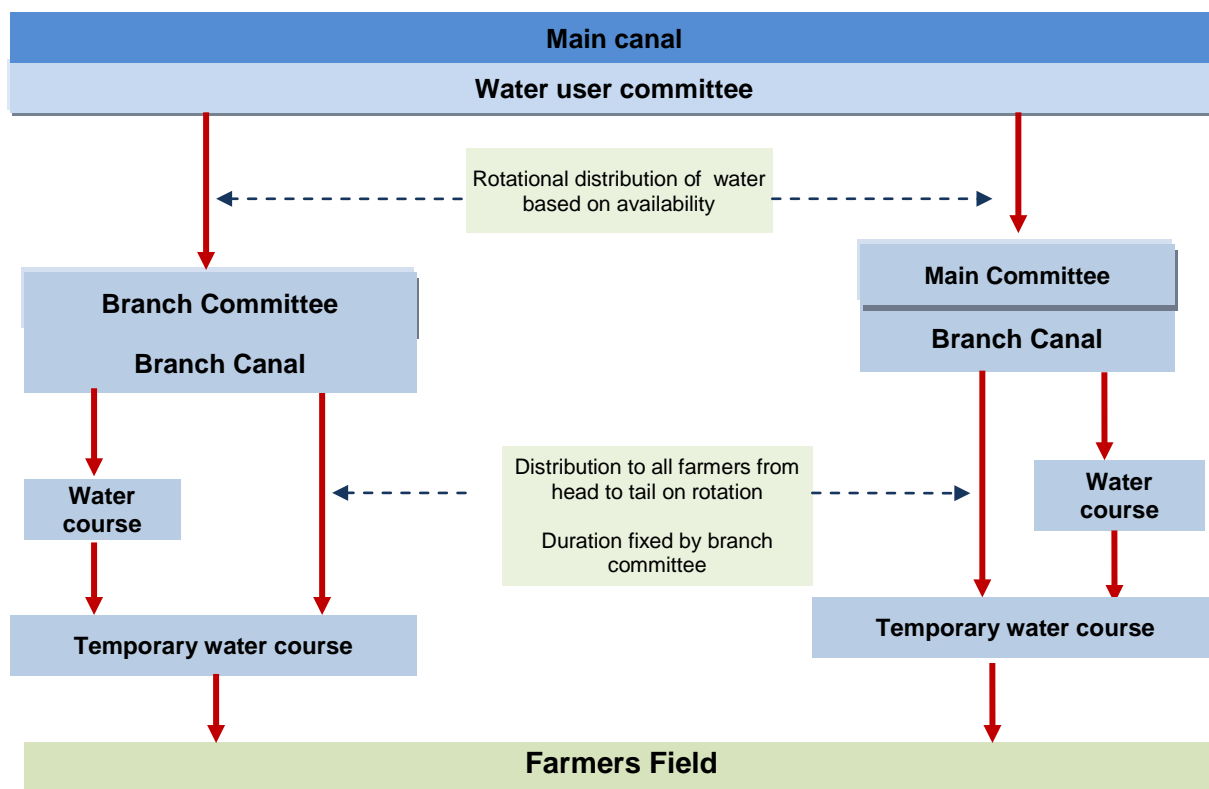
2.5 Water Distribution

2.5.1 Water distribution system

Figure 1 presents water distribution system of studied irrigation project. There is no water distribution system or mechanism on summer. Water is abundant on summer season, even flooded from canal. There is no mechanism to control and regulate water supply. Hence, water flow freely on main canal and branch canal. Farmer irrigate crop as per their requirement. Water control or regulation structure are poorly developed. Likewise, field canal is poorly developed. Field to field irrigation is carried out during summer season. This often created flooding or waste of water. Irrigation generally started from head of the canal and gradually move towards the tail end.

Water is scarce on winter and spring season, specially for wheat and early paddy. Water is distributed on rotational basis on winter and spring season. The committee distribute water to the branch canal on rotational basis, which vary from 2 to 7 days per crops season. Water is distributed for at-least two times, first after 3 to 5 week of planting of wheat and second after 8 to 10 week of planning. Farmers adjoining main canal pump water directly to irrigate crop. Committee are not enforcing rule for discouraging such practices. Committee distribute water on rotational basis to branch canal. Specific time period or days is allocated for each branch canal. Branch committee/main committee look after water distribution at farmer field. Water is distributed based on land size from head to tail. Temporary water course are constructed to supply water. Specific duration (hours) is also allocated to each farmer. Time start once water reaches to the farmer's field.

Figure 2.1: Water distribution system, mainly for winter season



Medium irrigation project above 1000 ha have branch committee such as Hardinath, Bigihi, Ke.Bho.Le.Na and Lower Kisni Khola. The committee comprises of 7 to 11 members. The committee distribute water to farmers, mitigate branch level conflict and collect ISF. Part of the ISF collected committee is kept by the committee for their operation (generally 10%). However, such practices differs by irrigation project. About 10% of ISF is kept by Ke.Bho.Le.Na & Lower Kisni Khola Irrigation WUA, while no such practice was seen on Hardinath Western and Bigihi Irrigation WUA. Table 2.7 presents existence of bra

Table 2.7: Existence of branch committee and employment of watch man

Name of IP	Formation of branch committee	Watch man/operator	Activeness of branch committee
Kalapani Irrigation WUA	No branch committee , managed by main committee	1, seasonal	Not applicable
Bigihi Irrigation WUA	7 branch committee formed and functional	1, full time	Active, during winter season only
Hardinath Western Irrigation WUA	21 branch committee formed & functional , distribute waters, mitigate conflict among users, collects ISF	3, salary provided by Divisional Irrigation Office directly	Active, during winter season only
Jallad WUA	No branch committee , no main committee	None	
Bhuteni Sainik Irrigation WUA	No branch committee	1, part time & seasonal (rsummer season)	
Lower Kisni Khola Irrigation WUA	6 branch committee formed and functional, distribute waters, mitigate conflict among users, collects ISF	None	Active, during winter season only
Ke.Bho.Le.Na Irrigation WUA	15 branch committee formed and functional; distribute waters, mitigate conflict among users, collects ISF	2, one full time- paid by committee, 1 seasonal paid by VDC	Active
Musarghatta Paini Irrigation WUA	No branch committee	2, full time- one for head work and other for canal	

Source: Focus group discussions with WUA

Likewise, watcher have been employed by most of the irrigation project. They are seasonal, specially employed during winter season to regulate water supply. Few employ on summer season to monitor and supervise head work and maintain water distribution. All the branch committee are active and effectively distributing water on consensus basis. They regulate water supply by having discussions among farmers and generally supply water from head to tail on rotational basis.

Table 2.8 presents water distribution system of studied irrigation project. Water distribution is unmanaged. Field to field irrigation is carried out. Branch committee/watch man look after water distribution at farmer field while main committee look after water distribution at main canal. Time begins when water reaches to head of branch canal or head of farmers field. Head to tail irrigation is carried out to avoid potential conflicts and loss of water. There is no fix rule to distribute water but depends on demand and availability of water. The branch committee took decisions for distribution, generally decide on basis of land size. Attempts would be to irrigate more area as far as possible. For example, Kalapani Irrigation WUA provide water for 2 hrs for 0.17 ha of land while Ke.Bho.Le.Na Irrigation WUA provides water for 5 min for 0.66 ha. Time is counted after water reaches to head of the land. Problems related to leakage, poor water control and regulate water along with inadequate supply was reported across all the studied irrigation project.

Table 2.8: Water distribution system

S N	Name of IP	Distribution mechanism	Main canal to branch canal	Branch canal to farmer field	Problems
1	Kalapani Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring	Rotational basis based on land size (2 hrs for 0.17 ha of land)	Leakage, poor control structure, free use
2	Bigihi Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring (7 day)	Rotational basis based on land size (depends on water amount, irrigate crop on allocated time)	Leakage, poor control structure, limited water supply
3	Hardinath Western Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring (2-3 days)	Rotational basis based on land size (20 min for 0.5 ha)	Leakage, damage of control structure, free use, irrigated up to canal no 5 in winter
4	Jallad WUA	None	None	None	User conflict,
5	Bhuteni Sainik Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring (7 day)	Rotational basis based on land size (depends on water amount, irrigate crop on allocated time)	Leakage, poor control structure, limited water supply
6	Lower Kisni Khola Irrigation WUA	Field to field, head to tail	No control during rainy No control during summer, rotational basis on winter and spring (7 day)	Rotational basis based on land size (depends on water amount, irrigate crop on allocated time)	Leakage, damage of water control structure, limited water supply
7	Ke.Bho.Le.Na Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring (2 day)	Rotational basis based on land size (5 min for 0.66 ha)	Leakage, poor control structure, limited water supply
8	Musarghatta Paini Irrigation WUA	Field to field, head to tail	No control during summer, rotational basis on winter and spring (2 day)	Rotational basis based on land size (20 min for 0.66 ha)	Leakage, poor control structure, limited water supply

Source: Focus group discussions with WUA

2.5.2 ISF collection

Table 2.9 presents Irrigation Service Fee (ISF) collection practice of studied projects. According to Irrigation Policy and Rule, all water user association should collect ISF for repair and maintenance of canal. Likewise, they are expected to deposit certain percent of ISF on national treasury.

Water is plenty to grow main paddy. Farmers don't collect ISF on summer. This is mainly because of flooding of water from canal and poor functioning of water control and regulation structure. High water availability together with poor functioning of system is main reason for nonpayment water fee during summer season. ISF is mostly collected for winter and spring crops. Branch committee is generally responsible for collection of ISF. Committee collect ISF on advance or immediately after irrigation. There is general tendency among farmers to irrigate large land by paying less ISF. Evidence of non-payment is very less. If few farmers have last year due of ISF, the committee would not supply water.

ISF is generally charged on the basis of irrigated area. However two irrigation project are charging differently. One is getting payment from Village Development Committee (VDCs) while other is charging on the basis of hourly use. Irrigation fee about vary from Rs 750 per ha to Rs 150. Bigihi Irrigation WUA is getting payment from VDC at Rs 3000/day for use of water. None of the users make ISF payment, hence committee decided not request VDCs. VDC is providing part of the money for payment of salary watcher, however support from VDC is not regular. Kalapani Irrigation WUA is charging Rs 35 for 2 hours of water use.

Table 2.9: ISF collection practice

SN	Name of IP	Rainy season	Winter/ spring season	New entrant /membership fee
1	Kalapani Irrigation WUA	None	Rs 35 for 2 hours	Rs 501 for new member
2	Bigihi Irrigation WUA	None	No payment by users but VDC pay at Rs 3000/day for water use	No
3	Hardinath Western Irrigation WUA	None	Rs 150 per ha	No
4	Jallad WUA	None	None	-
5	Bhuteni Sainik Irrigation WUA	None	Rs 300/ha	Rs 10 for renew of membership
6	Lower Kisni Khola Irrigation WUA	None	Rs 750/ha	
7	Ke.Bho.Le.Na Irrigation WUA	None	Rs 300/ha	
8	Musarghatta Paini Irrigation WUA	None	Rs 750/ha	Rs 5 for renew of membership

Source: Focus group discussions with WUA

ISF collection vary from none in Jallad WUA to 132,330 in Musarghatta Paini Irrigation WUA. Table 2.8 presents amount of ISF collected and anticipated ISF. Farmers are using water to irrigate at-least one crop. Assuming this, ISF will be only collected for one crops, Rs 1.73 millions is expected to be collected. However actual collection of ISF is Rs 0.48 million only, which is nearly one fourth of expected irrigation fee collection. Payment of ISF vary from none in Jallad to 75% on Bhuteni Sainik Irrigation WUA. High payment on Bhuteni Sainik is mainly because of (a) well functioning/active executive committee (b) well/properly maintained records & collection of ISF based on records and (c) society, hill community and ex-army, following rules and (d) size of command area. It is easy to collect ISF on small irrigation like Bhuteni Sainik and Kalapani compared to larger IP.

ISF collection is poor because of inadequate water supply during winter and spring season and poor functioning of water regulation structure. Apart from this, present political condition of the country have further created conducive environment for non-payment. Poor ISF payment is mainly because of

- Poor functioning of the system, limited area irrigated during spring and winter
- Water control and regulation structure are either damage or not constructed
- High water leakage, either because of damage of canal or unscientifically developed farm canal
- Irrigation from field to field, hence difficult to control water supply
- Present political situation of the country

Table 2.10: Amount of ISF collected per year

Name of IP	Irrigated Area (ha)	ISF (Rs/ha)	ISF			Irrigated areas (ha) based ISF collection
			Expected (Rs)	Collected (Rs)	Percent	
Kalapani Irrigation WUA	201	NA	-	11,797		NA
Bigihi Irrigation WUA	3000	NA	-	107,000		NA
Hardinath Western Irrigation WUA	1000	150	1,50,000	20,500	13.7	137
Jallad WUA	700	NA	-	0		
Bhuteni Sainik Irrigation WUA	300	300	90,000	67,500	75.0	225
Lower Kisni Khola Irrigation WUA	1100	750	825,000	79560	9.6	106
Ke.Bho.Le.Na Irrigation WUA	780	300	2,34,000	63778	27.3	213
Musarghatta Paini Irrigation WUA	550	750	412,500	132,330	32.1	176
Total	7631	2250	1711500	482465	28.2	857

Source: Focus group discussions with WUA

If ISF was taken as proxy indicator to measure irrigated area, only 857 ha of land is irrigated varying from 106 ha on Lower Kisni Khola irrigation to 225 ha on Bhuteni Sainik Irrigation WUA. This does not include three irrigation users where fee are not collected or apply different rule to collect ISF. This reveals either limited use of irrigation or poor payment of ISF.

2.5.3 Water use conflict

Water use conflict within and between users as well as with alternative uses were discussed with local communities (Table 2.11). Water scarcity is main cause of conflict within users. This remain similar across all the studied project..

Table 2.11: Water Use conflict among the different studied Irrigation Projects

SN	Name of IP	Within user	Between users	Alternative uses
1	Kalapani Irrigation WUA	Water scarcity	Irrigation scheme construction	Drinking water project
2	Bigihi Irrigation WUA	Head users not paying fee		Paper factory polluting water,
3	Hardinath Western Irrigation WUA	Water scarcity	Several IP above barrage (7)	
4	Jallad WUA	No rule	Several IP from same source	Brick factory and fish pond
5	Bhuteni Sainik Irrigation WUA	Water scarcity		Plotting of land, damaging canal
6	Lower Kisni Khola Irrigation WUA	Water scarcity		
7	Ke.Bho.Le.Na Irrigation WUA	Water scarcity	Several IP from same source	None
8	Musarghatta Paini Irrigation WUA	Water scarcity		

Source: Focus group discussions with WUA

Water use conflict between irrigation WUAs is observed on 4 irrigation projects. This is mainly because of construction of other irrigation project which result on limited supply of water for irrigation. Efforts had been made to minimize these conflicts, however it is still prominent and affecting on wise use of irrigation project, especially in case of Hardinath. Nevertheless, Ke.Bho.Le.Na Irrigation WUA had formed Irrigation Water User Organization

with representation of different irrigation project under the leadership of Village Development Committee to avoid water use conflict with other irrigation projects. The study also noted conflict with other alternative uses resulting on poor performance or damage of irrigation facility. Drinking water is possessing threat for irrigation on Kalapani while water is mostly used for Brick factory and Fish pond in Jallad. Apart from this, paper factory is polluting water on Bigihi whole plotting of land and rapid expansion of market is damaging canal on Bhuteni Sainik Irrigation WUA.

2.5.4 Assessment of water management system

Table 2.12 presents assessment of water management system. Water management system is considered poor across all the studied project. This is mainly because of poor management of water, limited collection of ISF and water use conflict. Likewise, users are not making any payment of ISF according to use. Water management is very poor and flooding arises from canal on summer. Structure and system are constructed to regulate water supply. However, systems is not functional at present, which is mainly because of poor management and less participation of users. Field to field irrigation are carried out, resulting high loss of water. There is need for improvement on regulation structure as well ISF collection. Likewise, efforts also need to be minimized for water use conflict, especially with alternative uses.

Table 2.12: Assessment of water management system

SN	Name of IP	Assessment
1	Kalapani Irrigation WUA	Poor , poor management of water, absence of water control and regulation structure, limited collection of ISF and water use conflict with other IP and alternative use
2	Bigihi Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict with alternative use
3	Hardinath Western Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict with other IP
4	Jallad WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict with other IP
5	Bhuteni Sainik Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict
6	Lower Kisni Khola Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict
7	Ke.Bho.Le.Na Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict with other IP
8	Musarghatta Paini Irrigation WUA	Poor , poor management of water, damage of water control and regulation structure, limited collection of ISF and water use conflict

Source: Focus group discussions with WUA

2.6 Institutional Governance

2.6.1 Institutional development

Institutional development of WUAs is very poor. Divisional Irrigation Office simply registered WUAs without adequate social mobilization approaches. As a result of this, users are less aware or not interested with the functioning of WUAs. They are doing renewing registration of WUAs to get support from Irrigation Office. The all committee members are not aware of their role and responsibilities. They are mostly working on regulating water supply. Committee lack adequate facilities for operation though office have been established. Likewise, none of the committee members had obtained training on account keeping and management. As a result of this record keeping is poor. Committee are taking major decisions with users as passive participants. Likewise, all committee have limited human resources. Watcher are even employed seasonally. Table 2.13 presents institutional development situation of IP.

Table 2.13: Assessment of Institutional development

SN	Name of IP	Institutional development
1	Kalapani Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, watch man temporary
2	Bigihi Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, difficult to provide salary of 1 watch man
3	Hardinath Western Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, 3 watchman but poorly involved on canal management
4	Jallad WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations , no staff, high conflict and committee dissolved
5	Bhuteni Sainik Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, 1 part time and seasonal watchman
6	Lower Kisni Khola Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, committee formed recently and no watchman
7	Ke.Bho.Le.Na Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, 2, one full time- paid by committee, 1 seasonal paid by VDC
8	Musarghatta Paini Irrigation WUA	Poor , limited training, poor participation, poor record keeping, inadequate facilities for office operations, 2, full time- one for head work and other for canal

Source: Focus group discussions with WUA

2.6.2 Rules of law

Rule of law is assessed in terms of presence of constitutions, development and enforcement of penalties mechanism and awareness among users about constitution of WUA. All WUAs have constitutions, however provision of constitutions are poorly implemented. Likewise, penalties mechanism are developed for poorly enforced. This situation remain similar across all the studied project. Penalties mechanism has been designed for non-participation on canal repair and maintenance work, however its enforcement of rule is not carried out. This is mainly because of poor functioning of system and present political transition of the country. Likewise, very few users aware about the constitution of the WUA. Even the users committee are not following the provision of constitutions. Very few committee members are aware of constitutions. Committee are taking decision without complying the provisions made on constitutions, especially related to organization of general assembly, executive committee meeting, enforcement of penalties mechanism etc. Constitution simply remain as paper document and its application is very limited across all the studied irrigation project.

Table 2.14 : Rule of law

SN	Name of IP	Constitution of WUA	Penalties mechanism and enforcement	Awareness of constitutions
1	Kalapani Irrigation WUA	Yes	Developed & partially enforced	Poor
2	Bigihi Irrigation WUA	Yes	Developed but not enforced	Poor
3	Hardinath Western Irrigation WUA	Yes	Developed but not enforced	Poor
4	Jallad WUA	Yes	Developed but not enforced	Poor
5	Bhuteni Sainik Irrigation WUA	Yes	Developed but not enforced	Poor
6	Lower Kisni Khola Irrigation WUA	Yes	Developed but not enforced	Poor
7	Ke.Bho.Le.Na Irrigation WUA	Yes	Developed but not enforced	Poor
8	Musarghatta Paini Irrigation WUA	Yes	Developed but not enforced	Poor

Source: Focus group discussions with WUA

2.6.3 Executive committee

Table 2.15 presents composition and functioning of executive committee. Water use committee is active or functioning on all the irrigation projects except in Jallad WUA. It was dissolved recently because of internal conflict. Women representation is nearly one forth on all the committee, however it is very less on Hardinath and Ke.Bho.Le.Na Irrigation WUA. This is mainly because of election of members form branch canal. Executive meeting are not organized regularly in most of the irrigation projects exception are Bhuteni Sainik Irrigation WUA and Ke.Bho.Le.Na Irrigation WUA where executive committee meeting are organized regularly. The meeting are organized as and when required. Committee meeting are generally organized once or twice a year, mostly for making decisions related to water management and mobilization of labour for repair and maintenance of canal. Majority of members participated on executive committee meeting varying from 80% on Lower Kisni Khola Irrigation WUA to 60% on Kalapani and Ke.Bho.Le.Na Irrigation WUA.

Table 2.15: Composition and functioning of executive committee

SN	Name of IP	Members number	Women (%)	Participant ration (%) in meeting	No of meeting per year	Activeness
1	Kalapani Irrigation WUA	11	36.4	60	2 (Occasional as required)	Active
2	Bigihi Irrigation WUA	14	21.0	70	2 (Occasional as required)	Active
3	Hardinath Western Irrigation WUA	25	8.0	70	2 (Occasional as required)	Active
4	Jallad WUA	Committee dissolved due to internal conflict,				Inactive
5	Bhuteni Sainik Irrigation WUA	9	33.0	70	12 (Regular monthly)	Highly active
6	Lower Kisni Khola Irrigation WUA	11	27.2	80	12 (Regular monthly)	Active
7	Ke.Bho.Le.Na Irrigation WUA	19	15.8	60	12 (Regular monthly)	Active
8	Musarghatta Paini Irrigation WUA	11	18.2	72	2 (Occasional as required)	Active

Source: Focus group discussions with WUA

2.6.4 General assembly

General assembly are organized at-least once a year in all the irrigation project except on Jallad WUA (Table 2.16). General assembly is not organized because of internal conflict within WUA members. Level of participation of users on general assembly is very poor. Large majority of users don't took participate on general assembly meeting. Main reason of poor participation is mainly because of poor irrigation conditions. Users are not getting water regularly and hence express their less interest and willingness to participate on assembly.

Table 2.16: Organization of general assembly

SN	Name of IP	Total members	Frequency of meeting per year	Participant ration (%) in meeting	Users participation
1	Kalapani Irrigation WUA	199	1	36.4	Poor
2	Bigihi Irrigation WUA	400	1	20.0	Very poor
3	Hardinath Western Irrigation WUA	2500	1	44.4	Poor
4	Jallad WUA	Not organized			Very poor
5	Bhuteni Sainik Irrigation WUA	272	1	29.4	Poor
6	Lower Kisni Khola Irrigation WUA	1096	1	42.7	Poor
7	Ke.Bho.Le.Na Irrigation WUA	1385	1	80.0	Very high
8	Musarghatta Paini Irrigation WUA	305	1	40.0	Poor

Source: Focus group discussions with WUA

2.6.5 Compliance with legal requirement

WUA are required to conduct annual audit, general assembly and renew their registration annually with Divisional Irrigation Office. Likewise, they are also expected to deposit 10% of ISF on national treasury. All water users WUA are conducting audit, general assembly and renew of registration regularly except for Jallad. Renew of membership with Divisional Irrigation Office is necessary for receiving support from Divisional Irrigation Office whereas audit and general assembly minute is necessary for renew of membership. Hence, all the water user WUA are renew their registration regularly. However none of the WUA are depositing ISF on national treasury except Hardinath Western Irrigation WUA. Hardinath Western Irrigation WUA deposited Rs 15,000 on national treasury last year.

Table 2.17: Compliance with legal requirements

S N	Name of IP	Audit	General assembly	Renew of registration	Deposition of ISF on national treasury
1	Kalapani Irrigation WUA	Yes	Yes	Yes	No
2	Bigihi Irrigation WUA	Yes	Yes	Yes	No
3	Hardinath Western Irrigation WUA	Yes	Yes	Yes	Yes
4	Jallad WUA	No	No	No	No
5	Bhuteni Sainik Irrigation WUA	Yes	Yes	Yes	No
6	Lower Kisni Khola Irrigation WUA	Yes	Yes	Yes	No
7	Ke.Bho.Le.Na Irrigation WUA	Yes	Yes	Yes	No
8	Musarghatta Paini Irrigation WUA	Yes	Yes	Yes	No

Source: Focus group discussions with WUA

2.6.6 Voluntary labor contribution

Users participate on repair and maintenance of canal, including head works. Irrigation canal are generally cleaned/maintained at-least twice a year, (a) before summer season and (b) after summer season. Table 2.18 presents number of days of voluntary labor contribution. All irrigation project are mobilizing voluntary labor for repair and maintenance of canal.

Table 2.18: Number of days of voluntary labor contribution

S N	Name of IP	Labor contribution day/year (Approx)	General assessment
1	Kalapani Irrigation WUA	199	High participation of users
2	Bigihi Irrigation WUA	500	Poor participation, mostly on branch canal
3	Hardinath Western Irrigation WUA	2500	Poor participation, mostly on branch canal
4	Jallad WUA	500	Poor participation, very few participated, especially poor and marginalized
5	Bhuteni Sainik Irrigation WUA	1200	Poor participation, more participation of tail end user
6	Lower Kisni Khola Irrigation WUA	1080	Poor participation, more participation of tail end user
7	Ke.Bho.Le.Na Irrigation WUA	3600	Poor participation, more participation of tail end user
8	Musarghatta Paini Irrigation WUA	600	Poor participation, more participation of tail end user

Source: Focus group discussions with WUA

Number of days of voluntary labour contribution depends on extent of damage of canal by river and other small rodents. Number of days of voluntary labour contribution vary from 199 days on Kalapani Irrigation WUA to 3600 days by Ke.Bho.Le.Na Irrigation WUA. However, it is very difficult to ascertain number of days of labor contribution since no records are maintained. Likewise, labor contribution is very poor among all the system, which is mainly because of limited water supply and poor functioning of system. Level of participation of users on repair and maintenance of canal is poor. People from tail end generally participate on main canal repair and maintenance, while participation of users from head end is comparatively less. Rules and mechanism for penalties developed for not contributing voluntary labor, however rule are not enforced. This is mainly because of limited water supply (poor functioning of system) and present political situation of the country.

2.6.7 Assessment of governance situation

Governance system is assessed in terms of regular organization of general assembly and executive committee meeting, compliance to rule of law, awareness among users and labour contribution on repair and maintenance of canal. This is mainly because of poor enforcement of punishment rule. Table 2.19 presents assessment of governance system of irrigation projects. Governance system of irrigation project is poor for all the projects. This is mainly because very few people are participating on general assembly and decisions are taken on minority. Committee are taking decisions related to management and ISF while users are passive participants. There is poor participation of users on repair and maintenance of irrigation canal, especially main canal. Despite of formulation of rule and regulations, their application is very limited.

Table 2.19: Assessment of governance system

SN	Name of IP	Assessment
1	Kalapani Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
2	Bigihi Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
3	Hardinath Western Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
4	Jallad WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
5	Bhuteni Sainik Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
6	Lower Kisni Khola Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
7	Ke.Bho.Le.Na Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user
8	Musarghatta Paini Irrigation WUA	Poor , poor enforcement of rules and regulations, limited number of people participation on general assembly, committee taking decisions while users are passive participants, less awareness of constitutions among user

Source: Focus group discussions with WUA

2.7 Resource Mobilization

2.7.1 Source of income

Table 2.20 presents source of income of WUAs. ISF, agency support and others (mobilization of last year saving, interests of fixed deposits etc) are the source of income for a

all the WUAs. External agency remains main source of income for all the WUAs followed by ISF and others. Five out of eight studied WUAs have received support from external agencies such as Divisional Irrigation Office, Village Development Committee, Forest User Committee, Agriculture Development Committee etc. Seven out of eight WUA have generated income through ISF varying from Rs 11797 to Rs 132,330. Other income of Ke.Bho.Le.Na is very high which is mainly because of interest earned by the WUA by fixed deposition of Rs 2 million. Water user association are dependent on external agencies while their internal resource mobilization through ISF is less.

Table 2.20: Source of income of the WUA of last year

Unit: Rs

SN	Name of IP	ISF (Rs)	Agency support (external) (Rs)	Others and last year balance (Rs)
1	Kalapani Irrigation WUA	11797	35000	3,156
2	Bigihi Irrigation WUA	107,000	471,567	12,125
3	Hardinath Western Irrigation WUA	20500	380448	26,641
4	Jallad WUA	DIO provided 800,000 for maintenance, no records of expenditure, committee dysfunctional		
5	Bhuteni Sainik Irrigation WUA	67,580	220,000	20,502
6	Lower Kisni Khola Irrigation WUA	79,560	-	36,062
7	Ke.Bho.Le.Na Irrigation WUA	63668	-	758,059
8	Musarghatta Paini Irrigation WUA	132330	171,460	55,798

Source: Last fiscal year Audit Report (2011/12) of WUA

2.7.2 Expenses

Table 2.21 presents source of expenses of WUAs. Watchman salary, operational expenses such as meeting cost, travel cost, stationery, audit fee etc, repair and maintenance of canal and ISF deposit are main expenses. Large proportion of expense is made on repair and maintenance of canal varying from Rs 9,288 to Rs 471,567. Large amount is spent on repair and maintenance because most of external agencies such as Divisional Irrigation Office, VDC and Agriculture Development have provided conditional grant, where amount should be spent on repair and maintenance related activities. Salary of watchman and operational expenses remain main expense for all WUAs. Only one WUA deposit ISF.

Table 2.21: Last year expenditure of the WUA

Unit: Rs/year

SN	Name of IP	ISF deposit	Watchman salary	Operational expense	Repair and maintenance
1	Kalapani Irrigation WUA		12000	12056	9288
2	Bigihi Irrigation WUA	-	93,000	13,950	471,567
3	Hardinath Western Irrigation WUA	15000			380,448
4	Jallad WUA	No records maintained			
5	Bhuteni Sainik Irrigation WUA	-	36,000	14080	244,020
6	Lower Kisni Khola Irrigation WUA	-	2500	23,161	84,011
7	Ke.Bho.Le.Na Irrigation WUA	-	111,600	45,531	252,728
8	Musarghatta Paini Irrigation WUA		49,300	71,450	13,9055

Source: Last fiscal year Audit Report (2011/12) of WUA

2.7.3 Saving and balance

Table 2.22 presents income and expenditure of WUA. All WUAs are making small saving from income of the WUAs varying from Rs 411,868 on Bho.Le.Na Irrigation WUA to Rs 5950 on Lower Kisni Khola Irrigation WUA. Jallad WUA have no income and expenditure though they have received support from DIO for repair and maintenance of canal.

Table 2.22: Last year income and expenditure of WUAs

SN	Name of IP	Total income (Rs)	Total expenditure (Rs)	Balance (Rs)
1	Kalapani Irrigation WUA	49,953	33,344	16,609
2	Bigihi Irrigation WUA	59,0692	578,517	12,175
3	Hardinath Western Irrigation WUA	427,589	395,449	32,141
4	Jallad WUA	None, conflict exists among users		
5	Lower Kisni Khola Irrigation WUA*	115,622	109,672	5,950
6	Bhuteni Sainik Irrigation WUA	3,08,082	2,94,100	13,982
7	Ke.Bho.Le.Na Irrigation WUA	821,727	409,859	411,868
8	Musarghatta Paini Irrigation WUA	359,588	295,805	99,783

Source: Last fiscal year Audit Report (2011/12) of WUA

*loan taken by users to do audit

2.7.4 Assessment

Table 2.23 presents assessment of resource mobilization among WUAs. The users are conducting annual audit and maintained financial records. Likewise, they have been able to mobilized resources from both internal and external sources. Hence, resource mobilization and management is considered satisfactory but not adequate to effectively operate and manage system. WUAs are highly dependent on external agencies for repair and maintenance of canal whereas internal resource generation is very less and not adequate to sustain WUAs. This situation remain similar across all the studied irrigation project..

Table 2.23: Assessment of resource mobilization

SN	Name of IP	Assessment
1	Kalapani Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate to sustain WUAs
2	Bigihi Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
3	Hardinath Western Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
4	Jallad WUA	Unsatisfactory , poor maintenance of records highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
5	Bhuteni Sainik Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
6	Lower Kisni Khola Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
7	Ke.Bho.Le.Na Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate
8	Musarghatta Paini Irrigation WUA	Satisfactory, but not adequate to effectively operate and maintain irrigation system , highly dependent on external agencies for repair and maintenance, internal resource generation is very less and not adequate

Source: Focus WUA discussions with water user association

2.8 Performance of Surface Irrigation

Performance of irrigation system is assessed on the basis of (a) increment on productivity (b) expansion of cropped area (c) cropping intensity and (d) crop diversification. Contribution of irrigation on above four areas is very limited, which remain similar among all the studied irrigation WUAs. Likewise, ISF collection, awareness of users and external and international resource mobilization were also taken into consideration for assessment of performance of irrigation project. Table 2.14 presents assessment of irrigation project.

Cropping intensity is less and large area of land remain fallow especially during winter season. Nevertheless, few farmers have installed shallow tube well to grow wheat and maize within the command area. Water distribution in flooding style i.e. field to field, no managed water distribution. ISF collection is very limited, and not sufficient for repair and maintenance. Present collected amount is neither sufficient for operating the system nor for the repair and maintenance. Likewise, committee is highly dependent on external agencies for repair and maintenance, whereas user contribution is very less. Labour contribution has been made, however penalties mechanism for non-participation are poorly enforcement. Poor functioning of system along with the present political situation is blamed for this. Rule of law is weakly enforced. Users are less aware with the management of the irrigation. This situation remain similar among all the studied WUAs. The irrigation is operational but with limited capacity. The study found performance of project either poor and very poor for all the studied project.

Table 2.24: Performance of irrigation project

SN	Name of IP	Assessment
1	Kalapani Irrigation WUA	Poor. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance, less awareness of users, rule of law very weak
2	Bigihi Irrigation WUA	Very poor. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is not collected from users instead dependent on VDC, less awareness of users, rule of law very weak, and poor resource mobilization, water pollution
3	Hardinath Western Irrigation WUA	Poor.. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance, less awareness of users, rule of law very weak
4	Jallad WUA	Very poor. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is not collected, less awareness of users, rule of law very weak, dependent on VDC for support and poor resource mobilization
5	Bhuteni Sainik Irrigation WUA	Poor.. Productivity enhancement and intensification is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance, less awareness of users, rule of law very weak
6	Lower Kisni Khola Irrigation WUA	Poor.. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance,, rule of law very weak
7	Ke.Bho.Le.Na Irrigation WUA	Poor.. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance,, rule of law very weak
8	Musarghatta Paini Irrigation WUA	Poor.. Productivity enhancement and intensification of crop is less, large proportion of land remain fallow on winter and spring, ISF is collected but not adequate, highly depend on external resources for maintenance, less awareness of users, rule of law very weak

Source: Focus group discussions with WUA

3 GROUND WATER IRRIGATION

3.1 Introduction

Table 3.1 presents overview of studied irrigation project. Most of studied DTW are operational from almost a decade ago expect for Binihi. Annex 11 to Annex 18 presents list detail information of each studied ground water projects. Studied STW were recently constructed, which are less than 2 years. Users are almost homogenous in case of ground water. Of 5 DTW studied, three are managed by hilly caste people. Likewise, 1 terai caste and 2 hilly caste managed STW were studied. User households is relatively less on both DTW and STW, which vary from 18 to 200. DTW WUC has more user or beneficiary compared to STW.

Table 3.1: Characteristics of studied ground water IP

SN	Name of GWIP	Type	Year of construction	Dominant caste/society	Users Households
1	Naktajijh WMC	DTW	1987	Terai caste	150
2	Binihi WMC	DTW	2009	Terai caste	111
3	Shiva Parbati WUC	DTW	1999	Terai caste	82
4	Prithivinagar Maheshpur WUC	DTW	1999	Hilly caste	45
5	Sundar Samuhik Krishak WUC	DTW	1987	Hilly caste	64
6	Sanakishan WUC	STW	2008	Terai caste	200
7	Sansari mai WUC	STW	2011	Hilly caste	18
8	Suryodaya WUC	STW	2011	Hilly caste	22

Source: Focus group discussions with WUC/WMC

3.2 Water Availability and Irrigated Area

Table 3.2 availability of water for irrigation. Water is available adequately on all ground water IP which remain almost similar across all the studied IP. Availability of ground water does not vary by season. Same amount can be extracted, however water recharge on summer is high while dryness is observed on spring. Farmers are either less aware or have not encountered any water quality problems due to extraction of ground water. This might be mainly because of limited extraction of water.

Table 3.2: Availability of water for irrigation

SN	Name of GWIP	Type	Water source	Water availability		
				Summer	Winter	Spring
1	Naktajijh DTW WMC	DTW	Under ground, perennial	High	High	High
2	Binihi DTW WMC	DTW	Under ground, perennial	High	High	High
3	Shiva Parbati WUC	DTW	Under ground, perennial	High	High	High
4	Prithivinagar Maheshpur WUC	DTW	Under ground, perennial	High	High	High
5	Sundar Samuhik Krishak WUC	DTW	Under ground, perennial	High	High	High
6	Sanakishan WUC	STW	Under ground, perennial	High	High	High
7	Sansari mai WUC	STW	Under ground, perennial	High	High	High
8	Suryodaya WUC	STW	Under ground, perennial	High	High	High

Source: Focus group discussions with WUC/WMC

Table 3.3 presents irrigated and irrigable area by season. All STW and DTW are not utilized according to its capacity. Despite of its ability to irrigate crops throughout the year, it remain idle in most of the season. Load shedding problem further support to this situation. Use of DTW/STW is less on summer while, it is relatively high on winter. Likewise, it is less utilized on spring season. Farmers only use DTW/STW if water is not available from rain or through surface water. Farmers only use STW/DTW when no other alternatives are available. Demand increases when water scarcity problem arises. During this time, it is very difficult to fulfill demand of all farmers, which is mainly because of electricity problem. Hence, area under irrigation is very less. Farmers are mostly using to prevent plant for wilting.

Table 3.3: Irrigable and irrigated area by season

SN	Name of GWIP	Type	Irrigable area (ha)	Irrigated area (ha)		
				Summer	Winter	Spring
1	Naktajijh DTW WMC	DTW	38.0	12.0	18.0	14.0
2	Binihi DTW WMC	DTW	43.0	13.3	20.0	10.0
3	Shiva Parbati WUC	DTW	60.0	15.0	22.0	12.0
4	Prithivinagar Maheshpur WUC	DTW	36.0	5.0	5.0	5.0
5	Sundar Samuhik Krishak WUC	DTW	44.0	38.0	32.0	22.0
6	Sanakishan WUC	STW	130	33.3	22.0	6.0
7	Sansari mai WUC	STW	14.2	7.2	4.2	1.4
8	Suryodaya WUC	STW	14.2	4.2	3.5	1.1

Source: Focus group discussions with WUC/WMC

3.3 Irrigation Condition

Table 3.4 presents assessment of irrigation condition. Irrigation condition is relatively good and attempts have been made to improve water distribution system by avoiding leakages through construction of pipe outlets. However outlets are either damaged. Water leakage is very high after outlets. No permanent canal are constructed on farmer field. Instead farmers use temporary canal, where water leakage is high. Farmers often complained about high loss of water from outlets, further making irrigation more expensive. The irrigation condition is good for most of the STW however use is very limited. Of 9 studied IP, condition of two are poor mainly because of poor management.

Table 3.4: Irrigations condition of ground water IP

30	Name of GWIP	Type	Water extraction structure	Assessment		
				Water-uptliftment	Water distribution	Overall
1	Naktajijh DTW WMC	DTW	Electric pump with pump house	Electricity problem, High investment on maintenance ,	Damage and leakage , poorly developed & managed	Good, but distribution canal poorly developed
2	Binihi DTW WMC	DTW	Electric pump, Artesian	Electricity problem, water waste	Canal construction on process	Poor, not managed properly
3	Shiva Parbati WUC	DTW	Electric pump with pump house	Water seepage from tank, Electricity problem	Damage and leakage, poorly developed	Good but limited use
4	Prithivinagar Maheshpur WUC	DTW	Electric pump, Artesian	Electricity problem, electricity price	Damage and leakage, poorly developed	Poor & limited use
5	Sundar Samuhik Krishak WUC	DTW	Electric pump with pump house	Electricity problem	Damage and leakage, poorly developed	Good but limited use
6	Sanakishan WUC	STW	Electric & diesel pump	Electricity problem	No remarkable problem	Good but limited use
7	Sansari mai WUC	STW	Electric pump	Electricity problem	No remarkable problem	Good but limited use
8	Suryodaya WUC	STW	Electric pump	Electricity problem	No remarkable problem	Good but limited use

Source: Focus group discussions with WUC/WMC

3.4 Water Distribution

Table 3.5 presents water distribution of ground water IP. DTW are distributing water on first come first serve basis for electric motor operation whereas use of artesian water is either free or fee is collected on the basis of irrigated land per year. However, these are the exceptional cases which was observed on Binihi and Prithivinagar Maheshpur. In majority of the cases, watch man keep records of demand, assign queue and supply water.

STW are operated on individual basis or owned by particular farmer, distribution rule don't apply here. However, neighboring famers can use pump with permission of land owner by using own generator or paying electricity charge. In case of DTW, committee is charging irrigation fee on the basis of unit rate of electricity consumption, which vary from Rs 5 to Rs 12 per unit. This rate is inclusive of operator and maintenance cost. Farmers had to pay Rs 3.7 per unit of consumption of electricity whereas they are collecting irrigation fee which is almost three times higher than cost. This has not only made irrigation expensive but also out of reach of small and marginal farmers. Electricity remain main problem together with water leakage. Use of water is high on agriculture land nearby the outlet, however use decline after outlet. Of the five studied DTW, water distribution system is good on four outlet. However it had not been able to fulfill demand of all users. Water distribution system of STW are not assessed since it appears as a private goods with limited access of group.

Table 3.5: Water distribution of ground water IP

S N	Name of GWIP	Type	Distribution mechanism	Irrigation fee	Problems	Assessment
1	Naktajjih DTW WMC	DTW	First come first serve	Rs 360 per hour	Electricity related,	Good but difficult to fulfill demand
2	Binihi DTW WMC	DTW	No defined rule	None	System not yet established	Poor, no system exists
3	Shiva Parbati DTW WUC	DTW	First come first serve, at-least 2 outlets at time	Rs 12 per unit of electricity consume for member and Rs 16 for non-member	Electricity, water leakage	Good but difficult to fulfill demand
4	Prithivinagar Maheshpur DTW WUC	DTW	Different rule for artisan and electric use First come first serve and area specific rate	Rs 6000 per ha/year for artisan water & Rs 10 per unit of electricity consume	Electricity, water leakage, Electricity price	Good but use limited
5	Sundar Samuhik Krishak DTW WUC	DTW	First come first serve	Rs 5 per unit use of electricity	Electricity, water leakage	Good but difficult to fulfill demand
6	Sanakisha WUC	STW	Not applicable	Payment of electricity fee or diesel expense	Electricity	Not applicable
7	Sansari mai WUC	STW	Not applicable	Payment of electricity fee or diesel expense	Electricity	Not applicable
8	Suryodaya WUC	STW	Not applicable	Payment of electricity fee or diesel expense	Electricity	Not applicable

Source: Focus group discussions with WUC/WMC

3.5 Institutional Governance

3.5.1 Rule of law

Rule of law is assessed in terms of existence of constitutions, organization of general assembly, regular audit of income and expenditure and renew of membership with Divisional Irrigation System. Table 3.6 presents assessment of situation of rule of law. All the WUCs are registered with ground water field office with constitutions. However they are not aware about existence of constitutions. This situation remain similar across all the both studied STW and DTW projects. Likewise, they are not renewing committee as well conducting general assembly and audit. Committee is taking major decisions related to management while users have least concern of it.

Table 3.6: Assessment of rule of law

	Name of GWIP	Type	Constitutions	Audit	General assembly	Renew of group
1	Naktajjih DTW WMC	DTW	Not aware	No	Yes	Yes
2	Binihi DTW WMC	DTW	Not aware	No	No	No
3	Shiva Parbati WUC	DTW	Not aware	No	No	No
4	Prithivinagar Maheshpur WUC	DTW	Not aware	No	No	No
5	Sundar Samuhik Krishak WUC	DTW	Not aware	No	No	No
6	Sanakishan WUC	STW	Not aware	No	No	No
7	Sansari mai WUC	STW	Not aware	No	No	No

Source: Focus group discussions with WUC/WMC

3.5.2 Executive committee meeting

Table 3.7 presents executive committee meeting of group. Executive committee meeting of STW groups are not organized and almost dysfunctional. Villagers even forget the name of the committee members. Executive committee is functional on DTW however they are either inactive or less active. Committee meeting are organized as and when required and there is no regular organization of meeting. Majority of the committee members are participating on meeting, mainly to take decisions related to repair and maintenance of pump when required.

Table 3.7: Organization of executive committee meeting

SN	Name of GWIP	Type	Committee members (no)	Women (%)	Participant ration (%) in meeting	No of meeting for year	Activeness
1	Naktajjih DTW WMC	DTW	9	11.1	90	2 (occasional)	Active
2	Binihi DTW WMC	DTW	7	42.0	No meeting organized	No meeting organized	Inactive
3	Shiva Parbati WUC	DTW	11	18.2	66.7	1 (as & when required)	Less active
4	Prithivinagar Maheshpur WUC	DTW	11	18.2	66.7	1 (as & when required)	Less active
5	Sundar Samuhik Krishak WUC	DTW	11	18.2	66.7	1 (as & when required)	Less active
6	Sanakishan WUC	STW	Not functional		Not organized		Inactive
7	Sansari mai WUC	STW	Not functional		Not organized		Inactive
8	Suryodaya WUC	STW	Not functional		Not organized		Inactive

Source: Focus group discussions with WUC/WMC

3.5.3 General assembly

Table 3.8 presents organization of general assembly. Of the nine studied ground water group, only one have organized general assembly meeting. This is mainly because group of STW are non-functional while major decisions of DTW are taken by committee. Committee meeting is too irregular.

Table 3.8: Organization of general assembly

SN	Name of GWIP	Type	Total members	Frequency of meeting per year	Participant ration (%) in meeting	Users participation
1	Naktajijh DTW WMC	DTW	150	1	90.0	Very high
2	Binihi DTW WMC	DTW	111	Not organized		
3	Shiva Parbati WUC	DTW	82	Not organized		
4	Prithivinagar Maheshpur WUC	DTW	45	Not organized		
5	Sundar Samuhik Krishak WUC	DTW		Not organized		
6	Sanakishan WUC	STW		Not organized		
7	Sansari mai WUC	STW		Not organized		
8	Suryodaya WUC	STW		Not organized		

Source: Focus group discussions with WUC/WMC

3.5.4 Group functioning

Table 3.9 assessment functioning of group. Of the nine studied ground IP, functioning of group is good on only one DTW while function of remaining DTW are either poor or very poor functioning. All STW groups remain inactive. General assembly is not organized where as users are less aware. Likewise, executive committee are also inactive or less active.

Table 3.9: Assessment of functioning of WUA

SN	Name of GWIP	WUA functioning
1	Naktajijh DTW WMC	Good , General assembly is organized, poor awareness of constitutions, executive committee active, public audit of income and expenditure conducted
2	Binihi DTW WMC	Very poor , General assembly not organized, poor awareness of constitutions, executive committee inactive, audit and renew of organization not carried out
3	Shiva Parbati WUC	Poor , General assembly not organized, poor awareness of constitutions, executive committee less active, audit and renew of organization not carried out
4	Prithivinagar Maheshpur WUC	Poor , General assembly not organized, poor awareness of constitutions, executive committee less active, audit and renew of organization not carried out
5	Sundar Samuhik Krishak WUC	Poor , General assembly not organized, poor awareness of constitutions, executive committee less active, audit and renew of organization not carried out
6	Sanakishan WUC	Very poor , General assembly not organized, poor awareness of constitutions, executive committee inactive, audit and renew of organization not carried out, group inactive
7	Sansari mai WUC	Very poor , General assembly not organized, poor awareness of constitutions, executive committee inactive, audit and renew of organization not carried out, group inactive
8	Suryodaya WUC	Very poor , General assembly not organized, poor awareness of constitutions, executive committee inactive, audit and renew of organization not carried out, group inactive

Source: Focus group discussions with WUC/WMC

3.6 Resource Mobilization

3.6.1 Internal and external resource mobilization

Table 3.10 presents international and external resource mobilization of group. Both internal and external resource mobilization is very poor. None of the groups have received support except for two DTW IP which had received support from JADP and VDC for canal expansion and construction. Voluntary labor contribution is virtually non-existent. Users are contributing cash for repair and maintenance as and when required.

Table 3.10: International and external resource mobilization

SN	Name of GWIP	Type	Voluntary labor contribution	Support from external agencies
1	Naktajijh DTW WMC	DTW	None, shouldering repair and maintenance cost as and when required	JADP and VDC supported for canal expansion
2	Binihi DTW WMC	DTW	None	JADP and VDC supported for canal expansion
3	Shiva Parbati WUC	DTW	None	None
4	Prithivinagar Maheshpur WUC	DTW	None	None
5	Sundar Samuhik Krishak WUC	DTW	None	None
6	Sanakishan WUC	STW	None	None
7	Sansari mai WUC	STW	None	None
8	Suryodaya WUC	STW	None	None

Source: Focus group discussions with WUC/WMC

3.6.2 Income

Irrigation fee remain main source of income from all the studied DTW IP. None of the STW have generated income. Only one DTW had received support from JADP and VDC for expansion of canal. Table 3.11 presents source of income of committee.

Table 3.11: Annual income of WUC/WMC

SN	Name of GWIP	Type	Irrigation fee	Agency support (external)	Others and last year balance
1	Naktajijh DTW WMC	DTW	177,030	293,824	11,735
2	Binihi DTW WMC	DTW	-	-	-
3	Shiva Parbati WUC	DTW	114,764		
4	Prithivinagar Maheshpur WUC	DTW	11,500		
5	Sundar Samuhik Krishak WUC	DTW	45,000		
6	Sanakishan WUC	STW	-	-	-
7	Sansari mai WUC	STW	-	-	-
8	Suryodaya WUC	STW	-	-	-

Source: Focus group discussions with WUC/WMC

3.6.3 Expenditure

Table 3.12 presents last year expenditure of group. WUC are making expenditure on operator fee, electricity, repair and maintenance and operational expenses. None of the STW are having group related income and expenses. DTW are using expenses mostly to pay electricity bills followed by operator fee. Very few have contributed for repair and maintenance and that too confined among those who received support from external agencies.

Table 3.12: Last year expenditure of WUC/WMC

S N	Name of GWIP	Type	Electricity	Operator fee	Repair and maintenance	Operational expense
1	Naktajijh DTW WMC	DTW	41,342	14,730	342,520	64,415
2	Binihi DTW WMC	DTW	-	-	-	-
3	Shiva Parbati WUC	DTW	35003	27003	23924	-
4	Prithivinagar Maheshpur WUC	DTW	10,500	6500		
5	Sundar Samuhik Krishak WUC	DTW	32400	6300		
6	Sanakishan WUC	STW	-	-	-	-
7	Sansari mai WUC	STW	-	-	-	-
8	Suryodaya WUC	STW	-	-	-	-

Source: Focus group discussions with WUC/WMC

3.6.4 Income and Expenses

Table 3.13 presents income and expenditure of the group. Most of the DTW WUC are having small saving from operations except for Prithivinagar Maheshpur WUC. The saving is mostly kept for repair and maintenance of pump as and when required. Prithivinagar Maheshpur WUC took a loan from members to meet its expense. High expense was mainly because of electricity demand charge payment. Committee is making payment of nearly Rs 400 a month whether they use or not electricity for irrigation.

Table 3.13: Income and expenditure of WUC/WMC

SN	Name of GWIP	Type	Total income (Rs)	Total expenditure (Rs)	Balance (Rs)
1	Naktajijh DTW WMC	DTW	482,589	463,007	19,582
2	Binihi DTW WMC	DTW	-	-	-
3	Shiva Parbati WUC	DTW	114,764	85930	28,834
4	Prithivinagar Maheshpur WUC	DTW	11,500	17,000	(6500)
5	Sundar Samuhik Krishak WUC	DTW	45,000	38,700	6300
6	Sanakishan WUC	STW	-	-	-
7	Sansari mai WUC	STW	-	-	-
8	Suryodaya WUC	STW	-	-	-

Source: Focus group discussions with WUC/WMC

3.6.5 Assessment

Table 3.14 presents assessment of WUCs based on resource mobilization. Resource mobilization is very poor or poor among all the studied WUCs. This is mainly because book of accounts are not maintained properly, limited external resource mobilization and ISF is just sufficient to pay electricity charge and operator expenses.

Table 3.14: Assessment of WUC based on resource mobilization

SN	Name of GWIP	Resource mobilization
1	Naktajih DTW WMC	Good , generation of both internal and external support, public audit conducted, income and expenditure records maintained,
2	Binihi DTW WMC	Very poor , no resource mobilization, no income from WUA,
3	Shiva Parbati WUC	Poor , ISF collected which is just adequate to pay electricity bill, support from external agencies limited, book of accounts poorly maintained
4	Prithivinagar Maheshpur WUC	Very poor , no resource mobilization, income not sufficient to meet expenses of WUA, book of accounts poorly maintained
5	Sundar Samuhik Krishak WUC	Poor , ISF collected which is just adequate to pay electricity bill, support from external agencies limited, book of accounts poorly maintained
6	Sanakishan WUC	Very poor , non-functional
7	Sansari mai WUC	Very poor , non-functional
8	Suryodaya WUC	Very poor , non-functional

Source: Focus group discussions with WUC/WMC

3.7 Performance of Ground Water

Performance of irrigation system is assessed on the basis of (a) increment on productivity (b) expansion of cropped area (c) cropping intensity and (d) crop diversification. Contribution of irrigation on above four areas is very limited, which remain similar among all the studied irrigation WUAs. Likewise, ISF collection, awareness of users and external and international resource mobilization were also taken into consideration for assessment of performance of irrigation project. Table 3.15 presents assessment of irrigation project. Performance of ground water IP is either poor or very poor when assessed from these perspective.

Table 3.15: Assessment of performance of ground water IP

SN	Name of GWIP	Overall
1	Naktajih DTW WMC	Poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited,
2	Binihi DTW WMC	Very poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited, not used for high value crop cultivation
3	Shiva Parbati WUC	Poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited,
4	Prithivinagar Maheshpur WUC	Very poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited, not used for high value crop cultivation
5	Sundar Samuhik Krishak WUC	Poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited,
6	Sanakishan WUC	Very poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited, not used for high value crop cultivation
7	Sansari mai WUC	Very poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited, not used for high value crop cultivation
8	Suryodaya WUC	Very poor , large area of land remain fallow, not fully operational, ISF collected is just adequate to meeting operating expenses, external resource mobilization is limited, not used for high value crop cultivation

Source: Focus group discussions with WUC/WMC

4 SUMMARY AND CONCLUSIONS

4.1 Surface Water

Major findings of the surface irrigation project includes:

Irrigation condition is very poor, but operational. Problem is quite visible from head to tails. The head works are poorly managed, which resulted on sedimentation and siltation. Water regulation gates are either damage or not functioning properly. The canal are not on designed shape. Lot of damages and leakages are observed. Water control and regulation structure are either damaged or not yet constructed. Water leakage from system is high There is need of huge investment for making system operational.

Water supply is inadequate to irrigate whole area throughout the year. Irrigation can be done on rainy season, however it is very difficult to ascertain whether it is irrigation or not. Flooding on canal arises during summer, however water flow on winter and spring is very less. Farmers are leaving large proportion land under fallow, which is mainly because of shortage of labor together with poor irrigation facility. Conjunctive use irrigation should be promoted mainly during winter and spring season to increase both cropping intensity and diversity.

ISF collection is limited, not consistent with irrigation use. Farmers are collecting ISF, however amount is very less. None of the farmers are making payment of water use for paddy while limited users are making payment for winter crops. This is mainly because of poor irrigation condition. ISF is mostly used for payment of watch man and small repair and maintenance work. The WUAs have high dependency on external agencies for repair and rehabilitation work.

Water user association have poor institutional capacity . Water user association have been formed and registered with Divisional Irrigation Office. However, institutional capacity of association is very poor. None of the agencies have strengthen their institutional capacity. Awareness of users about project and functioning of the irrigation is quite low. Water user association may become dysfunctional on near future if capacity building efforts are not carried out urgently. Social mobilization efforts need to be carried out.

Performance of irrigation is poor. Contribution of irrigation on (a) improvement on productivity (b) expansion of cropped area (c) cropping intensity and (d) crop diversification. etc is very limited. This reveals poor performance of the irrigation system. This situation remain similar across all the studied irrigation project.

4.2 Ground Water

Major findings related to ground water project includes:

Irrigation facility is good, but utilization is limited. Irrigation system has been designed to irrigate crops. Large investment have been made for making system functional by providing support for electricity and repair and maintenance of canal. Despite of this, majority of farmers are not using. They mainly used tube well only when other alternatives are available.

Fulfilling demand of water on time is difficult. Water is abundant but it is very difficult to fulfill demand of all users. Farmers only put their demand of water when to other alternatives to irrigation are available. As a result of this, demand is very high. However, short supply of electricity together with voltage problems create problems to fulfill demand of all farmers. Farmers had to sit on long queue to get water for irrigation.

Water use fee is highly expensive, but sufficient just to meet operating expense. Users are collecting water use fee on the basis of consumption of electricity. Amount is very high despite of government subsidy on electricity tariff for irrigation. The amount is just adequate to pay electricity bills and operator expenses. Users cannot afford for large scale operation and maintenance. They often look for external support when expenses are to be made. This is quite evident on Naktajhij DTW WMC.

WUA is inactive and not functioning properly. Water user committee have been formed but majority of them have remained inactive. General assembly and executive committee meeting are not organized regularly. Likewise, large majority of users are not aware of constitutions of WUA. Users are less aware of water functioning of water use committee. Social mobilization efforts need to be carried out for making WUA functional.

Performance of irrigation is poor. Contribution of irrigation on (a) improvement on productivity (b) expansion of cropped area (c) cropping intensity and (d) crop diversification. etc is very limited. This reveals poor performance of the irrigation system. This situation remain similar across all the studied irrigation project. Cultivation of high value crop should be promoted.

Nippon Koei Co. Ltd.
Team Leader, JICA Study Team
Preparatory Survey on JICA's Cooperation Program for Agriculture
and Rural Development (*Food Production and Agriculture in Terai*)

Sample Survey on Agriculture Markets and Marketing

FINAL REPORT

June 2013



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Abbreviation

JICA	:	Japan International Cooperation Agency
M1	:	Bardibas (Mahottari)
M2	:	Dhalkebar (Dhanusa)
M3	:	Gaushala (Mahottari)
M4	:	Mahendra Nagar (Dhanusa)
M5	:	Aurahi (Mahottari)
M6	:	Birtamod (Jhapa)
M7	:	Kathar (Morang)
M8	:	Surunga (Jhapa)
M9	:	Budhabare (Jhapa)
Mt	:	Metric tone
Rs	:	Rupees

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1. INTRODUCTION

1.1 Background

Japan International Cooperation Agency (JICA) entrusted Nippon Koei Co. Ltd, Vision and Spirit for Overseas Development (VSOC Co. Ltd and CDC International Cooperation, hereafter JICA Study Team (JST) to undertake preparatory survey on JICA's Cooperation Programme for Agriculture and Rural Development (Food Production and Agriculture in Terai). This study intends to analyze current situation and critical issues in agriculture and rural development in Terai plains of Nepal and intends to identify feasible and adequate approaches for the proposed "Integrated Agriculture and Strengthening Project".

JST sub-contracted NARMA Consultancy Pvt Ltd (hereafter NARMA) to undertake a study on "Sample Survey on Agricultural Activities, Agriculture Distribution and Input Supply System and Marketing" as part of its aforementioned "JICA Preparatory Survey on the Agriculture and Rural Development program in the Terai Region". As part of the above study, this report presents Agriculture Market and Marketing situation of study area.

1.2 Objective

Main objective of the study is to assess market and market situation on study area while studying major market center operating on the study.

- **Assess situation of major agriculture market on study area while focusing on**
 - Office for registration
 - Location
 - Year of establishment
 - Number of Employees
 - Site area(m²)
 - Major facilities
 - Major agricultural produce
 - Number of wholesalers and retailers
 - Components of production area (% of domestic/imported)
 - If there is wholesales/retailers of imported produce,
 - Specify the country:
 - Volume of business/day (ton, NRs)
- **Assess marketing situation of paddy and vegetables on study area**

1.3 Methodology

Following methods were followed for study:

Interaction with the market management committee/ market manager: The study team interacted with the market management committee and market managers to understand about functioning of the agriculture market. Interaction were organized on following market centers.

The study conducted major market facilities survey in the study districts. Table 1.1 present characteristics of studied market center. Nine market center were studied from four districts of which 3 are from Mahottari, 2 from Dhanusa, 3 from Jhapa and 1 from Morang. Likewise, 3 are wholesale markets, 3 are retail markets, rest are wholesale and retail markets. Map 1.1 shows studied market places.

Table 1.1: Overview of studied market

District	Market center name	Code	Location	Type of Market	Year of establishment
Mahottari	Bardibas Agriculture Produce	Bardibas (M1)	Bardibas-2	Wholesale & retail	1959
Dhanusa	Dhalkebar Agriculture Produce	Dhalkebar (M2)	Dhalkebar-3	Wholesale & retail	1998
Mahottari	Gaushala	Gaushala (M3)	Gaushala-1,2	Retail	1999
Dhanusa	Mahendranagar-Sakhuwa	Mahendranagar (M4)	Mahendranagar -2,3	Wholesale & retail	1964
Mahottari	Aurahi	Aurahi (M5)	Aurahi-3	Retail	1956
Jhapa	Birtamod Agriculture Produce Wholesale	Birtamod (M6)	Anarmani-3	Wholesale	1996
Morang	Katahari Agri. Produce	Katahari (M7)	Katahari-6	Retail	1998
Jhapa	Kankai Tarkari Utpadan Samuha Thok Bikri Tatha Byabasthapan Kendra	Surunga (M8)	Surunga-5	Wholesale, Collection Centre	1995
Jhapa	Budhabare Agri. Produce	Budhabare (M8)	Budhabare-9	Wholesale	1996

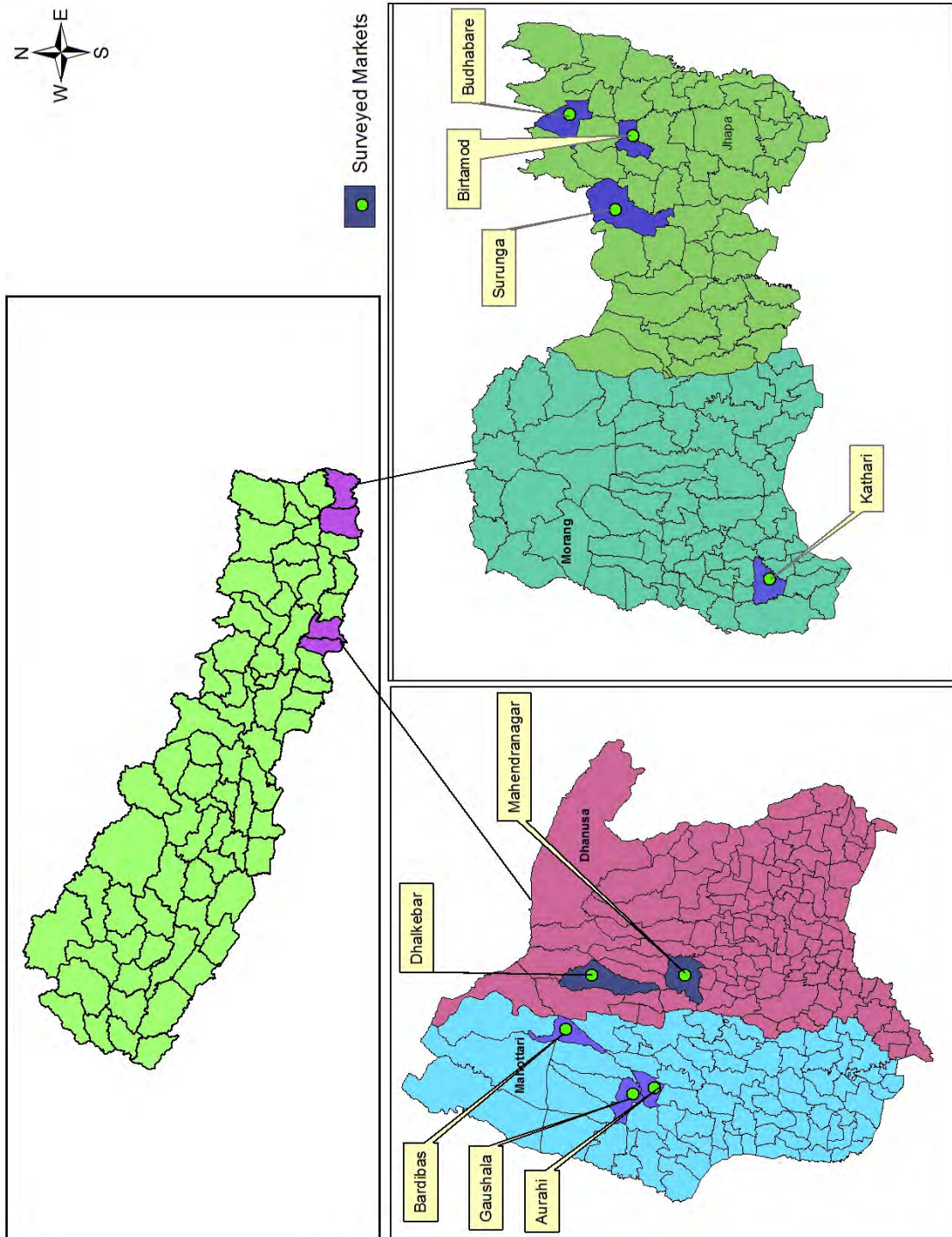
Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendra Nagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Market are mostly contracted out to the contractors. Contractors charge rent of the stall depending on the market facility use. It vary from Rs 20 to Rs 50 per day. There is no methods of record keeping at the market, especially on sale records, price information, market arrival, place of arrival etc.

Government have recently introduced agriculture market record keeping system on selected market. However, market information are not kept properly or updated regularly on studied market. Hence, interaction with the market management committee members, manager and traders were carried out to estimate sale volume on market, place of origin of produce, sale of produce etc. The information below are discussed on the basis of consultation with the traders.

Interaction with collectors, traders : The study team interacted also interacted with traders and collectors operating on each study market center and study villages to understand commodity specific marketing situation on study area. The study explore on exiting marketing system of rice and vegetables on study area.

Map 1.1: List of study markets



2. OVERVIEW OF STUDIED MARKET

2.1 Market Management

2.1.1 Market Operation

Cereals, vegetables, fruits, fish, live animals, meat are major commodities traded on the market. All market are managed by market management committee. However, the committee have contracted out with contractors for day to day business operation. Contractors hire market facilities on annual basis and rent to farmers, traders and wholesaler on daily or monthly basis. Of 9 markets, four are operating twice a week, three are operating daily, one thrice a week and one market is seasonal. This market operates mostly during tomato producing seasons.

Table 2.1: Operation and management of market

Market name	Major commodities	Market operation	Area (ha)	Business hour/day	Market management
Bardibas	Cereals, vegetables, fruits, fish, live animals, meat	Twice a week	2.33	12	Committee
Dhalkebar	Vegetables, fruits, spices	Thrice a week	4	12	Committee
Gaushala	Cereals, vegetables, live animal, meat	Twice a week	6.66	14	Committee
Mahendranagar	Live animals, vegetable, fruits	Twice a week	1.43	12	Committee
Aurahi	Vegetables, cereals, meat	Twice a week	1.33	4	Committee
Birtamod	vegetable, fruit, spices	Daily	2.7	12	Committee
Katahari	Vegetables, fish, fruits	Daily	0.13	14	Committee
Surunga	Vegetables	Seasonal, daily		11	Committee
Budhabare	Vegetables	Daily,	0.2	11	Committee

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.1.2 Composition of Market Management Committee

Table 2.3 below presents composition of market management committee. The market management committee comprises of traders, farmers, government line agencies staff, local government officials and others include representative of local political parties, local leader, school teacher etc. Market management committee of Aurahi (Mahottari) and Mahendra Nagar (Dhanusa) is dominated by other while that of Surunga is managed by farmers. Gaushala market is managed by traders only. Rest of the market are managed jointly.

2.1.3 Traders number and characteristics

Table 2.3 below presents number of traders on studied market. Number of traders vary from 4 on Budhabare (Jhapa) to 500 in Gaushala (Mahottari) market. Number of wholesalers is high on Birtamod (Jhapa) and Budhabare (Jhapa) whereas retailer dominates on Gaushala (Mahottari) and Budhabare (Jhapa) market. Farmers stall is high on Mahendranagar (Dhanusa) and Surunga (Jhapa) market.

Table 2.2: Composition of market management committee*Unit: % of members*

Market name	Traders	Farmers	Government/ local government	Other	Total	Women representation
M1	33.3	22.2	13.1	31.3	100.0	11.1
M2	33.3	33.3	12.1	21.2	100.0	11.1
M3	100.0	-	-	-	100.0	-
M4	-	-	11.1	88.9	100.0	-
M5	42.9	-	2.0	55.1	100.0	-
M6	33.3	33.3	13.1	20.2	100.0	11.1
M7	33.3	33.3	13.1	20.2	100.0	11.1
M8	-	100.0	-	-	100.0	14.3
M9	33.3	33.3	13.1	20.2	100.0	33.3
Overall	34.2	26.6	20.6	18.6	100.0	10.1

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.3: Different categories of traders operating at studied market center

Traders	M1	M2	M3	M4	M5	M6	M7	M8	M9	Overall
Traders (No)	280	250	500	60	400	274	75	32	4	1875
Distribution by type of trading (Percent)										
Traders - Bulk trading	21.4	6.0	-	-	-	-	-	-	-	4.0
Wholesalers	7.1	14.0	-	8.3	2.5	32.1	-	-	100.0	8.6
Retailers	35.7	40.0	60.0	8.3	37.5	67.9	20.0	-	-	45.7
Farmers (Producers)	35.7	40.0	40.0	83.3	60.0	-	80.0	100.0	-	41.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.1.4 Employee

Table 2.4 below presents number of employee on studied market. Of nine market, Aurahi and Budhabare market don't have any employee or staff. Number of staff on market vary from 1 on Gaushala to 12 on Birtamod.

Table 2.4: Number of employee of studied market

Traders	M1	M2	M3	M4	M5	M6	M7	M8	M9
Manager/coordinator	1	1	-	-	-	2	1	1	-
Support staff	2	3	1	2	-	10	2	1	-
Total	3	4	1	2	-	12	3	2	-

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.2 Sales Quantity and Volume

Agriculture produce is sold directly and market arrival is very less. Farmers traded directly from production pockets, major market centers and district head quarter. Hence, market arrival of quantity appears very less. Hence, this does not include those produce which are sold directly outside these study markets.

2.2.1 Cereals

Cereals is traded on four market center. Table 2.5 presents quantity and amount of cereals traded on studied market. Wholesale trading is conducted on two markets namely Bardibas and Mahendranagar whereas retail trading is conducting on four markets, namely Bardibas, Gaushala, Aurahi and Dhalkebar. Annual quantity of cereal traded on market varies from 1000 MT at Gaushala market to 8 MT at Mahendranagar market. Annual business volume of cereals is highest on Gaushala market (Rs 3500) while lowest (Rs 510) on Dhalkabar market. Both trade volume and business turnover appears very is less since this does not take account of cereals traded outside the market facility. Nearly 80% of cereals are traded from village level market directly.

Table 2.5: Cereals traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	50	3000	10	700	60	3700
2	M2						
3	M3			1000	35000	1000	35000
4	M4	5	300	3	210	8	510
5	M5			72	2304	72	2304
6	M6					0	0
7	M7					0	0
8	M8					0	0
9	M9					0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.2.2 Pulses/Lentils

Pulses are traded on four market center. Table 2.6 presents quantity and amount of pulses traded on studied market. Wholesale trading is conducted on two markets namely Bardibas and Mahendranagar market whereas retail trading is conducting on four markets, namely Bardibas, Gaushala, Mahendranagar and Kathari market. Annual quantity of pulses traded on studied market varies from 500 MT at Gaushala market to 14 MT at Mahendranagar market. Annual business volume of pulses is highest on Gaushala Market (Rs 35000) while lowest (Rs 1020) at Mahendranagar market. Both trade volume and business turnover appears very is less since this does not take account of pulses traded outside market facility. Nearly 90% of pulses are traded directly.

Table 2.6: Pulses traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	60	4200	30	2400	90	6600
2	M2						
3	M3			500	35000	500	35000
4	M4	10	700	4	320	14	1020
5	M5						
6	M6						
7	M7			12.5	1250	12.5	1250
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.2.3 Vegetables

Vegetables are traded on all market. Table 2.7 presents quantity and amount of vegetables traded on studied market. Wholesale trading is conducted on four markets namely Bardibas, Dhalkebar, Birtamod, and Budhabare market whereas retail trading is conducting on all the studied market. Annual quantity of vegetables traded on studied market varies from 206 173 MT at Birtamod market to 12 MT at Surunga market. Annual business volume of vegetable is highest on Birtamod Market (Rs 3,996,601) while lowest at Surunga market (Rs 1200). Both trade volume and business turnover appears relatively high on these market. Nearly one third of vegetables produce on the district are traded through these market. Likewise, Indian vegetables are also traded from two market namely Dhalkebar and Birtamod market.

Table 2.7: Vegetables traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	10	200	40	1,200	50	1,400
2	M2*	6,332	3,113			6,332	3,113
3	M3			300	6,000	300	6,000
4	M4	40	800	50	1,500	90	2,300
5	M5			286	10,010	286	10,010
6	M6*	2,06,173	36,96,601			2,06,173	36,96,601
7	M7			1,750	18,750	1,750	18,750
8	M8	12	1,200			12	1,200
9	M9	1,664	19,200			1,664	19,200

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Note: * Data compiled from annual report of Market

2.2.4 Fruits

Fruits are traded on seven markets. Table 2.8 presents quantity and amount of fruits traded on studied market. Wholesale trading is conducted on four markets namely Bardibas, Dhalkebar, Mahendranagar, and Birtamod market whereas retail trading is conducting on all the studied market except Kathari and Surunga market. Annual quantity of fruits traded on studied market varies from 25877 MT at Birtamod market to 2 MT at Gaushala market. Likewise, annual business volume of fruits is highest on Birtamod Market (Rs 25,877) while lowest at Gaushala market (Rs 1200). Likewise, Indian fruits are also traded from two market namely Dhalkebar and Birtamod market. Both trade volume and business turnover

appears is very less. Very few amount (almost 15-20%) of fruits produce on the district are traded through these markets. Collectors purchase fruits directly from the orchard and export outside district. Hence, market arrival is very less.

Table 2.8: Fruits traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	80	7200	30	3000	110	10200
2	M2*	2347	434			2347	434
3	M3			2	200	2	200
4	M4	30	2100	40	4000	70	6100
5	M5			3	450	3	450
6	M6*	25877	913671			25877	913671
7	M7			25	1500	25	1500
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Note: * Data compiled from annual report of Market

2.2.5 Spices

Spices are traded on seven markets. Table 2.9 presents quantity and amount of spices traded on studied market. Wholesale trading is conducted on four markets namely Bardibas, Dhalkebar, Mahendranagar, and Birtamod market whereas retail trading is conducting on all the studied market except Kathari and Surunga market. Annual quantity of spices traded on market varies from 3479 MT at Birtamod market to 150 MT at Gaushala market. Likewise, annual business volume is highest on Birtamod Market (Rs 8,51,219) while lowest at Gaushala market (Rs 150). Very few amount (almost 15-20%) of spices produce on the district are traded through these markets. Collectors purchase directly and export outside district. Both trade volume and business turnover appears is very less.

Table 2.9: Spices traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	1	150	5	750	6	900
2	M2*	1,914	1,289			1,914	1,289
3	M3			1	150	1	150
4	M4	2	300	4	600	6	900
5	M5			5	702	5	702
6	M6*	3,479	8,51,219			3,479	8,51,219
7	M7			13	750	13	750
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Note: * Data compiled from annual report of Market

2.2.6 Live animals

Live animals is traded on three market. Table 2.10 presents quantity and amount of live animal traded on studied market. Wholesale trading is conducted on only two markets

namely Bardibas and Mahendranagar, whereas retail trading is conducting on one studied market namely Gaushala. Annual quantity of live animal traded on market varies from 2800 at Mahendranagar market to 800 at Gaushala market. Likewise, annual business volume is highest on Mahendranagar Market (Rs 21,000) while lowest at Gaushala market (Rs 8000). Very few animal (almost 15-20%) come to these markets. Farmers generally bring for meeting immediate cash need. Livestock are traded directly from villages.

Table 2.10: Live animal traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (No/Year)	Amount (Rs000/year)	Quantity (No/Year)	Amount (Rs000/year)	Quantity (No/Year)	Amount (Rs000/year)
1	M1	2400	24000			2400	24000
2	M2						
3	M3			800	8000	800	8000
4	M4	2800	21000			2800	21000
5	M5						
6	M6						
7	M7						
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.2.7 Meat

Meat is traded on six markets. Table 2.11 presents quantity and amount of meat traded on studied market. Wholesale trading is conducted on three markets namely Bardibas, Mahendranagar and Birtamod, whereas retail trading is conducting on six markets except Gaushala, Surunga and Budhabare. Annual quantity of meat traded on market varies from 416 MT at Birtamod market to 12.5 MT at Kathari market. Likewise, annual business volume is highest on Birtamod Market (Rs 147,325) while lowest at Kathari market (Rs 2500). Very few amount of meat is traded from these market. Butchers directly sale meat to consumers from shop which are established either at at market place or village.

Table 2.11: Meat traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	40	12000	25	8750	65	20750
2	M2			292	131400	292	131400
3	M3						
4	M4	20	6000	10	3000	30	9000
5	M5			60	24000	60	24000
6	M6	416	147325	0	0	416	147325
7	M7			12.5	2500	12.5	2500
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.2.8 Fishes

Fish is traded on six markets. Table 2.12 presents quantity and amount of fish traded on studied market. Wholesale trading is conducted on three markets namely Bardibas, Mahendranagar and Birtamod, whereas retail trading is conducting on six markets except Dhalkebar, Surunga and Budhabare. Annual quantity of fish traded on market varies from 375 MT at Kathari market to 2 MT at Gaushala and Aurahi market. Likewise, annual business volume is highest on Birtamod Market (Rs 51897) while lowest at Gaushala market (Rs 500). Very few amount of fish is traded from these market.

Table 2.12: Fish traded on studied market

SN	Market	Wholesale (Approx)		Retailing (Approx)		Total	
		Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)	Quantity (Mt/Year)	Amount (Rs000/year)
1	M1	45	9000	30	7500	75	16500
2	M2						
3	M3			2	391	2	391
4	M4	20	4000	10	2500	30	6500
5	M5			2	500	2	500
6	M6	285	51897			285	51897
7	M7			375	11250	375	11250
8	M8						
9	M9						

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3 Origin of Produce

2.3.1 Cereals

Cereals are brought from adjoining area, within district, nearby districts, other districts and India. Table 2.13 presents origin of cereals traded on the market. Sale of Indian cereals is high on Gaushala and Mahendranagar market, whereas that of adjoining area is high on Aurahi market. Likewise, Bardibas market is selling cereals produce within district followed by adjoining area.

Table 2.13: Origin of cereals traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	30		25	10	100				
2	Within district	40			20					
3	Nearby districts	20			10					
4	Other districts	10			10					
5	India			75	50					
	Overall	100		100	100	100				

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.14 presents the proportion of cereals brought by different stakeholders on the market. Farmers, wholesaler (local and outsiders), retailers and traders (Indian) are bringing cereals on market. Share of retailers and farmers is high on Bardibas and Aurahi market where as that of traders (Indian) and wholesaler (local) is high on Gaushala and Mahendranagar market respectively. Indian traders are bringing produce on Gaushala and Mahendranagar markets.

Table 2.14: Market stakeholder bringing cereals to the market*Unit: % of trade volume*

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	40		10	10	10				
2	Wholesaler (local)	10		15	50					
3	Wholesaler (outsiders)	10			2					
4	Retailers	40				90				
5	Traders (India)			75	38					
	Total	100		100	100	100				

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.2 Pulses

Pulses are brought from adjoining area, within district, nearby district, other district and India. Table 2.15 presents origin of produce traded on the market. Sale of Indian origin pulses is high on Gaushala and Mahendranagar market, whereas most of the pulses traded on Bardibas and Kathari market come from the district.

Table 2.15: Origin of pulses traded on the market*Unit: % of trade volume*

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	30		10	20			40		
2	Within district	40			30			60		
3	Nearby districts	20			10					
4	Other districts	10								
5	India			90	40					
	Overall	100		100	100			100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.16 presents proportion of pulses brought by different stakeholders on the market. Farmers, wholesaler (local and outsiders), retailers and traders (India) are bringing pulses on market. Share of retailers and wholesaler (outsider) is high on Bardibas market, farmers on Kathari market and wholesalers (local) on Aurahi market. However, share of Indian traders is high on Gaushala market.

Table 2.16: Market stakeholder bringing pulses to the market*Unit: % of trade volume*

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	20		10	10			100		
2	Wholesaler (local)	10		15	50					
3	Wholesaler (outsiders)	40			2					
4	Retailers	30								
5	Traders (India)			75	38					
	Total	100		100	100			100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.3 Vegetables

Vegetables are brought from adjoining area, within district, nearby district, other district and India. Table 2.17 presents origin of vegetables traded on the market. Sale of Indian origin vegetables is high on Birtamod and Budhabare market whereas sale of vegetables coming from adjoining area is high on Dhalkaber, Gaushala and Aurahi market. Likewise, most of

vegetables on Mahendranagar and Kathari market are brought from the district. Indian vegetables arrive on Dhalkebar, Birtamod and Budhabare market.

Table 2.17: Origin of vegetables traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	30	40	100	25	100		40	100	10
2	Within district	40	20		50		10	60		30
3	Nearby districts	20	20				15			30
4	Other districts	10			25		15			0
5	India		20				60			30
	Overall	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.18 presents proportion of vegetables brought by different stakeholders on the market. Farmers, wholesaler (local and outsiders), retailers and traders (India) are bringing vegetables on market. Share of farmers is high on all the market except from Budhabare and Birtamod market. Indian traders share is high on Birtamod market whereas wholesaler share is high on Budhabare market.

Table 2.18: Market stakeholder bringing vegetables to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	60	80	80	50	70	25	75	100	20
2	Wholesaler (local)	20	20	20	45		20			10
3	Wholesaler (outsiders)	10			5		25			40
4	Retailers	10				30		25		
5	Traders (India)						30			30
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.4 Fruits

Fruits are brought from adjoining area, within district, nearby districts, other district and India. Table 2.19 presents origin of fruits traded on the market. Sale of Indian fruit is high on all the studied market except on Dhalkebar and Kathari market. Likewise, fruits are mostly brought within the district for sale on Kathari market whereas it is brought from adjoining area on Dhalkebar market.

Table 2.19: Origin of fruits traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	30	30	10	5			10		
2	Within district	10	20	20	15	0	10	90		
3	Nearby districts	10	20	10	15	10	10			
4	Other districts		20	10	5	30	30			
5	India	50	10	50	60	60	40			
	China					10				
	Overall	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.20 presents the proportion of fruits brought by different stakeholders on the market. Fruits are brought by retailers, traders (India), wholesaler (local), farmers and wholesaler (outsiders). Indian traders are bringing most of the fruits traded on most of the studied market whereas retailers are bringing most of fruits traded on Aurahi and Kathari market.

Table 2.20: Market stakeholder bringing fruits to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	40	30	10	5		10			
2	Wholesaler (local)		10	20	5		20			
3	Wholesaler (outsiders)			20	20		20			
4	Retailers	10				100		100		
5	Traders (India)	50	60	50	70		50			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.5 Spices

Spices are brought from adjoining area, within district, nearby districts, other district and India. Table 2.21 presents origin of spices traded on the market. Sale of spices is high on all the studied market except on Birtamod and Kathari market. Spices are mostly brought within the district for sale on Kathari whereas it is brought from nearby district on Dhalkebar market.

Table 2.21: Origin of spices traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	40	10		5					
2	Within district				15		25			
3	Nearby districts				10		25			
4	Other districts					100		100		
5	India	60	90	100	70		50			
	Overall	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.22 presents proportion of spices brought by different stakeholders. Spices are brought by retailers, traders (India), wholesaler (local), farmers and wholesaler (outsiders). Indian traders bring spices on most of the studied markets except on Aurahi and Kathari. Retailers are bringing most of the spices on these markets.

Table 2.22: Market stakeholder bringing spices to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	40	10		5					
2	Wholesaler (local)				15		25			
3	Wholesaler (outsiders)				10		25			
4	Retailers					100		100		
5	Traders (India)	60	90	100	70		50			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.6 Live animals

Live animals are brought from adjoining area, within district, nearby districts, other district and India. Table 2.23 presents origin of live animals traded on the market. Sale of Indian origin animal and animal from adjoining area is high on Mahendranagar. Most of animal traded on Bardibas and Gaushala market are brought from adjoining area.

Table 2.23: Origin of live animal traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	50		100	30					
2	Within district	50			10					
3	Nearby districts				20					
4	Other districts				10					
5	India				30					
		100		100	100					

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.24 presents proportion of live animals brought by different stakeholders. Live animals are brought by retailers, traders (India), wholesaler (local), farmers and wholesaler (outsiders). Indian traders are bringing livestock on Mahendranagar market whereas farmers are bringing most of the live animals on Bardibas and Gaushala market.

Table 2.24: Market stakeholder bringing live animal to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	50		100	20					
2	Wholesaler (local)	20			20					
3	Wholesaler (outsiders)	20			10					
4	Retailers	10								
5	Traders (India)				50					
	Total	100	0	100	100					

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.7 Meat

Meat are brought from adjoining area, within district, nearby districts, and other district. Table 2.25 presents origin of meat traded on the market. Traders generally bring live animals from nearby area, slaughter them and sale on the market during market days . Hence, meat are generally brought from adjoining area, within district and nearby districts.

Table 2.25: Origin of meat traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	50		100	60	100		100		
2	Within district	50			10		50			
3	Nearby districts				20		50			
4	Other districts				10					
	Overall	100		100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.26 presents proportion of meat brought by different stakeholders on the market. Meat are brought by retailers, wholesaler (local), farmers and wholesaler (outsiders).

Farmers and wholesaler are mostly bringing meat to the market, whereas retailers/butcher are bringing meat on Bardibas, Mahendranagar and Kathari market.

Table 2.26: Market stakeholder bringing meat to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	40	0	100	50	100			0	0
2	Wholesaler (local)	10					30			
3	Wholesaler (outsiders)						70			
4	Retailers	50			50			100		
	Total	100	0	100	100	100	100	100	0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.3.8 Fish

Fish are brought from adjoining area, within district and India. Table 2.27 presents origin of fish traded on the market. Sale of Indian fish is high on Birtamod market while it is brought from adjoining area and within district on rest of the market.

Table 2.27: Origin of fish traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	50		100	45	100		90		
2	Within district	50			50		20	10		
5	India				5		80			
	Overall	100		100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.28 presents the proportion of fish brought by different stakeholders on the market. Fish are brought by retailers, traders (India), wholesaler (local), farmers and wholesaler (outsiders). Farmers and local wholesaler are bringing fish on most of market. Nevertheless, Indian traders are bringing about 10% of fish sold on Birtamod market.

Table 2.28: Market stakeholder bringing fish to the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	50		100	45	100		75		
2	Wholesaler (local)	20			40		100			
3	Wholesaler (outsiders)	20			5					
4	Retailers	10						25		
5	Traders (India)				10					
	Total	100		100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4 Place of Sale

2.4.1 Cereals

Table 2.29 presents place of sale of cereals. Cereals are sold on adjoining area, within district, nearby districts and other districts. Majority of cereal are sold within district either adjoining area or other places within the district in all market except on Mahendranagar market. More than half of the cereals is exported to other nearby places from this market.

Table 2.29: Place of sale of cereals

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	30		25	40	40				
2	Within district	40		75	10	40				
3	Nearby districts	20			50					
4	Other districts	10				20				
	Total	100		100	100	100				

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.30 presents buyers of cereals. Buyers of cereals are consumers, wholesaler (outsiders & local), and retailers. Consumers are main buyers on all the market except for Mahendranagar market. Wholesalers are main purchaser on Mahendra nagar market.

Table 2.30: Buyers of cereals

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	40		75	25	60				
2	Wholesaler (local)	40		25						
3	Wholesaler (outsiders)	10			75					
4	Retailers	10				40				
	Total	100		100	100	100				

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.2 Pulses

Table 2.31 presents place of sale of pulses. Pulses are sold on adjoining area, within districts nearby districts and other districts. Majority pulses are sold within the district, i.e either on adjoining area or other places within the district on all market center except for Mahendranagar market. More than half of the pulses is exported to nearby districts from this market.

Table 2.31: Place of sale of pulses

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	40		25	40			100		
2	Within district	40		75	10					
3	Nearby districts	10			50					
4	Other districts	10								
	Total	100		100	100			100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.32 presents buyers of pulses. Buyers of pulses are consumers, wholesaler (outsiders & local), and retailers. Consumers are main buyers on all the market except for Mahendranagar market, where wholesalers are main purchaser.

Table 2.32: Buyers of pulses

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	40		75	25			100		
2	Wholesaler (local)	40		25						
3	Wholesaler (outsiders)	10			75					
4	Retailers	10								
	Total	100		100	100			100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.3 Vegetables

Table 2.33 presents place of sale of vegetables. Vegetables are sold on adjoining area, within districts, nearby districts, other districts and India. Most of vegetables are sold within the district, i.e. either on adjoining area or other places within the district in all market center except on Birtamod market. Majority of vegetables are exported to other nearby districts and India from this market.

Table 2.33: Place of sale of vegetables

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	40	100	50	50	100	15	100	100	65
2	Within district	50		50	10		30			15
3	Nearby districts	5					20			20
4	Other districts	5			40		10			
5	India						25			
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.34 presents buyers of vegetables. Buyers are consumers, wholesaler (outsiders & local), retailers and Indian traders. Consumers and retailers are main buyers on all the market except for Birtamod market. Wholesalers and Indian trader are purchasing most of vegetables from this market.

Table 2.34: Buyers of vegetables

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	50	60	50	50	80	5	100	0	10
2	Wholesaler (local)	30					35		10	10
3	Wholesaler (outsiders)	10					20		50	20
4	Retailers	10	40	50	50	20	20		40	60
	Traders (India)						20			
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.4 Fruits

Table 2.35 presents place of sale of vegetables. Fruits are sold on adjoining area, within district, nearby districts, other districts and India. Most of fruits are sold within the district, i.e either on adjoining area or other places within the district in all market center except on Birtamod market. Nearly half of the fruits are exported to nearby districts and India from this market.

Table 2.35: Place of sale of fruits

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	50	100	100	100	100	30	100		
2	Within district	50					15			
3	Nearby districts						30			
4	Other districts						10			
	India						15			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.36 presents buyers of fruits. Buyers of fruits are consumers followed by wholesaler (outsiders & local), retailers and traders (India). Consumers are main buyers on all the market except for Birtamod market. Wholesalers and Indian traders purchase nearly half of fruits from this market.

Table 2.36: Buyers of fruits

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	50	100	100	100	100	10	100		
2	Wholesaler (local)	30					25			
3	Wholesaler (outsiders)	10					20			
4	Retailers	10					25			
5	Traders (India)						20			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.5 Spices

Table 2.37 presents place of sale of spices. Cereals are sold on adjoining area, within district, other districts, India and Bangladesh. Majority of spices are sold within the district either adjoining area or other places within the district in all market center except Birtamod market. Large amount of spices is exported to India and Bangladesh from this market.

Table 2.37: Place of sale of spices

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	60	100	100	100	100	5	100		
2	Within district	40					5			
3	Other districts						5			
4	India						30			
5	Bangladesh						55			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.38 presents buyers of spices. Buyers of spices are consumers, wholesaler (outsiders & local), retailers and traders (India and Bangladesh). Consumers are main buyers on all the market except Birtamod market. Wholesalers and traders (India and Bangladesh) are main purchaser from this market.

Table 2.38: Buyers of spices

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	80	100	100	100	100	5	100		
2	Wholesaler (local)	10					35			
3	Wholesaler (outsiders)	5					20			
4	Retailers	5					20			
	Traders (India & Bangladesh)						20			
	Total	100	100	100	100	100	100	100		

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.6 Live animals

Table 2.39 presents place of sale of live animals. Live animals are sold on adjoining area, within district and other districts. Majority of live animal are sold on other district and adjoining area on all market center except.

Table 2.39: Place of sale of live animals

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	20		50	50					
2	Within district	20								
4	Other districts	60		50	50					
	Total	100		100	100					

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.40 presents buyers of live animals. Buyers of live animals are consumers and wholesaler (outsiders and local). Wholesaler and consumers are main buyers on these market.

Table 2.40: Buyers of live animals

Unit: % of sale volume

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	20		50	50					
2	Wholesaler (local)	20								
3	Wholesaler (outsiders)	60		50	50					
	Total	100		100	100					

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.7 Meat

Table 2.41 presents place of sale of meat. Meat is sold on adjoining area and within the district. Majority of meat are sold within the district either adjoining area or other places within the districts on all market center. This is mainly because butcher slaughter animals during market day and sale from market only. In most of the cases they sale directly to the consumer.

Table 2.41: Place of sale of meat*Unit: % of sale volume*

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	40	0	100	100	100	50	100	0	0
2	Within district	60					50			
	Total	100	0	100	100	100	100	100	0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.42 presents buyers of meat. Buyers of meat are consumers and retailers. Consumers are main buyers of meat on on all the market.

Table 2.42: Buyers of meat*Unit: % of sale volume*

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	80	0	100	100	100	100	100	0	0
2	Retailers	20								
	Total	100	0	100	100	100	100	100	0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.4.8 Fish

Table 2.43 presents place of sale of fish. Fish are sold on adjoining area, within district nearby districts and other districts. Majority of fish is sold within the district either adjoining area or other places within districts in all market center.

Table 2.43: Place of sale of fish*Unit: % of sale volume*

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	50	0	100	100	100	40	100	0	0
2	Within district	50					40			
3	Nearby districts						10			
4	Other districts						10			
	Total	100	0	100	100	100	100	100	0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.44 presents buyers of fish. Buyers of fish are consumers followed by wholesaler (outsiders & local), and retailers. Consumers are main buyers on all the market. Wholesalers are also purchasing fish from Bardibas and Birtamod market.

Table 2.44: Buyers of fish*Unit: % of sale volume*

SN	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Local)	70	0	100	100	100	80	100	0	0
2	Wholesaler (local)	20								
3	Wholesaler (outsiders)						20			
4	Retailers	20								
	Total	100	0	100	100	100	100	100	0	0

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

2.5 Summary and Conclusions

Table 2.45 presents business transaction on studied market. Business transaction is highest on Birtamod market whereas lowest on Surunga market. Daily business transaction varies from Rs 15,508.8 on Birtamod market to Rs 3.3 Surunga market. Wholesale trading dominates on 5 markets namely Bardibas, Mahendranagar, Birtamod, Surunga and Budhabare market whereas retail trading dominates on Gaushala Aurahi and Kathari.

Table 2.45: Business transaction on studied market

SN	Market	Business amount (000/year)			Daily transaction (Rs 000)	Share (%)	
		Wholesale	Retail	Total		Wholesale	Retail
1	M1	59,750	24,300	84,050	230.3	71.1	28.9
2	M2	4,836	1,31,400	1,36,236	373.3	3.6	96.4
3	M3	-	77,541	77,541	212.4	-	100.0
4	M4	35,200	12,130	47,330	129.7	74.4	25.6
5	M5	-	37,966	37,966	104.0	-	100.0
6	M6	56,60,714	-	56,60,714	15,508.8	100.0	-
7	M7	-	36,000	36,000	98.6	-	100.0
8	M8	1,200	-	1,200	3.3	100.0	-
9	M9	19,200	-	19,200	52.6	100.0	-

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.46 origin of the produce traded on studied market. Most of the agriculture produce traded on market come from the district (adjoining area and within district) followed by India and nearby districts. This situation remain similar almost all the studied market.

Table 2.46: Origin of agriculture produce traded on the market

Unit: % of trade volume

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	36.3	33.3	55.6	22.5	66.7	-	46.7	100.0	10.0
2	Within district	37.5	13.3	2.5	25.0	-	26.7	53.3	-	30.0
3	Nearby districts	8.8	13.3	1.3	10.6	1.7	30.8	-	-	30.0
4	Other districts	3.8	6.7	1.3	7.5	5.0	9.2	-	-	-
5	India	13.8	33.3	39.4	34.4	26.7	31.7	-	-	30.0
6	China	-	-	-	-	-	1.7	-	-	-
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.47 presents share of market stakeholders bringing on different agriculture produce. Farmers and Indian traders are the main stakeholders bringing produce on the farmer followed by wholesaler and retailers. Share of farmer is high on Bardibas and Gaushala market. Likewise, share of wholesaler is high on Birtamod and Budhabare market, retailers on Aurahi Kathari market and Indian traders on Mahendra Nagar and Dhalkebar market. Indian traders are selling produce on five market whose share vary from 13.8% on Bardibas to almost 50% on Dhalkebar market.

Table 2.47: Market stakeholder agriculture produce on the market

S.N	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Farmers	42.5	40.0	51.3	24.4	46.7	5.8	41.7	100.0	20.0
2	Wholesaler (local)	11.3	10.0	8.8	28.1	0.0	37.5	0.0	0.0	10.0
3	Wholesaler (outsiders)	12.5	0.0	2.5	6.8	0.0	35.0	0.0	0.0	40.0
4	Retailers	20.0	0.0	0.0	0.0	53.3	0.0	58.3	0.0	0.0
5	Traders (India)	13.8	50.0	37.5	40.8	0.0	21.7	0.0	0.0	30.0
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.48 presents place of sale of agriculture produce. Almost all the produce are sold within the district (adjoining area and within district) Nevertheless, very few produce are traded outside district and to India and Bangladesh as well.

Table 2.48: Place of sale of produce*Unit: % of trade volume*

S.N.	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Adjoining area	41.3	100.0	68.8	72.5	90.0	31.7	100.0	100.0	10.0
2	Within district	43.8	-	25.0	3.8	6.7	31.7	-	-	30.0
3	Nearby districts	4.4	-	-	12.5	-	10.0	-	-	30.0
4	Other districts	10.6	-	6.3	11.3	3.3	5.8	-	-	-
5	India	-	-	-	-	-	11.7	-	-	30.0
	Bangladesh	-	-	-	-	-	9.2	-	-	
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

Table 2.49 presents buyers of agriculture commodities. Buyers of agriculture commodities are consumers, wholesaler (outsiders & local), and retailers. Consumers are main buyers on all the market.

Table 2.49: Buyers of agriculture commodities

S.N	Particulars	M1	M2	M3	M4	M5	M6	M7	M8	M9
1	Consumers (Individuals/business)	53.8	86.7	81.3	68.8	90.0	40.0	100.0	0.0	20.0
2	Wholesaler (local)	22.5	0.0	6.3	0.0	0.0	19.0	0.0	10.0	10.0
3	Wholesaler (outsiders)	13.1	0.0	6.3	25.0	0.0	16.0	0.0	50.0	40.0
4	Retailers	10.6	13.3	6.3	6.3	10.0	13.0	0.0	40.0	0.0
5	Traders (India)	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	30.0
	Total	100	100	100	100	100	100	100	100	100

Market Name: M1: Bardibas (Mahottari); M2: Dhalkebar (Dhanusa); M3: Gaushala (Mahottari); M4: Mahendranagar (Dhanusa); M5: Aurahi (Mahottari); M6: Birtamod (Jhapa); M7: Kathari (Morang); M8: Surunga (Jhapa); M9: Budhabare (Jhapa)

3. PADDY MARKETING SYSTEM

3.1 Production pockets

Paddy is grown on all area of the study district. It is main staple food as well as source of income for farmers. Farmers generally sell paddy to meet their household expenses. Table 1 below presents major production pockets of paddy along with traders and big rice mills operating at the district.

Table 3.1: Paddy production pockets and trading places

District	Production Pockets/ Collection center	Traders (Road head)	Rice Mills (Factory)
Jhapa	Budhabare, Shivgunj, Damak, Chandragadhi, Garamani, Anarmani, Surunga, Topgacchi, Sanischare, Gauradaha, Maharanijhoda, Juropani	Birtamod, Damak, Budhabare, Garamani, Gaurigunj	Khanar (Sunsari), Gaurigunj, Damak, Birtamod
Morang	Belbari, Kaseni, Aamgachhi, Tankisinuwari, Bahuni, Bayarban	Pathari, Rangeli, Dainiya, Karsiya, Biratnagar, Tankisinuwari, Urlabari	Biratnagar, Urlabari, Khanar (Sunsari), Duhabi (Sunsari)
Mahottari	Ratauli, Bhramapura, Ekaraiya, Sahorwa, Banauli, Dharampur, Singhyahi, Pipara, Dami Madai, Bhangaha, Sripur, Ankar, Nainhi, Balwa, Loharpatti, Sahasaula	Jaleswar, Ramgopalpur, Pipara, Gausala, Bardibas, Aurahi	Mahendranagar (Dhanusa), Janakpur
Dhanusa	Sapahi, Baniniya, Ramdaiya Gopalpur, Thera, Kachuri, La Bagewa, Mauhahi, Barmajhiya, Raghunath pur, Thilla Bhatiyani, Sabaila, Makantaha, Paterwa, Khariyani, Yedukoha, Gothkoyalpur and Chora Koyalpur	Mahendranagar, Jaleswor, Pipra	Mahendranagar (Dhanusa), Janakpur

3.2 Distribution system

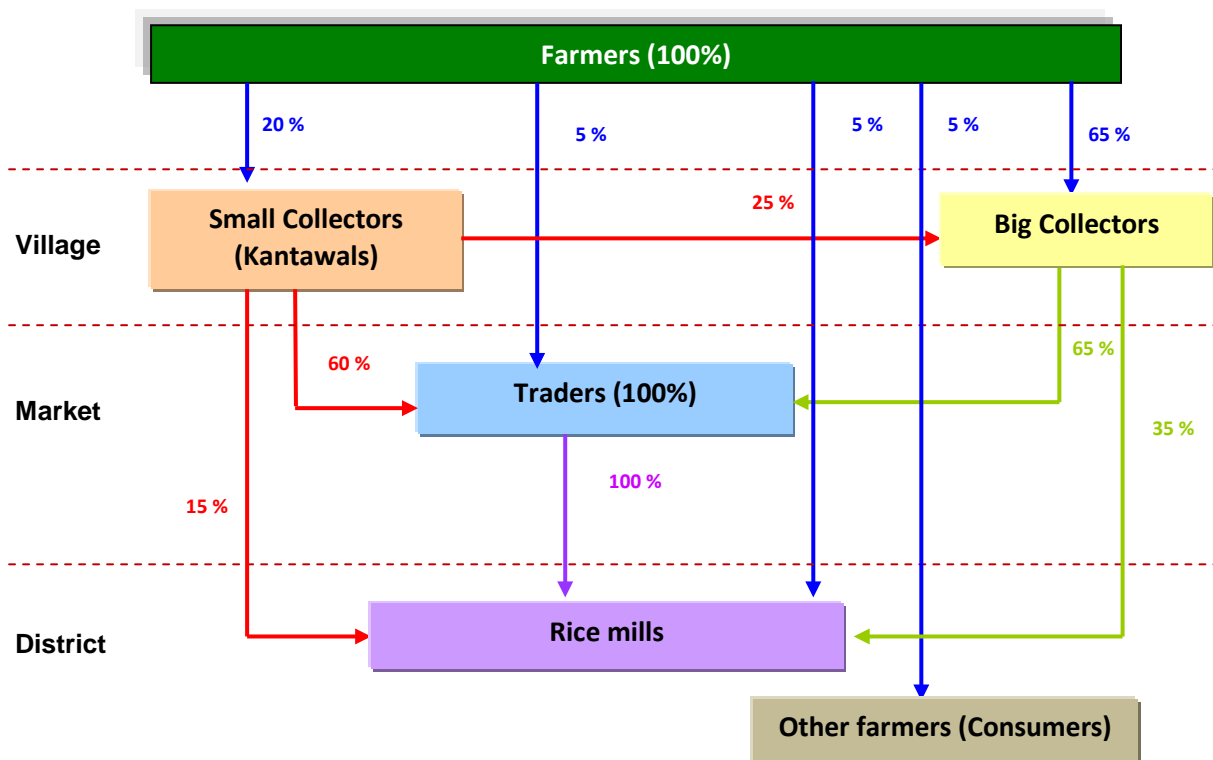
Distribution system is prepared following consultations with the traders and farmers. During the market survey, consultative meeting were organized to prepare the distribution system due lack of proper record keeping of information at concerned market center. Participants were requested to prepare distribution map in such a way that once the product reach to one market stakeholders from various sources, it is considered as 100 percent and distribution was made accordingly. Data and figures are presented here are the perception of stakeholders working in these area. The study found following marketing stakeholders operated

- **Small collectors:** Small collectors are popularly known as *kantawal*, operating their business at village. They are also collector or commission agents of big traders. Around 10 to 12 small collectors are operating at village/production pockets. They have seasonal in nature, operates mostly on season. They have a weighing machine together with limited storage capacity, nearly one to two room. Storage and purchasing capacity is around 5 to 10 ton per month. They sale paddy immediately or store for about a month. Most of these small collector had to buy paddy on cash. Farmers generally don't prefer to sale them on credit. Generally small farmers are the main supplier to small collectors.

- Collectors:** The big collectors are operating at the village level. Nearly two to three collectors are operating at village level. They have storage capacity of 100 to 200 ton. They generally buy paddy after harvest and wait for price, such that they can make profit. They also provide loan to farmers for purchase of production input such as seeds and fertilizers with less interest rate. They generally buy paddy on cash and credit. They take around 7 days for payment of purchase. These collectors have contract with big traders or mill owners to sale their produce. Traders also provide loan to purchase paddy.
- Traders:** Traders are operating at the market center. They are also the stockiest of the paddy. They store paddy and wait for price. They either directly purchase from collectors or employ their commission agent at village level. Traders also provide loan to collector to purchase and maintain stock of paddy. Likewise, they have connection with big rice mills and sale paddy.
- Mill owners (Factory):** Mill owners and factory are operating at the district head quarter or market center. They generally purchase paddy, do milling and packaging. The rice then sold to consumers through their commission agents. Mill owner also purchase paddy directly from traders and collectors. However, farmers have less access to sale produce because their demand is high and small holder producer cannot fulfill their demand.

Paddy is sale directly to buyers, i.e. without milling. Farmers in the study districts sell paddy to collectors, traders and rice mills. Figure 1 presents distribution system of paddy. Trading of paddy take at three levels, first at village level where small and big collector operates. Collectors purchase paddy on small scale and then assemble it. Then it is sold to the traders, who generally operates at the road head or major market center. These traders sell paddy to rice mill or factory. Very few farmers also sale produce to rice mills and consumer directly, however such amount is negligible. Use of cooperatives is virtually non-existent on all study districts.

Figure 3.1: Distribution system of paddy



Following marketing channels were observed in case of paddy

- Farmers - Small collector - Big collector - Traders - Rice mill
- Farmers - Big collector - Traders- Rice mill
- Farmers - Traders - Rice mill
- Farmers - rice mill
- Farmers - consumers

Of above five type of trading system, first two are quite common on all the districts. Farmers generally prefer to sale to big collectors, operating at village level. This is mainly because they get loan from collectors to purchase seeds and chemical fertilizers.

3.3 Selection of Buyers

In each rice production area, nearly a dozen for buyers (collectors) are operating. Farmers have lot of choice to select buyers. Likewise, each buyers price varies between 5 to 10 paisa per kg to attract more farmers. Though price is one of the important criteria for selecting traders, farmers generally prefer to sale produce to those collectors whom they trust or who is on business from long time. Likewise, timely payment or immediate cash payment is also one of the criteria for selection of buyers. Farmers don't prefer to sale produce to new traders because they have less confidence or trust with new traders.

Farmers generally select those traders/collectors who provide them credit for purchase of production inputs at low interest rate. Collectors generally charge interest of 24 to 36 percent per year on loan. Farmers immediately sale paddy to pay back loan of traders.

3.4 Price Determination

Most of farmers, especially small farmers sell their paddy to collectors due to the urgent need for cash and also due to lack of storage facilities. Price can be determine by following:

- Buyers
- Farmers
- Both

Collectors/buyers set price of paddy in most of the cases. Even large farmers have less role on setting price of paddy. Traders/Mill owner set price of paddy based on production and availability on market. Guided by this, collectors set prices at village level, which is slightly less (about Rs 1 per kg) than trader price. Farmers have less influence on setting price, which is mainly because of cheap paddy flowing from India. According to the collectors, price of Indian paddy is 20-25% cheaper compared to Nepal. Nepalese farmers cannot compete with price of India, mainly because of availability of cheap production inputs, mainly seeds and fertilizers. Famers also cross checked or enquired price with other nearby collectors/traders prior to the sale of paddy. They can bargain on price if price varies significantly. Apart from this, they can choose any collectors who give high price.

Five methods were observed for setting price as shown below.

- Prevailing market price
- Negotiation between buyer and sellers
- Quality and size
- Marketing cost and profit margin
- Price agreement before harvest

Of five methods, prevailing market price was the main criterion used in setting prices by most of the buyers followed by negotiation between buyers and sellers. Quality and size and marketing cost and profit margin are not considered for determining prices.

Price of paddy varies by season. Price is less during time of harvest (season) while it increase on summer season (off-season). Large holder farmers generally sale during summer season while small holder farmers sale immediately. Apart from this, farmers who had taken loan from collectors also sale paddy immediately to pay loan. Table below presents season and off-season price of paddy among different market agents. The price of paddy varies by variety as well.

Price is generally determined by the mill owner or factory. The price then spreads to traders, collectors and farmers. Trader generally purchase paddy at Rs 22 to 26 per kg whereas traders purchase at Rs 22 to 26/kg. Likewise, collectors purchase at Rs 16 to 24 per kg from farmers. Profit margin of collectors, traders and mill owner is varies from Rs 1 to 2 per kg, after meeting all their marketing expenditure. Traders and collector generally hold or store product to increase their profit. They generally buy paddy at low price and sold when price is high.

Table 3.2: Purchase price of paddy (Rs/kg)

Districts	Collectors		Traders		Mill-owners	
	Season	Off-season	Season	Off-season	Season	Off-season
Mahottari	16-20	20-24	20-22	22-26	22-24	24-26
Dhanusa	16-20	20-24	20-22	20-25	22-24	24-26
Morang	18-20	20-24	22-24	22-26	24-26	26-28
Jhapa	18-20	20-24	22-24	22-26	24-26	26-28

3.5 Price Information

Farmers are getting price information from following sources:

- Buyers (Collectors)
- Personnel communication with traders/mill owners of local market center
- Mass media (radio, television)

Buyers and personnel communication with traders/mill owners of local market centre are the most important source of price information. Very few farmers had access to price information through mass media, such as radio or television. Farmers generally don't listen price information provided through mass media which is mostly because of timing of dissemination.

3.6 Conclusion

The rice marketing system is generally dominated by the middlemen. It is mainly caused by the low level of farmer's education, under-developed infrastructure and inefficient flow of market information. There is a need to develop and extend the systematic price information dissemination system. Likewise, improvements of infrastructure related to marketing facilities, particularly storage, transportation to prolong the supply of paddy and reduce marketing cost is essential.

4. VEGETABLE MARKETING SYSTEM

4.1 Introduction

Vegetables are produce on small scale mostly for cash income. Very few farmers are growing commercially. Major vegetables which are grown in the study area are tomato, cucurbits, ladies finger and coal crop, especially cabbage and cauliflower. Farmers bring produce to local weekly markets (*haat bazar*) and sell their produce. Government has also developed marketing center/facilities on few strategic locations for retailing and wholesaling of vegetables. Vegetables generally come from nearby area and adjoining district. Few commodities also come from India which depends on location of market. Most of the vegetables, which come to local market are consumed within the district while very few goes outside district or to Kathmandu.

Following type of market are operational in the study districts with regards to trading of vegetables.

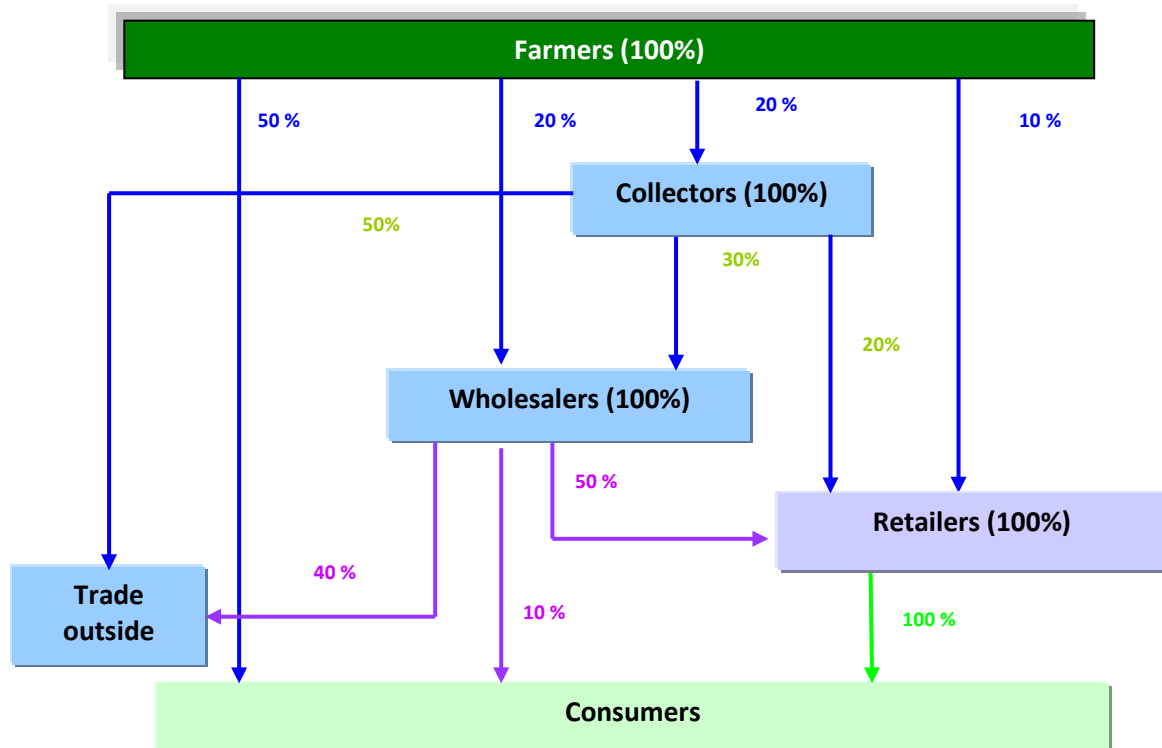
- **Local weekly markets (*haat bazaar*):** The *Haat Bazaar* has been a part of rural Nepalese culture for a long time. It is very common to have a market at a particular day of the week at a designated place in a village (usually the village square or on both sides of the road/pathway leading to the village). It is mostly a collection of individual farmers bringing their produce for sale. The buyers may be another farmer, a local resident of the village, a local retailer who will purchase that day to sell locally on other days or a petty trader. Traders also collect produce at the market and sell to other large market.
- **Collection Centers:** Collection centers are a notch above the *Haat Bazaars*. These markets are usually situated on the side of a rural road or a highway. This is the type of place where local retailers, petty traders and agents of large main market wholesalers hang out. They bargain with local farmers for the products available at the season. Cash is used in most of the time, but goods may be given on credit to regular traders. Retailers use this place to purchase smaller amounts for sale in nearby markets. Traders and agents dispatch goods to main markets. The market area is occupied for only a short duration each day. The regularity of the market is guided by the harvesting season. Bardibas market is collection center. Collection center may or may not be organized.
- **Transit Markets:** Transit markets play an important role in the supply of foods, vegetables and fruits to remote districts. These markets import and forward produce to other areas in the hills and mountains. Most of the transit markets are strategically located at arterial road heads. Transit market function to exchange various commodities. However, designated area are not regulated by the government and are spontaneously established and recognized by the citizens, in the other word it might be like a commercial town at cross road. Dhalkebar of Dhanusa district is also known as transit market
- **Wholesale Markets:** Wholesale Markets are located exclusively in large towns and cities like Kathmandu, Birtamod and the like. These markets are more organized and have permanent structures like sheds, storage space and roads. The volume of transaction is large and produce are dispatched to other towns or across the border to India. The central government, the local municipality and private sector have supported the establishment of wholesale markets. Rates of produces in markets are decided by the traders mostly depending on the mechanisms of supply and demand. Large individual producers and farmer groups have direct access to these markets. Small producers are usually not entertained here. The wholesale merchants sell in bulk to retailers and to suppliers to towns like Kathmandu and Pokhara.

- Retail markets:** Retail Markets are situated in municipal areas. They are usually close to the wholesale market and sometimes in the same vicinity. However, a town may have a number of retailing outlets in a single city. Retail markets serve the local consumers. The products are acquired from the local wholesalers, but at times, retailers are known to procure goods directly from farmers/producers at a cheaper price. Such farmers are from the immediate vicinity of the town. The market will have permanent sheds for which retailers pay rent to the local municipality.

4.2 Distribution System

Farmers generally sale vegetables on local market directly, mainly at Haat bazar. They bring their produce on small basket (around 20 kg) and sale to consumers directly. Collectors, generally are operating at the road or village level purchase from farmers and sold to wholesalers or retailers within and outside district. Involvement of collector is quite visible in case of tomato and potato. Wholesaler are operating at the major market center of each district. They purchase directly from farmer and old to retailer. Figure 1 presents marketing channel for sale of vegetables. Value addition and processing of vegetables does not exist.

Figure 4.1: Distribution system of vegetables



Trading of vegetable take at three levels, first at village level where collector operates. Collectors purchase vegetables and then trade outside or sell to wholesalers. Wholesalers, who generally operates at the major market center sell produce to retailers or traders located outside district, especially at Kathmandu, Pokhara and Narayanghat market. Very few farmers also sale produce traders directly, however such practice is not common. Use of cooperatives is virtually non-existent on all study districts.

Distribution system of vegetables in Terai is completely different than hills. This is mainly because of scale of production, availability of local market, accessibility and organization of farmers. In hills farmers are organized into groups and cooperatives. Cooperatives are facilitating sale of produce and local demand of produce is sale while production is high. Collector center concept is functioning very well, mainly because of large number of

producers with economy scale of production. However, production of vegetable is less and scattered. Farmers generally cultivate on small area to generate additional income for households. Local haats (market) are widely developed and vegetables can be sold since scale of production is very less. Cereals still remain main crop.

Following six market chain are observed in the district, which includes:

- Farmers - Consumers
- Farmers - Wholesaler - Retailers - Consumers
- Farmers - Collectors - Wholesaler - Retailers - Consumers
- Farmers - Retailers - Consumers
- Farmers - Collectors - Wholesaler - Traders (outside district)
- Farmers - Collectors - Traders (outside district)

Of above six type of trading system, farmers - consumers and farmers -wholesaler-retailers and consumers are most common on all the study districts. Farmers generally sale to consumer directly because of small amount of produce. Last two channel are most common for tomato and potato

4.3 Selection of Buyers

Farmers generally operate a small stall during the market day at each market facility center. They sale produce directly to consumers. However, few farmers sold amount in bulk quantity to retailers and wholesaler directly. They contact traders/collectors operating at the market center and sold their produce. Farmers have choice of traders since nearly half a dozen of wholesalers are operating in each market.

4.4 Price Determination

Most of farmers, especially small farmers sell their surplus vegetables to consumers directly due to the urgent need for cash and also due to lack of storage facilities. Price can be determine by following:

- Buyers
- Farmers
- Both

Price of vegetables is generally set by buyers, especially for purchase of large quantity. Farmers have control over price for small quantities. Following four methods were observed for setting price as shown below.

- Prevailing market price
- Negotiation between buyer and sellers
- Quality, size and quantity of produce
- Marketing cost and profit margin

Of four methods, prevailing market price was the main criterion used in setting prices by most of the buyers followed by negotiation between buyers and sellers. Quality, quantity and size is the third important criterion for setting price. Marketing cost and profit margin are not considered for determining prices.

4.5 Price Information

Buyers and personnel communication with is the most important source of price information. Very few farmers had access to price information through mass media, such as radio or television. Farmers are getting price information from following sources:

- Buyers (Collectors)
- Personnel communication at local market center
- Mass media (radio, television)

5. MARKETING PRACTICES

This section presents additional information about marketing system on study village as sought by the JST. Detailed marketing system is discussed on village survey report separately. However, this section presents additional information sought by the JST. This section mainly discuss buyers, including selection criteria, mode of deal, post harvest activities, marketing etc

5.1 Selection of Buyers

Selection of buyers depend on community. Farmers generally prefer do business with those traders who have long working relationship, especially for cereals and fruits. The selection of buyers depend on type of commodities. For cereals, farmers prefer to select collector from village. They generally prefer to sale to same person. About 2-3 such collectors are operating on the village. Vegetables are sold directly to consumers and retailers on nearby market. Farmers also sale to collectors or wholesaler depending upon quantity of produce. Working relationship and immediate cash payment is main criteria for selection of buyers. Farmers generally provide for 7 days credit to road head collector while they sale on cash with wholesalers or retailers operating at market center. Farmers sale entire fruit bearing tree on lump sum basis before harvest to contractor/collector. Collector/contractor who provide advance payment before harvest is main criteria for selection. Table 5.1 presents buyers of fruits and vegetables. Traders doing fruits, vegetable and cereals are different. People generally select person from same VDC or nearby VDC, whom they know or have business relationship from long time. Farmers sale on cash when produce are brought to market

Table 5.1: Buyers of agriculture commodities

	Selection criteria	Buyers
Fruits	<ul style="list-style-type: none"> Working relationship/trust Advance payment 	<ul style="list-style-type: none"> Local collector/Contractor Consumers & retailers
Vegetables/spices	<ul style="list-style-type: none"> Immediate cash 	<ul style="list-style-type: none"> Wholesaler (market center/road head) Consumers & retailers
Cereals/pulses	<ul style="list-style-type: none"> Working relationship/trust Loan/Credit 	<ul style="list-style-type: none"> Collector/Contractor Small collector (<i>Kantawaals</i>)

5.2 Method of Payment/Mode of deal

All produce are sold on cash, however traders are investing money before harvest as well. Table 5.2 presents mode of deal for selling of agriculture produce on study market. Traders/collectors provide loan for purchase of inputs, especially fertilizer and seeds. After harvest, farmers provide cereals especially paddy to the big collector. Big collector may make payment immediately or within 7 days after deducting loan and interest. Collector also may provide little cash if farmers requested. Small collectors had to make payment immediately on cash after purchase since villages don't trust them. There is no price difference between small and big collector, small collector even offer more price. Scale of production of vegetables is very small. Most of the produce is sold directly to consumers and retailers on local weekly market. As a result of this, marking system is not organized. Retailers and wholesaler operating on market center had to make payment immediately after receipt of vegetables. However, collectors operating at road head (especially for tomato and potato), farmers provide on credit for about 7 days. Traders repay money within 7 days. Road head collectors are local and farmers have good faith and trust on them.

Fruits are sold before harvest on lump sum basis. Traders/Collectors provide advances to farmers based on agreed amount, generally 50% of payment is made. Traders/collectors are mostly local or people from nearby village. Hence, traders can make payment within 7 days if local. However, traders coming from outsider had to make full payment on cash prior to loading of fruits.

Table 5.2: Mode of deal of agriculture commodities

	Pre-harvest	Post harvest
Fruits	<ul style="list-style-type: none"> • Advance payment 	<ul style="list-style-type: none"> • Credit for 7-15 days after harvest • Immediate cash after sale
Vegetables/spices	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Immediate cash after sale • Credit for 7days
Cereals/pulses	<ul style="list-style-type: none"> • Loan for purchase of production inputs & household affairs 	<ul style="list-style-type: none"> • Immediate cash or credit upto 7 days • Small collector (Kantawaals)

5.3 Post Harvest Activities

Farmers sale immediately after harvest and don't perform any post harvest activities. Farmers don't do grading of their produce, which remain similar for all the produce. Buyers generally buy commodities on lump sum basis. Table 5.3 presents post-harvest activities. Farmers are using locally available materials such as bamboo basket, sacks for packaging of produce. Likewise, use of crate is also increasing especially in case of tomato. Cereals are packed on jute or plastic sacks and sold to the market. No processing of fruits and vegetables are carried out at present. However, milling of paddy is carried out though small local level mill exists at the village itself. This is mainly because of less demand of produce locally as well as outside. Farmers sale paddy directly to collector or big rice mill operating at village. This is mainly because of less demand of milled rice.

Table 5.3: Post harvest activities

	Grading	Packaging	Processing
Fruits	<ul style="list-style-type: none"> • No, traders harvest all produce 	<ul style="list-style-type: none"> • None, bamboo basket 	<ul style="list-style-type: none"> • None
Vegetables/spices	<ul style="list-style-type: none"> • No, sale on lump sum basis 	<ul style="list-style-type: none"> • No, mostly locally available material 	<ul style="list-style-type: none"> • None
Cereals/pulses	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • No, 	<ul style="list-style-type: none"> • Locally processed but for self-consumption

5.4 Weighing of Produce

Traders are using local weighing machine. The study could not find use of advanced/electronic weighing machine in the study area. This is mainly because of small production quantity. Nevertheless, few traders are using electrical weighing machine especially at market center. But use is even limited in these places. Both the traders and farmers are using traditional weighing machine.

Traders are using weights/scale prepared by Nepal Bureau of Standards & Metrology. Likewise, they are also using stones for weighing. Both weights and stones are used for weighing. Despite of this, farmers' don't feel cheated on scale. Most of the farmers said, there might be some problems on grams but traders cannot cheat. Farmers generally check with weights/scale before weighing of produce. Differences on scale/weight will be corrected immediately. Hence, most of the farmers on study area felt that scale used by traders are precise. According to farmers, traders generally cheat on price but not on weight. If anyone notice use of wrong scale, traders cannot operate business in village.

5.5 Collective and Cooperative Marketing

The study could not find collective or cooperative marketing system of fruits, vegetables and cereals on study villages. However, cooperative marketing has started on other adjoining areas, especially in cereal seed production.