

Chapter 11 Master Plan

11.1 Composition of Master Plan

There are lots of existing plans which are closely related to attainment at strategic development goal as mentioned previously. In each sector, these existing plans are classified into some development projects. Also, the new development projects are formed and proposed to cope with the subjects that the existing plans could not settle. These are the projects composing the Master Plan. Furthermore, these projects are planned in due consideration of the priority development fields and the priority development subjects mentioned in Clause 10.3.4.

11.2 Estimate on Development Fund

11.2.1 Conversion of Past Development Investment Amount

All the past development investment amount was converted to the constant price of end of 2009. The conversion factors were estimated based on the annual inflation rates for 10 years from 2000 to 2009 as shown in Table 12.2.1. Using these conversion factors, each annual development investment amount was converted to the constant price at end of 2009.

Table 11.2.1 Conversion Factors to Constant Price at End of 2009

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Inflation Rate	2.44%	2.30%	2.61%	2.76%	2.81%	2.67%	2.97%	3.59%	3.42%	0.29%
Conversion Factor	1.273	1.227	1.228	1.210	1.181	1.141	1.124	1.112	1.070	1.003

Source: Proyecto de Memoria 2009 – Peru Central Bank (BCRP)

11.2.2 Estimated Development Investment Budget

(1) Assumption of Development Investment Amount

Since there are no available data on future development investment budget for central government, regional government and local government, it was estimated on the assumption that it would increased in proportion to the growing rate of GDP.

(2) Actual Amount Invested

Table 12.2.2 indicates the actual development investment amount in Ayacucho Region.

Table 11.2.2 Actual Development Investment Amount in Ayacucho (S/.)

Government	2005	2006	2007	2008
Central	N/A	132,353,719	140,495,725	137,136,414
Region	N/A	53,752,070	115,878,290	97,733,353
Local	55,801,742	92,393,038	112,579,097	N/A
Total	N/A	278,498,827	368,953,112	N/A

Source : MEF Website(http://ofi.mef.gob.pe/bingos/transparencia_pi/mensual/default.aspx?y=2006&ap=ActProy)

As shown in the above table, the latest available data for central government, regional government and local government are those in 2007. Thus, the study was carried out using 2007 data.

(3) Estimate of Development Investment Budget

In order to know the growing of development investment budget in future, the study was carried out for the average growing rate of GDP for 11 years (1999-2009). Table 11.2.3 shows the GDP issued by the Central Bank in Peru.

From these data, the average growing rate of GDP for the past 10 years was estimated at 5.1%. On the other hand, as for the growing rate of GDP after 2010, MEF projects 5.0% for 2010, 5.8% for 2011, and 6.0% for 2012. In this Study, these projected growing rates of GDP were employed for 2010 to 2012. After 2013, 6% and 7% were

employed taking into consideration the past growing rate of GDP, MEF's projected GDP and current economic condition in Peru. In addition, 3% after 2011 was also applied expecting that the serious economic condition would be realized.

In addition, the total development investment amount of S/.368,953,112 for Ayacucho Region in 2007 was converted to the constant price of end of 2009 shown in Table 11.2.2, using the conversion factor indicated in Table 11.2.1. As a result, it was estimated at S/.410,276,000 at constant price of end of 2009. The development investment budget for 10 years from 2011 to 2020 was estimated using this amount. Table 11.2.4 shows the estimated development investment budget for 10 years from 2011 to 2020.

Table 11.2.3 Actual GDP in Peru

Year	Actual GDP* (S./million)	Growing Rate	Accumulated Growing Rate	Average of Growing Rate
1999	117,587	-	-	-
2000	121,057	3.0%	3.0%	3.0%
2001	121,317	0.2%	3.2%	1.6%
2002	127,402	5.0%	8.3%	2.7%
2003	132,544	4.0%	12.7%	3.0%
2004	139,141	5.0%	18.3%	3.4%
2005	148,640	6.8%	26.4%	4.0%
2006	160,145	7.7%	36.2%	4.5%
2007	174,407	8.9%	48.3%	5.1%
2008	191,505	9.8%	62.9%	5.6%
2009	193,155	0.9%	64.3%	5.1%

Source: Proyecto de Memoria 2009 - (BCRP)

*: Constant price at 1994

Table 11.2.4 Estimated Development Investment Budget in Ayacucho Region (Unit: S./)

Year	3 % of Growing Rate of GDP After 2011		6 % of Growing Rate of GDP After 2013		7 % of Growing Rate of GDP After 2013	
	Growing Rate of GDP	Estimated Amount	Growing Rate of GDP	Estimated Amount	Growing Rate of GDP	Estimated Amount
2007	-	410,276,000	-	410,276,000	-	410,276,000
2008	9.8%	450,483,000	9.8%	450,483,000	9.8%	450,483,000
2009	0.9%	454,537,000	0.9%	454,537,000	0.9%	454,537,000
2010	5.0%	477,264,000	5.0%	477,264,000	5.0%	477,264,000
2011	3.0%	491,582,000	5.8%	504,945,000	5.8%	504,945,000
2012	3.0%	506,329,000	6.0%	535,242,000	6.0%	535,242,000
2013	3.0%	521,519,000	6.0%	567,357,000	7.0%	572,709,000
2014	3.0%	537,165,000	6.0%	601,398,000	7.0%	612,799,000
2015	3.0%	553,280,000	6.0%	637,482,000	7.0%	655,695,000
2016	3.0%	569,878,000	6.0%	675,731,000	7.0%	701,594,000
2017	3.0%	586,974,000	6.0%	716,275,000	7.0%	750,706,000
2018	3.0%	604,583,000	6.0%	759,252,000	7.0%	803,255,000
2019	3.0%	622,720,000	6.0%	804,807,000	7.0%	859,483,000
2020	3.0%	641,402,000	6.0%	853,095,000	7.0%	919,647,000
2011-2020 Total		5,635,432,000		6,655,584,000		6,916,075,000

Source : GDP 2008-2009: Proyecto Memoria – Central Bank of Peru (BCRP)

2010-2012: Marco Macroeconomico Multianual 2010-2012 - MEF

2013-2020: JICA Study Team (but 3% for 2011-2020)

The development investment budget for 10 years from 2011 to 2020 in Ayacucho Region was estimated at S/.5,635 million for 3% of growing rate, S/.6,656 million for 6% of growing rate of GDP and S/.6,916 million for 7% of growing rate of GDP.

(4) Development Investment Budget Applicable for Master Plan

The above estimated development investment budget would cover the cost for presently on-going projects and O&M cost of completed ones as well as the new projects to be proposed in the future. In addition, this estimated budget covers all sectors. Accordingly, the development investment budget for the Master Plan being mainly composed of agriculture, livestock and road sectors, should be picked out from the estimated development

investment budget. According to the past data, the development investment budget for agriculture, livestock and road sectors, would occupy about 60% of total one. In addition, the development investment budget applicable for the Master Plan was assumed to be 20% of that for agriculture, livestock and road sectors since no data are available for the cost for presently on-going projects and O&M cost of completed ones as well as the new projects to be proposed in the future. Consequently, the development investment budget applicable for the Master Plan was estimated to be about S/.676 million for 3% of growing rate, about S/.799 million for 6% of growing rate of GDP and S/.830 million for 7% of growing rate of GDP. Thus, the Master Plan is formulated taking into account this applicable budget.

11.3 Vulnerability Measurement

11.3.1 Development Objective

In Ayacucho region, there are frequent occurrence of natural disasters such as drought and floods, which bring about the decrease in agricultural production and deterioration of roads, so that farming activities and life conditions of farmers would become unstable. In the Master Plan, therefore, the “shortage of tackling capacity against natural disasters” is regarded as vulnerability, so that the purpose of Vulnerability Measurement Program is decided to be the “stabilization of farming activities and life conditions by improving the tackling capacity for vulnerability mitigation by GRA, local governments and communities”.

11.3.2 Basic Policies for Formulation of Development Program

Constraints of the development and basic policy for formulation of the Program is shown in Table 11.3.1

Table 11.3.1 Constraints of Development and Basic Policies for Formulation of the Program

Constraints		Basic Policies for Formulation of Development Program
<u>Decrease of the capacity on vulnerability reduction due to lack of basic information and communities' poor physical capacity on vulnerability reduction</u> • Effective assistance plan can not be prepared and implemented due to lack of informations on use of natural resources • Effective assistance plan can not be prepared and implemented due to lack of meteorological information • Knowledge and activities related to vulnerability are not concentrated • Communities can be isolated very easily when some natural disaster is happened.	⇒ ⇒ ⇒	<u>Improvement of capacity of regional government through development of regional basic information</u> • Improve planning capacity through development and/or update of regional basic information such as land use map • Enhancement of understanding on vulnerability through preparation and distribution of hazard map based on natural conditions data like climate and topography etc. <u>Improvement of farmers' capacity on mitigation of vulnerability through concentration of related knowledge</u> • Improvement of farmers' capacity for mitigation of vulnerability through concentration and distribution of knowledge, related projects, useful resource and technologies. <u>Improvement of communities' capacity on mitigation of vulnerability through strengthening of organizational activity</u> • Improvement of community capacity on mitigation of vulnerability through strengthening of organizational activity <u>Improvement of capacity on mitigation and analysis through strengthening of meteorological monitoring and analysis</u> • Amplify meteorological station to realize medium / long term monitoring • Strengthening of provision system for andes agricultural meteorology information to farmers and institutes
<u>Decrease of capacity to reduce vulnerability due to lack of access (transportation)</u> • Capacity to reduce vulnerability is lost due to lack of accessibility and, such situation causes not only agricultural sector and also others sectors like health and education	⇒ ⇒ ⇒	<u>Effective mitigation of vulnerability through intensive improvement of roads frequently damaged</u> • Intensive and urgent improvement of road frequently damaged

Source: JICA Study Team

11.3.3 Approach to Formulation of Development Program

11.3.3.1 Viewpoint for Formulation of Development Program

The followings are principal considerations for formulation of development program.

(1) Maximum Utilization of SNIP Sub-Projects Un-implemented

Many SNIP sub-projects related to vulnerability measure are not yet implemented. Moreover, these sub-projects are already approved technically by responsible agencies. Therefore, maximum utilization of SNIP sub-projects is considered for effective formulation and implementation of the development program, also for keeping equality between beneficiaries.

(2) Consideration for Recovery and Preventive Measures

The Master Plan defines meteorological vulnerability as an important challenge for achievement of purpose of the Master Plan. Meteorological vulnerability has already become reality and has caused many negative impacts such as drought, decrease of agricultural production etc. Therefore, the development program is formulated in consideration with “Preventive Measure” and also “Recovery Measure”

(3) Possibility of Application of Development Program for Other Regions

As well as the Ayacucho Region, Other regions located in Andes area also face meteorological vulnerability. Therefore, the development program is formulated in consideration of applicability and ripple effect to other regions.

11.3.3.2 Analysis and Evaluation of Existing Projects (SNIP Sub-Projects)

(1) Analysis of Contents of SNIP Sub-projects Related to Social Assistance and Development Needs

SNIP sub-projects related to social assistance is analyzed for confirmation of development demand (needs) and utilization of the sub-projects for effective formulation of the development program. 341 of SNIP sub-projects are related to Social Assistance. These projects aim to assist social development through activities of several sectors such as agriculture, livestock, irrigation, education, health etc.

Out of the sub-projects, 133 sub-projects consist of activities related to agriculture, livestock, road and capacity development of government sectors which compose the Master Plan. These sub-projects are included in other development programs of the Master Plan for effective formulation of sectoral development programs. Components and number of remaining 208 sub-projects are shown in Table 11.3.2.

Eighty eight point nine percent of the 208 sub-projects are categorized in Education (39.4%), Social Development (32.2%) and Health (17.3%) sectors. With regard to categorization by infrastructure and non-infrastructure, 87.0% of the sub-projects are categorized in infrastructure project, so that it can be said that the need of infrastructure development is extremely high. The allocation of the sub-project by grade of poor is 50.9% in extremely poor area, 31.3% in very poverty area and 17.8% in poor area. This means that the more the grade of poor is, the more the number of sub-project is.

As shown in Table 11.3.2, activities of the sub-projects are diverse. Out of the activities, the activity which has strong relation with “Mitigation of Meteorological Vulnerability” is the sub-projects for “Construction of Multi-purpose Community Hall” of social development sector. These sub-projects aim at enhancement of capacity of communal

organization, and some of them mention very clearly purpose of “Preparation of Shelter against Natural Disaster”.

Table 11.3.2 Contents and Number of SNIP Sub-Project Related to Social Assistance

Category		Contents	Zone																Total						
			Poverty					High Poverty					Extrem Poverty												
			P1-A	P1-CP	P1-X	P1-Xa	P1-Xf	P1-Xp	P2-A	P2-F	P2-P	P2-X	P2-Xa	P2-Xf	P2-Xp	P3-A	P3-F	P3-P	P3-X	P3-Xa	P3-Xp	Nos.	%	Nos.	%
Art	Capacity Development	Strengthening of Competitivity of Ceramic Production, Strengthening of Textile Production													1	1					2	1.0%	6	2.9%	
	Infrastructure	Strengthening of Equipments for Handycraft Production, Construction of Handycraft Center													1	1	2				4	1.9%			
Culture	Capacity Development	Promotion of Historial / Cultural Festival																			2	1.0%	4	1.9%	
	Infrastructure	Construction of Museum																			2	1.0%			
Education	Infrastructure	Construction of Educational Facilities and Class Room,Rehabilitation of Educational Facilities and Class Room, Strengthening of Materials for																					82	39.4%	
			1	2		1	7	6	1	7	2	2	4		9	16	6	16	1	1	82	39.4%			
Electricity / Communication	Infrastructure	Construction of Electric Power Plant, Construction of Secondary Transmission Network												1	1		1				3	1.4%	3	1.4%	
Health	Capacity Development	Enhancement of Capacity of Epileptic, Enhancement of Community Health Care Capacity, Enhancement of Community Capacity for Risk and Infantil Malnutrition Management															1				7	3.4%	36	17.3%	
	Infrastructure	Construction of Medical Center, Rehabilitation of Medical Center, Strengthening of Materials for	1		2			2	3		4	1	2		2	5	2	5			29	13.9%			
Sanitary	Infrastructure	Construction of Helth Care Service Facilities, Construction of Sewage Drain																			1	3	1.4%	3	1.4%
			2																						
Social Capacity Development	Capacity Development	Strengthening of Economic and Cultural Activity, Enhancement of Capacity Disabled Persons, Enhancement of Women's Capacity, Enhancement of Indian's Right, Enhancement of Capacity of Meddium and Small Scale Enterprise														2					15	7.2%	67	32.2%	
	Infrastructure	Construction of Nursing Home, Accomodation Facilities and Multi-purose Hall, Strengthening of Equipments for Small Scale Enterprise	5	5		1		5		5		3		4	5	3	16				52	25.0%			
Turism	Capacity Development	Improvement of Quality of Eco Turism													1						1	0.5%	1	0.5%	
House	Infrastructure	Construction of House							2												2	1.0%	2	1.0%	
Integrated Social Development	Infrastructure	Construction of Educational, Water Supply and Irrigation Infrastructure, Rehabilitation of Road and							1	1				1	1						4	1.9%	4	1.9%	
	Nos.		6	24	2	2	2	1	19	13	1	17	3	5	7	19	31	11	42	1	2	208	100.0%	208	100.0%
Total			2.9%	11.5%	1.0%	1.0%	1.0%	0.5%	9.1%	6.3%	0.5%	8.2%	1.4%	2.4%	3.4%	9.1%	14.9%	5.3%	20.2%	0.5%	1.0%	100.0%			
%																									
Sub-Total per Poverty Grade			37					65					106					208							
Sub-Total Project related to Infrastructure			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Sub-Total Project related to Capacity Development (Non infrastructure)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Source: SNIP at April 2009

The needs of sub-projects related to the construction of multi-purpose community hall and shelters are high, accounting for 47 project equivalents to 22.6% of all sub-projects. Out of 47 the sub-projects, 26 sub-projects (55.3%) are located in extremely poor area, which means that the more poor area has the high need of multi-purpose community hall.

Generally, farmers' house is built with adobe which can be deteriorated very easily and vulnerable to earthquakes and other natural disasters. To mitigate this situation, INDECI and the National Training Service for the Construction Industry - SENSICO prepared a manual for “building adobe homes strengthened” to improve the strength of the adobe house.

Besides these farmer's individual problems, low capacity of community to reduce vulnerability is also important challenge. The road conditions in Ayacucho Region are quite poor and many communities can be isolated easily by occurrence of natural disasters. Therefore, it is important to increase capacity of the community to mitigate the vulnerability and construction of multi-purpose community hall for community activity and shelter.

Thus, the Master Plan includes the construction of multipurpose community hall / shelters within the vulnerability mitigation measures in consideration of its high needs and importance.

(2) Evaluation and Prioritization of SNIP Sub-Projects

For early expression of effect of the development program, it is necessary to implement project according to importance of each projects. Hence, the importance of sub-projects related to the construction of multipurpose community hall and shelters are evaluated by the criteria as shown in Table 11.3.3. The indicators were selected with consideration to consistency with the view points and easiness of collection of data.

Table 11.3.3 Evaluation Criteria for SNIP Sub-Projects Related to “Multi-purpose Community Hall and Shelter”

View Point	Indicator		Points	Remarks
Relevance	Grade of Poverty	Extremely Poor (P3)	30	Grade of consistency with purpose of the Master Plan “Mitigation of Poverty”
		Very Poor (P2)	18	
		Poor (P1)	6	
Efficiency	Frequency of Occurrence of Natural Disaster	Province with very high human damage by meteorological disaster	30	Grade of efficiency to mitigation of vulnerability
		Province with high human damage by meteorological disaster	18	
		Province with low human damage by meteorological disaster	6	
Effectiveness	Project Cost / Beneficiary	Less than 1,416 Soles (below average minus 15%)	10	Economic effectiveness
		1,416 - 2,184 Soles	6	
		More than 2,184 (Over average +15%)	2	
Impact	Affection to Environment and Society	No negative impact or positive impact	5	Grade of affection to Environmental and Social aspects
		Small negative impact or negative impact avoidable or can be mitigated	3	
		Big negative impact or negative impact unavoidable or can not be mitigated	1	
	Spreading Effect	Highly adaptable for other area	5	Grade of spreading effect (adaptability) to other area
		Moderately adaptable for other area	3	
		Difficult to adapt for other area	1	
Sustainability	Strengthening of Organization	Project by Local Government	10	Level de implementing organization
		Project by Regional Government	6	
		Project by Central Government	2	
Maximum Point			90	
Minimum Point			18	

Source: JICA Study Team

Making up 47 sub-projects in descending order according to evaluation points, top-ranked sub-projects which are positioned in 20% of total cost of sub-projects were classified into the 1st priority, sub-projects positioned in more than 20% to 40% were classified into the 2nd priority and the remaining sub-projects were classified into the 3rd priority.

As the result of prioritization, 18 sub-projects are classified into the 1st priority, 17 sub-projects into the 2nd priority and 12 sub-projects into the 3rd priority as shown Table 11.3.4.

Table 11.3.4 Result of Prioritization of SNIP Sub-projects Related to Multi-purpose Community Hall

Priority	Extremely Poor (P1)	Very Poor (P2)	Poor (P3)	Total
1	0	0	18	18
2	2	11	4	17
3	6	2	4	12
Total	8	13	26	47

Source : JICA Study Team

11.3.4 Development Program

11.3.4.1 Composition of Development Program

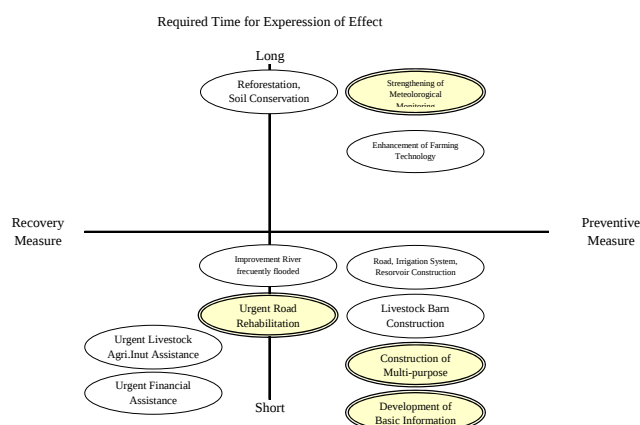
Based on trend of SNIP sub-projects and the basic policies, the development program consisting of 4 projects was formulated as shown in Table 11.3.5.

Table 11.3.5 Summary of Development Program

Project	Purpose	Type
Basic Information Arrangement Project for Vulnerability Mitigation Capacity Building (New Project)	- Enhancement of regional government's capacity on analysis of vulnerability through development of basic information - Enhancement of community's capacity on vulnerability measure through community risk analysis - Enhancement of farmers' capacity on vulnerability measure through collection, organization, distribution of measures for mitigation of vulnerability	Short Term Preventive Measure (Regional, Provincial and Farmers' Level)
Meteorological Monitoring Strengthening and Observation Network System Establishment Project for Vulnerability Mitigation Capacity Development (New Project)	- Enhancement of capacity of regional government on analysis of meteorological monitoring through development of monitoring system - Enhancement of capacity of farmers on mitigation of agricultural vulnerability through provision of agricultural meteorology information	Long Term Preventive Measure (Regional and Farmer's Level)
Community Vulnerability Mitigation Capacity Development Project (Project based on SNIP sub-project)	- Enhancement of community's capacity on vulnerability measure through activation of organizational activity and provision of multi-purpose community hall - Enhancement of community's physical capacity against natural disaster through construction of multi-purpose community hall with shelter function.	Short Term Preventive Measure (Community Level)
Urgent Rehabilitation Project for Frequent Disaster Occurrence Roads (New Project)	Prevention of isolation of community through improvement of road frequently damaged	Short Term Urgent Recuperative Measure (Regional Level)

Source: JICA Study Team

The projects of several sectors can contribute directly or indirectly to mitigation of meteorological vulnerability. For example, reforestation and irrigation sectors contribute to the mitigation of vulnerability through prevention of landslides, water conservation and recharge, frost / drought, etc. Figure 11.3.1 shows the role and relationship among the projects (sectors) within the framework of the development program.



Source: JICA Study Team

11.3.4.2 Outline of Development Program

Figure 11.3.1 Role and Relation of Projects (Image)

(1) Basic Information Arrangement Project for Vulnerability Mitigation Capacity Building

(a) Background

Basic information such as natural and economic conditions is lacked in Ayacucho Region. Moreover, accuracy of existing statistical data is not credible. Therefore, GRA can not carry out problem analysis, preparation of development plan and implementation of project effectively. Under such circumstance, this project aims to enhancement of capacity of regional and local governments for problem analysis and planning through development of regional and local level basic information. In 2010, GRA initiates activity for settlement of regional basic information. This project has strong relation with that government's activity. Therefore, this project is useful for GRA for effective implementation of their

activity utilizing especially maps to be prepared by this project.

(b) Components

1) Preparation of Draft Database and Base Map

Prepare draft database and base map (land use, road network, river, etc.) based on existing information and latest satellite image. Maps will be prepared using GIS Arc View which is used by Ayacucho Regional Government

2) Seminar on Sectoral Subject Map

Organize seminar on sectoral subject map with participation of related organizations and projects. On the seminar, (i) explanation about draft database and base map, (ii) Confirmation of important subject for related agencies (example : land use, water resource, potential of irrigation, climate, cultivated crop, location of school and health centre, poverty, etc.) , (iii) Selection of person in charge and, (iv) Confirmation and collection of availability of existing information will be discussed.

3) Field Investigation for Complementing Base Map

Carry out field investigation to verify accuracy of result of screening by satellite image. The screening result will be checked comparing with actual field condition. In addition, questionnaire survey and interview will be carried out to collect detailed information that cannot be collected from satellite image (location of small-scale irrigation system, area with high frequency of natural disaster occurrence, other detailed information required by the organizations).

4) Community Resource and Risk Mapping

Develop community's understanding on vulnerability through analysis of water resources, forest, farming area, dangerous area by community resource and risk mapping based on the base map (5 communities / province). Information collected by this activity will be used for complementing base map.

5) Preparation of Vulnerability Hazard Map

Prepare and/or update vulnerability hazard map thorough multiple analysis combining information on land use, topography, meteorological (rainfall, topography, temperature), etc. Moreover, hazard map on social aspect will be prepared focusing on distance between community and major cities, health centre, etc.

6) Preparation of Inventory of Useful Resources and Technologies for Mitigation of Vulnerability

Prepare inventory of useful resources and technologies for mitigation of vulnerability through evaluation of information gathered from related organizations and projects. The Inventory will be comprehensive covering not only traditional technology such as terracing for soil conservation and also crops like high cold resistance crop, tree for soil conservation and living measures like improved stove, medical herbs, etc.

7) Preparation and Distribution of Regional Atlas

Prepare Regional Atlas based on prepared maps (Sectoral Subject Map, Hazard Map) and other available information. The Regional Atlas will be distributed to educational organizations. as material for vulnerability education of juveniles.

(c) Period

2012-2013 (2 years)

(d) Target Area

Ayacucho Region

(e) Project Cost

S/3,000,000

(2) Climate Monitoirn Strengthening and Observation Network System Establishment Project for Vulnerability Mitigation Capacity Building

(a) Background

Many part of the Ayacucho Region is located in high elevated area with harsh natural condition. Such area is very sensitive to El Nino and La Nina phenomena which frequently occur. In addition, negative impact by climate change is also concerned in the recent years. GRA recognizes that such adverse climate conditions are vulnerability of the region.

SENAMHI monitors meteorological condition by the stations installed in across the country. In case of Ayacucho Region, Cachi Irrigation Project monitors meteorological condition instead of SENAMHI. However, monitoring by the Cachi does not cover whole region due to unbalance location of stations (concentrated only in cetral zone and Huamanga Province). Moreover, medium and long term analysis of meteorological condition is difficult due to lack of long term monitoring data.

Accumulation of monitoring data in long term is indispensable for analysis of climate change. Accumulated data contributes to medium and long-term meteorological analysis, farmers' decision-making on farming and government's decision making on agricultural development.

Under such situations, this project aims to enhance capacity to mitigate the vulnerability through the development of meteorological monitoring system and provision of agricultural meteorology information to farmers. As well as Ayacucho Region, many regions located in Andes Area are facing meteorological vulnerability. In this sense, this project seeks that the Ayacucho Region becomes model or centre for other regions in the study and monitoring of meteorology.

(b) Components

1) Establishment of Base for Agricultural Meteorology Monitoring

Establish agricultural meteorology research centre at INIA or Regional Department of Agriculture as a base of monitoring and research of

Andes area where is vulnerable to meteorological disaster. This centre will be the focal point for the monitoring and provision of information to farmers. 2) Survey for River Water Flow Monitoring Carry out cross section survey at major rivers and water source of medium scale irrigation systems for river water flow monitoring. Water flow velocity also will be measured at least 3 times on wet season, dry season and intermission of these seasons as a basic data for the river water flow monitoring. 3) Enhancement of the Capacity of Meteorological Analysis through Development and Expansion of Monitoring Facilities Install facilities for monitoring of agricultural meteorology such as air, soil and water temperature, rainfall, sunshine, etc. In areas with communications systems, installation of automatic data transmission monitoring system will be considered. For other areas, simple monitoring system will be installed in schools to cover wider area. In addition, water gauge will be installed in rivers for the river water flow monitoring. 4) Medium and Long Term Meteorological Analysis through Development of Agricultural Meteorology Monitoring System Medium and long-term continuous data collection is indispensable for sufficient agricultural meteorology monitoring. Therefore, develop institutional system for data collection and operation and maintenance of monitoring facilities. Public organization such as school and health centre located in wider area of Ayacucho Region will be utilized for the monitoring in consideration with limited staffs of regional and local governments for the monitoring. An information collection system continued the long and medium term planning is essential for monitoring agro-climate so it will establish a system for collecting information and control, operation and maintenance of measurement equipment. Both the regional government and local governments are not adequately staffed and will be used at public facilities such as schools and health centres for the meters can be installed in wide areas of the region. The flow monitoring flows of major rivers should be carried out by the provincial governments and in the watersheds of medium-sized irrigation facilities monitoring must be performed by the boards of users. With regard to river water flow monitoring, utilization of local governments (for major rivers) and irrigation water user's associations (for medium scale irrigation systems) are considered. 5) Preparation and Distribution of Calendar of Agricultural Meteorology for Enhancement of Farmer's Capacity for Mitigation of Vulnerability Prepare calendar for agricultural meteorology based on existing data and analysis. This schedule includes useful information for farming activity such as temperature, rainfall, occurrence of meteorological disaster (dry, cold weather, etc.) in recent 5-10 years and also timing of seeding, etc.
(c) Period 2013-2014 (2 years)
(d) Target Area Target Area of the Project is all Ayacucho Region. Monitoring facilities for meteorology and river water flow will be installed in 5 locations for each province and each monitoring activity (In total 110 locations)
(e) Project Cost S/4,000,000

(3) Community Vulnerability Mitigation Capacity Building Project

(a) Background In Ayacucho Region, natural disaster such as drought and heavy rain caused by phenomena El Niño and La Niña, frost, etc. frequently occur. Communities in Ayacucho Region are isolated very easily when some natural disaster occurs due to lack of accessibility. Therefore, it is necessary to enhance community's and farmers' capacity to take measures for natural disaster themselves. Development of public services in rural area is delayed. Electrification rate of Ayacucho Region is only 52.3% against 75.7 % of national average. Number of families without any communication method is 78.6% against 46.7% of national average. Under such situation, communities are isolated and very vulnerable to natural and other disasters. There are 47 sub-projects related to construction of multipurpose community hall (including similar projects such as accommodation facility and nursing home, etc.) in SNIP. These sub-projects aim at establishment of base for community development and public service. Some sub-projects clearly mention objective of installation of shelter against natural disaster such as frost. Under such situation, this project aims at enhancement of community's capacity for mitigation of vulnerability through multi-purpose community hall which has function as base of community's organizational activity and shelter.
(b) Components 1) Establishment and Strengthening of Community's Vulnerability Committee Establish community's vulnerability committee as a management body of multipurpose community hall and community's activity on mitigation of vulnerability. For sustainable use of multi-purpose community hall, carry out training for the committee members on operation and management. At the same time, construction site of the community hall will be selected. 2) Construction of Multipurpose Community Hall Construct multi-purpose community hall equipped with kitchen, water supply and simple solar power generation panel which has function as shelter, health centre as well as meeting space. Construction will be carried out with participation of beneficiaries (provision of workforce, etc.) to enhance activity of community vulnerability committee.

3) Demonstration and Extension of Infrastructures for Mitigation of Vulnerability (Strengthened House, Improved Stove, etc.) Technical assistance for installation of infrastructures for mitigation of vulnerability such as strengthened house, simple power generation panel, etc. thorough demonstration.	
(c) Period 2013-2014 (2 Years)	
(d) Target Area Target Area of the Project is all Ayacucho Region. 47 SNIP sub-projects related to this Project have high priority for implementation. In case the budget arrangement can be made for more than 47 sub-projects, areas above 3,000 m in elevation of Cangallo, Lucanas, Paucar del Sara Sara and Parinacochas Provinces which have high risk of damage by meteorological disaster, have high priority for project implementation	
(e) Project Cost	
1st Priority Sub-project Group:	S/2,800,000
2nd Priority Sub-project Group:	S/2,800,000
3rd Priority Sub-project Group:	S/8,700,000
Total:	S/14,300,000

(4) Urgent Rehabilitation Project for Frequent Disaster Occurrence Roads

(a) Background Development of the road network in Ayacucho Region is rather delayed. Almost all roads except national road are not yet paved. Such lack of access is affecting many sectors such agriculture, health, education, etc. GRA and farmer's enterprises make the operation, maintenance of regional, and farm roads. However, the road are frequently damaged due to disaster. Therefore, primordial countermeasure such as reinforcement of road is required. This project aims to enhance capacity of the community for mitigation of vulnerability through intensive strengthening work of roads where are frequently damaged by disaster.	
(b) Contents	
1) Implementation of Road Inventory Survey and Evaluation Recognize condition of road through road inventory survey. Dangerous road will be selected through the evaluation and categorization (level, risk, importance such as number of community, etc.)	
2) Construction Work for Strengthening of Dangerous Area Carry out rehabilitation, improvement and reinforcement work for dangerous area (road).	
3) Participatory Reforestation for Road Protection Carry out slope reforestation for improvement of sustainability of effect by rehabilitation, improvement work. Reforestation will be carried out with participation of beneficiaries to enhance their awareness about vulnerability.	
4) Priority of SNIP Unimplemented Sub-projects SNIP unimplemented sub-projects include many sub-projects related to road, but do not include the urgent works only for dangerous area.	
(c) Period 2012-2013 (2 Years)	
(d) Target Area According to the INDESI Report 2006, approximately 10 km of road are considered as dangerous road. Target Area of this project is approximately 30 km of dangerous road giving high priority to 10 km mentioned above.	
(e) Project Cost S/4,000,000	

(5) Target Area of Development Program

Table 11.3.6 shows target area of the projects based on relation between characters by altitude and province shown in Table 10.3.2. In addition, regional development map by sector is shown in Figure 11.3.2.

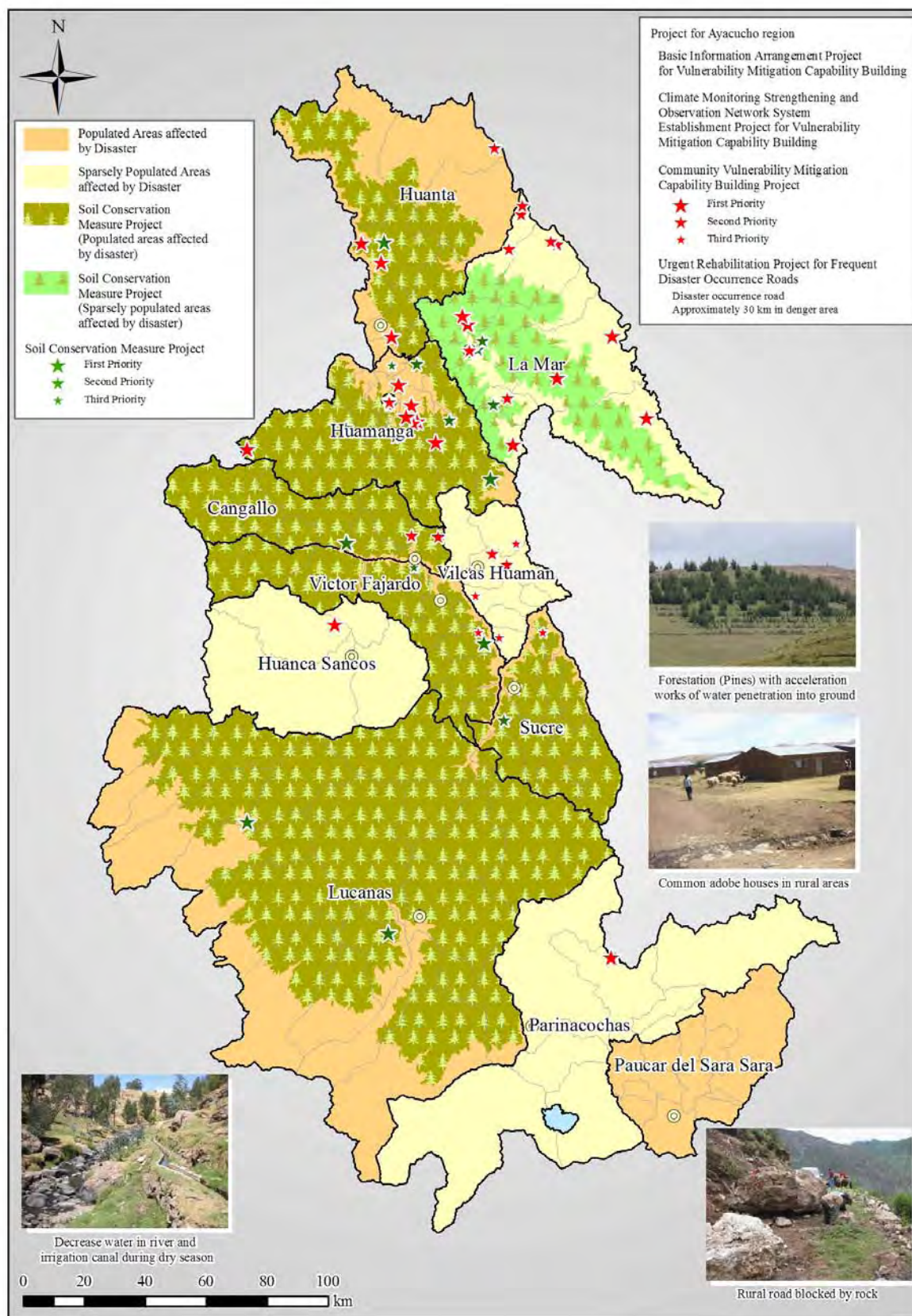
Table 11.3.6 Target Area of Development Program

Zone	No.	Province	Altitude (m)	Basic Information Arrangement Project for Vulnerability Mitigation	Strengthening and Observation Network System Establishment Project for Vulnerability Mitigation Capacity Building	Community Vulnerability Mitigation Capacity Building Project	Urgent Rehabilitation Project for Frequent Disaster Occurrence Roads	Soil Conservation Measure Project
Whole Region				⊙	⊙		⊙	
North	1	Huanta	2,000-4,000			⊙		⊙
	2		< 2,000			○		
	3	La Mar	2,000-4,000			△		○
	4	Huamanga	2,000-4,000			⊙		⊙
Central	5	Cangallo	≥ 4,000			○		
	6		2,000-4,000			⊙		○
	7	Vilcas Huaman	2,000-4,000			△		△
	8	Victor Fajardo	≥ 4,000			○		
	9		2,000-4,000			⊙		○
	10	Huanca Sancos	≥ 4,000			△		
	11		2,000-4,000			△		△
	12	Sucre	≥ 4,000			○		
	13		2,000-4,000			⊙		○
South	14	Lucanas	≥ 4,000			○		
	15		2,000-4,000			⊙		⊙
	16	Parinacochas	≥ 4,000			△		
	17		2,000-4,000			△		△
	18	Paucar del	≥ 4,000			○		
	19	Sara Sara	2,000-4,000			⊙		△

Remarks: ⊙ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Soil Conservation Measure Project aims to mainly for mitigation of vulnerability. Therefore, this project is included in Development Program on Vulnerability Measure.

Source: JICA Study Team



Source: JICA Study Team

Figure 11.3.2 Regional Development Map by Sector (Vulnerability Measure)

11.4 Farming/Extension

11.4.1 Development Objective

Agriculture in Ayacucho Region faces many constraining factors in climate conditions such as topography (slope land), high altitudes and low temperatures. In addition, there exist various problems on farming system such as lack of farming budget and access to markets. Therefore, integrated countermeasure for both production and supply systems is required to link agricultural product in Ayacucho Region with market. The Farming / Extension Sector Development Program aims at improvement of livelihood of poor peasants through strengthening of competitiveness of agricultural products by improving “agricultural production system” and “agricultural supporting system”.

11.4.2 Basic Policies for Formulation of Development Program

Constraining Factor and Basic Policy for Formulation of Farming / Extension Sector Development Program are shown in Table 11.4.1

Table 11.4.1 Constraining Factor and Basic Policy for Formulation of Farming / Extension Sector Development Program

Development Constraining Factor		Basic Policy for Formulation of Program
1. Farming		
<u>High Risk of Natural Disaster</u> • Agricultural production and productivity are low and unstable due to difficulty on natural condition (temperature and rainfall) • Introduction of new varieties and crops is difficult due to severe natural condition • Utilization of unused land is difficult (be strongly influenced by elevation and existence of water source) • High difficulty in mechanization		<u>Reflection of Character of Region and Natural Conditions</u> • Strengthening of agricultural production corresponding to natural condition such as perennial crop in low elevation area, annual crop in high elevation area
<u>Inefficient Agricultural Production due to Lack of Infrastructure for Production</u> • Introduction of new varieties and crops is difficult due to severe natural condition • Damages by natural disaster can not be avoided and/or mitigated • Reduction of competitiveness of agricultural products on price due to high conveyance loss.		<u>Utilization of Unused Resources and Regional Peculiar Resources</u> • Utilization of Andes typical agricultural product which are suitable for natural condition of Ayacucho Region. • Consideration of use of unused land
<u>Reduction of Efficiency of Agricultural Production and Farmers' Income</u> • No excess production for sale after securing food for self consumption due to small farming land • Low profitability due to lack of fertilizer and agricultural chemical by financial deficit. Furthermore, intensification such as mechanization can not be proceeded. • Peasants can not take a risk for introducing new varieties and/or crops due to small farming land and financial deficit. • Reduction of competitiveness on quantity and quality due to individual farming system (lack of cooperative activity)	⇒ ⇒ ⇒	<u>Consideration for Characteristics of Poor Peasants' Farm Management</u> • Increase of production for stabilization of food supply for self consumption and sales through increase of production of traditional crops • Selection and introduction of high value varieties of traditional crops • Acceleration of research and extension activity of traditional and non-traditional crops for crop diversification • Reduction of peasants' risk for introduction of new crops through cropping trial at provincial and community level demonstration farm
<u>Low Agricultural productivity due to Low Farming Technology</u> • Low productivity and quality of products. In addition, production amount of the same variety can not be secured • Low market value due to raw products (Lack of processing)		<u>Improvement of Efficiency of Farming Management</u> • Improvement of efficiency of production activity by formulation of producers' organization. • Enhancement of capacity on sales and financing through strengthening of function of producers' organization.

Development Constraining Factor		Basic Policy for Formulation of Program
2. Extension		
<u>Reduction of Efficiency of Agricultural Production due to Lack of Agricultural Information</u> - Problems and demands can not be recognized well - Decision making such as selection of crops can not be made according to market demand and crop character. - Reduction of capacity for price negotiation		<u>Improvement of Access to Extension Service</u> - Improvement of access to extension service by establishment of community level demonstration farm (INIA has already established several demonstration farms) - Strengthening consolidation between INIA and Regional Department of Agriculture for improvement of efficiency of extension activity.
<u>Insufficient Extension and Supporting Activity</u> - Extension activity for wide area cannot be effectively. - Limited resources for extension activity such as extension worker cannot be utilized effectively. - Low profitability due to lack of fertilizer and agricultural chemical by financial deficit. Furthermore, intensification such as mechanization can not be proceeded. - Peasants can not take a risk for introducing new varieties and/or crops due to small farming land and financial deficit.	⇒	<u>Expansion of Activity for Technology Development</u> - Strengthening of INIAs' research capacity to meet diversified peasants' needs. - Enhancement of supporting activity to reduce peasants' risk to introduce new crops - Technical assistant to advance farmers group for introduction of new crops and, Extension activity for other peasants through the groups
<u>Insufficient Research, Trial and Production Activity</u> - Insufficient research and trial activity to meet diversified peasants' demand (farming technology, type of crops) - Delay of diffusion of high quality agricultural input	⇒	

Source: JICA Study Team

11.4.3 Approach to Formulation of Development Program

11.4.3.1 Viewpoints for Formulation of Development Program

Considerations for formulation of the development program are as follows.

(1) Maximum Utilization of SNIP Sub-Projects Un-implemented

Many SNIP sub-projects related to farming and extension service are not yet implemented in spite of the fact that these sub-projects are already technically approved by responsible agencies. Therefore, maximum utilization of SNIP sub-projects is considered for effective formulation, implementation of development program. Utilization of SNIP sub-project is also important to keep equality between beneficiaries.

(2) Comprehensive Strengthening of Production System

Poor peasants of Ayacucho Region face several problems on farming such as environment, farming management system and cropping technology. To link agricultural products in Ayacucho Region with market, comprehensive improvement of all production process is required. The development program is thus formulated not only for individual cropping technology but comprehensive support for entire production system from inputs, cropping technology to farmers' organization, etc.

(3) Possibility of application of Development Program for Other Regions

As well as Ayacucho Region, Other regions located in Andes area also face problem on poverty. Therefore, the development program is formulated in consideration of applicability and ripple effect to other regions.

11.4.3.2 Analysis and Evaluation of Existing Projects (SNIP Sub-Projects)

(1) Components of SNIP Sub-Projects Related to Farming and Extension Sector

For effective formulation of the development program utilizing SNIP sub-projects, Components of SNIP sub-projects were confirmed and analyzed. SNIP includes 150 sub-projects related to farming. Out of them, 36 sub-projects have strong relation with marketing and processing. Therefore, these 36 sub-projects were removed to

Marketing and Processing Sector in the Master Plan. Components of remaining 114 sub-projects were analyzed. Location of the sub-projects is concentrated in northern region of Ayacucho Region. 93 sub-projects or 82% of total number of the sub-projects are located in 3 provinces (Huamnta, La Mar and Huamanga Provinces). In contrast, sub-project in the southern region is small in number, that is, only one sub-project for Paucar del Sara Sara Province and no sub-projects for Huanca Sancos and Parinacochas Provinces.

In SNIP, location of the sub-projects targeted whole Ayacucho Region is assumed in Huamanga Province (Regional Capital). Therefore, there is certain inequality in the number of the sub-project. However, it is mentioned that the number of sub-projects is reflecting differences of accessibility to market and big consuming cities and, environment of agricultural production between northern and southern regions of Ayacucho Region. Table 11.4.2 shows the number of the sub-projects by components. To clarify the development needs, Table 11.4.2 shows the cumulative number of components included in the sub-projects.

Table 11.4.2 Classification of SNIP Sub-Project by Contents

Grade of Poverty	Sub-Project related to farming													Sub-Project related to extension service				Total
	Inputs						Cropping etc.											
	Farming Inputs	Facilities for Nursery	Irrigation Facility	Harvesting Machine	Facilities for Post Harvesting and Storage	Processing Facility	Whole of Cropping Technology	Production of Seed and Seedling Tech.	Pest and Disease Control Tech.	Harvesting Technology	Processing Technology	Strengthening of Organization for Production and Sales	Development of Bio-Diesel	Capacity Development of Staffs	Study and Education for Extension Service	Technology of Development, Strengthening of Production of Input, Conservation of Resources	Equipment and Materials	
P1 (Poor)	3	4			1		5	3				2	1			3		22
P2 (Very Poor)	7	8	3	2	7	1	21	7	3	2	2	17		1			1	82
P3 (Extremely Poor)	9	12	1	5	3		38	9	3	5	3	14		1	2	1		106
Total	19	24	4	7	11	1	64	19	6	7	5	33	1	2	2	4	1	210
Sub-Total 1	66						135							9				210
Sub-Total 2							201							9				210

Source: JICA Study Team, Elaborated based on SNIP (April 2009)

Table 11.4.3 shows number of the sub-projects by crop type. Table 11.4.3 as well as Table 11.4.2, shows the cumulative number of crops included in the sub-projects.

Table 11.4.3 Classification of SNIP Sub-Project by Crops

Grade of Poverty	General Crops	Pulses	Potato	Onion	Wheat	Corn	Oat	Quinoa	Native Potato	Andes Cereals	Frijol	Garlic	Artichoke	Sugar Cane	Banana	Tuna	Coffee	Cacao	Fruits	Citrous	Peach	Durazno	Avocado	Achiote	Lucuma	Native Forage	Cochinilla	Apicola	Cuy	Tara
P1 (Poor)	2				1					1					1		1	2	1		1		3							
P2 (Very Poor)	3	1				2			1							4	10	8	2	1		2		2		1	1	1		3
P3 (Extremely Poor)	4		4	1	1	5		1	3		1	1	2	1		3	3	3	10	1		5	1		2				1	7
Total	9	1	4	1	2	7		1	4	1	1	1	2	1	1	7	14	13	13	2	1	7	4	2	2	1	1	1	1	10

Source: JICA Study Team, Elaborated based on SNIP (April 2009)

The following are main observations by the analysis of SNIP sub-projects from the viewpoints of components and

crops.

In terms of components, there are many comprehensive sub-projects which cover all agricultural aspects from farming technology to marketing organizations.

There are many sub-projects related to seed and seedling production. Most of these sub-projects aim at seed and seedling production of annual crops like potato and maize, and perennial crops like coffee, cacao and fruits.

Sub-projects related to extension service is very widely covering from capacity development of staff, strengthening of research, technology development and strengthening of material and equipment.

Target crops are diversified with 27 crops (except unspecified crops such as “Pulses”, “Fruits” and “General Crops”). The number of crops as well as number of the sub-project, is numerous in the northern region of Ayacucho Region reflecting diversified natural condition and easy access to market.

The development program was formulated in consideration of the observations mentioned above.

(2) Evaluation of SNIP Sub-Projects

For effective formulation of the development program utilizing SNIP sub-projects, SNIP Sub-project were evaluated by the following criteria

Table 11.4.4 Evaluation Criteria of SNIP Sub-Projects

View Point	Indicator		Points	Remarks
Relevance	Grade of Poverty	Extremely Poor (P3)	30	Grade of consistency with purpose of the Master Plan “Mitigation of Poverty”
		Very Poor (P2)	18	
		Poor (P1)	6	
Efficiency	Potential of Soil	High Potential (A)	30	Grade of applicability to natural condition
		Medium Potential (Xa, P)	18	
		Low Potential (Xp, F, Xf, CX)	6	
Effectiveness	Project Cost/ Beneficiary	Less than 1,614 Soles (below average minus 15%)	10	Economic effectiveness
		1,416 -2,184 Soles	6	
		More than 2,184 (Over average +15%)	2	
Impact	Affection to Environment and Society	No negative impact or positive impact	5	Grade of affection to Environmental and Social aspects
		Small negative impact or negative impact avoidable or can be mitigated	3	
		Big negative impact or negative impact unavoidable or can not be mitigated	1	
	Spreading Effect	Highly adaptable for other area	5	Grade of spreading effect (adaptability) to other area
		Moderately adaptable for other area	3	
		Difficulty in adapt for other area	1	
Sustainability	Strengthening of Organization	Project by Local Government	10	Level de implementing organization
		Project by Regional Government	6	
		Project by Central Government	2	
Maximum Point			90	
Minimum Point			18	

*Relevance and efficiency of the sub-project for extension service intended all of Ayacucho Region were adjusted to “P3” and “A”

*Tara can be used as forest production and also as reforestation. Therefore, high points is given for “F” (suitable for forest) of efficiency for sub-project related to Tara

Source: JICA Study Team

One hundred fourteen sub-projects are made up in descending order according to evaluation points. Top ranked sub-projects which are positioned in 20% of total cost of sub-projects were classified into the 1st priority, sub-projects positioned in more than 20% to 40% were classified into the 2nd priority and the remaining sub-projects

were classified into the 3rd priority.

As the result of prioritization, 20 sub-projects were classified into the 1st priority, 49 sub-projects into the 2nd priority and 45 sub-projects into the 3rd priority. As for the number of 1st priority sub-projects in terms of grade of poverty, 14 sub-projects were classified into extremely poor (P3) area, one into very poor (P2) area and 5 into poor (P1) area.

Table 11.4.5 Result of Prioritization of SNIP Sub-projects

Priority	Poor (P1)	Very Poor (P2)	Extremely Poor (P3)	Total
1	5	1	14	20
2	1	9	39	49
3	8	27	10	45
Total	14	37	63	114

Source: JICA Study Team

11.4.4 Development Program

11.4.4.1 Composition of Development Program

The following 4 projects composing the development program are formulated based on the basic policy and result of analysis of the SNIP sub-projects.

Table 11.4.6 Projects of Development Program

Project	Purpose
High Quality Seeds and Nursery Production Project	<u>Countermeasure for improvement of productivity and quality of new and existing crops</u> The Project aims at improvement of productivity and quality mainly existing crops which are cultivated in very wide area of Ayacucho Region
Market Competitiveness Strengthening and Crop Diversification Promotion Project	<u>Countermeasure for improvement of market value of agricultural productions and for acceleration of crop-diversification</u> The Project aims at strengthening of competitiveness of agricultural productions through acceleration of crop-diversification by introducing valuable crops and varieties.
New Crop Production Development Project	<u>Countermeasure for entry and creation of new market</u> The Project aims at development of production system and technology of new products with high demand in the future
Agricultural Extension Service Strengthening Project	<u>Countermeasure for strengthening of peasants supporting system</u> The Project aims to enhance farmers' organization, acceleration of crop-diversification, and improvement of quality of agricultural productions through strengthening of peasants supporting system.

Source: JICA Study Team

11.4.4.2 Outline of Development Program

(1) High Quality Seeds and Nursery Production Project

(a) Background Most of the poor peasants in Ayacucho Region practice extensive agriculture. Peasants who apply adequate agricultural method such as use of fertilizer, seed renovation, etc. is very few. As a result, cropping yield of agricultural production in Ayacucho Region is very low. In case of potato, average cropping yield is approximately 11t / ha. Even in Huamanga Province where agricultural production is concentrated, cropping yield of potato is about 16t / ha. In addition, several problems such as low quality, lack of access to market, low price of major products are laid and these problems cause low income of peasants. To increase peasants' income, competitiveness of agriculture should be improved through increase of productivity, improvement of quality and, introduction of new valuable crops. Normally, poor peasants use their production mainly for self-consumption. Moreover, poor peasants face deficit of farming budget and high risk of natural disaster. Therefore, introduction of new crops is not easy for them. Under such circumstances, this Project aims to strengthen productivity and quality through improvement of seed of existing crops. The Project also intends creation of new income source (production of high quality seed) of farmers.
(b) Components 1) Assessment of Character of Crop and Set up Quality Evaluation Standard Set up Quality Evaluation Standard for seed / seedling production through assessment of genetic character of crops. 2) Production of High Quality Seed and Seedling of Annual Crops (Mainly High Elevation Area) Develop INIA's farm for strengthening of breeder and foundation seeds production of annual crops. Recruit candidate farmers for

multiplication of the foundation seed in the community. Candidate farmers will be organized for effective technical assistance. Carry out technical assistance for the farmers' organization on character of variety. Location for seed production farm will be selected from isolated farming land no adjacent to other farming land for avoiding mix with other varieties.

3) Production of High Quality Seedling of Perennial Crops (Mainly Low Elevation Area)

Develop high quality seedling production system for cash crops (Coffee, Cacao, etc.) and fruits (Avocado, etc.) in community. Recruit candidate farmers for seedling production and formulate them as candidate seedling production group. Carry out technical seminar for the candidate groups regarding seedling production methods such as grafting technique and crop character at INIA's farm. Candidate seedling production groups with enough ability will be selected as final group. Construct facilities and equipment for seedling production such as greenhouse at farmers' group owned land.

4) Comparative Cropping Trial of Farmers' with High Quality Seeds

To raise awareness of farmers on improvement of farm management, effect of high quality seed should be shown clearly. Therefore, carry out cropping trial to compare difference between farmers' and high quality seeds. Result of the cropping trial will be analyzed to clarify effectiveness of high quality seed.

5) Prepare High Quality Seed / Seedling Production Farmer Certification System

Evaluate activity of the groups and quality of seed / seedling based on standard to be set up by 1) mentioned above. The groups, which are evaluated well, will be certified as seed / seedling production farmers group for differentiation from normal farmers (creation of new income source).

(c) Period

2012-2015 (4 Years)

(d) Target Area

Target Area of the Project is all Ayacucho Region. Number of seed production groups is approximately 10 groups for each province. Regarding to production of seedling of perennial crops, La Mar and Huanta Provinces, which has suitable natural condition for perennial crops are prioritized.

SNIP includes 24 sub-projects related to this projects. Out of these sub-projects except multi regional projects, sub-projects with high priority will be selected as high priority sub-project.

(e) Project Cost

1st Priority Sub-project Group:	S/9,700,000
2nd Priority Sub-project Group:	S/800,000
3rd Priority Sub-project Group:	S/19,800,000
Total:	S/30,300,000

(2) Market Competitiveness Strengthening and Crop Diversification Promotion Project

(a) Background

One of the characteristics of Ayacucho Region is diversified natural condition. Elevation of northern and central region of Ayacucho Region varies from 1,000 up to 4,000 m in elevation. Each elevation band has different climate condition and such diversification climate condition represents potential of growing several crops. At present, many crops are cultivated according to natural condition. Rice, fruits, cacao and coffee are mainly cultivated in low elevation area and, potato, maize and vegetables, etc. are mainly cultivated in high elevation area. However, diversification of natural condition is not sufficiently utilized due to lack of cropping technology, market analysis, etc.

Under such circumstance, this Project aims to increase farmers' income through introduction of new varieties and crops valuables at the market utilizing diversified natural condition and improvement of quality of existing crops.

(b) Component

1) Selection of Crops and Varieties Valuable at Market

Comprehensive analysis for multiple aspects such as environment of production, access to market, etc. is necessary for selection of valuable crops. Therefore, selection of valuable crops will be done in coordination with marketing studies by "Market Distribution System Establishment Project for Agricultural Production" and "Distribution Infrastructure Construction Promotion Project" carried by Agricultural Production Distribution / Agro-Processing Sector.

At present, following crops are considered as valuable crops based on needs of SNIP Sub-projects and other preliminary analysis.

Annual Crops (Cereals)	Maize (for food), Quinoa, Wheat, Kiwicha, Colure Maize (Purple Corn)
Annual Crops (Vegetables)	Potato (yellow type), Frijol, Artichoke, Garlic, Onion, Pea, Tomato
Perennial Crops	Avocado, Coffee, Cacao, Durazno (Peach), Tuna (Cactus Fruit)
Others	Tara (Tree)

2) Evaluation of Character and Conservation of Agricultural Products of Ayacucho Region

- Evaluation of Character of Agricultural Products of Ayacucho Region

Evaluation of character of existing crops and varieties for review of market value and for quality improvement is carried out. Many Andes native crops such as quinoa, kiwicha and olluco are cultivated in Ayacucho Region. In addition to general crops, evaluate character of these crops (genetic, growth, nutrition, etc.).

- Strengthening of INIA's Capacity for Genetic Resource Conservation

INIA's genetic resource conservation facility (Storage) to conserve varieties of Ayacucho Region and to accelerate activity for development of new valuable varieties is expmaded.

- Preparation of Guideline on Character of Agricultural Products

Guidelines on Character of Agricultural Products in the Ayacucho Region are prepares based on the result of the evaluation mentioned above. The Guidelines will be used for new variety development and, promotion activity to expand consumption carried out by "Market Distribution System Establishment Project for Agricultural Production" and "Distribution Infrastructure Construction Promotion Project" of Agricultural Production Distribution / Agro-Processing Sector. Actually, some of Andes native crops like Quinoa are recognized as high nutrient crops in international market. It is important to carry out promotion activity highlighting such special character for expanding the market.

3) Evaluation of Environment for Production, Selection of Priority Crops and Pilot Area

High priority valuable crops and pilot area (priority area) are selected in consideration to environment for production, crop character, market access, etc.

4) Cropping Trial in INIA

Cropping trial of selected crops and varieties at INIA for development of cropping technology is carried out. Result of the cropping trial will be summarized in "Cropping Technology Pamphlet".

5) Cropping Trial in Community

Cropping trial group is formed in the community. Technical assistance on cropping technology and operation and management of the organization to the groups for improvement of market competitiveness by organizational work is carried out.

(c) Period

2014-2019 (6 years)

(d) Target Area

Target Area of the Project is mainly Huanta, Huamanga, Cangallo Provinces and Puquio city of Lucanas Province, which have developed agricultural areas, good access to market and diversified natural condition. Participant farmers group are around 10 groups per varieties or crops (around 20 varieties / crops).

SNIP includes 59 sub-project related this project. Out of 59 sub-projects except national or multi-regional sub-project, sub-project has strong relation with the project will be high priority.

(e) Project Cost

1st Priority Sub-project Group:	S/.14,400,000
2nd Priority Sub-project Group:	S/.18,800,000
3rd Priority Sub-project Group:	S/.11,800,000
Total:	S/.45,000,000

(3) New Crop Production Development Project

(a) Background

Many products in Ayacucho Region such as potato and maize compete with other regions. Products of Ayacucho Region do not have enough competitiveness to win such competition and this situation causes low income of farmers. To improve farmers' income, it is important to improve the competitiveness of products in both volume and price. At the same time, development of new products for differentiation from other region also is important as long-term countermeasure.

This Project aims to develop farming technology of crops, which have potential of creating high demand in the future and have potential to be grown in Ayacucho Region. At present, chemical free / organic products and sugar beet bio-ethanol are considerable as potential new products. Actual status of these products area as follows.

Chemical Free / Organic Products

In recent years, Peruvian economy is growing stably and it is expected that future maturing of socio-economy will increase people's awareness of health and safety of foods. There are some organic and high nutrient products in makert of Lima. However, production of chemical free / organic product is still small. Thus, if the regional or provincial governments develop a system for organic crop production, it is possible to grow these products as new special products of the region. Moreover, it is also possible that Ayacucho Region becomes advanced area for organic products production in the long-term vision.

Sugar Beet for Bio Ethanol

Peru has been evaluating the mandatory for use of biofuels (E10: 10% bio ethanol mixed oil). Peru is a signatory to the Kyoto Protocol and the Ministry of Environment has been promoting researches related to methods of use of CDM and climate change. Due to the rise of awareness of environmental issues mentioned above, it is possible that the Peruvian government permits or obligates use of E10. Under such situation, Agencies such as Agency for Private Investment Promotion (PROINVERSION) started promotion activities regarding bio ethanol production. There are many crops (materials) for bio-ethanol production such as wheat, maize, sugar cane, potatoes and sugar beets, etc. The production volume of ethanol per material weight is larger in cereals such as maize, however, real productivity depends on various factors such as natural conditions and cropping yield. Therefore, it is necessary to evaluate several factors to know real productivity. Considering the natural condition and food security of Ayacucho Region, sugar beet which has high cropping yield and can be grown with little water is considerable as material of bio ethanol.

Currently sugar beet cultivation is not spread in Ayacucho Region, however, evaluation of possibility of sugar beet bio ethanol production is

important to develop new product and to exploit unused lands with severe natural condition.

(b) Component

1) Development of Chemical Free / Organic Product Production System

- Analysis of Market Demand

Identify current and future demand through research activities by "Market Distribution System Establishment Project for Agricultural Production" of Agricultural Production Distribution / Agro-Processing Sector. In SNIP sub-projects, Cocoa, coffee, achiote and potato are selected as target crops for organic products production.

- Development of Chemical free / Organic Products Production Technology in INIA

To develop production technology of organic products, cropping trial in INIA is carried out. (i) Evaluation of organic materials available in Ayacucho Region (Nutritional value, volume, etc.), (ii) Production method of organic fertilizer, (iii) Cropping technology, (iv) Method of pest and disaster control, etc. will be examined and analyzed through the cropping trial.

Pest and disaster control is very important for production of chemical free and organic products. Therefore, pest and disaster control combined several method should be examined (production of organic chemical, rotation for avoiding injury by continuous cropping, use of companion plants like marigold and oats, use of bio defence, use of natural enemy insect, etc.). A "Manual of chemical free / organic products production" is prepared based on the result of examines.

- Establishment of Certification Standard for Chemical free / Organic products

Quality assurance (reliability of the product) is essential to expand the market of healthy products. Therefore, it is necessary to establish a quality standard based on international one such as it's of Codex committee under FAO and WHO. At the same time, it is also important to establish certification system of organic products' producers taking methodology of GAP (agricultural production process management system), which has been expanding in Europe. GAP is a methodology for protection of safety of producers and products through monitoring of each production process.

- Selection of Chemical Free / Organic Product Producers' Group and Technical Assistance

Select chemical free / organic products producers' group for pilot level production in the community. Technical assistance is carried out for the group. At the same time, Promotion activity by "Market Distribution System Establishment Project for Agricultural Production" of Agricultural Production Distribution / Agro-Processing Sector. Is carried out.

2) Development of Production System of Sugar Beet for Bio-Ethanol

- Analysis of Market Demand

Current and future demands through research activities by "Market Distribution System Establishment Project for Agricultural Production" of Agricultural Production Distribution / Agro-Processing Sector are identified.

- Sugar Beet Cropping Trial in INIA

Sugar beet cropping trial in INIA is carried out. The cropping trial should be carried out at different altitudes to assess the possibility of use of unused land. For the production of competitive bio-ethanol, high cropping yield and high sugar contents are important. Therefore, cropping trial will be carried out focusing on these two factors. Result of cropping trial will be compiled a cropping manual as diffusion material for peasants.

- Selection and Technical Assistance to Producers' Group

Beet production will take place with the selection of groups of producers for the pilot production. This project aims to develop a new product for the future, so that the necessary inputs must be fully provided by the implementing entity.

- Selection of Pilot Production Group and Technical Assistance

Cropping trial (pilot production) by selected groups in the community is carried out. This project aims at development of future's new products. Therefore, cost for cropping trial may be covered by project implementation agency.

(c) Period

2018-2019 (2 Years)

(d) Target Area

Target Area of the Project is mainly Huamanga, La Mar and Huanca Provinces, which have been developed as agricultural areas with good access to market. Participant peasant group are around 10 per each products (chemical free / organic product and sugar beet bio-ethanol) (in total 200 ha).

This Project includes 10 SNIP sub-projects (8 for organic products, one for coffee quality standard and one for bio-ethanol). Out of these sub-projects except national or multi-regional sub-project, sub-project has strong relation with the Project will be given high priority.

(e) Project Cost

1st Priority Sub-project Group:	S/5,300,000
2nd Priority Sub-project Group:	S/2,400,000
3rd Priority Sub-project Group:	S/5,500,000
Total:	S/13,200,000

(4) Agricultural Extension Service Strengthening Project

(a) Background / Contents

Regional Department of Agricultural is responsible for agricultural extension in Peru. The department has about 100 agronomists and extension works throughout Ayacucho Region to carry out agricultural extension services. However, extension service is not sufficient due to

lack of capacity of extension worker, extension material and dispersed location of farming land. Most of the farmers in Ayacucho Region are in poor situation and they do not have enough farming budget. In addition, high frequency of occurrence of natural disasters, lack of access to markets, etc., limits farmers' activity regarding increase of income such as introduction of new varieties and crops. To overcome this situation, strengthening of extension service to supply opportunity to try activities for increasing income to farmers is necessary. Under such situation, this Project aims to strengthen farming technology of farmers, provision of opportunities of trial activities to increase income through improvement of access to extension service at provincial and community levels.

(b) Components

1) Enhancement of Capacity of Provincial Level Extension Worker

- Seminar on Technology of Extension Work

Periodical technical seminar is carried out for enhancement of technical capacity of provincial level extension worker. The seminar will be organized in corporation with the Huamanga University and INIA. The seminar should be comprehensive including technical training on crop character, cropping technology, formulation and strengthening of organization, etc. Participant extension workers should prepare agricultural development plan for their command area through problem analysis as an capacity development activity

- Study Tour

A study tour is carried out for selected representative extension worker. In the study tour, the extension workers will discuss with farmers and local governments in advanced area.

- Preparation of Extension Manual

Extension manual summarizing crop character, cropping technology, methodology for formulation and strengthening of organization, etc., is prepared. The manual should include information about agricultural finance (name of agency or project, loan condition, application method, etc.) to realize financial support to farmers.

2) Installation of Equipments for Extension Service

Motor cycles and basic investigation tools such as pH meter for provincial level extension workers are distributed.

3) Establishment of Provincial Level Demonstration Farm

Provincial level demonstration farm to improve farmers' access to extension service is established and expanded. In the demonstration farm, mainly cropping trial of new crops and varieties will be carried out for farmers who cannot take a risk for introducing new crops and varieties. It is difficult that very few extension workers manage demonstration farm. Therefore, the management will be delegated to peasants. Harvested products will be salary for the peasants.

4) Formation of Advanced Farmer Groups and Intensive Assistance

To improve access to extension services at the community level, extension service system is established through the advanced farmers group. Farmers who are positive for introduction of new crops and varieties will be selected as group member. The group will carry out cropping trial of new crops and varieties in the community with input support to demonstrate to other peasants. In addition, technical assistance on strengthening of organization will be carried out to promote cooperative production and to train as model group in the community.

5) Strengthening of Agricultural Information

Agricultural information prepared by "Market Distribution System Establishment Project for Agricultural Production" of Agricultural Production Distribution / Agro-Processing Sector is provided for peasants. At the same time, Producers are provided with information such as list of advanced farmers group to the market.

(c) Period

2011-2020 (10 Years)

(d) Target Area

Target Area of the Project is all Ayacucho Region. Participant peasant group are around 10 per each province. SNIP includes 5 sub-projects related this project. Out of these sub-projects except national or multi-regional sub-projects, sub-project has strong relation with the Project will be given high priority.

(e) Project Cost

1st Priority Sub-project Group:	S/3,600,000
2nd Priority Sub-project Group:	S/400,000
3rd Priority Sub-project Group:	S/0
Total:	S/4,000,000

(5) Target Area of Development Program

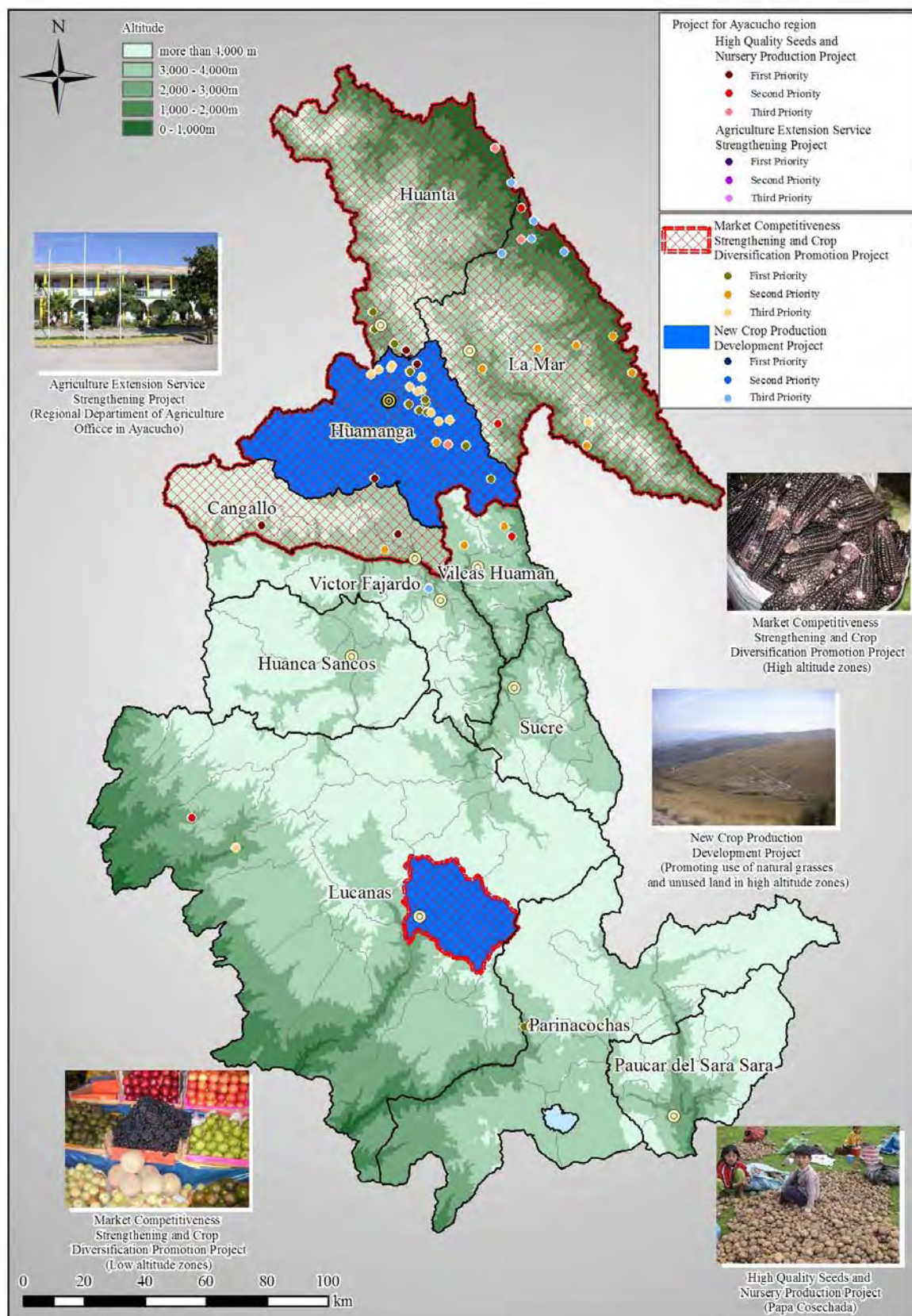
Table 11.4.7 shows target area of the projects based on relation between characteristics by altitude and province shown in Table 10.3.2. In addition, regional development map by sector is shown in Figure 11.4.1.

Table 11.4.7 Target Area of Development Program

Zone	No.	Province	Altitude (m)	High Quality Seeds and Nursery Production Project	Market Competitiveness Strengthening and Crop Diversification Project	New Crop Production Development Project	Agricultural Extension Service Strengthening Project
Whole Region				◎			◎
North	1	Huanta	2,000-4,000		◎		
	2		< 2,000		◎		
	3	La Mar	2,000-4,000		◎		
	4	Huamanga	2,000-4,000		◎	◎	
Central	5	Cangallo	4,000			○	
	6		2,000-4,000		◎	◎	
	7	Vilcas Huaman	2,000-4,000				
	8	Victor Fajardo	≥ 4,000				
	9		2,000-4,000				
	10	Huanca Sancos	≥ 4,000				
	11		2,000-4,000				
	12	Sucre	≥ 4,000				
	13		2,000-4,000				
South	14	Lucanas	≥ 4,000			○	
	15		2,000-4,000		◎	◎	
	16	Parinacochas	≥ 4,000				
	17		2,000-4,000				
	18	Paucar del	≥ 4,000				
	19	Sara Sara	2,000-4,000				

Remark: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: JICA Study Team

Figure 11.41 Regional Development Map by Sector (Farming / Extension)

11.5 Livestock

11.5.1 Development Objective

Agriculture and livestock are the most important income sources in rural area. Seventy percent of rural population of Ayacucho Region is engaged in agriculture and livestock. However, livestock in Ayacucho Region is extensive and its productivity is low. In addition, overgrazing without pasture management is causing several problems such as deterioration of vegetation. Taking into consideration such situations, the Livestock Development Sector Program aims at the “promotion of livestock and improvement of livelihood by livestock through the sustainable use of natural resources”.

11.5.2 Basic Policies for Formulation of Development Program

Table 11.5.1 shows constraints for development and basic policies for formulation of development program.

Table 11.5.1 Constraints for Development and Basic Policy for Formulation of Development Program

Constraints for Development		Basic Policy for Formulation of Development Program
<u>High Risk of Natural Disaster</u> • Increase of livestock mortality by natural disaster • Decrease in livestock productivity due to increase of stress by frequent movement/ Increase in work burden of farmers for frequent movement of livestock		<u>Introduction of Sustainable System of Livestock fitted to Natural Character of Andes Area</u> • Re-assessment of regional native and hybrid species which have potential to grow in Ayacucho Region • Sustainable and effective use of natural resources (land, water, slope) through introduction of appropriate technology of livestock
<u>Deterioration of Environment for Production and Increase of Production Loss</u> • Deterioration of Natural Pasture • Deterioration of natural pasture and decrease of production area (habitat) due to food competition between livestock • Increase in livestock mortality by natural disaster • Increase in livestock mortality and morbidity / Decrease in product quality • Decrease in product quality due to relative mating • Delay of introduction of good breed	⇒ ⇒ ⇒	<u>Development of Stable Supply System of High Quality Feedstuff</u> • Improvement of technology for natural pasture management • Introduction of technology for intensive natural pasture management and production • Introduction of technology for feed breed and storage
		<u>Improvement of Environment for Production</u> • Improvement of infrastructure and technology on sanitary management to reduce risk of damages by pest and natural disaster • Improvement of technology on re-production / breeding for improvement of livestock quality
		<u>Sustainable Utilization of Wild Camelid</u> • Strengthening of system for protection and management of vicuna with participation of local population, local government and regional government
<u>Decrease of Farmers' Capability on Price Negotiation</u> • Sales of products at low price		<u>Formulation of Commercial base Producers' Organization</u> • Formulation of producers' organization for improvement of productivity and capacity on price negotiation

Source: JICA Study Team

11.5.3 Approach for Formulation of Development Program

11.5.3.1 Viewpoint for Formulation of Development Program

Considerations for formulation of development program are as follows.

(1) Effective Utilization of Existing SNIP Sub-Projects un-implemented

SNIP includes many sub-projects related to livestock, and most of them meet with basic policy and target of the development program. In addition, equality on opportunity of participating in the project between beneficiary farmers is very important. Therefore, the development program is formulated in consideration of utilization of SNIP sub-projects un-implemented.

(2) Consideration for Natural Condition and Market Accessibility

Environment for production such as natural condition, market accessibility has strong influence to management method of livestock. Among several environments for production, altitude, quality of pasture, existence of irrigation water and market accessibility are important environments to determine components of the development program. Table 11.5.2 shows priority area by component in consideration of the important environments.

Table 11.5.2 Priority Area by Activity

Components	Priority Area
Improvement of Milk Productivity	Low / mid altitude area with access to market and potential of irrigation development for intensive pasture cultivation
Improvement of Beef Productivity	Low / mid altitude area with access to market, extensive natural pasture, source of drinking water for livestock and potential of irrigation development
Improvement of Alpaca Meat and Coat Productivity	High altitude area with access to market, extensive natural pasture, source of drinking water for livestock and potential of irrigation development
Improvement of Cuy (Guinea pig) Productivity	Mid / high altitude and population concentrated areas with access to market, source of drinking water for livestock and potential of small scale irrigation development

Source: JICA Study Team

11.5.3.2 Analysis and Evaluation of Existing Projects (SNIP Sub-Projects)

(1) Distribution of SNIP Sub-Projects by Province and Type of Animal

Distribution of 145 SNIP Sub-projects related to livestock by province and type of animal is shown in Table 11.5.3. Almost half of the SNIP Sub-projects are related to cattle. Twenty six sub-projects or 18% of total number of the sub-projects aim to beef production and 48 sub-projects or 33% aim at milk production. Sub-projects related to cuy (guinea pig) and alpaca are 53 in number or 36% and the other 7 in number or 5%. As mentioned above, development needs for cattle and guinea pig production are very high occupying 88% of the SNIP sub-projects. In terms of the distribution by province, Sub-projects are concentrated in northern region of Ayacucho Region, 55 sub-projects for Huamanga Province in which Ayacucho City, regional capital is located, 16 sub-projects for La Mar Province and 13 sub-projects for Huanta Province.

Table 11.5.3 Distribution of SNIP Sub-projects related to Livestock by Province and Type of Animal

Category of Livestock	Type of Animal	Number of Sub-Projects	%	Huanta	La Mar	Huamanga	Cangallo	Vilcas Huaman	Victor Fajardo	Huanca Sancos	Sucre	Lucanas	Parinacochas	Paucar del Sara Sara
				58%			32%				11%			
Total		145	100	13	16	55	21	2	12	2	8	8	5	3
Cattle	Sub-Total	74	51	8	11	19	15	0	6	1	5	4	4	1
	Beef Cattle	26	18	2	3	6	9	-	0	1	-	3	2	-
	Milk Cow	48	33	6	8	13	6	-	6	-	5	1	2	1
Camelid	Sub-Total	12	8	0	0	3	2	0	1	0	2	3	1	0
	Alpaca	7	5	0	0	2	0	0	0	0	2	2	1	0
	Vicuña	5	3	0	0	1	2	0	1	0	0	1	0	0
Guinea Pig	Guinea Pig	53	36	4	5	31	4	2	4	0	1	0	0	2
Others	Others	6	4	1	0	2	0	0	1	1	0	1	0	0
	Chicken	2	1.4	1	0	1	0	0	0	0	0	0	0	0
	Goat	1	0.7	0	0	1	0	0	0	0	0	0	0	0
	Sheep	2	1.4	0	0	0	0	0	1	1	0	0	0	0
	Pig	1	0.7	0	0	0	0	0	0	0	0	1	0	0

Source: JICA Study Team

(2) Analysis of Contents of SNIP Sub-projects

Summary of contents of SNIP Sub-projects related to livestock is summarized in Table 11.5.4.

Table 11.5.4 Contents of SNIP Sub-projects related to Livestock

Purpose	Contents
Improvement of Productivity and Quality of Pasture	Sterengthening of pasture and feedstuff production (Production and management of irrigated pasture land
Improvement of Production System	Improvement of production technology, introduction of cooperative and enterprising production system and, commercialisation of production
Development of Basic Infrastructure for Production	Development of cattle shed, processing facilities (milk, meat, coat and wool), irrigation system, fence for pasture, etc.
Improvement of Technology for Livestock Management	Improvement of technologies for feeding, sanitary control, breed improvement, breeding, expression of milk, shearing

Source: JICA Study Team

(3) Evaluation Method of SNIP Sub-projects

Five criteria are applied for evaluation of SNIP Sub-projects. The maximum score is 90 and the minimum score is 18. Result of the evaluation is shown in Table 11.5.5.

Table 11.5.5 Criteria and Result of Evaluation of SNIP Sub-projects

Criteria	Indicator	Points	Category						
			Nos.	Cattle		Camelid		Others	
				Meat	Milk	Alpaca	Vicuna	Cuy	Sheep Goat
Relevance	Grade of Poverty	Total	145	26	48	7	5	53	6
	Extremely Poor (P3)	30	75	16	29	2	3	24	1
	Very Poor (P2)	18	62	10	17	4	1	25	5
	Poor (P1)	6	8	0	2	1	1	4	0
Effectiveness	Land Use Potential	Total	145	26	48	7	5	53	6
	High Potential (A,P)	30	58	14	17	4	0	20	3
	Moderate Potential (Xa,Xp)	18	56	8	22	3	5	16	2
	Low potential (F,Xf)	6	31	4	9	0	0	17	1
Efficiency	Project Cost / Beneficiary	Total	145	26	48	7	5	53	6
	Less than 840 Soles	10	64	13	22	3	3	20	3
	840 - 1,650 Soles	6	35	11	12	2	2	5	3
	More than 1,650 Soles	2	46	2	14	2	0	28	0
Impact	Environmental Impact	Total	145	26	48	7	5	53	6
	positive impact or negative impact	5	64	4	18	7	3	30	2
	Small negative impact or avoidable / mitigable negative impact	3	81	22	30	0	2	23	4
	Big negative impact or unavoidable / no mitigable negative impact	1	0	0	0	0	0	0	0
	Spreading Effect	Total	145	26	48	7	5	53	6
	Highly adaptable for other area	5	19	3	4	4	2	4	2
	Moderately adaptable for other area	3	65	8	28	2	2	23	2
	Difficult to adapt for other area	1	61	15	16	1	1	26	2
Sustainability	Strengthening of Organization	Total	145	26	48	7	5	53	6
	Project by local government (GL)	10	63	2	31	1	4	21	4
	Project by regional government (GR)	6	17	0	9	3	0	5	0
	Project by central government (GN)	2	65	24	8	3	1	27	2

Source: JICA Study Team

Sub-projects in descending order is made up according to evaluation points. Top ranked sub-projects which are positioned in 20% of total cost of sub-projects were classified into the 1st priority, sub-projects positioned in more than 20% to 40% were classified into the 2nd priority and the remaining sub-projects were classified into the 3rd

priority.

Table 11.5.6 shows result of the prioritization. Out of 145 sub-projects, 10 sub-projects or 7% were classified into the 1st priority (5 for milk production, 2 for beef production, one for alpaca production and 2 for guinea pig), 46 or sub-projects or 31% into the 2nd priority and other 62 sub-projects into the 3rd priority.

Table 11.5.6 Summary of SNIP Sub-projects related to Livestock by Priority

Priority	Milk Cow	Beef Cattle	Alpaca	Vicuna	Guinea Pig	Others	Total	%	Project Cost (Original)	Project Cost (Converted Price End of 2009)
1	5	2	1	0	2	0	10	7	19,894,108	21,294,301
2	16	9	1	3	15	2	46	31	21,835,258	23,659,351
3	27	15	5	2	36	4	89	62	49,202,119	53,838,566
Total	48	26	7	5	53	6	145	100	90,931,485	98,792,218

Source: JICA Study Team

11.5.4 Development Program

11.5.4.1 Composition of Development Program

The development program consists of following six projects.

- Milk Production Support Project
- Beef Cattle Production Project
- Alpaca Production Support Project
- Vicuna Management and Protection Project
- Cuy Production Efficiency Improvement Project
- Mutton and Wool Production Support Project

The development program aims to contribute to social-economic development of poor rural area of Ayacucho Region bringing up enterprising farmers for milk, beef, camelid coat, wool production, etc., through training, capacity development and technical assistance mainly for following subjects

- Production and management of pasture (Stable production of high quality pasture for improvement of productivity of livestock)
- Formulation and strengthening of producers' association (Development of market oriented association which is capable on price negotiation at the market)
- Development of infrastructure for production (Introduction of farming management system flexible to natural disaster and pests)
- Improvement of production technology (Amplification of livestock's habitat, improvement of product's quality, improvement of technology for feeding, sanitary control, breeding, breed improvement, etc.)

11.5.4.2 Outline of Development Project

(1) Milk Production Support Project

(a) Background / Objective

Major milk cows in Ayacucho Region are hybrids of 23 regional native species and improved species such as Brown Swiss and Holstein. These hybrids are genetically suitable for milk production. However, milk productivity of the hybrids is low due to lack of quantity and quality of feedstuff. In addition, frequent natural disaster and pest cause vulnerable production system.

Yearly milk production per milk cow (180 days / year) ranges from 328 to 417 Kg (1.8 to 2-3 kg / day) in the northern region, from 192 to 295 Kg (1.1 to 1.6 kg / day) in the central region and from 424 to 839 kg (2.4 to 4.7 kg / day) in the southern region. For improvement of production volume, strengthening of production system (conversion to intensive or semi-intensive production system) is necessary introducing controlled breeding technology, appropriate sanitary management, utilization of high calorie feedstuff, etc. In addition,

development of production system which can realize suitable and high quality milk supply to the market is necessary to grow competitive production area. To realize such production system, strengthening of producers' association, growth of enterprising producers, utilization of irrigation for pasture production, development of basic infrastructure (cow shed, fence, processing facility) and strengthening of technical support are needed. Ayacucho Region imports a considerable percentage of milk from other regions. On the other hand, GOP is implementing a program to promote milk consumption by school and other peoples (Vaso de Leche y Desayunos Escolares). This program has increased potential demand and it is estimated that 6,150 ton of supply deficiency was occurred in 2008.

Under such situation mentioned above, this Project aims to increase the peasants' income increasing milk productivity through improvement of production system.

(b) Component

1) Improvement of Pasture

The supportability of pasture land depends mainly on the cropping yield and quality of pasture, the grazing system, species of pasture and livestock, among others. Difference of the supportability between natural pasture land and cultivated pasture land is 1.5-3.0 times. Moreover, the difference between natural pasture land and cultivated pasture land with fertilizer is 2.0-4.0 times. Thus, the type of pasture is very important factor in the productivity of livestock. Therefore, technical assistance for introducing leguminous pasture such as alfalfa, catch clover, poaceous pasture like rye grass, orchard grass, oat, etc. is carried out, and also technology for utilization of harvesting and industry residues is transferred.

2) Training and Strengthening of Producers' Association

Organizing producers is important for (i) Enhancement of entrepreneurial spirit and understanding on mutual benefit, (ii) Improvement of productivity and quality, (iii) Enhancement of capacity on price negotiation, (iv) Increase of opportunities for participating in national and international markets.

Therefore, assistance for formulation of producers' association to realize organized and entrepreneurial intensive milk production is carried out. In concrete term, small scale producers who own 2-10 milk cows are formulated to secure stable production. The Project targets formulation of 20 associations (in total 500 producers) which consist of 50 producers each. For effective implementation of the Project giving priority to positive producers, preparation of "the plan for development of infrastructure and installation of facilities" is set up as a condition to receive support by the Project.

3) Establishment of Demonstration Farm and Technical Assistance on Milk Production Management

Establish demonstration and/or training farm at land of producers' association as method of technical assistance. Technical assistance on pasture production, rotation pasture management system, disaster control, livestock sanitary management, milking sanitary management, breeding (artificial insemination, transplantation of fertilized egg), natural breeding, etc., is carried out. Site which have facilities for technical assistance such as cattle shed, pasture land will be selected as demonstration farm.

4) Development of Infrastructure for Livestock

Develop appropriate infrastructures for livestock according to field condition to strengthening milk cow management system and reduction of damage by natural disaster (cattle shed, feeding site, watering place, sanitary milking space, cool box, silo, place for manure production, etc.), installation site will be selected from community or producers owned land thorough coordination between producers themselves.

(c) Period

2013-2016 (4 Years)

(d) Target Area

Beneficiaries of the project are around 1,000 producers. La Mar, Huamanga, Cangallo, Victor Fajardo and Lucanas Provinces which have relatively good access and high milk production are main target area of the Project. In addition, SNIP Sub-project which have strong relation with this Project will be selected as the target area (Ref. 11.5.3.2).

(e) Project Cost

1st Priority Sub-project Group:	S/7,000,000
2nd Priority Sub-project Group:	S/400,000
3rd Priority Sub-project Group:	S/1,100,000
Total:	S/8,500,000

(2) Beef Cattle Production Project

(a) Background / Objective

Most of livestock producers in Ayacucho Region are small-scaled farmers. Importance of livestock is higher in high altitude area (more than 4,000 m) where are facing several constraints such as difficulty in finding water resource for irrigation, low soil fertility and high natural disaster risk, etc.

Producers practice extensive livestock with very low technology. Several problems such as deterioration of pasture land due to lack of management and low technology cause decrease of productivity. Productivity of beef is very low ranging between 85 and 139 kg / head. In addition, 5 years of grazing period is necessary due to use of low productive native breeds and lack of improved feedstuff. Moreover, livestock's resistance to pest and natural disaster is low.

Under such situation mentioned above, this Project aims to improve peasants' income increasing productivity through improvement of beef cattle production system.

(b) Components**1) Technical Assistant on Pasture Management and Production**

Technical assistance to producers on pasture management and production is carried out. Main contents of technical assistance are (i) Natural pasture management technology, (ii) Cultivated pasture production and management technology, (iii) Intensive pasture management technology (mixture of poaceous and leguminous pasture), (iv) Technology for utilization of harvesting and industry residues, and (v) Technology on silo.

2) Formulation and Strengthening of Producers' Association

Mechanism for collaboration between local and regional governments is developed to promote beef cattle production. Technical assistance for formulation of producers' association flexible for producers needs is carried out to realize intensive and commercial livestock. In concrete term, small-scaled producers who own 3-10 beef cattle are formulated to secure stable production. The Project targets formulation of 20 associations (in total 1,000 producers) which consist of 50 producers each. For effective implementation of the project giving priority to positive producers, preparation of "the plan for development of infrastructure and installation of facilities" is set up as a condition to receive support by the project.

3) Establishment of Demonstration Farm and Technical Assistance on Beef Cattle Production Management

Demonstration / training farm at some producers' association is established for technical assistance. Producers' discussion and technical assistance regarding intensive livestock (pasture management, fattening, pest control, sanitary control, breeding, natural breeding, artificial insemination, transplantation of fertilized egg) are carried out. In addition, breeding cattle through assistances mentioned above is developed. At the same time, pedigree for breed exchange between communities and breeding control such as record of pregnancy, etc., is prepared. Sites which have facilities for technical assistance such as cattle shed, pasture land will be selected as demonstration farm.

4) Development of Infrastructure for Livestock

Appropriate infrastructures for livestock according to field condition are developed to strengthening milk cow management system and to reduce damage by natural disaster (cattle shed, feeding site, watering place, sanitary milking space, cool box, silo, place for manure production, etc.), installation site will be selected from community or producers owned land thorough coordination between producers themselves.

(c) Period

2011-2014 (4 years)

(d) Target Area

Beneficiaries of the Project are around 1,000 producers. La Mar, Huamanga, Cangallo, Victor Fajardo and Lucanas Provinces which have relatively good access and high livestock production are main target areas of the Project. In addition, SNIP Sub-projects which have strong relation with this Project will be selected as the target area (Ref. 11.5.3.2).

(e) Project Cost

1st Priority Sub-project Group:	S/.11,600,000
2nd Priority Sub-project Group:	S/.9,700,000
3rd Priority Sub-project Group:	S/.27,900,000
Total:	S/.49,200,000

(3) Alpaca Production Support Project**(a) Background / Objective**

Similarly to other south American camelids, alpaca inhabits in Andes highland areas. Characteristics of alpaca production are (i) adaptable to severe climate condition area where other livestock can not inhabit, (ii) low risk of deterioration of pasture (high possibility of effective use of pasture) in comparison to other livestock, (iii) multiple products (meat and coat), etc. Therefore, strengthening of alpaca production is very important for improvement of income of farmers in high altitude area where European livestock can not grow. As mentioned above, alpaca has advantages. However, production and quality of alpaca meat and coat are low due to deterioration of natural pasture, lack of technology, natural disaster, etc. According to information of INEI, production of alpaca coat and meat in 8 provinces ranges from 1.5 to 2.2 kg / head / year and 24.8 to 31.8 kg / head, respectively.

Under such situations mentioned above, this Project aims to improve peasants' income increasing productivity through improvement of alpaca production system.

(b) Components**1) Technical Assistant on Pasture Management and Production**

Technical assistance on natural pasture management is conducted. In concrete term, it includes rotation pasture management and preparation of fence, preparation of infiltration ditches to improve water retention, preparation of irrigation, introduction of improved pasture to restore natural pasture. Continuously, technical assistance on cultivated pasture management is carried out. Oat (poaceous pasture) and alfalfa, dutch clover (leguminous pasture) are considerable for mixed cropping. In addition, technical assistance on production of dry pasture, feed mixing method is carried out. Moreover, technical assistance on restore deteriorated pasture land giving fallow period is executed.

2) Formulation and Strengthening of Producers' Association

Technical assistance for formulation of producers' association flexible for producers needs is carried out to realize stable and commercial production of alpaca. In concrete term, small-scaled producers is formulated to secure stable production. The Project targets formulation of

20 associations (in total 1,000 producers) which consist of 50 producers each. For effective implementation of the Project giving priority to positive producers, preparation of “the plan for development of infrastructure and installation of facilities” is set up as a condition to receive support by the project.									
3) Installation of Infrastructures for Livestock To avoid deterioration of pasture land, rotation system of pasture land and install fence is introduced. In addition, infrastructures for mitigation of risk of natural disaster and feed production (animal shed, animal barn with watering place, cutting place, silo, etc.) are installed.									
4) Technical Assistance on Management for Alpaca Production (Feed Production, Sanitary Management, Breeding, etc.) Technical assistance on management for alpaca production is carried out. In concrete term, it includes technologies on feeding, fattening, mineralizing, pest and disaster control including parasite, sanitary control, natural breeding, artificial breeding, reduce of relative mating risk, cutting, shearing, washing and conservation method of products.									
(c) Period 2011-2013 (3 Years)									
(d) Target Area Beneficiaries of the project are around 1,000 producers. Huamanga, Sucre, Lucanas and Parinacochas Provinces which have relatively good access and high alpaca production are main target area of the Project. In addition, SNIP Sub-projects which have strong relation with this Project will be selected as the target area (Ref. 11.5.3.2).									
(e) Project Cost <table> <tr> <td>1st Priority Sub-project Group:</td><td>S/.2,300,000</td></tr> <tr> <td>2nd Priority Sub-project Group:</td><td>S/.1,900,000</td></tr> <tr> <td>3rd Priority Sub-project Group:</td><td>S/.12,600,000</td></tr> <tr> <td>Total:</td><td>S/.16,800,000</td></tr> </table>		1st Priority Sub-project Group:	S/.2,300,000	2nd Priority Sub-project Group:	S/.1,900,000	3rd Priority Sub-project Group:	S/.12,600,000	Total:	S/.16,800,000
1st Priority Sub-project Group:	S/.2,300,000								
2nd Priority Sub-project Group:	S/.1,900,000								
3rd Priority Sub-project Group:	S/.12,600,000								
Total:	S/.16,800,000								

(4) Vicuna Management and Prevention Project

(a) Background / Objective Similarly to alpaca, vicuna is Andes native animal. Coat of vicuna has higher value than the alpaca at the market for their rarity. Vicuna coat is considered as luxury item in the market. Big difference between alpaca and vicuna is possibility of breeding (alpaca can be breed and vicuna can not be breed). The vicuña lives by family group (herd) of 16 heads (one male, females and children) or youth herds of 200 heads of solitary males in territory. Due to the living style mentioned above, vicuna's habitat is extensive and dispersed, and this is a reason of increasing poaching. CONAC, organization related vicuna has already not functioned, and other related agencies do not have attention for poaching problem. In addition, there are many problems such as insufficient management of habitat due to lack of basic information, lack of technology for vicuna production, inappropriate searing technology, existence of illegal trader, deterioration of habitat due to increase of other livestock like sheep, etc. As the result of these problems, productivity of vicuna coat is low. Appropriate production and protection systems such as pasture management, management of statistic, surveillance system, installation of protection fence, activity for compliance of regulations are necessary for effective utilization of vicuna which is valuable resource of Andes. In addition, adequate facilities and technology such as sanitary control for shearing are required to avoid damages of vicuna. It also requires the strengthening of coordination between RGA, Local Government and communities and concerned agencies as CITES. Under such situations mentioned above, this Project aims to improve peasants' income through sustainable utilization of vicuna establishing system for vicuna protection.
(b) Component 1) Technical Assistance for Pasture Production and Management Technical assistance for sustainable management of natural pasture such as preparation of fence is carried out to avoid invasion of other livestock such as sheep, preparation of infiltration ditches to improve retention water, installation of irrigation, improvement of pasture introducing improved grass, technology for restore deteriorated pasture land by native grass, etc. 2) Formulation and Training of Vicuna Producers' Association Communal vicuna protection area and surveillance system are established in collaboration with regional government, local governments and NGO's. In concrete term, The systems through technical assistance on improvement of capacity of communities on vicuna protection are established to realize cooperative protection activity, vicuna management technology such as shearing and post shearing treatment. Around 118 associations (25-400 farmers per association) for carrying out following activities are established and/or reactivated. - Protection of vicuna against poaching - Effective shearing - Effective shearing treatment technology such as washing for adding value of product Each association should prepare action plan including protection method and schedule for effective implementation of this project. 3) Development of Infrastructure for Protection of Vicuna Vicuna can not grow in captivity. Therefore, coat shearing is done capturing wild vicuna. For capture of vicuna, fence for more than 1,000 ha pasture land which is required habitat for each vicuna herb is prepared. In addition, facilities for shearing, post shearing treatment, etc. are installed.

4) Technical Assistance on Vicuna Management and Protection	
Technical assistance for management of facilities for Vicuna Management and Protection such as vehicle, surveillance cottage, vicuna capture and shearing house, storage, etc. is carried out. At the same time, technical assistance on vicuna production such as method of capture, sanitary control, storage, natural breeding, etc., is carried out.	
(c) Period	
2014-2015 (2 Years)	
(d) Target Area	
This Project targets mainly Lucanas Province where many vicunas inhabit. Number of beneficiaries is around 400. In addition, SNIP Sub-projects which have strong relation with this Project will be selected as the target area (Refer to Item 11.5.3.2).	
(e) Project Cost	
1st Priority Sub-project Group:	S/.0
2nd Priority Sub-project Group:	S/.6,200,000
3rd Priority Sub-project Group:	S/.800,000
Total:	S/.7,000,000

(5) Cuy Production Efficiency Improvement Project

(a) Background / Objective	
Most of farmers in Ayacucho Region practice mixed farming (farming in 1.0-1.5 ha of farming land and livestock at community land). Breeding of cuy (guinea pig) is relatively easy. Therefore, about 270,000 cuy are in Ayacucho Region in as a important protein source in the Andean Area.	
Breeding of cuy can be done in small space. In addition, cuy can be used both purpose of self consumption and sales. Moreover, market demand is relatively high. Therefore, breeding of cuy can be a countermeasure for improvement of small-scaled farmers' income. However, productivity of cuy is low (0.3 to 0.6 kg per cuy) due to lack of production technology and facilities.	
Under such situation mentioned above, this Project aims to improvement of peasant's income through increase of productivity of guinea pig improving production system. Both Regional Government and Local Governments have interest in the potential of the cuy.	
(b) Component	
1) Production of Feedstuff for Cuy	
Technical assistance on production of high nutrition pastures such as alfalfa is carried out for realizing 100-400 cuys breeding in 0.1-0.3 ha of pasture land. In addition, technical assistance for production of mixed feedstuff is carried out.	
2) Formulation and Strengthening of Producers' Association	
Activity of producers associations in the district of Vinchos and Huamanga Province formulated by FONCODES is an example of successful model of guinea pig breeding. To realize stable production of guinea pig, formulation and/or strengthening of new and existing producers' association are required. Therefore, producers' association which consists of 25 farmers with 100-400 cuys (around 500 farmers, 20 associations) is formulated.	
3) Technical Assistance on Technology on Cuy Breeding	
Daily and timely management is required for successful cuy breeding. Therefore, breeding method should be selected with consideration to farmers capacity (use of harvesting, food residues, etc.). In addition, facilities for favourable sanitary control. Therefore, technical assistance on sanitary control such as pest control, sanitary management of growing bam, breeding, etc., is required.	
4) Development of Facilities for Cuy Breeding	
Cuy is an animal quite fragile. Therefore, facilities to protect cuy against enemy alien, cold and also for appropriate feeding to avoid feeding frenzy are required. For this reason, facilities for intensive production of cuy such as guinea pig growing bam, feedstuff production facility and processing facility are developed.	
(c) Period	
2014-2016 (3 Years)	
(d) Target Area	
Beneficiaies of the project are around 500 producers. La Mar, Huamanga, Cangallo, Victor Fajardo and Lucanas Provinces which have relatively good access and high livestock production are main target area of the Project. In addition, SNIP Sub-projects which have strong relation with this Project will be selected as the target area (Ref. 11.5.3.2).	
(e) Project Cost	
1st Priority Sub-project Group:	S/.300,000
2nd Priority Sub-project Group:	S/.2,600,000
3rd Priority Sub-project Group:	S/.10,500,000
Total:	S/.13,400,000

(6) Mutton and Wool Production Support Project

(a) Background / Objective	
In addition to livestock mentioned above, sheep, goats, pigs and poultry are widely bred. Within these livestock, pigs consume mainly food	

residue of the farmers. Therefore, productivity of pig production strongly depends on availability of farmers' food. On the other hand, goats and sheep are important income sources of farmers. Especially, sheep which have high adaptability have the largest population at the altitude more than 3,000 m.

Most of sheep in Ayacucho Region is native specie and breeding method is extensive. The breeding strongly depends on natural pasture land and faces several risks such as natural disaster and pest. As a result, productivity of sheep is low. According to information of INEL, annual productivities of sheep meat and wool range between 9.8 to 13.5 kg and 1.2 to 1.6 kg per head in major 8 provinces.

Under such situation mentioned above, this Project aims to improvement of peasant's income through increase of productivity of sheep meat and wool improving production system.

(b) Component

1) Technical Assistance for Pasture Production and Management (Natural and Cultivated Pasture)

Technical assistance on natural pasture management such as rotation pasture management, preparation of infiltration ditches is carried out to improve water retention, installation of irrigation, and introduction of improved pasture to restore natural pasture. In addition, technical assistance on restore deteriorated pasture land giving fallow period is carried out. Moreover, technical assistance on utilization harvesting residue at beginning of rainy season when quantity of pasture is decreased, mixed cultivation of Oat (poaceous pasture) and alfalfa, dutch clover (leguminous pasture), production of dry pasture, feed mixing method, etc., is carried out.

2) Establishment of Demonstration Farm and Technical Assistance on Sheep Management

Demonstration / training farm at some producers' association for technical assistance is established. Producers' discussion and technical assistance regarding intensive livestock (pasture management, fattening, pest control, sanitary control, breeding, natural breeding, artificial insemination, transplantation of fertilized egg) are carried out. In addition, Breeding sheep through assistances mentioned above is developed. At the same time, technical assistance to avoid relative mating such as breeding control record of pregnancy, etc., carried out. Sites which have facilities for technical assistance such as cattle shed, pasture land will be selected as demonstration farm.

3) Formulation and Training of Producers' Association

Technical assistance on formulation and strengthening of producers' association flexible is carried out to diverse member needs for intensive and commercial production. Around 1,000 farmers will be organized for stable supply of mutton and wool. Trained members of the association should prepare a Plan for Development of Infrastructure for Livestock for enhancement of initiative and positiveness of the association.

4) Development of Infrastructure for Livestock

Infrastructures for livestock to avoid overgrazing such as fence for natural pasture land, preparation of infiltration ditches to improve retention water, etc., are developed. In addition, livestock shed, livestock barn with watering space, shearing place, silo, etc, for adequate sheep management and reduction of risk of natural disaster. are developed

(c) Period

2011-2013 (3 Years)

(d) Target Area

This Project targets 1,000 farmers of mainly Huamanga Province, Cangallo and Huanca Sancos Provinces (central part of the region) and Lucanas Province (southern part of the region) which have high population of sheep. In addition, SNIP Sub-project which have strong relation with this Project will be selected as the target area (Ref. 11.5.3.2).

(e) Project Cost

1st Priority Sub-project Group:	S/0
2nd Priority Sub-project Group:	S/2,800,000
3rd Priority Sub-project Group:	S/200,000
Total:	SL3,000,000

(7) Development Area

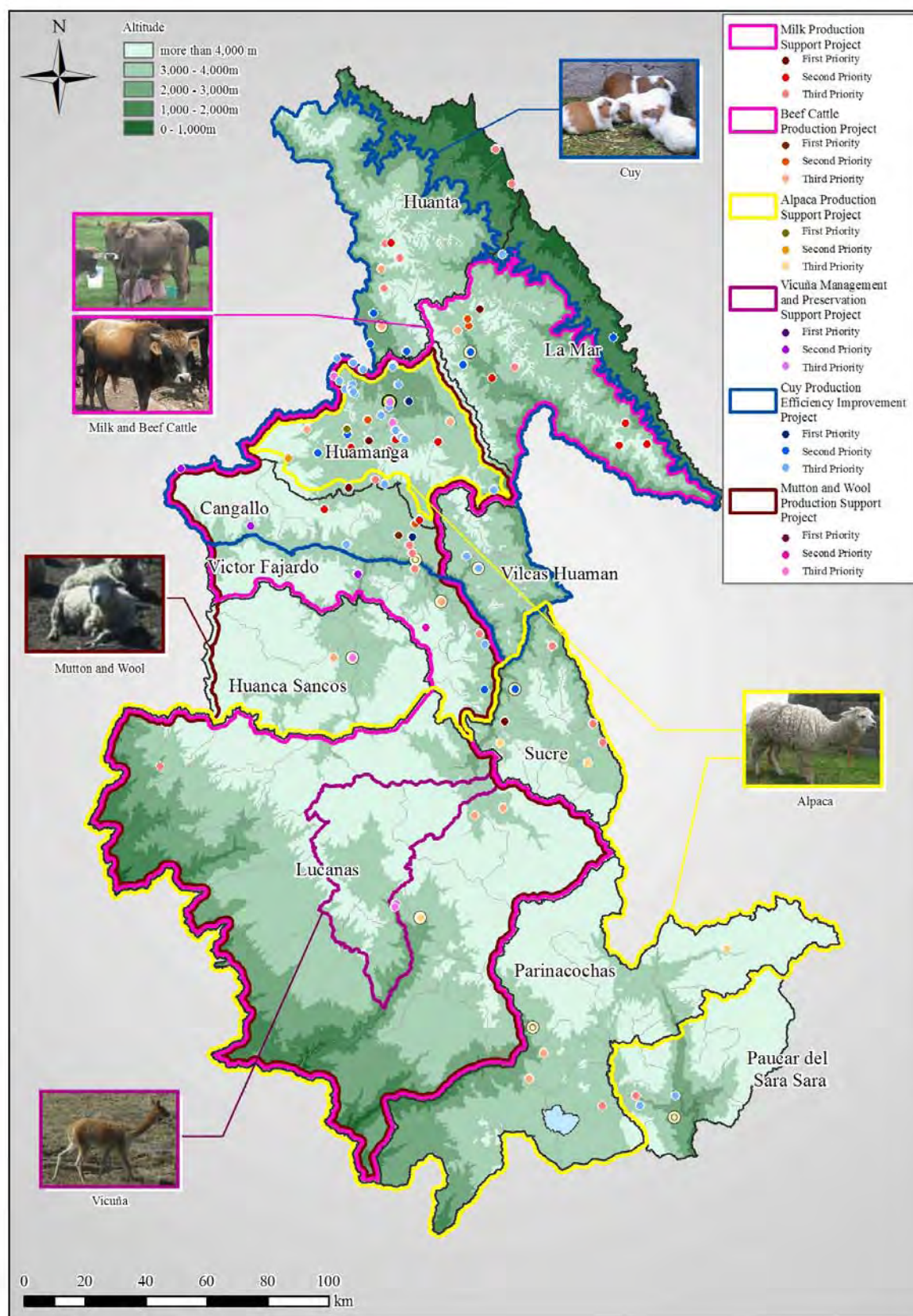
Relation between the projects mentioned above and characteristic per province and altitude shown in Table 10.3.2 is summarized in Table 11.5.7 and the regional development map by sector is shown in Figure 11.5.1.

Table 11.5.7 Target Areas for Development Projects

Zone	No.	Province	Altitude (m)	Milk Production Support Project	Beef Cattle Production Project	Alpaca Production Support Project	CuPrProduction Efficiency Improvement Project	Vicuna Management and Preservation Project	Mutton and Wool Production Support Project
Whole Region									
North	1	Huanta	2,000-4,000	○	○			○	○
	2		< 2,000					○	
	3	La Mar	2,000-4,000	◎	◎			◎	○
	4	Huamanga	2,000-4,000	◎	◎	◎	△	◎	◎
Central	5	Cangallo	≥ 4,000	○	○	○	△		
	6		2,000-4,000	◎	◎	△	△	◎	◎
	7	Vilcas Huaman	2,000-4,000	○	○			○	○
	8	Victor Fajardo	≥ 4,000	○	○	○	△		◎
	9		2,000-4,000	◎	◎	○	○	△	◎
	10	Huanca Sancos	≥ 4,000	○	○	△	○		◎
	11		2,000-4,000	○	△		△	△	○
	12	Sucre	≥ 4,000	△	△	○	△		△
	13		2,000-4,000	○	○	◎	○	△	○
South	14	Lucanas	≥ 4,000	◎	○	◎	◎		◎
	15		2,000-4,000	◎	◎	○	◎	△	◎
	16	Parinacochas	≥ 4,000	○	○	◎	○		○
	17		2,000-4,000	○	○	○	○	△	○
	18	Paucar del	≥ 4,000	△		○	△		△
	19	Sara Sara	2,000-4,000	○	○	△	△	△	○

Remark: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: JICA Study Team

Figure 11.5.1 Regional Development Map by Sector (Livestock)

11.6 Inland Fishery

In order to elaborate the Master Plan of which the goal is to improve the living conditions of the poor peasants, a development program for inland fishery is proposed based on the results of the analysis on the current situation in Ayacucho Region.

11.6.1 Development Objective

Rainbow trout breeding is the main activity of inland fishery in Ayacucho Region and its production is within the areas of the Sierra between 3,200 to 4,100 meters in elevation. In 2007 there were 47 producers associations registered in the fishery division of DIREPRO under GRA and the number of associations tends to lightly increase. At the regional level, the fishing activity has remained steady, except the production of DIREPRO - which policy is to reduce the production. On the other hand, the activity in private sector has been highly increased.

Under the circumstances, inland fishery is positioned as a new industry which can contribute to the activation of new rural economy in Ayacucho Region, which depends greatly on agriculture and livestock. In particular, the peasants highly expect development of inland fishery in relation to generating employment opportunities and income increase. Nevertheless, the environment for the production of inland fishery in Ayacucho Region is not developed enough in comparison to other regions which are more developed regions such as Puno and Junin. Along with the decentralization process, the fishery section was transferred from the Ministry of Production (*PRODUCE*) to the Regional Direction of Production (*DIREPRO*) in 2006, which can make possible the implementation of a more detailed development program in accordance with the current conditions in Ayacucho Region. However, there has not been any development plan so far.

With the above, the objective of the development program is to contribute to the creation of employment opportunities as well as a higher income for the poor peasants and improve living conditions in rural area through the promotion of inland fishery in Ayacucho Region.

11.6.2 Basic Policies for Formulation of Development Program

In order to reach the objectives for the development program, it is necessary to prepare the development programs in detail in accordance with the following basic policies.

Table 11.6.1 Current Conditions, Issues, Basic Policies for Development Program

Constraints		Basic Policies	
<u>Unstable Production / Insufficient Quality Control</u> • Difficulty in financial arrangement for construction and O&M of aquaculture pond • Extensive aquaculture/operation (difficulty in insurance of profitability) • Shortage of production and supply facilities of young fish (difficulty in ensuring of high quality of young fish) • Lack of feed production and supply facilities (difficulty in ensuring of cheap feed) • Non-provision of distribution system of cold chain • Non-provision of sanitary and safety control system	⇒	<u>Inactivity of Inland Fishery</u> • Shortage of Experience and Know-How on Promotion of Aquaculture Industry • Shortage of Coordination between Production Areas and Relevant Agencies to Inland Fishery • Difficulty in Financial Participation by People Living in Development Potential Area • Poor Ability on Management and Institutional Strengthening by Producers Associations • Lack of Regional Medium	⇒
		1. Basic Policies <u>Support to Small-scaled Business</u> The first priority is to support to create small business in areas where there is a high potential for development, to promote the conformation of small entrepreneurs to create a model for small business of inland fishery. <u>Women Participation</u> Focusing on the peasant women playing important role, it is desirable to prepare the plan as precondition of women participation. In addition, it is being considered the creation and strengthening of women's associations that can be the beneficiaries of this supporting program. <u>Environmental Considerations for Lakes, Lagoons and Rivers</u>	

		and Long Term Promotion Plan focusing on Aquaculture	It is expected to make a promotion plan of inland fishery in consideration of .water environment in/around target areas
<u>Insufficient Market Development</u> • Low degree of recognition in region as production area • Low degree of recognition and difficulty in financial arrangement for marketing activities • No development stragy and plan for marketing • Insufficient marketing activties to large consumable areas like Lima • Lack of coordination and activities of local producers associations • Constant lack of market information system			2. Basic Strategies <u>Establishment of Stable Supply of Fish Production</u> The supply system which animal protein can be easiliy taken from fish products, is established. The supply system which the farmers can take fish product with safety and rich nutrition at cheaper price, is established. <u>Business Promotion toward Creation of Job Opportunity and Farmers'Income Improvement</u> Priority is given to policy focusing on creation of job opportunity and farmers' income improvement. <u>Arrangement of Locally Integrated Production Conditions</u> The production sites accompanied by young fish production center and distribution center are established at the southern region with high potential of inland fishery promotion.
			3. Priority Areas for Promotion Two Provinces of Lucanas and Parinachochas located at the southern region are decided as priority areas for promotion of inland fishery.

Source JICA Study Team

11.6.3 Approach to Formulation of Development Program

On the basis of the basic policies and strategies above-mentioned, a development program is prepared in the following manner.

11.6.3.1 Viewpoints for Formulation of Development Program

(1) Establishment of Stable Supply System for Fish Products

A supply system for fish products will be established with the aim of contributing to the stable supply of fish products for the poor peasants in Ayacucho Region. The peasants have certain eating habits, which are mostly based on consuming protein from barnyard animals; therefore, consuming alternatives will be increased by establishing the supply system in order to facilitate the access to the protein of fish products. In consideration of improvement for nutrition and eating habits, it is essential to establish a stable supply system of fish products that should be innocuous, high nutritional value and low price for the poor peasants.

(2) Industry Development with Objectives of Creating Job Opportunities and Improving Peasants' Income

In order to realize the indicators of the medium and long terms plan related to inland fishery for the period of 2007 – 2024 established in PDRC, which is the increase of 25% in the added value for production and the 5% of increase in the number of workers, this supporting program will give the first priority to the creation of job opportunities and the increase on rural families' income. Regarding the production oriented to the development of markets in the urban areas of Peru, it is anticipated to compete with the production regions that are more developed. Considering competing with other regions, this supporting program gives priority to areas with high development potential.

(3) Establishment of Locally Integrated Development for Fish Production

Up to date, the proper environment suitable for rainbow trout hatchery was mainly established in the northern region centering on Huamanga Province; as the fish farm of DIREPRO, which has a hatchery center and a production center for balanced food for rainbow trout. Nevertheless, the southern part of the region, which has a great development potential due to the existence of several lakes and lagoons of considerable dimensions, does not have a proper environment for the trout production. That's why the input for trout hatchery in the southern region comes from other regions, becoming a burden for the operation and management of fish farms.

Therefore, it is proposed that this supporting program is to be established for a new production pole at the south of the region which has a high potential for inland fishery promotion, by means of constructing production centers for establishment of a new base of production accompanied by facilities such as fry production centers and marketing center of fish products, etc.

(4) Promotion in Priority Areas

According to the development policies for the fishery sector of DIREPRO and PRODUCE, the priority points are: (i) area that has a breeders association with a high production, and (ii) presence of lagoons with over 100 ha of extension and that may be part of one of the development guidelines of this current Master Plan, and (iii) area with a high poverty level. In consideration of the points, Lucanas and Parinacochas are priority provinces for this supporting program. In particular, Yaumuri and Ancascocha lagoons have a high priority.

11.6.3.2 Evaluation and Prioritization of SNIP Sub-projects

(1) Analysis and Evaluation of Existing Sub-Projects

As of April 2009 there were 41 sub-projects registered, approved or under evaluation in SNIP related to inland fishery in Ayacucho Region as it is described below. SNIP sub-projects can be classified into 4 types: (i) Constructions of fish farms in small scale at district and community level (38 sub-projects), (ii) Construction of the production center for trout breeding (one sub-project), (iii) Construction of refrigerators for fish products (1 sub-project) and (iv) Strengthening of technical capacities for trout breeding (1 sub-project). In addition, these SNIP sub-projects are further classified according to their provinces and poverty levels as presented in the table below:

Table 11.6.2 Outline of SNIP Sub-projects by Province and Poverty-level

Province	SNIP-Perfil Approved and under evaluation		P3 area		P2 area		P1 area	
	No.	Amount (S/.)	No.	Amount (S/.)	No.	Amount (S/.)	No.	Amount (S/.)
Huanta	5	1,979,552	1	131,792	3	356,691	1	1,491,069
La Mar	5	406,492	4	331,610	1	219,677	0	0
Huamanga	1	1,696,700	0	0	0	0	1	1,696,700
Cangallo	3	6,477,456	3	6,477,456	0	0	0	0
Vilcas Huaman	2	271,755	2	271,755	0	0	0	0
Victor Fajardo	2	988,250	2	988,250	0	0	0	0
Huanca Sancos	0	0	0	0	0	0	0	0
Sucre	4	665,898	0	0	4	665,898	0	0
Lucanas	6	5,559,338	0	0	6	5,559,338	0	0
Parinacochas	9	2,314,442	1	79,226	8	2,235,216	0	0
Paucar del Sara Sara	4	1,113,000	0	0	3	816,000	1	297,000
Ayacucho in total	41	21,617,678	13	8,280,089	25	9,852,820	3	3,484,769

Source: JICA Study Team

Considering the measures of this supporting program and the content of the existing SNIP sub-projects, the table below shows a brief summary of the sub-projects to be implemented as a priority.

Table 11.6.3 Relationship between Existing SNIP Projects and Proposed Projects

Existing SNIP Sub-project	Strategies of Development Program	Proposed Project
- Construction of the production center for trout breeding - Construction of refrigerators for fish products	- Preparation of Development Plan for Inland Fishery - Strengthening of Institutional Building for Inland Fishery	Inland Fishery Support Institution Capacity Strengthening Project
Strengthening of technical capacities for trout breeding	- Organization and Strengthening of Farmers' Organization for trout production - Establishment of Extension System for Technology of Inland Fishery	Extension System Establishment Project for Small-scaled Aquaculture Production Organization
Constructions of fish farms in small scale at district and community level	- Organization and Strengthening of Farmers' Organization for trout production - Establishment of Extension System for Technology of Inland Fishery	Small-scaled Aquaculture Pond Construction Project

Source: JICA Study Team

(2) Prioritization of SNIP Sub-projects

In relation to the prioritization of the SNIP sub-projects referred to in “Small-scaled Aquaculture Pond Construction Project”, three indicators of evaluation were considered: (i) Priority for the high poverty areas (relevance), (ii) Priority for the projects with a high potential for inland fishery development (effectiveness), (iii) Priority to the areas that have a high synergistic effect between the “Inland Fishery Support Institution Capacity Strengthening Project” and the “Extension System Establishment Project for Small-scaled Aquaculture Production Organization”, (efficiency). The results are shown in the table below:

Table 11.6.4 Prioritization of SNIP Projects for “Project on Construction of Small-scale Fish Firm in Ayacucho”

Evaluation Indicators of Inland Fishery Projects				Point	Remarks
Item	Indicator				
Relevance	Poverty level	P3 area		30	High relevance with objectives of the Master Planning
		P2 area		18	
		P1 area		6	
Effectiveness	Potential	High potential area (exist a lagoon with more than 100 ha)		30	Effectiveness to local potential
		High potential area (exist a lagoon with less than 100 ha)		18	
		Middle and low potential area		6	
Efficiency	Relation with other projects	Close relation with two priority projects		10	Efficiency for technologies and costs
		Close relation with a priority project		6	
		No close relation with a priority project		2	
Impact	Environmental considerations	No damage or positive impact		5	Environmental impacts
		Limited damage with appropriate mitigation measures		3	
		Anticipated damage though mitigation measures are conducted		1	
	Effect to other districts	High applicable		5	Effectiveness to local applicable
		Middle applicable		3	
		Low applicable		1	
Sustainability	Organizational strengthening	Administration by local governments		10	Sustainability by governmental interventions
		Administration by regional government		6	
		Administration by central government		2	
Highest points				90	
Lowest points				18	
<Evaluation of the project>					
* North-Central P3 area : 30+6+6+3+5+6= Total 56 (Fourth priority)					
* North-Central P2 area : 18+18+6+3+3+6= Total 54 (Fifth priority)					
* North-Central P1 area : 6+18+6+3+5+6= Total 44 (Sixth priority)					
* South P3 area : 30+30+10+3+5+6= Total 84 (First priority)					
* South P2 area : 18+30+10+3+5+6= Total 72 (Second priority)					
* South P1 area : 6+30+10+3+5+6= Total 60 (Third priority)					

Source: JICA Study Team

On the basis of the above evaluation, a prioritization was conducted for the Small-scaled Aquaculture Pond Construction Project as follows. In addition, the SNIP sub-projects in the first to three priority areas are integrated in consideration of efficiency of construction works.

Table 11.6.5 Target Area and Number of SNIP Sub-projects by Priority in “Small-scaled Aquaculture Pond Construction Project”

Priority	Area	Number of SNIP Projects
First	High Potential Area (South area of Ayacucho) (Lucanas, Parinacochas, Paucar del Sara Sara)	17
Second	P3 area in the North-Central Ayacucho	12
Third	P2 and P1 areas in the North-Central Ayacucho	9

Source: JICA Study Team

11.6.4 Development Program

11.6.4.1 Composition of Development Program

Three development projects are proposed for promotion of inland fishery in Ayacucho.

- Inland Fishery Support Institution Capability Strengthening Project
- Extension System Establishment Project for Small-scaled Aquaculture Production Organization
- Small-scaled Aquaculture Pond Construction Project

11.6.4.2 Outline of Development Program

(1) Inland Fishery Support Institution Capability Strengthening Project

(a) Background and Objectives

Along with the decentralization process, the fishery section was transferred from the Ministry of Production (*PRODUCE*) to the Regional Direction of Production (*DIREPRO*) in 2006, which can make possible the implementation of a more detailed development program in accordance with the current conditions in Ayacucho. However, there has not been any development plan so far. On the other hand, the environment for the production of inland fishery in Ayacucho is not developed enough in comparison to other regions which are more developed such as Puno and Junin.

In this situation, the objective of the project is to promote inland fishery for the poor peasants through strengthening of institutional building under a development plan of inland fishery in Ayacucho Region.

(b) Components

1) Preparation of Regional Development Plan for Inland Fishery

Review and analysis of the National development plan for fishery sector

The fishery section of DIREPRO confirms the national policy as well as the national development plan of fishery sector.

Understanding of Current Condition

For preparing a development plan in detail, the fishery section of DIREPRO studies current condition of inland fishery in Ayacucho with close cooperation of the related section of regional government, producers, local NGOs, marketing traders.

Examination of Development Policies and Strategies

Considering the current condition, the fishery section of DIREPRO prepares the development policy and strategies of inland fishery.

Preparation of Development Plan

In close cooperation and coordination with local authorities, the fishery section of DIREPRO prepares an integrated development plan of inland fishery in Ayacucho.

2) Strengthening of Institutional Building for Inland Fishery

Capacity Building of the Fishery Sector of DIREPRO

In accordance with the increase of work in charge under the decentralization, the fishery sector of DIREPRO is to increase the number of staff as well as to employ skilled engineers, especially in trout production, tropical aquaculture, fish hatchery, extension system, environmental issues, food processing, for realizing continuous support and promotion of inland fishery development.

Establishment of Inland Fishery Association in Ayacucho Region

Local authorities related to inland fishery such as DIREPRO, farmers' associations, NGOs and the private sector were focused on their own activities. Therefore, the coordination activities were quite limited. It is important to strengthen their coordination among the local authorities for realizing sound development of inland fishery in Ayacucho.

Establishment of Cooperation with Advanced Regions

It is necessary to strengthen the cooperation with authorities of inland fishery in Puno and Junín, where are advanced regions for inland fishery, in order to introduce modern techniques, to exchange information and to implement joint activities and so on.

<u>Establishment of Trout Hatchery Center in Southern Region of Ayacucho</u> In spite of having a high potential for trout production in the southern part of Ayacucho, the institutional supports have not been promoted. Thus, an integral center is to be established to promote trout production for small-scale producers in the southern part of the region with necessary facilities and equipment such as fry breeding center, food-processing facilities, freezers and refrigeration chambers, hygiene facilities, and so on. <u>Strengthening of Information Control for Inland Fishery</u> DIREPRO is to have an important role to provide information of inland fishery for local producers as an information center with appropriate facilities and equipment. <u>Restructuring of Environmental Management System</u> Environmental management system is to be reevaluated and restructured in order to keep favorable environment for inland fishery.
(c) Period 2012- 2016 (5 years)
(d) Target Area Whole Ayacucho Region, however, priority areas should be Lucanas and Parinacochas Provinces at southern region which have lakes and lagoons with high development potential.
(e) Project Cost S/2,500,000

(2) Extension System Establishment Project for Small-scaled Aquaculture Production Organization

(a) Background and Objectives Not a few small-scale producers have been discontinued inland fishery. The producers expect to organize a producer's association for the advantage of communal works, but the governmental supports are quite limited. In addition, an appropriate extension system for small-scale producers is not established under the fishery section of DIREPRO and local authorities. In this situation, the objective of the Project is to promote inland fishery for the poor peasants through establishment of extension system in Ayacucho Region.
(b) Components 1) Organization and Strengthening of Producers' Associations for Inland Fishery <u>Formulation and Restructuring of Producers' Associations for Inland Fishery</u> A producers' association will be constituted by 7 to 15 families from the same community since this number is easy for the group working. Promoters of the fishery section of DIREPRO, local NGOs, etc. will support their activities such as awareness campaign of entrepreneurial spirit, group management methods, regulations, etc. <u>Promotion of Communal Activities</u> Producers' associations, with support of promoters of local NGOs as well as fishery section of DIREPRO, will promote communal activities such as equipment purchasing, fish breeding, transportation, marketing, development of food processing, environmental considerations for lagoons and rivers, etc. <u>Establishment of Opportunities for Capacity Building</u> Producers' associations, with the support of promoters of the fishery section of DIREPRO and local NGOs, will receive training for strengthening of their capacity of technologies as well as administration. In particular, it is necessary to pay an attention in promotion of women's participation in their training because they are devoted to training daily activities. <u>Participation of Community Development Planning</u> Producers' associations, with support of promoters of local NGOs as well as fishery section of DIREPRO, are to strengthen their group capacity to participate in the process of decision-making for preparation of development plan at the local government level. <u>Strengthening of Cooperation among Producers' Associations</u> Producers' associations, with the support of promoters of the fishery section of DIREPRO and local NGOs, are to promote close cooperation among associations for technique and information exchanges, joint activities, etc. 2) Establishment of Extension System for Inland Fishery <u>Establishment of Model Case for Inland Fishery in Ayacucho Region</u> The same breeding techniques are applied all over Peru. However, not a few small-scale producers have been abandoned the fishery business. Thus, it is essential to establish an optimization of administrative management and fishery techniques that may be suitable to natural and social conditions in Ayacucho Region. <u>Preparation of Manuals and Guidelines for Extension of Inland Fishery</u> The extension works of the fishery section of DIREPRO as well as local NGOs are to prepare manuals and guidelines of inland fishery (production techniques, maintenance of fish farm, business management, environmental considerations, etc.), which can be easily understood by the small-scale producers as well as by the producers' associations in Ayacucho.

Training and Distribution of Extension Workers

Skilled extension workers of DIREPRO as well as fishery experts of donors will train extension workers of DIREPRO and local NGOs to be sent to the major production areas. In particular, it is suggested that extension workers are sent, as soon as possible, to the southern part of the region that has a high potential for inland fishery development.

Establishment of Local Extension System

The fishery section of DIREPRO, with support of local NGOs and international experts, will regularly carry on training courses, preferably for the associations located close to the priority areas of inland fishery development. Simultaneously, some producers' associations, which are able to play as a nucleus group in the priority areas, are to be selected for implementing integrated training and support as a model case. On the basis of the model case, a local extension system is to be established.

Awareness Campaign of Inland Fishery

Producers' associations as well as DIREPRO are to conduct awareness campaign of inland fishery to let local people know inland fishery as follows.

- Environmental education for lagoons, rivers and water resources (schools, community meetings, etc.)
- Awareness raising for food, nutrition and hygiene (schools, women's groups, communities meetings, etc.)

(c) Period

2014 - 2018 (5 years)

(d) Target Area

Whole Ayacucho Region, however, priority areas should be Lucanas and Parinacochas Provinces at southern region which have lakes and lagoons with high development potential.

(e) Project Cost

S/8,000,000

(3) Small-scaled Aquaculture Pond Construction Project

(a) Background and Objectives

Not a few small-scale producers have been discontinued inland fishery. The producers expect to organize a producers association for the advantage of communal works and to open as a community-based business with a small-scale fish firm.

In this situation, the objective of the Project is to promote community-based inland fishery with producers' associations through the construction of small-scale fish firms in Ayacucho Region.

(b) Components

Study on Implementation Plan

In line with SNIP procedure as a pre-investment study, a pre-feasibility study and/or a feasibility study is conducted in consideration of an appropriate small-scale fish firms under the community-based management.

Contract and Procurement

The fishery sector of DIREPRO with support of GRA and local governments conducts a series of contracts and procurement for construction.

Selection of Contractors

The fishery sector of DIREPRO with support of GRA selects and contracts with a consulting firms as well as contractors, and conducts procurement of equipment and materials with them.

Construction of Small-scaled Aquaculture Ponds

The aquaculture ponds are constructed in accordance with prioritization above-mentioned.

Phase	Area	Number of Sub-projects
Phase 1	Southern part of the Region (Lucanas, Parinacochas, Paucar del Sara Sara)	17
Phase 2	P3 area in the Northern – Central Amazonas	12
Phase 3	P2 and P1 areas in the Northern – Central Amazonas	9

Strengthening of Operation and Maintenance for Aquaculture Ponds

The contractors train the fishery sector of DIREPRO as well as producers' associations for the operation and maintenance of fish pond because it is quite important for the sustainability of the activities.

(c) Period

2015 - 2020 (5.5 years)

(d) Target Area

Whole Ayacucho Region

(e) Project Cost

1st Priority Sub-projects Group:	S/9,500,000
2nd Priority Sub-projects Group:	S/10,000,000
3rd Priority Sub-projects Group:	S/5,500,000
Total:	S/25,000,000

(4) Target Area of Development Program

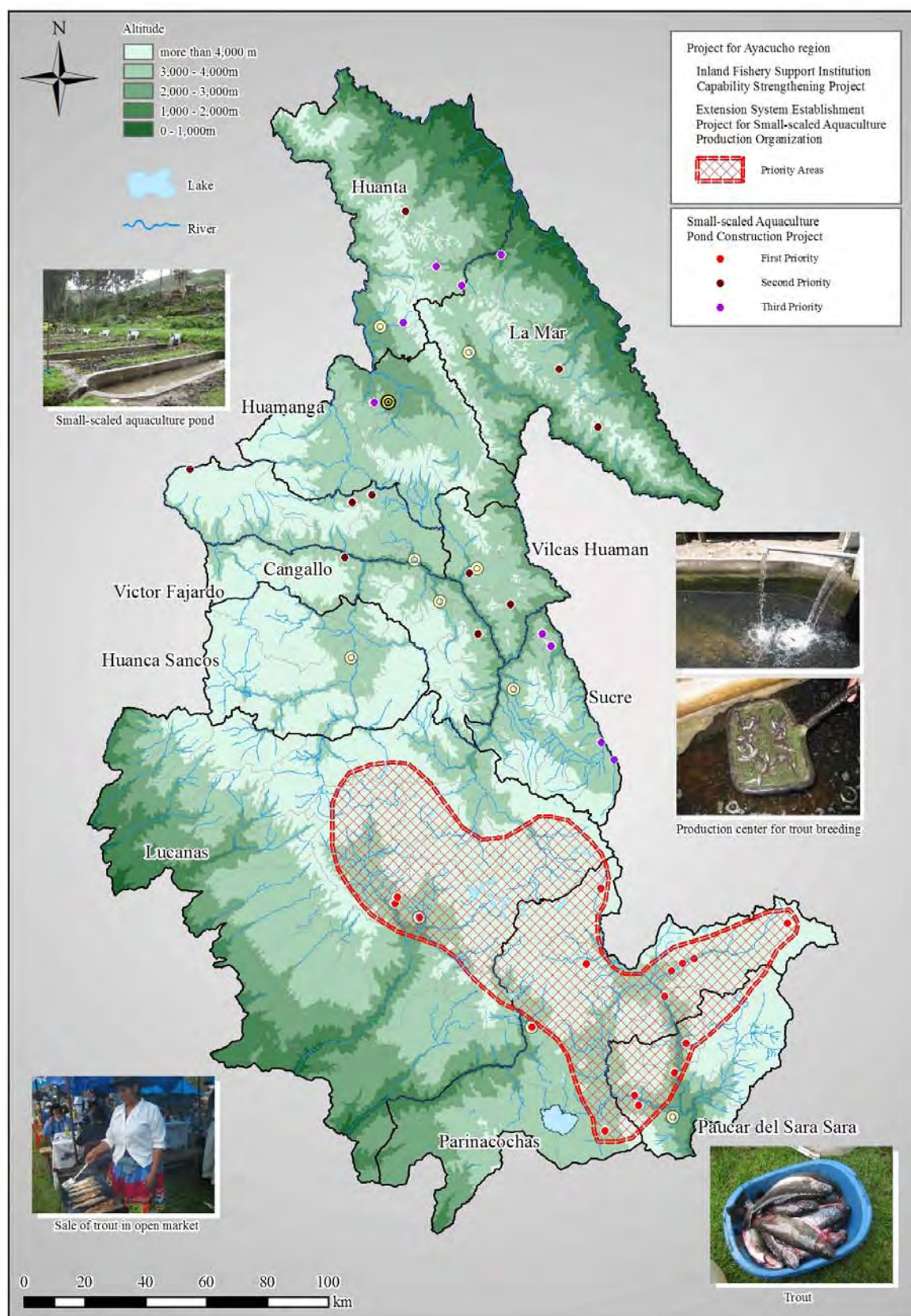
Table 11.6.6 shows target area of the projects based on relation between characters by altitude and province shown in Table 10.3.2. In addition, Regional Development Map by Sector is shown in Figure 11.6.1.

Table 11.6.6 Target Area of Development Program

Zone	No.	Province	Altitude (m)	Inland Fish Support Institution capability Strengthening Project	Extension System Establishment Project for Small-scaled Aquaculture Production Organization	Small-scaled Aquaculture Pond Construction Project
Whole Region				◎		
North	1	Huanta	2,000-4,000			○
	2		< 2,000			○
	3	La Mar	2,000-4,000			○
	4	Huamanga	2,000-4,000			△
Central	5	Cangallo	≥ 4,000			○
	6		2,000-4,000			○
	7	Vilcas Huaman	2,000-4,000			○
	8	Victor Fajardo	≥ 4,000			△
	9		2,000-4,000			○
	10	Huanca Sancos	≥ 4,000			△
	11		2,000-4,000			△
	12	Sucre	≥ 4,000			△
	13		2,000-4,000			△
South	14	Lucanas	≥ 4,000		◎	○
	15		2,000-4,000		◎	◎
	16	Parinacochas	≥ 4,000		◎	◎
	17		2,000-4,000		◎	◎
	18	Paucar del	≥ 4,000		◎	○
	19	Sara Sara	2,000-4,000		◎	◎

Remarks: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: JICA Study Team

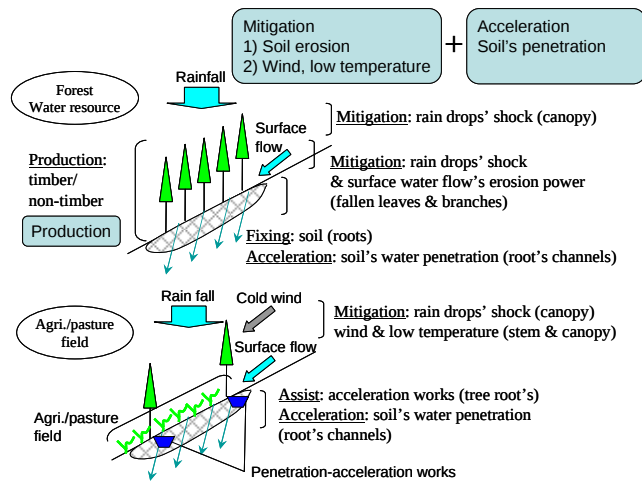
Figure 11.6.1 Regional Development Map by Sector (Inland Fishery)

11.7 Reforestation/Environmental Conservation

11.7.1 Development Objective

(1) Effects expected by Reforestation/Environmental Conservation Program

In general, forest has various functions such as water resource cultivation. The objectives of reforestation in Ayacucho Region are timber/non-timber production, soil conservation/mitigation of cold weather damage (strong wind and cold temperature)/acceleration of water penetration on agricultural/pasture fields, watershed management (water resource cultivation), measures of global warming (emission control of warming temperature gas) conservation of rear species, agro-forestry projects, and capacity development/education for these activities. In this manner, the reforestation is recognized as a part of environmental conservation activities and



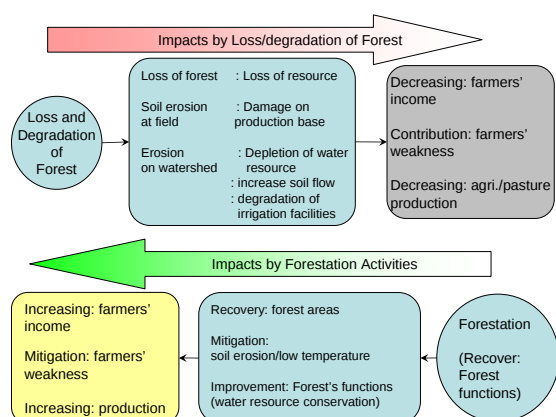
Source: JICA Study Team

Figure 11.7.1 Forest's Functions required in Ayacucho Region

reforestation projects target improvement of forest functions. The natural/social conditions/issues were considered, as in Chapter 4, based on the collection of previous basic information of the reforestation/environmental conservation sector, field survey and discussions with some officials related to the reforestation sector. As the results of the consideration the following 4 points can be recognized as required forest functions in Ayacucho Region, that is, (i) forest production (timber/non-timber), (ii) watershed cultivation (conservation of water resource), (iii) mitigation of soil erosion (soil erosion control), and (iv) mitigation of wind damage (mitigation of the low temperature).

(2) Objectives of Reforestation/Environmental Conservation Sector Program

The Master Plan would be formulated based on the objectives which is to “connect the products in Ayacucho Region to the markets”. The prior issues of development are “mitigation of weakness of poverty-stricken farmers”, “improvement of livelihood of poverty-stricken farmers” and “development of capacity of local government”. The contribution points by the reforestation/environmental conservation sector are described in Figure 11.7.2. These are (i) recovery of forest's resources, (ii) mitigation of soil erosion and low temperature on the agricultural fields, and (iii) water resource conservation. Recovery of forest



Source: JICA Study Team

Figure 11.7.2 Impacts by Reforestation

resource can assist in improvement of the farmers' livelihood, but not be expected enough productivity as a main income source, because the natural condition in Ayacucho Region is so severe. It is deemed that the main income

source would be agriculture or livestock industry. The activities of soil/water conservation preserve/maintain the production base or watershed for irrigation. It means that the activities assist in the improvement of main industries indirectly. Therefore, the objective of the Reforestation/Environmental Conservation Sector Program is to provide indirect support for the activities of the main sectors such as agriculture, livestock industry and irrigation.

11.7.2 Basic Policies for Formulation of Development Program

Table 11.7.1 shows the problems, constraints and the basic policies for formulation of the development program to settle them.

Table 11.7.1 Basic Policies for Development Program

Problems and Constraints	Basic Policies
■ Increasing soil erosion (Agriculture & pasture field/water resource) - Productivity degradation - deterioration/loss of production base - debasement of penetration - increasing eroded soil flow --> yield decline (agri & pasture) --> adverse impacts on water resource and irrigation facilities	□ Reforestation for conservation of production base Prevent soil erosion/dehydration, keep healthy production base Object areas: agri/pasture field and water resource Objectives: improvement of forest functions; mitigation of eroded soil flow, wind protection combination of water utilization/penetration method (ditch, canal, terrace, etc)
■ Soil Dehydration ■ Low temp. damage - Productivity degradation --> yield decline (agri & pasture)	Effects: mitigation and prevention of soil erosion/low temp. improvement of soil penetration/forest function (wind protection)
■ Forest resource deterioration - timber - fuelwood --> income loss, shortage of essential commodity	□ Reforestation for productive forests Recover cleared forest (forest resource), supply forest products Object areas: former forest/plantation, bare land Objectives: timber/non-timber/firewood production
■ Increasing soil erosion --> Income loss of agri. (adverse impacts on water resource and irrigation facilities)	Effects: additional income, firewood supply
in addition to above, ■ Forestation intensive is not high --> not enough progress of forestation projects	□ Promotion, training and dissemination of agro-forestry preserve agri./pasture fields from hard weather & additional income Object areas: agri./pasture lands Objectives: keep forestation intensive and preserve agri./pasture lands Effects: soil improvement, measures for low temp., additional income
■ Unclear objectives of regional forestation master plan --> Shortage of forest condition data --> Unclear of necessity of forestation in Region --> Shortage of records of forestation achievements	□ Preparation of Ayacucho Reforestation Development Plan Comprehend forest resource info./necessary areas, effective implementation of forestation Object areas: Whole Ayacucho Region Objectives: Forest inventory survey (with GIS) : Comprehend forestation necessity areas, firewood needs : Share information with irrigation sector : Systematization of forestation technique, capacity development and expansion : Five-years forestation plan Effects: Programmatic and effect forestation project implementation

Source: JICA Study Team

11.7.3 Approach to Formulation of Development Program

The basic policies for formulation of the Reforestation/Environmental Conservation Sector Program were

considered with determination of needs/issues/inhibitory factors through analysis of the present situation of land of Ayacucho Region and their forests, also past reforestation performance of SNIP sub-projects. The approaches to the formulation of development program are described hereinafter.

(1) Participatory approach

The main activity of reforestation/environmental conservation sector is plantation among all the projects. The past plantation works in Ayacucho Region have been conducted by the farmers with supplies of seedlings and instruments from DRA. The communities have been entrusted with the task of planted seedlings and those became their assets. The main reason was that DRA respected the ownership system of the lands in Ayacucho Region. As the farm and pasture lands which are available and necessary for reforestation belong to the communities or individuals. Under this ownership system, it is deemed that the decision made by DRA is appropriate. The reforestation/environmental conservation project will take the participatory approach by basically following this point.

(2) Objective Basis Approach

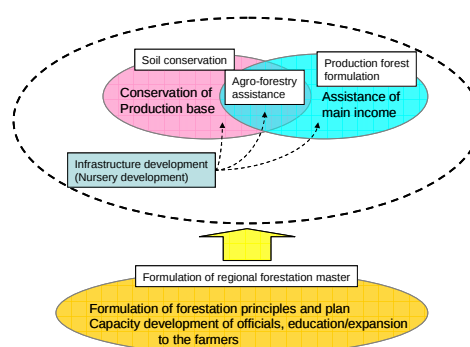
The study was made for how to solve the inhibitory factors in the basic policies. The various factors such as, object areas, method, and anticipated effects would be different by each project. Therefore, each project will be prepared based on each need (objective approach). Each project is formulated for each item mentioned in the basic policies for sector program of the project because these show problems and solutions and each solution has a definite objective.

(3) Incorporation of Existing Project Plans

The SNIP sub-projects shall be deemed as existing plans/needs in this Study as mentioned in Section 10.3. The corresponding SNIP sub-projects will be reviewed and taken into the formulated projects in the Study. The selected SNIP sub-projects will be incorporated into the project plans. The SNIP sub-projects will be evaluated by the criteria, which will be described below, and will be given the priority order in turn.

(4) Approach Considered the Relationships among Projects

The proposed Reforestation Plan Preparation Project will be worked out for whole Ayacucho Region after clarifying the forestry resources and the areas to be reforested. In addition, the Plan aims at capacity development of the officials and education/expansion of technology and philosophy of the reforestation to the farmers who will carry out the plantation works. Therefore, this project should be implemented in advance considering effectiveness of other proposed projects. And the project should not take long term because it would lead to delay in implementation of other projects.



Source: JICA Study Team

Figure 11.7.3 Relation Among Projects

11.7.4 Development Program

Based on the points above, the following 4 projects are proposed:

- Reforestation Plan Preparation Project: The development policy of reforestation will be prepared by conducting the clarification of development potential of forest resources in whole Ayacucho Region,

determination of necessary areas for reforestation, and investigation of causes of present problems. In addition, systemization of technology will be made for the capacity development for the officials and training and dissemination to the farmers.

- **Soil Conservation Measure Project:** The soil erosion prevention measures will be applied for agricultural fields, pasture fields, watershed, and degraded lands (former forests, bare lands, etc.), where serious erosion would bring about significant damage on the production base. In addition, the Project includes improvement of water penetration of soil for effective use of less rainwater.
- **Production Forest Creation Project:** The Project will create the forest which will produce timber, firewood, and non-timber forest products.
- **Agro-forestry Support Project:** The Project aims at promotion of the traditional agro-forestry, improvement of technology, and dissemination of its know-how to communities (farmers).

In addition, there are some SNIP sub-projects related to environmental conservation issues, such as, recovery the cleared forests, protection area measures, global warming measures etc. These environmental issues are recognized as so important ones. However, these do not have much direct efficiency for the objective of Master Plan. Therefore, these were not reflected upon the proposed projects.

11.7.5 Analysis and Evaluation of Existing Projects (SNIP Sub-projects)

The SNIP sub-projects related to reforestation/environmental conservation were analyzed and evaluated to reflect them into the proposed projects.

(1) Number of SNIP Sub-projects by Province

As of April 2009, there are 58 sub-projects out of SNIP sub-projects which are related to reforestation/environmental conservation sector and have been not yet started for implementation. As showing in Table 11.7.2, Huamanga Province has the largest number of sub-projects, followed by La Mar and Victor Fajardo Provinces. Also a concentration of sub-projects is found in the northern and the central regions of Ayacucho Region.

Province	Number
Huanta	7
La Mar	11
Huamanga	16
Cangallo	1
Vilcas Huaman	1
Victor Fajardo	11
Huancasancos	-
Sucre	3
Lucanas	5
Parinacochas	3
Paucar del Sara	-
Total	58

(2) Classification of SNIP Sub-projects

The SNIP sub-projects related to reforestation/environmental conservation are classified into 5 types such as (i) soil conservation, (ii) productive forest, (iii) agro-forestry, (iv) environment conservation, and (v) capacity development.

The number of SNIP sub-projects by province and by objective are shown as Table 11.7.3. Twenty two sub-projects belong to the soil conservation category and 16 sub-projects to the productive forestation category. These two categories are recognized as the major needs.

Source: Original SNIP data compiled by
JICA Study Team

Table 11.7.2 Nos. of SNIP Sub-projects by Province

Table 11.7.3 Objective-Wise Number of SNIP Sub-projects

Province	Soil conservation	Productive forest	Agro-forestry	Natural environment conservation	Capacity development	Total
Huanta	1	2	-	2	2	7
La Mar	4	1	2	1	3	11
Huamanga	10	4	2	-	-	16
Cangallo	1	-	-	-	-	1
Vilcas Huaman	-	-	-	1	-	1
Victor Fajardo	2	4	2	3	-	11
Huancasancos	-	-	-	-	-	0
Sucre	2	1	-	-	-	3
Lucanas	2	3	-	-	-	5
Parinacochas	-	1	-	1	1	3
Paucar del Sara	-	-	-	-	-	0
Total	22	16	6	8	6	58

Source: Original SNIP data compiled by JICA Study Team

(3) Methodology of SNIP Subproject Evaluation

The SNIP sub-projects are prioritized using the evaluation criteria as shown in Table 11.7.4.

Table 11.7.4 Criteria for Evaluation of SNIP Sub-projects

Criteria for evaluation of forestation/environmental conservation sub-projects (SNIP projects)				
5 Measures	Indicator		Score	Points concern
Relevance	Poverty level	Extreme poverty area (P3)	30	Consistency with object of M/P (mitigation of poverty)
		High poverty area (P2)	18	
		Poverty area (P1)	6	
Effectiveness	Adaptation level for land-use potential	High potential (Xa, Xp, Xf, F: agricultural/pastoral field, and forest)	30	Consistency with situation of project sight
		Middle potential (A, P, CP: agricultural/pastoral field, residential areas)	18	
		Low potential (X: conservation areas)	6	
Efficiency	Project cost per beneficiary	< 250 sol/beneficiary	10	Efficiency of project cost
		250 <= or < 700 sol/beneficiary	6	
		700 <= sol/beneficiary	2	
Impact	Environmental/social impacts	No significant negative impact is expected or positive impact is expected	5	Scale of environmental/social impacts
		Not significant impacts is expected, or they are expected to be mitigated/prevented	3	
		Significant negative impacts are expected, or they are not expected to be mitigated/prevented	1	
	Spread effect	High possible to spread to the other areas	5	Spread effect to the other areas
		Possible to spread to the other areas	3	
		Low possible to the other areas	1	
Sustainability	Capacity building of organization	Managed by Local Government level	10	Expression level of capacity building of management organizations
		Managed by Provincial Government level	6	
		Managed by National government level	2	
Maximum score			90	
Minimum score			18	

Source: JICA Study Team

- **Relevance:** The poverty category by the zoning in this Study shows beneficiaries' needs. The sub-projects in the high needs area can be judged to be suitable as solution of poverty reduction. For this reason, project relevance is considered by the relation between poverty category (zoning results) and position of the sub-project.
- **Effectiveness:** Zoning categories Xa, Xp, Xf show the appropriate areas for agriculture, pasture, and forestation respectively, although these need conservation measures. The measures of soil erosion on these categorized areas contribute to conservation of production base of poor peasants. Conservation of the production base would give advantage to them, so that it can be evaluated as high effectiveness. In

contrast to this, soil erosion measures on (X) area, which is categorized as conservation area, would give benefit to wide area. However, it is not sure to realize the benefit to poor peasants concerning the mitigation of vulnerability and improvement of livelihood. The productive forest project in the appropriate areas for reforestation could have high possibility of successful planting, the sub-projects in such areas are evaluated as high score.

- **Efficiency:** The sub-project cost per beneficiary is used as indicator for efficiency. In the case of the less cost can produce many beneficiaries, the project can be evaluated as high efficiency. The sub-project are sorted as the value of the indicator. In the case of the cost per beneficiary is S/.250 or less, the project is evaluated as “high”. But in the case of S/.250 or more upto less than S/.700, it is evaluated as “medium”, and “low” in the case of S/.700 or more. In addition, the SNIP sub-project costs were converted to present value.
- **Impact:** (i) Impact on natural/social environment and (ii) spread effect are used as indicator of impact.
 - (i) Impact on natural/social environment: In the case of the significant impacts such as a large scale resettlement/significant pollution/activities in a protected areas might occur, the evaluation score of the project is to be low. If possibility of such significant impacts are none, the evaluation score is to be high.
 - (ii) Ripple effect: in the case the reforestation technology or organizational skill are enhanced, the results and experiences obtained through the project could be useful for the other projects. The project evaluation score is to be high. But, if the project’s ripple effect is unexpected, the evaluation score is to be low.
- **Sustainability:** When the sub-projects are completed and support is terminated by the local government, efficiencies of the sub-projects could be longer than by the central government. In other words, the sub-projects which will be implemented by the government close to the target area, would have higher possibility on being sustainably maintained , and is given high score accordingly.

(4) Evaluation Results of SNIP Sub-projects

The SNIP sub-projects are evaluated by the criteria mentioned above. The evaluation results are digitalized, sorted, and the project costs are accumulated in total. Table 11.7.4 and Table 11.7.5 shows:

The cumulative total cost of the SNIP sub-projects within 20% would be given the 1st priority, and 21~40% would be given the 2nd priority. The remaining would be give the 3rd priority.

Table 11.7.5 Number of Prioritized SNIP Sub-project by Province

Province	Priority-1	Priority-2	Priority-3	Total
Huanta	2	3	2	7
La Mar	-	5	6	11
Huamanga	1	7	8	16
Cangallo	1	-	-	1
Vilcas Huaman	1	-	-	1
Victor Fajardo	2	5	4	11
Huancasancos	-	-	-	0
Sucre	-	2	1	3
Lucanas	3	2	-	5
Parinacochas	-	-	3	3
Paucar del Sara	-	-	-	0
Total	10	24	24	58

Source: Original SNIP data compiled by JICA Study Team

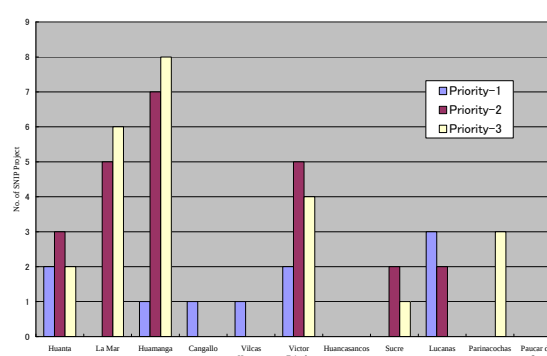


Figure 11.7.4 Prioritized SNIP Sub-project by Province

Source: Original SNIP data compiled by JICA Study Team

The numbers of priority-wise classified SNIP project are shown in Table 11.7.6 and Figure 11.7.5.

Table 11.7.6 Number of Priority-Wise Classified SNIP Sub-project

Priority	Classification of Project					Total
	A ^{*1}	B ^{*2}	C ^{*3}	D ^{*4}	E ^{*5}	
Priority-1	6	2	0	1	1	10
Priority-2	10	4	5	4	1	24
Priority-3	6	10	1	3	4	24
Total	22	16	6	8	6	58

A: Soil conservation

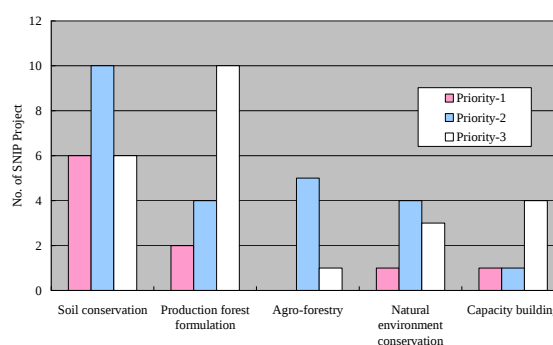
B: Production forest formulation

C: Agro-forestry

D: Natural environment conservation

E: Capacity building

Source: Original SNIP data compiled by JICA Study Team



Source: Original SNIP data compiled by JICA Study Team

Figure 11.7.5 Number of Priority-Wise Classified SNIP Sub-project

11.7.6 Outline of Development Program

(1) Reforestation Plan Preparation Project

(a) Background

Most of the areas in Ayacucho Region except Selva have always been extraordinarily harsh terrains with severe weather condition for forest plants. In addition, lands have been preferentially used for agriculture/pasture, and the existing forests had been cutdown for fuel, so that the forest areas have been declined. (The National Reforestation Plan (*Plan Nacional de Reforestacion:2005, MINAG: Ministry of Agriculture*) recognized that 73,880 km² is the cleared forests areas. PDRC 2007-2024 says 13,375.05 ha of forest area was decreased and adverts to increasing the forest areas by reforestation as a part of long term plan from 2007 to 2024.). The reforestation projects have been implemented by DRA and PRONAMACHCS (*now AgroRural*) or local governments (Province, District). Although many reforestation/environmental conservation projects have been implemented, there are 4 issues as below.

(1) Shortage of information on present forest condition and demand of reforestation: The basic present data such as, forest areas and distributions, stocks, etc. have not been studied. The distribution of agricultural fields/pasture fields, watershed areas are unclear and the areas where the soil erosion measures are necessary are not specified. Similarly record of needs for firewood for cooking is not available.

(2) Difficulty in planning: As mentioned above, consequence, necessary reforestation areas (positions), amount (areas, number of plantings), quality (method) are no clear. Therefore, it is difficult to make an appropriate reforestation plan.

(3) Lack of master plan for whole Region: At present, the reforestation organizations will at first seek for the communities who would need reforestation, and next, the reforestation will be implemented in the communities. In this sense, there is not clear regional directionality and the reforestation activities are sporadic. It is not recognized to have efficient achievements by investment.

(4) Shortage of systematic technology and expansion: There are some manuals for reforestation technologies on the list of species depending on elevation, seedling production of beneficial species, agro-forestry method (including Silvopasture). However, they were issued about 20 years ago, the understanding level among the officials of DRA is different, and these manuals have not been systemized yet. Therefore, it is difficult to expand the reforestation technologies.

The reforestation master plan in Ayacucho Region, based on basic data (such as present forest condition/reforestation achievements/needs of firewood), is necessary to solve the issues above, and also need the capacity development of officials and education/expansion of reforestation technologies to communities (farmers) for the projects.

(b) Component

1) Basic Study

The major items of the study are: forest inventory survey, existing forestation inventory survey & monitoring, present land-use survey, organization survey for reforestation implementation in the communities, and firewood needs survey. The existing reforestation areas shall include the achievements not only by DRA but also by the other organizations' achievement. This study scopes the large area, therefore, the study should be made in coordination with the results of present land-use survey (by conducting by GIS sector in this M/P Study) and link the data of forest map to GIS data.

2) Reforestation Mater Plan and term-wise plan (5 year plan)

As the result of the basic study, the basic data related to forest/reforestation will be collected. After that, the issues will be determined and the principles/targets of the master plan to solve the issues will be established. The mater plan is formulated for 15 years, by the time span of 5 years (the first, the second, and the third 5 year plan). The principle and targets for each 5 year plan will be established. And also, the reforestation areas selection, reforestation type, prioritization in reforestation area, reforestation guidelines and the outline of project cost will be prepared.

3) Capacity development of the officials of DRA and education/expansion to the farmers

The existing reforestation technology will be collected/reviewed, and the necessary reforestation technology will be developed. From the results, the training for the officials of DRA will be made. The training will be provided both in foreign country and the developed area in Peru. The results of the training will be used to carry out the pilot projects. The education of the reforestation meanings and expansion of the developed technologies to the communities (farmers) will be implemented through the pilot projects.

(c) Period

2012 - 2017 (5.5 years)

(d) Target Area

The whole areas of Ayacucho Region

(e) Project Cost

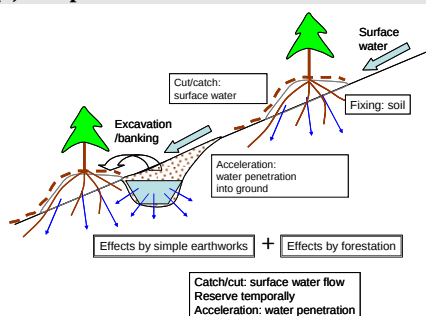
1st Priority Sub-project Group:	S/.14,742,000
2nd Priority Sub-project Group:	S/.1,100,000
3rd Priority Sub-project Group:	S/.4,100,000
Total:	S/.25,000,000

(2) Soil Conservation Measure Project

(a) Background

The low temperature and the dry weather continue during the dry season in Ayacucho Region, and the rainy season has the concentrated downpour. This brings about erosion of soils which are the production bases of the agriculture/pasture. It leads to seriously low productivity. As for irrigation, its efficiency is declined by the soil erosion occurred at watershed which is the water resource of the irrigation system because of much sediment in the canals. Consequently, the agriculture and pasture which are main industries in Ayacucho Region are given damages by the soil erosion. This is a serious issue for the poor peasants. DRA and PRONAMACHCS (now AgroRural) have executed the reforestation projects to protect the soil erosion. Especially, AgroRural is conducting the reforestation to conserve the water resources and irrigation facilities, from the viewpoints of promotion of irrigation. The major causes of soil erosion are (i) concentrated downpour, (ii) steep slope, (iii) shortage of green cover on the soil surface, and (iv) low penetration of soil. (i) and (ii) are difficult to be improved artificially, but (iii) and (iv) are possible to be improved by reforestation. In consideration of the situation, this project aims to (i) improve the function of soil erosion prevention by the trees/tree group/forest, (ii) conserve the production bases of the main industries (agriculture/pasture in Ayacucho Region), and (iii) conserve the important watershed as the water resources for irrigation. The vulnerability of poor peasants could be mitigated by these activities.

(b) Component



Source: JICA Study Team

Figure 11.7.6 Plantation and Water Penetration Acceleration Works

1) Implementation Plan

- Selection of object areas

Table 11.7.7 shows the comparison between the sensibility of low temperature damages of agriculture lands and the provinces distribution of the SNIP sub-projects. The provinces of Huamanga, Lucanas and Huanta, followed by Sucre, Pucar Del Sara, and Victor Fajardo Provinces are the most sensitive area to the weather damages. The direction of sensibility and SNIP sub-projects distribution are almost the same. Therefore, 7 provinces of Huanta, La Mar, Huamanga, Cangallo, Victor Fajardo, Sucre, and Lucanas are selected as objective areas for the Project. Especially the areas where 3,000m and higher place are targeted by this Project.

Table 11.7.7 Comparison between SNIP Sub-projects and Sensibility

Province	Priority-1	Priority-2	Priority-3	Total	Ranking ^{*1}
Huanta	1	-	-	1	3
La Mar	-	4	-	4	11
Huamanga	1	4	5	10	1
Cangallo	1	-	-	1	7
Vilcas Huaman	-	-	-	-	8
Victor Fajardo	1	-	1	2	6
Huancasancos	-	-	-	-	9
Sucre	-	2	-	2	4
Lucanas	2	-	-	2	2
Parinacochas	-	-	-	-	10
Paucar del Sara	-	-	-	-	5
Total	6	10	6	22	

Ranking^{*1}: Ranking of sensibility of agriculture land

Source: Original SNIP data compiled by JICA Study Team

- Consideration of Measures

Each SNIP sub-project has different eroded areas and different erosion mechanism. The measures to improve the function of the forest/tree shall be considered by each case. Therefore, prior to implementation of reforestation, the causes of each erosion type and consideration of appropriate measures shall be studied and understood.

2) Prevention of soil erosion on agriculture/pasture lands

The production bases for agriculture and livestock should be directly conserved by the soil conservation function improvement which is realized by reforestation.

3) Improvement of penetration of agriculture/pasture lands

Ayacucho Region has less amount of rainfall in the limited rainy season. Therefore it is important to reserve the groundwater by penetrate rainfall into the ground during rainy season for the coming dry season. It is planned to combine the reforestation and accelerative simple earthworks as shown in Figure 11.7.6. It can cut the surface flow on the slope and accelerate penetration of rainwater into the ground. It is also much effective for prevention of soil erosion. These methods are explained by "Soil Conservation Manual at small watershed (Manual para conservacion de suelos en microcuencas, 1998) which was repared by PRONAMACHCS. The DRA officials are expected to understand the methods deeply and explain them to the farmers to expand them when they implement this project.

4) Conservation of water resource

The reforestation at the watershed of water resource introduces the following effectivenesses:

(i) To mitigate soil erosion by forest functions (mitigation of shock of rainfall drops with the tree canopies, cover of the ground with the defoliate leaves and branches, acceleration of water penetration into ground with developing roots system, etc.), (ii) To improve the water penetration of soil, and (iii) to reserve water in the ground.

Reforestation aims to conserve the water resource by these forest functions. However, the effects by the activities above can appear later. Therefore, this project should be implemented as a middle to long term project.

5) Capacity development and expansion

The reforestation work has the same characters with general civil engineering works. It requires quality and schedule management. The appropriate reforestation technology leads to improvement of survival ratio of planted seedlings and growing trees. It introduces realization of objective forest, and enables the forest functions to work well. However, until now the most existing reforestation works in Ayacucho Region have been implemented by the farmers themselves. The survival ratio of planted seedlings and trees in the existing reforestation areas is assumed to be not high. Therefore, it is necessary to make the guidance of the reforestation technology and expansion of them to the farmers by DRA officials as well as the reforestation works under control by DRA officials.

(c) Period

2012 - 2016 (5 years)

(d) Target Area

3,000m and higher places nominated by SNIP sub-projects in 7 districts of Huanta, La Mar, Huamanga, Victor Fajardo, Sucre and Lucanas.

(e) Project Cost

1st Priority Sub-project Group	: S/.12,100,000
2nd Priority Sub-project Group	: S/.14,400,000
3rd Priority Sub-project Group	: S/.15,700,000
Total	S/.42,200,000

(3) Production Forestry Creation Project

(a) Background

In order to make forestry industry successful, it is necessary to take balance among the enough forestry area and growing and demand of trees. In Ayacucho Region, the Amazon forests distributing over La Mar Province and Huanta Province and nearby low elevated areas are possible areas where forestry industry could be realized from suitable natural conditions. In other areas, the enough growth of planted trees is not much expected because of low temperature and dry weather. Therefore, it would be difficult to successfully conduct the forestry industry in the most of Ayacucho Region.

Meanwhile, the timber production can support the farmers' income when they get serious damages on the agricultural/pasture productions by the weather influence. Therefore, the timber production is attractive for the farmers, who could not find any other way to earn additional income. Most of the flat lands have been occupied by agriculture or pasture. Thus, some communities aim at reforestation on (i) the land not suitable for agriculture/pasture and/or (ii) steep slopes or land with thin soil layer. They try to use the lands effectively. And most of farmers use firewood for cooking and the restaurants along the main roads. The demand of firewood is assumed to be high. Eucalyptus which can grow faster and be harvested within a short time period is popular for firewood production.

As described above, the agriculture/pasture in Ayacucho Region are sensitive to bad weather and often get significant damages. The fragile condition of the desperately poor farmers is the most serious problem and it is required to mitigate their vulnerability and to improve their income. The firewood needs are high and the shortage of firewood which leads to over timber-felling. The over timber-felling brings about decreasing of the forest areas. It is undeniable that there is such bad spiral.

In consideration of the situation, this project aims to supplement the farmers' main income by reforestation activities.

(b) Component**1) Implementation plan**

The elevation in Ayacucho Region largely varies by region. This situation influences the weather conditions (rainfall amount, temperature). Therefore, the selection of suitable tree species by elevation is required. Reforestation would become possible in the high elevation areas or the lands with thin soil layer if suitable tree species are selected. Therefore, consideration of reforestation possibility and selection of suitable tree species are necessary to be carried out at the communities who want to conduct reforestation.

2) Productive forestation in small-scaled size

As described above, the large-scaled forestry would be difficult in the most of areas in Ayacucho Region except Huanta and La Mar Provinces. However, it is possible to supplement the main industries income by small-scaled production forestry. Therefore, the small-scaled production forestry in the communities will be implemented if the farmers desire it.

3) Formulation of Firewood Production Forest

Most of farmers use firewood for cooking. This project will implement forests enable to product firewood neaby their villages or along the major roads according to needs. It aims to supply firewood as scheduled.

(Object Areas)

This project aims to support the farmers' income in the shrub areas instead of the closed forest areas. The number of corresponded SNIP sub-project is 16. The number of SNIP sub-projects corresponding to this project in Huamanga Province, Victor Fajardo, and Lucanas are 4, 4 and 3, respectively. The number of corresponding SNIP sub-roject in Huanta Province is 2 and in La Mar Province is only one. It means that the direction of this project accords with the object areas of the SNIP sub-projects. Therefore, the SNIP sub-projects can be regarded as objective projects. The priority of the implementation will be determined based on the result of prioritization of the SNIP sub-projects.

The corresponding SNP sub-projects to this project are shown in Table 11.7.8, the corresponding Provinces are 7 (Huanta, La Mar, Huamanga, Victor Fajardo, Sucre, Lucanas, and Parinacochas). This project will be implemented at 3,500m in elevation and less, because the existing projects have become successful in this elevation.

Table 11.7.8 Number of SNIP Sub-projects Concerned

Province	Priority-1	Priority-2	Priority-3	Total
Huanta	-	1	1	2
La Mar	-	-	1	1
Huamanga	-	1	3	4
Cangallo	-	-	-	-
Vilcas Huaman	-	-	-	-
Victor Fajardo	1	-	3	4
Huancasancos	-	-	-	-
Sucre	-	-	1	1
Lucanas	1	2	-	3
Parinacochas	-	-	1	1
Paucar del Sara	-	-	-	-
Total	2	4	10	16

Source: Original SNIP data compiled by JICA Study Team

(c) Period

2014 - 2018 (4.5 years)

(d) Target Area

3,000m and higher places nominated by SNIP sub-projects in 7 districts of Huanta, La Mar, Huamanga, Victor Fajardo, Sucre, Lucanas, and Parinacochas.

(e) Project Cost

1st Priority Sub-project Group	S/.400,000
2nd Priority Sub-project Group	S/.6,500,000
3rd Priority Sub-project Group	S/.5,000,000
Total	S/.11,900,000

(4) Agro-forestry Support Project**(a) Background**

The agro-forestry in Ayacucho Region can be divided into the 3 types: (i) formulation of hedges to mitigate the cold wind to protect the crops and animals from low temperature damage, (ii) provision of nutrients on agricultural/pastoral fields, and (iii) provision of the commercial valuable trees.

The agricultural/pastoral productions often get damages by severe weather (low temperature, drought) because of most of Ayacucho Region are under inclement weather conditions. Especially, the agricultural/pastoral productions are often damaged by the low temperature and strong wind during the dry season. For this reason, the agro-forestry draws attention to wind fences which is also profitable as nutrients for the ground. Eucalyptus is the most popular tree specy for agro-forestry in Ayacucho Region, because hedges can protect the fields from severe weather, and the farmers also can earn from selling it as timbers. On the other

hand, some DRA officials have senses of caution in using them, because they have (i) anxiety of expelling the indigenous tree species by the exotic tree species, (ii) water competition between Eucalyptus and other surrounding plants, (iii) anxiety of expelling the other plants by the water competition. They would use the indigenous tree species for reforestation instead of the exotic one. However, only the manual of seedling production of the indigenous tree species was prepared 20 years ago and found only a few experiences of indigenous tree species reforestation. Tara draws attention as commercial valued tree. The production/sales system of tara is presently strengthened by Netherland assistance.

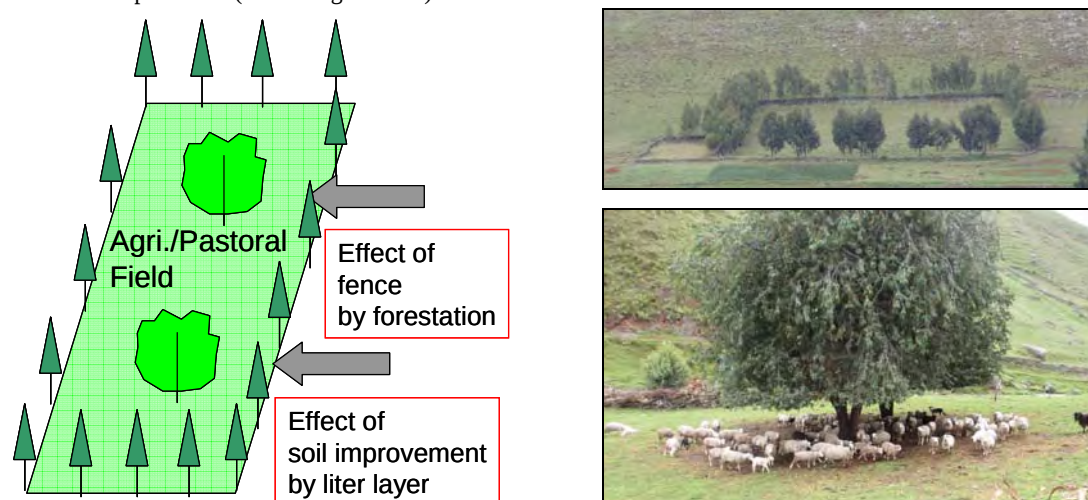
This project aims to improve the traditional agro-forestry and to development agro-forestry technology using the indigenous tree species.

(b) Component

1) Traditional agro-forestry implementation

(Objective areas): This project will be implemented in short term in provinces of Huamanga, Lucanas, Huanta, Sucre, and Pdel Sara Sara where are sensitive to the damage by the severe weather condition. The areas of 3,000m or more in elevation will be selected. 6 SNIP sub-projects correspond with this project. However, these SNIP sub-projects have less consistency with the sensitivity to the damages under the severe weather. Therefore, these will be applied as the new projects.

(Improvement of the traditional agro-forestry): The traditional agro-forestry aims at (i) prevention of the filed/animals from the cold/strong wind, (ii) prevention of the animals from the agricultural fields, (iii) expectation of improvement of the soil condition by litter layer, and (iv) timber/firewood production. (Refer to Figure 11.7.7).



Source: JICA Study Team

Figure 11.7.7 Traditional Agro-forestry

Figure 11.7.7 shows the traditional agro-forestry in Ayacucho Region. The manual for agro-forestry, “Traditional agro-forestry in central-southern Andes in Peru, - inventory of the techniques and tree species for the integrated agriculture -, (*Agroforesteria tradicional en los Andes del Peru, - Un inventario de tecnologías y especies para la integración lenosa a la agricultura-*, 1990) was published in 1990. The manual includes the sense /types /technology of agro-forestry. As the results of site reconnaissance, it was proved that most of the traditional agro-forestry took only high fences of Eucalyptus. The improvement idea of the traditional agro-forestry is recommended by the officials in charge of reforestation of DRA.

2) Improvement of traditional agro-forestry using indigenous tree species

There is a manual, “Course of Nursery for Community Forest (*manual for seedling production of indigenous tree species*): (*Curso Vivero Forestal Comunal, Proyecto FAO/Holanda/DGFF*)” which shows production technology for seedlings of indigenous tree species. However, the plantation method has not been developed yet. The planting method including the list of species classified by elevations, timing of planting, method of planting, etc. has not been established yet. Therefore, it is proposed to develop the method of plantation for indigenous tree species.

3) Implementation of pilot project

The technology of above “The manual of production of seedlings and the plantation method” will be substantiated by the pilot project, and the validity of them will be confirmed by monitoring. As described previously, there is a manual of agro-forestry but it is not for the farmers who can easily understand. There are only a few cases of the agro-forestry projects implemented under leadership of DRA. Implementation of 2 pilot projects are recommended for each branch office of DRA. The objectives of the pilot project are; (i) education of benefit/effects/techniques of agro-forestry, and (ii) substantiation of the developed technologies.

(c) Period

2015 - 2020 (6 years)

(d) Target Area		
3,000m and higher places in 5 districts of Huamanga, Lucanas, Huanta, Sucre, and P.del Sara Sara. where are sensitive to the damage by the severe weather condition.		
(e) Project Cost		
1st Priority Sub-project Group		S/.0
2nd Priority Sub-project Group		S/.19,600,000
3rd Priority Sub-project Group		S/.100,000
Total		S/.19,700,000

(5) Target Area of Development Program

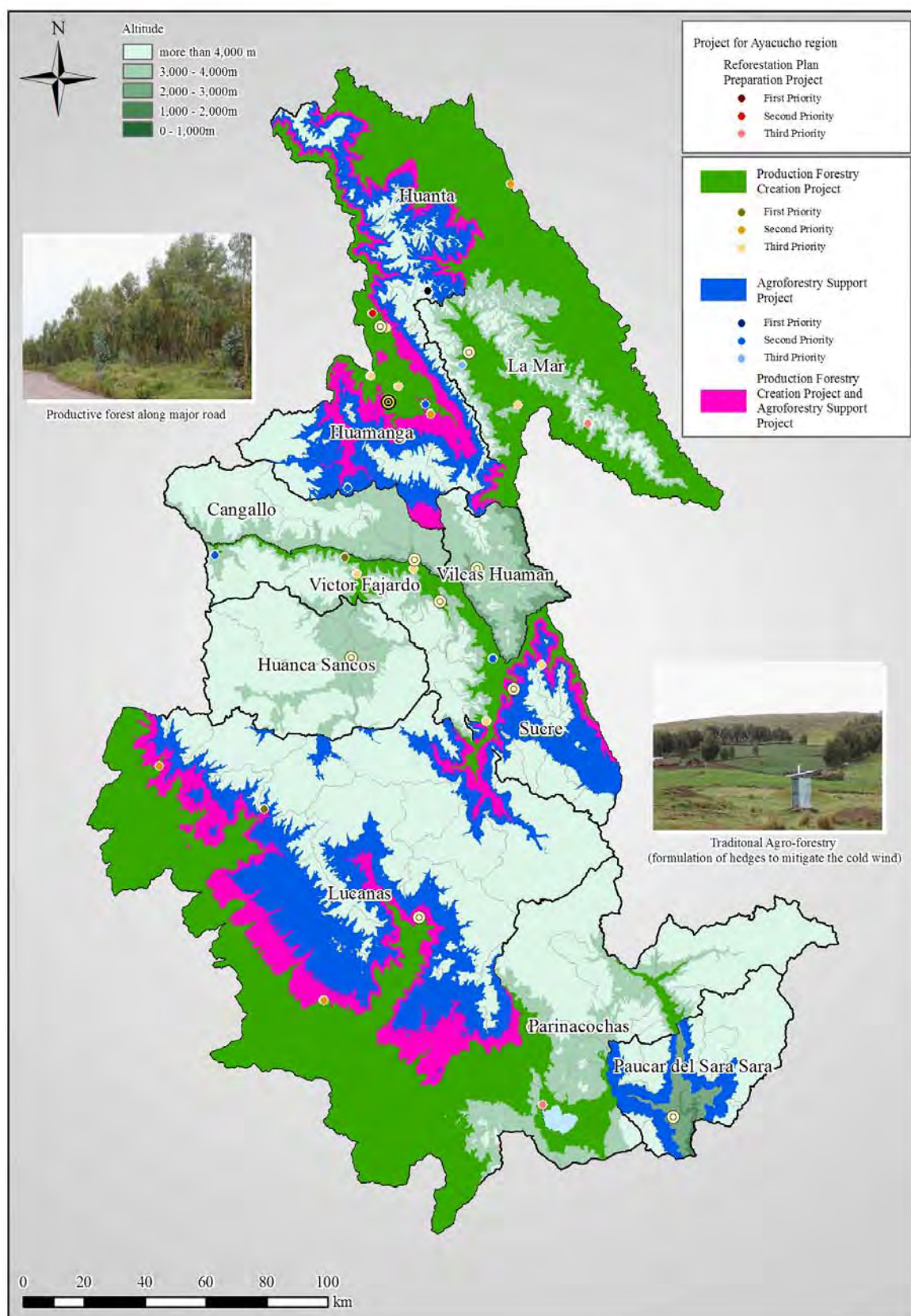
Table 11.7.9 shows the relation between the proposed development projects and regional characteristics which described in Table 10.3.2. The regional development map by sector is shown in Figure 11.7.8.

Table 11.7.9 Target Area of Development Program

Zone	No.	District	Altitude (m)	Reforestation Plan Preparation Project	Production Forestry Creation Project	Agro-forestry Support Project
Whole Region				◎		
North	1	Huanta	2,000 – 4,000		◎	◎
	2		< 2,000		◎	
	3	La Mar	2,000 – 4,000		◎	○
	4	Huamanga	2,000 – 4,000		○	◎
Central	5	Cangalla	>= 4,000			
	6		2,000 – 4,000		△	△
	7	Vilcas Huaman	2,000 – 4,000		△	△
	8	Victor Fajardo	>= 4,000			
	9		2,000 – 4,000		○	△
	10	Huanca Sancos	>= 4,000			
	11		2,000 – 4,000		△	△
	12	Sucre	>= 4,000			
	13		2,000 – 4,000		○	◎
South	14	Lucanas	>= 4,000			
	15		2,000 – 4,000		○	◎
	16	Parinacochas	>= 4,000			
	17		2,000 – 4,000		○	△
	18	Paucar del Sara	>= 4,000			
	19	Sara	2,000 – 4,000		△	◎

Remarks: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: JICA Study Team

Figure 11.7.8 Regional Development Map by Sector (Reforestation/Environmental Conservation)

11.8 Irrigation

11.8.1 Objectives of Development

Ayacucho Region lies mostly in Andean mountains above 3,000 m in elevation. Its climate is semidry with annual rainfall of some 100 mm, and a year is clearly divided into the rainy season from October to March and the dry season from April to September. This situation makes difficulty in stable agricultural production throughout the year, so that the development in agriculture sector is limited. In addition, the farmland is disposed to the risk of frequent draught caused by the abnormal weather in the recent years. To cope with these vulnerabilities, it is indispensable to introduce proper irrigation system. From these viewpoints, the objective of the Irrigation Sector Development is to increase and stabilize the yields of agricultural products through providing irrigation water to farmlands, and finally to improve the living standard of the poor farmers.

11.8.2 Basic Policies for Formulation of Development Program

To achieve the objectives described in the previous section, the basic policies for formulation of development program are as shown in Table 11.8.1.

Table 11.8.1 Present Situation, Problems and Concept for Irrigation Project Planning

Present Situation and Problems	Concept for Project Planning
<u>Deficiency in Irrigation Facilities</u> - Due to insufficient rainfall and its seasonal uneven distribution, irrigation is indispensable for stable agricultural production and its increase. However, a lot of farmers have no irrigation system and are unable to increase the production to get rid of poverty. - Even where irrigation system is introduced, full areas are not being irrigated due to their damaged and decrepit facilities. - In the areas where water resources are scarce or topographic condition is unsuitable, traditional irrigation method is unable to supply enough water to farmlands.	<u>Introduction of Suitable Irrigation Facilities</u> - Irrigation systems shall be constructed to increase the irrigation areas.. - Irrigation areas shall be expanded through rehabilitation and improvement of the existing irrigation systems. - Technical irrigation such as sprinkler and drip irrigation shall be introduced to increase the irrigation areas.
<u>Institutional Vulnerability and Capable Deficiency</u> - Due to ineffective water supply caused by what irrigation committees could not make suitable farming and irrigation plan, there are some irrigation schemes which could not be irrigated adequately. - In some irrigation schemes, poor maintenance of facilities results in poor irrigation because the operation and maintenance system is not well established.	<u>Strengthening of Irrigation Committees for Sustainable Management</u> - Irrigation committees shall be organized/reinforced and instructed on efficient irrigation practice such as the appropriate irrigation manners and schedule. - Appropriate maintenance, irrigation schedule, water charge collection and sustainable operation shall be carried out through irrigation committees.
<u>Lack of Basic Information for Irrigation Planning</u> - Actually the national, regional and local governments are developing irrigation projects on their own without exchanging information among them. Therefore, it is impossible to obtain the data covering all the irrigation projects being executed in Ayacucho Region. This situation can be the hindrance for irrigation development planning.	<u>Establishment of Basic Information System for Preparation of Appropriate Irrigation Development Plan</u> - GRA shall conduct inventory surveys to complete a database on irrigation projects under operation, and build a system for unified and sustainable management.

Source: Prepared by the Study Team

11.8.3 Approach to Formulation of Development Program

11.8.3.1 Viewpoints for Formulation of Development Program

(1) Institutional Reinforcement/Technical Capacity Building

In Ayacucho Region, the introduction of irrigation systems remains insufficient, thus, the high priority is given to the

expansion of irrigation areas in the region. To raise the effect of irrigation development, and maintain the sustainable operation of irrigation, it is indispensable to reinforce the beneficiary farmers' organizations, and instruct them on irrigation practice and maintenance of facilities. Some on-going irrigation schemes still present low efficiency of irrigation due to the ineffective operation and inappropriate maintenance of facilities.

In this sense, to utilize the limited water resources and valuable irrigation facilities and, maintain sustainable operation, the institutional reinforcement of irrigation committees and capacity development in irrigation practice shall be incorporated in the project formation. Each irrigation scheme has its own characteristics in natural and social conditions and features of irrigation facilities and irrigation methods, therefore, it will be more effective to incorporate the institutional reinforcement and training in the construction stage of each subproject. PRIDER or DRA's district offices, in cooperation with other relevant institutions, shall carry out the reinforcement of farmers' organizations and technical training.

(2) Utilization of Existing Programs

The latest statistic data on irrigation areas in Ayacucho Region are derived from the national census conducted 15 years ago, say in 1994. GIS data on irrigation schemes are not available at that time, therefore, the situation of the existing irrigation schemes is unknown. The rivers running in Ayacucho Region are generally small, and the majority of the poor peasants reside along those dotting rivers in small basins, but no hydrological or irrigation potential data are available. Hence, it seems impossible to program new irrigation sector projects during the limited period of this Study, thus, the existing plans are regarded as the development demand and potential. Concretely speaking, the analyses are made on the sub-projects registered in SNIP as of April, 2009, and the projects studied in "The Program of Small and Medium Irrigation Infrastructure in the Sierra" by JICA in addition.

As of April 2009, 576 subprojects are registered in SNIP irrigation sector, out of which 520 sub-projects unexecuted to date are examined excluding 56 sub-projects already executed. In addition, 3 sub-projects in the JICA Study on "The Program of Small and Medium Irrigation Infrastructure in the Sierra" are also taken for analyses. Therefore, 523 sub-projects in total are to be analyzed in this Study for establishing the irrigation sector development program. These 523 sub-projects are summarized in Table 11.8.2.

Table 11.8.2 Summary of Irrigation Subprojects in Ayacucho Region by Province

Province	Total		Approved		To be Approved	
	Nos.	Area (ha) Cost (S/.)	Nos.	Area (ha) Cost (S/.)	Nos.	Area (ha) Cost (S/.)
Ayacucho Total	523	501,614 ha S/. 1,106,894,982	411	352,245 ha S/. 666,838,476	112	149,369 ha S/. 440,056,506
Huanta	50	17,842 ha S/. 74,366,116	37	10,624 ha S/. 23,138,053	13	7,218 ha S/. 51,228,063
La Mar	32	10,399 ha S/. 38,797,569	27	9,715 ha S/. 33,057,205	5	684 ha S/. 5,740,364
Huamanga	98	114,405 ha S/. 220,712,480	66	60,522 ha S/. 114,083,558	32	53,883 ha S/. 106,628,922
Cangallo	64	53,856 ha S/. 103,870,041	51	26,685 ha S/. 62,635,374	13	27,171 ha S/. 41,234,667
Vilcas Huaman	34	8,443 ha S/. 15,578,729	33	8,291 ha S/. 15,483,020	1	152 ha S/. 95,709
Victor Fajardo	69	58,498 ha S/. 106,921,070	54	51,002 ha S/. 91,187,606	15	7,496 ha S/. 15,733,464

Province	Total		Approved		To be Approved	
	Nos.	Area (ha) Cost (S/.)	Nos.	Area (ha) Cost (S/.)	Nos.	Area (ha) Cost (S/.)
Huancá Sancos	23	47,264 ha S/. 188,924,874	14	34,503 ha S/. 59,398,066	9	12,761 ha S/. 129,526,808
Sucre	38	34,220 ha S/. 49,424,358	32	17,312 ha S/. 21,454,493	6	16,908 ha S/. 27,969,865
Lucanas	62	99,969 ha S/. 201,498,143	53	82,589 ha S/. 156,821,980	9	17,380 ha S/. 44,676,163
Parinacochas	21	22,213 ha S/. 48,658,190	16	16,733 ha S/. 31,815,721	5	5,480 ha S/. 16,842,469
Paucar del Sara Sara	32	34,505 ha S/. 58,143,412	28	34,269 ha S/. 57,763,400	4	236 ha S/. 380,012

Source: Prepared by the Study Team based on SNIP and Other Information. The costs are values at the end of 2009.

(3) Information Construction for Strategic Development Planning

Taking into account the fact that the present irrigation condition in the region is unknown, it is proposed to establish the construction of information database on irrigation and its management system to contribute to the future development plans. This digitalized database of basic irrigation information shall be in a form easy to sort, order and process, and the system for timely updating of the information shall be built.

11.8.3.2 Analyses and Evaluation of Existing Projects (SNIP Sub-projects)

(1) Evaluation Criteria

For the evaluation, the 523 sub-projects are categorized in accordance with their type in the following manner. It is considered that the sub-projects will be evaluated and the projects will be categorized into groups of similar nature for smooth implementation.

Category by Investment Cost

B: Big Investment Sub-projects (Estimated Investment Cost over S/6,000,000)

S: Small Investment Sub-projects (Estimated Investment Cost less than S/6,000,000)

Category by Irrigation Method

Te: Technical Irrigation Sub-projects (Subprojects which include technical irrigation even in part)

Tr: Traditional Irrigation Sub-projects

Category by Construction Type

N: Sub-projects of New Irrigation System Construction

R: Sub-projects of Improvement or Rehabilitation of Existing Irrigation System

The amount S/6,000,000 was applied for the categorization between B and S, because the Peruvian regulation for public investments stipulates that Pre-F/S is needed before the implementation of the sub-projects with investment cost higher than S/6,000,000, and in case of the investment cost over S/10,000,000, F/S is required.

The following criteria in Table 11.8.3 are applied for the evaluation of these 523 sub-projects.

Table 11.8.3 Evaluation Criteria for Irrigation Sub-projects

Criteria	Indicator		Rating	Remarks
Relevance	Poverty Level	Extreme Poverty (P3)	30	Contributing to the Development Priority "Improvement of Living Standard of Poor Farmers"
		High Poverty (P2)	18	
		Poverty (P1)	6	

Criteria	Indicator			Rating	Remarks
Effectiveness	Land User Potential	High	A	30	Contributing to Development Priority "Alleviation of Vulnerability and Improvement of Living Standard of Poor Farmers"
		↑	Xa	25	
			P	20	
			Xp	15	
			F	10	
			Xf	5	
		↓	X	3	
		Low	CP	1	
Efficiency	Investment per Beneficiary	Less than S/. 500		10	Factor of Economy (Costs of Present Value as of End of 2009 are applied.)
		S/. 500 - 1,000		8	
		S/. 1,000 - 2,000		5	
		Over S/. 2,000		2	
Impact	Environmental Impact	Small Investment (S)/ Improvement or Rehabilitation (R)		5	Big investment and new construction subprojects may cause more severe environmental impact.
		Others		3	
		Big Investment (B)/ New or Expansion (N)		1	
		Ripple Effect	Technical Irrigation (Te)		5
		Traditional Irrigation (Tr)		1	
Sustainability	Institutional Reinforcement	Local Government (GL)		10	Closer contact to beneficiary farmers through implementation by local governments is expected to help more smoothly in the reinforcement of O&M and irrigation committees.
		Regional Government (GR)		6	
		National Government (GN)		2	
Full Score				90	
Minimum				13	

Source: Prepared by the Study Team based on the SNIP information and others

(2) Evaluation Results

The total investment cost of the 523 sub-projects is estimated at S/1,100 million (S/1,106,894,982) at the constant price of the end of 2009. The 523 sub-projects are ordered according to the evaluation score of each sub-project, and the sub-projects from the top, of which the costs sum up to the 20% of the total cost, will be classified into the 1st priority sub-project group (*Group-1*), the following 20% into 2nd priority sub-project group (*Group-2*), and the remaining 60% into 3rd priority sub-project group (*Group-3*). The grouping in this manner can be expressed as below.

- 1st priority sub-project group (*Group-1*): Sub-projects with its score higher than or equal to 67 points
- 2nd priority sub-project group (*Group-2*): Sub-projects with its score higher than or equal to 57 points and less than 67 points
- 3rd priority sub-project group (*Group-3*): Sub-projects with its score below 57 points

The four project types are formed based on the categorization given in Table 11.8.4 as shown below and in Table 11.8.5.

- Large Investment Project (B): All the large investment subprojects of any irrigation type (*Tr/Te*) and any construction type (*N/R*)
- New Construction/Expansion Project (N): Small investment (S), traditional irrigation (*Tr*), and new construction/expansion subprojects (N)
- Improvement/Rehabilitation Project (R): Small investment (S), traditional irrigation (*Tr*), and improvement/rehabilitation subprojects (R)
- Technical Irrigation Project (Te): Small investment (S) and technical irrigation (*Te*) of any construction type (*N/R*)

Table 11.8.4 Classification of Irrigation Project Type

Item	Type of Sub-project							
Categorization in Table 11.8.3	Big Investment (B)				Small Investment (S)			
	Traditional Irrigation (Ti)		Technical Irrigation (Te)		Traditional Irrigation (Ti)		Technical Irrigation (Te)	
	New / Expansion (N)	Improvement / Rehabilitation (R)	New / Expansion (N)	Improvement / Rehabilitation (R)	New / Expansion (N)	Improvement / Rehabilitation (R)	New / Expansion (N)	Improvement / Rehabilitation (R)
	Big Investment (B)				New/ Expansion (N)	Improvement/ Rehabilitation (R)	Technical Irrigation (Te)	

Source: Prepared by the Study Team

By this project type, the evaluation results are summarized in Table 11.8.5.

Table 11.8.5 Evaluation Results of Existing Irrigation Sub-projects in Ayacucho Region

Province	Total					Group-1				
	Total	B	N	R	Te	Total	B	N	R	Te
Total Ayacucho Region	523	27	285	138	73	136	6	56	49	25
Huanta	50	2	17	13	18	37	1	12	12	12
La Mar	32	0	16	11	5	3	0	2	1	0
Huamanga	98	4	50	22	22	38	2	14	12	10
Cangallo	64	5	31	21	7	22	3	10	8	1
Vilcas Huaman	34	0	20	7	7	1	0	1	0	0
Victor Fajardo	69	2	47	17	3	1	0	0	1	0
Huanca Sancos	23	3	16	4	0	3	0	2	1	0
Sucre	38	1	26	7	4	0	0	0	0	0
Lucanas	62	7	33	19	3	15	0	6	7	2
Parinacochas	21	2	13	4	2	6	0	4	2	0
Paucar del Sara Sara	32	1	16	13	2	10	0	5	5	0
Province	Group-2					Group-3				
	Total	B	N	R	Te	Total	B	N	R	Te
Total Ayacucho Region	158	7	91	40	20	229	14	138	49	28
Huanta	7	0	3	1	3	6	1	2	0	3
La Mar	7	0	3	2	2	22	0	11	8	3
Huamanga	24	1	12	6	5	36	1	24	4	7
Cangallo	21	0	11	7	3	21	2	10	6	3
Vilcas Huaman	17	0	10	5	2	16	0	9	2	5
Victor Fajardo	23	0	19	3	1	45	2	28	13	2
Huanca Sancos	9	0	6	3	0	11	3	8	0	0
Sucre	5	0	3	2	0	33	1	23	5	4
Lucanas	14	3	8	3	0	33	4	19	9	1
Parinacochas	13	2	7	2	2	2	0	2	0	0
Paucar del Sara Sara	18	1	9	6	2	4	0	2	2	0

Source: Prepared by the Study Team based on the SNIP Information and Others

11.8.4 Development Program

11.8.4.1 Composition of Development Program

The development program consists of the following 7 projects.

- Large Investment Irrigation Project
 - 1) Cuchoquesera Dam Emergency Discharge System Construction Project (SNIP No. 86821)
 - 2) Ingalla Dam and Irrigation Canals Construction roject (SNIP Code 87269)
 - 3) Expansion and Improvement Project of Secondary Canal in Tambillo No. 7 Irrigation Unit, Stage II in the Ex PERC Irrigation System (SNIP No. 87235)

- New Construction and Expansion Irrigation Project
- Existing Irrigation Improvement and Rehabilitation Project
- Technical Irrigation Project
- Irrigation Basic Information and Database System Building Project

The large investment sub-projects are treated as individual projects, but the small investment projects are treated as the group of the sub-projects of similar natures such as irrigation type and project type.

The following 3 projects were classified into Group-1, however, these were proved to be disqualified due to their non-feasibility in accordance with the interview with GRA.

- SNIP 38190 Construction Project of Pallca Dam Irrigation System (Huamanga Province, Quinua District)
- SNIP 109193 Project of Irrigation Installation by Pump in Luricocha (Huanta province , Luricocha District)
- SNIP 111024 Construction Project of Chanquil Dam and Chanquil Incaraccay Irrigation System (Cangallo Province, Los Morochucos District)

Out of 7 projects, New Irrigation System Construction and Expansion Project, Existing Irrigation System Rehabilitation Project and Technical Irrigation Project consist of plural sub-projects of similar type. Even though the sub-projects have various origins of application, execution and finance source, GRA shall coordinate the implementation with those institutions and manage the whole project.

SNIP permits the procedure "Conglomerate (*Conglomerado*)" as mentioned in Section 5.7.3, through which several sub-projects can be implemented in one package. This has an advantage that the implementation and management can be smooth, however, the sole execution agency, GRA in this case, should prepare and submit project profile newly, and further carry out Pre-F/S and/or F/S, and besides finance all the budgets. The procedure will take a quite long time in coordination among various agencies, rearrangement of budgets and reevaluation of technical documents. Therefore, this Conglomerate system is considered unpractical and the procedure aforementioned is proposed.

The consolidation of the farmers' organization and capacity building in irrigation, which is indispensable for the sustainable operation, shall be incorporated in a component of each sub-project.

In addition to the said 6 irrigation projects, it is proposed to apply the "Irrigation Basic Information and Database System Building Project", which is a soft component project to improve the actual situation that the information on the present irrigation development in the region is incomplete.

11.8.4.2 Outline of Development Program

(1) Large Investment Irrigation Projects

(a) Background and Objectives

Ayacucho Region is undeveloped in irrigation, and the farmers remain poor under low and unstable agricultural productivity. Actually the demand for introduction of irrigation is strong, and it is considered as an important sector for Ayacucho Region. In this Study, 523 sub-projects of irrigation sector were analyzed, among which 27 are categorized in Large Investment Irrigation Project with the investment cost over S/.6 million.

In Peru, public investment projects with the cost below S/.6 million can be executed only with the evaluation of outline sheet (*perfil*), on the other hand, Pre-F/S is required for those with the cost higher than S/.6 million, and besides F/S is necessary for those with the cost over S/.10 million. By this reason, the sub-projects of which the cost is estimated to be more than S/.6 million will form independent projects so that the project can be implemented smoothly. The objectives of this project are to supply stable irrigation water to the existing irrigation system, and to

develop new irrigation farmlands.

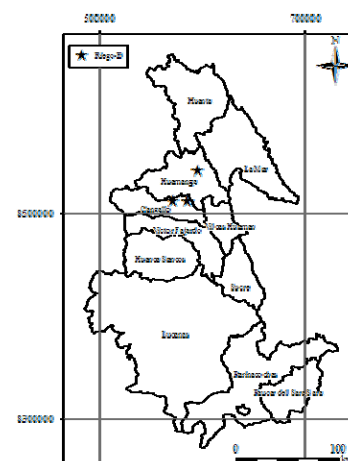
(b) Components

Among the 27 large investment projects of which the cost estimated cost is over S/.6 million, 3 projects are classified into the Group-1, which are listed in Table 11.8.6 and illustrated in Figure 11.8.1, the remaining 24 being categorized into Group-2 and Group-3.

Table 11.8.6 Large Investment Project in Group-1

SNIP Code	Project Name	Type	Area (ha)
Total			17,902
86821	Cuchoquesera Dam Emergency Discharge System Construction Project	BTrN	14,493
87269	Ingalla Dam and Irrigation Canals Construction Project	BTeN	1,307
87235	Expansion and Improvement Project of Secondary Canal in Tambillo No. 7 Irrigation Unit, Stage II in the Ex PERC Irrigation System	BTrN	2,102

By the implementation of these three projects, the irrigation water for farmlands of about 14,500 ha will be guaranteed, and new irrigation land of the estimated area 3,400 ha will be created. The total investment cost is estimated at about S/.36.8 million. Two projects except "Cuchoquesera Dam Emergency Discharge System Construction Project" have the investment costs over S/.10 million, then F/S is required for their implementation. The details are shown in Attachment-7 Project Sheet.



Source: Study Team

Figure 11.8.1 Locations of Big Investment Irrigation Projects

(c) Period

- 1) 2012-2014 (2.5 years)
- 2) 2016-2020 (4.5 years)
- 3) 2013-2016 (4 years)

(d) Target Area

- 1) Chuschi District (Cuchoquesera Village) of Cangallo Province
- 2) Los Morochucos District (Chanquil, Patachaca, Vizcachayoc Villages) of Cangallo Province,
- 3) Tambillo District of Huamanga Province

(e) Project Cost

- 1) S/.8,300,000
 - 2) S/.15,700,000
 - 3) S/.12,800,000
- Total S/.36,800,000

(2) New Construction and Expansion Irrigation Project

(a) Background and Objectives

In addition to the large investment irrigation projects, the development of small-scaled irrigation is also strongly desired. The main water resources for small-scaled irrigation are small streams and springs. Mainly traditional gravity irrigation is applied. In the existing irrigation system, new farmlands are developed as far as the water resources and farmlands are available in the viewpoint of effective use of regional natural resources. This category has 285 sub-projects, and the objective of this project is to develop irrigation farmlands by utilizing the limited water resources and lands.

(b) Components

The number of the sub-projects composing "New Irrigation System Construction and Expansion Project" is 285, of which the total investment cost is estimated to be S/.330 million at constant price of the end of 2009. These were ranked into 3 groups such as 1st priority group (Group-1: high priority), 2nd priority group (Group-2 : medium priority) and 3rd priority group (Group-3 : low priority), applying the evaluation criteria described in 11.8.3.2. The respective groups consist of 56, 91 and 138 sub-projects as summarized in Table 11.8.7 and illustrated in Figure 11.8.2.

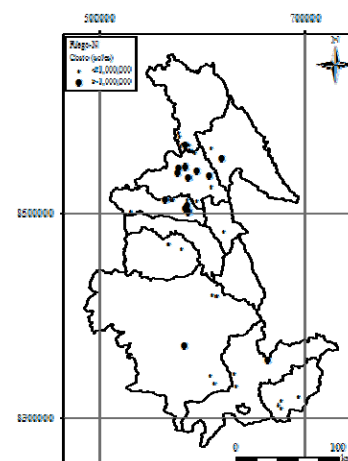
Table 11.8.7 New Construction and Expansion Irrigation Project

Province	Total			Group-1 + Group-2			Group-3
	Nos.	Area (ha)	Cost* (S/.)	Nos.	Area (ha)	Cost* (S/.)	Nos.
Total Ayacucho Region	285	156,079	329,622,800	147	64,576	129,193,874	138
Huanta	17	5,981	10,693,264	15	3,268	6,338,778	2
La Mar	16	7,036	30,906,905	5	676	3,012,157	11
Huamanga	50	38,403	73,331,210	26	20,583	38,575,164	24

Cangallo	31	17,045	31,206,010	21	10,027	17,073,324	10
Vilcas Huaman	20	5,854	10,947,114	11	3,030	6,463,173	9
Victor Fajardo	47	30,442	56,776,440	19	3,898	6,652,836	28
Huanca Sancos	16	6,790	16,698,468	8	5,128	11,280,686	8
Sucre	26	7,824	16,354,545	3	1,267	2,034,122	23
Lucanas	33	20,707	52,111,341	14	5,846	16,810,224	19
Parinacochas	13	10,158	20,393,428	11	6,062	12,496,637	2
Paucar del Sara Sara	16	5,839	10,204,075	14	4,791	8,456,773	2

Source: Prepared by the Study Team based on the SNIP information and others. *Price at the Level of the End of 2009

The project components consist of preparation and promotion of SNIP application documents, detailed design, fund finding and budget arrangement, tendering, contracting construction works, construction, environment mitigation works, organization of irrigation committee, instruction on operation and maintenance of irrigation facilities, etc. By the implementation of Group-1 and Group-2 in 10 years during 2011-2020, about 133,000 ha of farmlands will be newly irrigated for about 65,000 beneficiaries.



Source: Prepared by the Study Team

Figure 11.8.2 Locations of New Construction and Expansion Irrigation Project (Groups-1&2)

(3) Existing Irrigation Improvement and Rehabilitation Project

(a) Background and Objectives

In Ayacucho Region, irrigation systems already exist in some parts. However, most of them are not functioning effectively due to deteriorated facilities and inappropriate maintenance. This project aims at efficient irrigation water distribution and application to farmlands through improvement of the existing irrigation facilities. As inappropriate maintenance is one reason for the malfunction of the facilities, capacity building of the irrigation committees on irrigation practice, and operation and maintenance of the facilities will be carried out in parallel to the improvement of irrigation systems.

(b) Components

The number of the sub-projects composing "Existing Irrigation System Rehabilitation Project" is 138, of which the total investment cost is estimated to be S/.67 million at constant price of the end of 2009. These were ranked into three groups such as 1st priority group (Group-1: high priority), 2nd priority group (Group-2: medium priority) and 3rd priority group (Group-3: low priority), applying the evaluation criteria described in 11.8.3.2. The respective groups consist of 49, 40 and 49 subprojects as summarized in Table 11.8.8 and illustrated in Figure 11.8.3.

Table 11.8.8 Existing Irrigation Improvement and Rehabilitation Project

Province	Total			Group-1 + Group-2			Group-3
	Nos.	Area (ha)	Cost* (S/.)	Nos.	Area (ha)	Cost* (S/.)	Nos.
Total Ayacucho Region	138	33,445	67,225,089	89	21,514	37,828,114	49
Huanta	13	1,877	3,633,156	13	1,877	3,633,156	0
La Mar	11	3,188	6,684,763	3	365	591,188	8
Huamanga	22	9,313	16,207,271	18	4,876	9,206,223	4
Cangallo	21	3,336	6,352,571	15	2,445	4,723,357	6
Vilcas Huaman	7	2,165	3,530,664	5	2,016	3,284,742	2
Victor Fajardo	17	2,082	8,766,848	4	802	1,289,133	13
Huanca Sancos	4	215	496,172	4	215	496,172	0
Sucre	7	499	1,189,970	2	103	369,049	5

Lucanas	19	5,292	11,105,113	10	3,433	5,130,713	9
Parinacochas	4	391	648,538	4	391	648,538	0
Paucar del Sara Sara	13	5,087	8,610,023	11	4,991	8,455,843	2

Source: Prepared by the Study Team based on the SNIP information and others. *Price at the Level of the End of 2009

The project components consist of preparation and promotion of SNIP application documents, detailed design, fund finding and budget arrangement, tendering, contracting construction works, construction, environment mitigation works, reinforcement of irrigation committee, instruction on operation and maintenance of irrigation facilities, etc.

The Group-1 and Group-2 are proposed to be implemented in the 10 years during 2011-2020. By the implementation of this project, the irrigation facilities for about 22,000 ha farmlands will be improved/rehabilitated for about 62,000 beneficiaries.

(c) Period

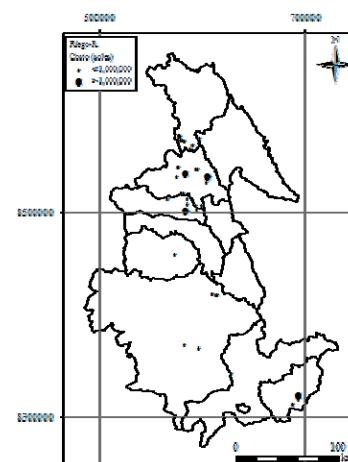
2011-2020 (10 years)

(d) Target Area

9 Provinces except Victor Fajardo and Sucre Provinces

(e) Project Cost

1st Priority Sub-project Group	S/.20,800,000
2nd Priority Sub-project Group	S/.17,000,000
3rd Priority Sub-project Group	S/.29,400,000
Total	S/.67,200,000



Source: Prepared by the Study Team

Figure 11.8.3 Locations of Existing Irrigation Improvement and Rehabilitation Project (Group-1&2)

(4) Technical Irrigation Project

(a) Background and Objectives

Irrigation water resource is not abundant in Ayacucho Region. On the other hand, it has an advantage that hydraulic head for irrigation is available by its topographic characteristics. Under such situation, water saving irrigation such as sprinkler or drip irrigation is being introduced to enable efficient irrigation. This project aims at promotion of water saving irrigation system. Besides, this type of irrigation requires technical knowledge and know-how, the training of the irrigation committees on irrigation practice, and operation and maintenance will lead to sustainable irrigation operation.

(b) Components

The number of the subprojects composing "Technical Irrigation Project" is 73, of which the total investment cost is estimated to be S/.74 million at the end of 2009 price value. These were ranked into three groups such as 1st priority group (Group-1: high priority), 2nd priority group (Group-2 : medium priority) and 3rd priority group (Group-3 : low priority), applying the evaluation criteria described in 11.8.3.2. The respective groups consist of 25, 20 and 28 subprojects as summarized in Table 11.8.9 and illustrated in Figure 11.8.4.

Table 11.8.9 Technical Irrigation Project

Province	Total			Group-1 + Group-2			Group-3
	Nos.	Area (ha)	Cost* (S/.)	Nos.	Area (ha)	Cost* (S/.)	Nos.
Total Ayacucho Region	73	44,472	74,259,198	45	23,987	49,958,904	28
Huanta	18	7,614	16,839,769	15	7,522	16,335,738	3
La Mar	5	175	1,205,901	2	76	205,493	3
Huamanga	22	12,498	26,772,722	15	7,862	18,723,353	7
Cangallo	7	1,849	3,335,650	4	1,289	2,330,090	3
Vilcas Huaman	7	424	1,100,951	2	197	323,745	5
Victor Fajardo	3	4,480	6,879,080	1	1,172	1,881,552	2
Huanca Sancos	0	0	0	0	0	0	0
Sucre	4	11,496	7,859,192	0	0	0	4
Lucanas	3	100	255,062	2	33	148,062	1
Parinacochas	2	1,139	2,176,077	2	1,139	2,176,077	0
Paucar del Sara Sara	2	4,697	7,834,794	2	4,697	7,834,794	0

Source: Prepared by the Study Team based on the SNIP information and others. *Price at the Level of the End of 2009

The project components consist of preparation and promotion of SNIP application documents, detailed design, fund finding and budget arrangement, tendering, contracting construction works, construction, environment mitigation works, reinforcement of irrigation committee, instruction on operation and maintenance of irrigation facilities, etc.

The Group-1 and Group-2 are proposed to be implemented in the 10 years during 2011-2020. By the implementation of this project, about 24,000 ha farmlands will be furnished with technical irrigation system for about 31,000 beneficiaries.

(c) Period

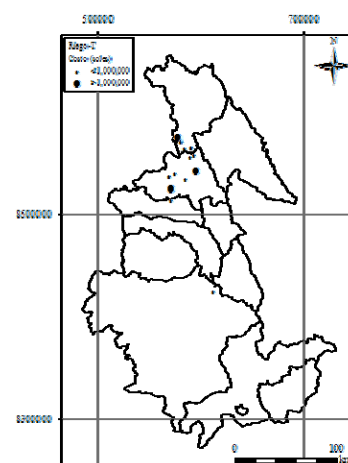
2011-2020 (10 years)

(d) Target Area

Huanta, Huamanga, Cangallo and Lucanas Provinces

(e) Project Cost

1st Priority Sub-project Group	S/.31,900,000
2nd Priority Sub-project Group	S/.18,100,000
3rd Priority Sub-project Group	S/.24,300,000
Total	S/.74,300,000



Source: Prepared by the Study Team

Figure 11.8.4 Locations of Technical Irrigation Project (Group-1&2)

(5) Irrigation Basic Information and Database System Building Project

(a) Background / Contents

The actual status of irrigation development in Ayacucho Region is presently unknown. Without these data, future strategic development planning, and diffusion of irrigation practice and O&M will be difficult. It is recommended to complete these data as early as possible. In addition, the data regarding irrigation committees and irrigation management are necessary for appropriate operation and management of irrigation systems. Therefore, the purpose of this project is to prepare a database of the basic information regarding irrigation, which should be easy to convert, and build up a system for timely update of the database.

(b) Components

Inventory Survey on Ongoing Irrigation Schemes

The information on ongoing irrigation schemes shall be collected from regional offices of the central government agencies, which have executed irrigation projects in Ayacucho Region. In case the necessary information is incomplete in the regional office, they shall be complemented in the headquarters in Lima or offices in other regions. The information supposed to be collected are; the name of irrigation scheme, location (administrative division, latitude, longitude and altitude), irrigated area, water source, irrigation water quantity, irrigation method, crops, yield, catalogue of irrigation facilities, beneficiary families, activities of irrigation committee, age of facilities, investment cost, operation and maintenance system (cost and activities), etc. The information shall be obtained from GRA and local governments in the region in the similar manner. If deemed necessary, trips shall be made to the sites to get data directly from irrigation committees.

Information Processing

The collected data and information shall, after their verification, be digitalized and compiled so that they could be converted and utilized in other programs. The database shall be able to be sorted and tallied by zone and irrigation method, and so on. The information shall be published on the website of GRA.

Building Information Management System

Information management and updating system shall be constructed, so that the data correction, addition and update can be made promptly when necessary. It is supposed at present that the agrarian agencies being operated in each province under DRA shall, occasionally or periodically, send information in a fixed format, and DRA shall update the database. However, the detailed system shall be determined in the course of this project.

(c) Period

2011-2012 (2years)

(d) Target Area

Whole Ayacucho Region

(e) Project Cost

S/.500,000

(6) Development Area

The development projects proposed above are listed in Table 11.8.10 in accordance with regional characteristics by

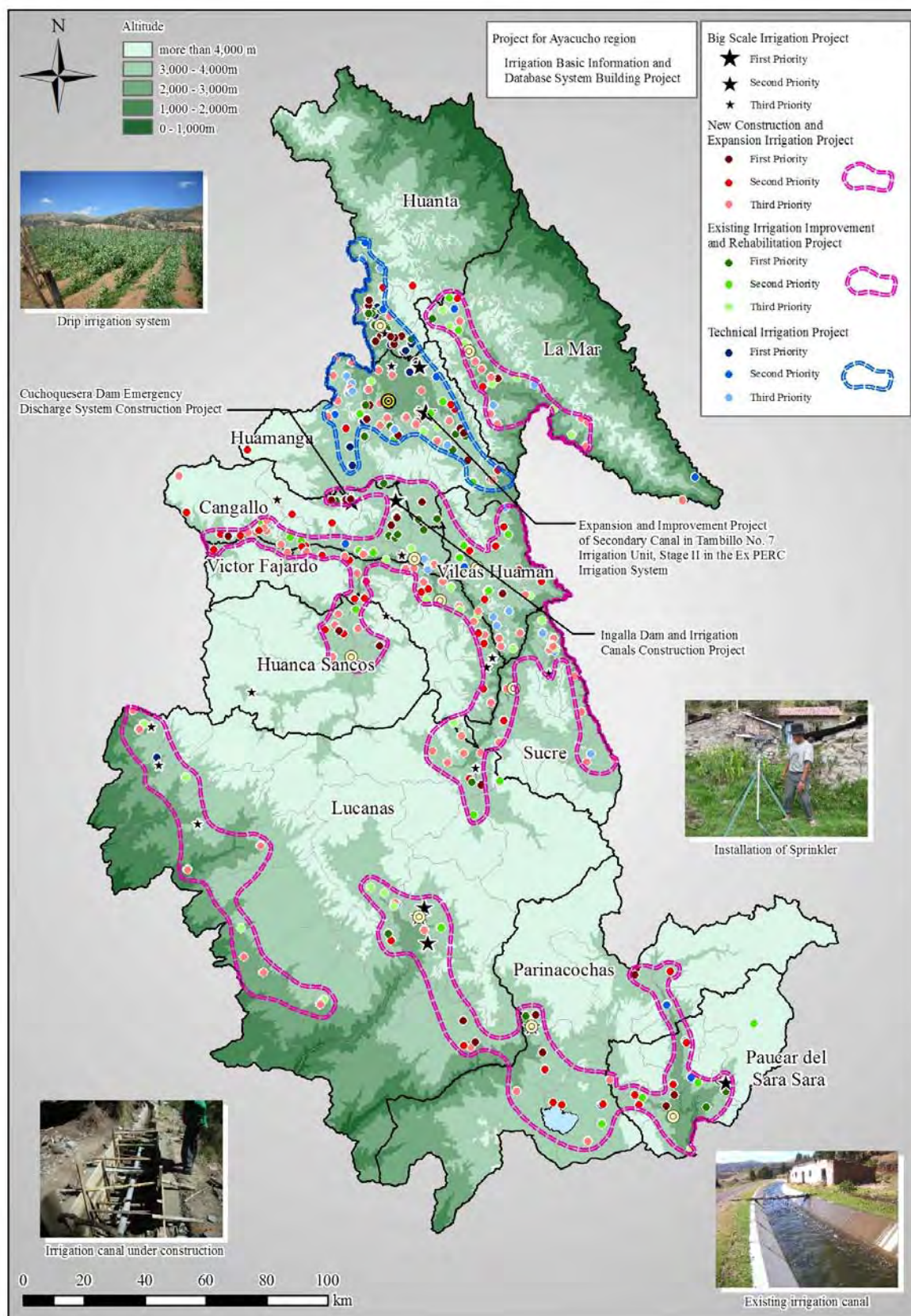
province and altitude described in Table 10.3.2, and illustrated in Figure 11.8.5.

Table 11.8.10 Target Area of Development Program

Province	Altitude (m)	Large Investment Projects			Small Investment Projects			Irrigation Basic Information Database System Building Project
		Cuchoquesera Dam Emergency Discharge System Construction Project	Ingalla Dam and Irrigation Canals Construction Project	Expansion and Improvement Project of Secondary Canal in Tambillo No. 7 Irrigation Unit, Stage II in the Ex PERC Irrigation System	New Construction and Expansion Irrigation Project	Existing IrrigationImprovement and Rehabilitation Project	Technical Irrigation Project	
Whole Region								⊙
Huanta	4000-2000				⊙	⊙	⊙	
	< 2000							
La Mar	4000-2000				⊙	○	○	
Huamanga	4000-2000			⊙	⊙	⊙	⊙	
Cangallo	> 4000				○			
	4000-2000	⊙	⊙		⊙	⊙	⊙	
Vilcas Huaman	4000-2000				⊙	○	○	
Victor Fajardo	> 4000				△	△		
	4000-2000				○	⊙	○	
Huanca Sancos	> 4000				△			
	4000-2000				⊙	⊙		
Sucre	> 4000							
	4000-2000				○	○	△	
Lucanas	> 4000					○		
	4000-2000				⊙	⊙	⊙	
Parinacochas	> 4000							
	4000-2000				⊙	⊙	○	
Paucar del Sara Sara	> 4000					○		
	4000-2000				⊙	⊙	○	

Remarks: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: Prepared by the Study Team

Figure 11.8.5 Regional Development Map by Sector (Irrigation Sector)

11.9 Roads

11.9.1 Development Objective

The major economic activities in rural area of Ayacucho Region are agriculture and livestock. Although the support to distribution of agricultural products is required, construction of basic infrastructures such as road is highly delayed due to climatic and geographical constraints. Under such situations, the road development program was prepared for the following objectives:

- Integrate the productive and distribution sectors through the construction, improvement and maintenance of road infrastructure
- Promote the strengthening of the sustainable maintenances of roads by community people.
- Support the strengthening of the management agencies being in charge of O&M and expansion of community roads.

11.9.2 Basic Policies for Formulation of Development Program

Based on the current situation of the roads and on the exchange of opinions with agencies related to road construction and maintenance, the basic policies for formulation of development program was worked out as follows:

Table 11.9.1 Current Problems and Basic Policies for Formulation of Road Development Program

Current Conditions and Subjects		Basic Policies
• No construction of roadnetwork supporting agricultural production network linking production areas to markets • Irregular and frequent deterioration of roads which result in unstable access to markets • Lack of roads connecting with remote rural areas where are far from major roads • Unpavement of major roads linking with major cities and markets which are bases of agricultural distribution	⇒ ⇒ ⇒	• Roadnetwork in the region will be improved to realize the integration of production and distribution sectors by road construction. • Impact by natural phenomenon will be mitigated by proper O&M of roads (construction of drainage facility and retaining wall) • Road conditions will be improved by leveling up of durability and capacity of roads.
• Shortage of regular O&M of roads by people participation	⇒ ⇒ ⇒	• Participation of people including initiative of independent agriculture without relying on government finance will be promoted by execution of continuous O&M of roads.
• Shortage of regular O&M of roads by local governments and administrative agencies in charge.	⇒ ⇒ ⇒	• Capability of local government on operation and management of road infrastructures and transportation will be improved. • Technical staff will be trained aiming to use of appropriate construction methods (technical and physical aspects) for proper O&M of roads.

Source: JICA Study Team

11.9.3 Approach to Formulation of Development Program

11.9.3.1 Viewpoints for Formulation of Development Program

The Road Development Program is a part of the Master Plan toward repletion of regional potentials and rural area development to poor peasants in Ayacucho Region, and focuses on support to transfer of passengers and carriage of goods aiming at modernization of administrative services, creation of opportunities, conquest of poverty, correction of disparities and environmental coexistence. In addition, the Program is prepared in coordination with agriculture and livestock sectors because road construction is essential for promotion of them.

11.9.3.2 Analysis and Evaluation of Existing Projects (SNIP Sub-projects)

From the information registered in SNIP, 675 unexecuted projects for the transportation sector have been found.

These sub-projects are reviewed and reorganized into the following 6 categories:

Table 11.9.2 Categorization of SNIP Sub-projects for Transportation Sector

Category	Denomination	Investment Amount (S/.)
TC-01	Construction and Improvement of Roads	28,590,955
TC-02	Rehabilitation of Roads	129,781,627
TC-03	Construction of Bridges and Road-related Structures	44,160,620
TC-04	Works in Urban Roads	124,855,989
TC-05	Project of Strengthening and Improvement of capacities	10,857,197
TC-06	Project of Logistic Support Infrastructure	6,275,479

Source: JICA Study Team

Taking into consideration the above categorization and the following description, the road development projects to be studied in the Master Plan are arranged as follows:

- Adjustment of overlapped SNIP sub-projects applied
- Re-categorization of sub-projects in consideration of improvement of road access and transportation of agricultural products which is main objective of the development program
- Exclusion of sub-projects located at urban areas since the target area in the Master Plan is rural area.

Table 11.9.3 Summary of Transportation Projects

Selection	Items	Total Project Cost (S/.)	Projects
Construction of Bridges and Road-related Structure	Road-related Structures	1,277,130.32	11
	Bridge Construction	41,650,731.10	54
Construction and Improvement of Roads	Road Construction	304,983,802.30	68
	Car Trail Construction	190,779,664.18	110
	Improvement of Biddle Paths	13,031,800.31	35
	Improvement of Roads	90,769,756.07	34
	Improvement of Car Trails	19,843,610.46	25
Strengthening and Improvement of Capacities	Maintenance Equipment	9,911,631.80	6
	Transit Management	1,935,445.52	2
Rehabilitation of Roads	Rehabilitation of Roads	133,721,099.97	43
	Rehabilitation of Car Trails	5,912,487.84	11
	Rehabilitation and Improvement of Car Trails	5,252,379.04	4
Total		819,069,538.91	403

Source: JICA Study Team

11.9.3.3 Prioritization of Existing Projects (SNIP Sub-projects)

(1) Evaluation of SNIP Sub-projects

The evaluation criteria to prioritize the SNIP sub-projects (unexecuted) on road sector is determined as shown in Table 11.9.4.

Table 11.9.4 Summary of Evaluation Criteria for Road Sector Sub-projects

Item	Indicator		Score	Consideration
Relevance	Degree of Poverty	Extreme Poverty (P3)	30	Degree of coherence with the Objective of the Master Plan (poverty reduction)
		High Poverty (P2)	18	
		Poverty(P1)	6	
	Curent Productive Potencial	High (More than 15 million soles per year)	15	Degree of coherence with the current production of agriculture, livestock, and potential fish-farming projects, by district
		Medium (Between 5 and 15 million sole per yearannual)	9	
		Low (Less than 5 million soles a year)	3	
Effectiveness	Population Benefitted by the Road Projects	High (More than 5000 beneficiaries)	15	Degree of coherent with the direct and indirect beneficiaries of the road projects. (roads, bridges, etc)
		Medium (Between 2000 and 5000 beneficiaries)	9	
		Low (Less than 2000 beneficiaries)	3	
Efficiency	Project Cost/beneficiary	Less than 400 Soles	10	Degree of financial efficiency
		Between 400 and 1000 Soles	6	
		More than 1000 Soles	2	
Impact	Environmental Impact	Mitigates both effects	5	Degree of intervention to mitigate environmental phenomena and impacts, by projects and localities connected.
		Mitigates at least one effect	3	
		There are severe negative impacts that will be difficult to avoid	1	
	Possibility of Irradiation	High Posibilitéis of Irradiation (atiende a más de 3)	5	Possibility of irradiation to other areas, by projects and localities connected.
		Medium possibily of irradiation (atienda por lo menos 2)	3	
		Low Possibility of Irradiation (atiende sólo a 1)	1	
Sustainability	Organizational Strengthening	Local Government Project (GL)	5	Government Level. Possibility for self-sustenance of projects by the community.
		Regional Government Project (GR)	3	
		National Government Project (GC)	1	
	Mainetanace Capacity	IVP Implemented and Strengthened	5	Degree of Intervention by the Maintenance Agencies (IVP: Provincial Road Institute)
		IVP Implemented	3	
		IVP Incomplete	1	
Maximum Score			90	
Minimum Score			18	

Source: JICA Study Team, March 2010

The evaluation items mentioned above are based on the following descriptions:

- **Relevance:** Taking into consideration the poverty reduction which is a target of the Master Plan, “relevance” was determined based on the degree of poverty.
- **Effectiveness:** “effectiveness” was evaluated by cost per beneficiary. There are many sub-projects more than C/B>400 of parameter, which shows good effectiveness of investment cost/beneficiary population.
- **Effeciency:** In order to measure “efficiency”, 2 indexes are considered. One is the production volume of agriculture and livestock at district level (considering “with project”) and the required cost. The other is beneficiary population.
- **Impact:** ‘impact’ was evaluated from 2 aspects of environmental impact and ripple effect. The former is evaluated by whether natural phenomenon affecting people and environmental contamination could be alleviated or not. The latter is evaluated whethere there a repple effect of sub-project to neighbouring areas or not.
- **Sustainability:** In order to evaluate the temporal sustainability and the work sustainability, possibility of sustainability was examined, especially availability of enough support from provincial road department (IVP).

Using the evaluation criteria mentioned above, the priority sub-projects covered by 20% of total budget (S/.163,762,467) are selected preferentially. In addition, the 3 priority groups of sub-projects classified from total budget are shown in the following table:

Table 11.9.5 Summary of Prioritized Projects

Selection	Score	Projects	Total Cost of the Projects (S/.)
1st Priority Sub-project Group	90-68	88	151,391,846.67
2nd Priority Sub-project Group	68-62	79	161,183,781.87
3rd Priority Sub-project Group	62-26	236	506,493,910.38
Total		403	819,069,538.00

Source: JICA Study Team, March 2010

Outline of the 1st priority group is mentined below. The sub-projects related to urban development and project

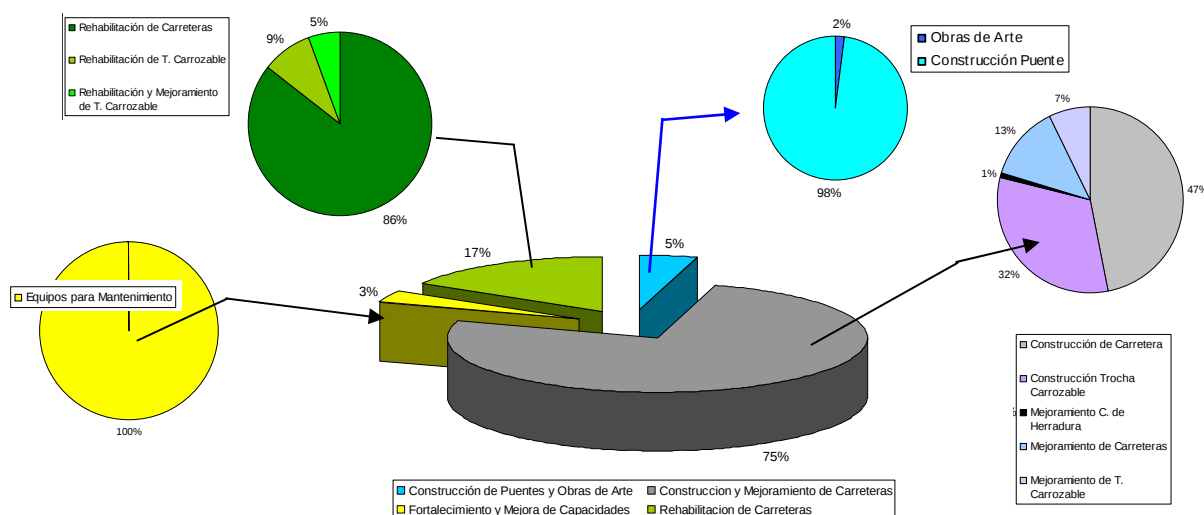
support are eliminated due to inconsistency with the target of Master Plan.

Table 11.9.6 Projects of 1st Priority Group

Category	Type of Work	Total Cost of the projects (S/.)	Projects
Construction of Bridges and Utility Works (culverts, etc)	Utility Works	125,375.00	1
	Construction of Bridges	6,756,222.16	11
Construction and Improvement of Roads	Construction of Roads	53,690,825.65	17
	Construction of Car Trails	36,643,535.16	14
	Improvement of Bridle Paths	827,482.88	6
	Improvement of Roads	14,929,639.48	10
	Improvement of Car Trails	8,195,225.17	6
Strengthening and Improvement of Capacities	Maintenance Equipment	5,258,373.27	3
	Transit Management	---	---
Rehabilitation of Roads	Rehabilitation of Roads	21,339,017.32	15
	Rehabilitation of Car Trail	2,253,364.11	3
	Rehabilitation and improvement of Car Trails	1,372,786.46	2
Total		151,391,846.67	88

Source: JICA Study Team

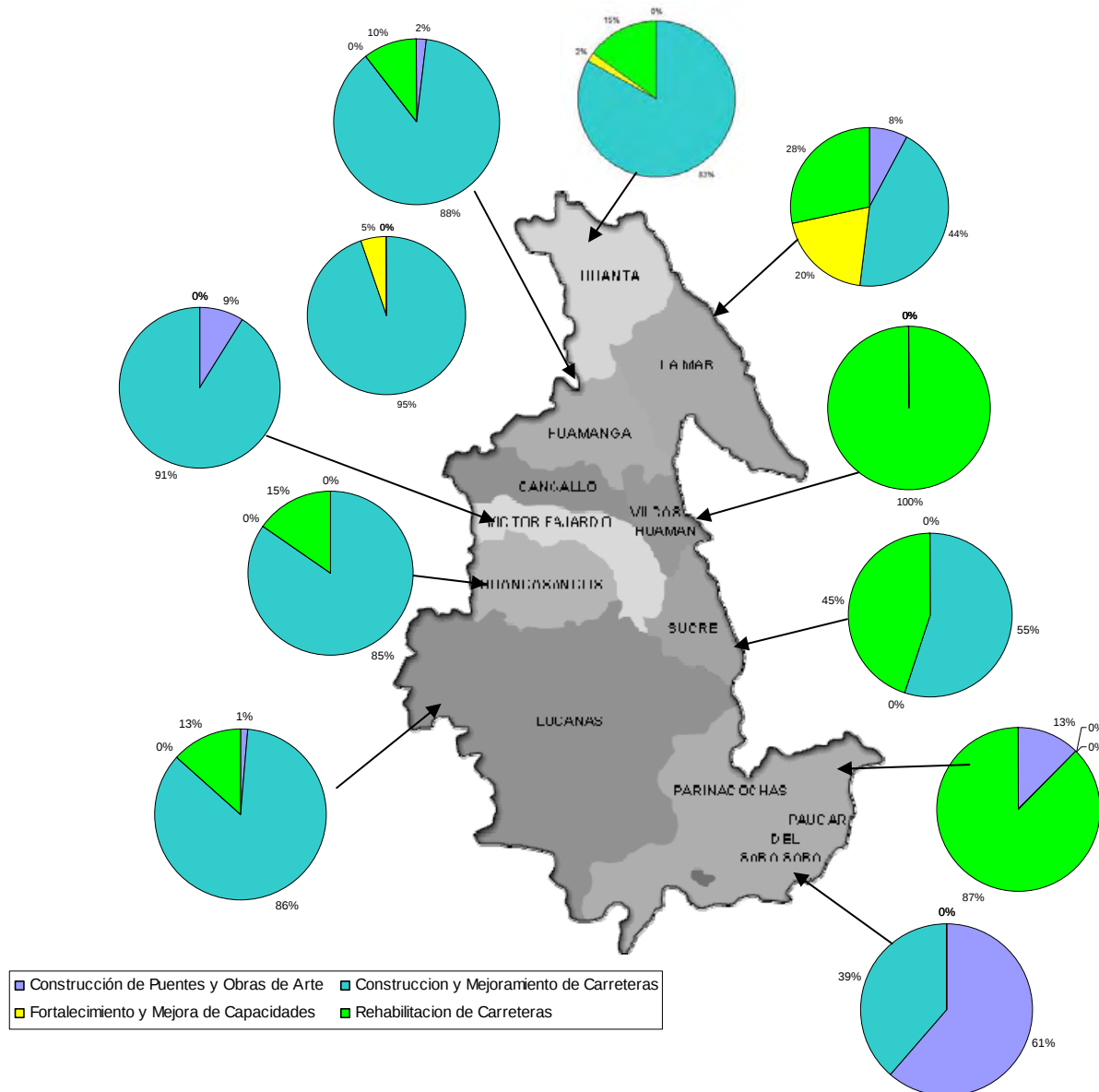
The following figure shows the composition of 1st priority group on road sector. From this figure, it is clarified that the number of road construction and rehabilitation sub-project is the largest and followed by road rehabilitation sub-project. These two sub-projects become more than 1,500 km in length and occupy 90% of investment cost. On the other hand, the capacity development sub-project is less in number and in cost. The investment cost of capacity development sub-project occupies only 3% of total one. However, this sub-project is so important for improvement of capacity development of related agencies to O&M of road infrastructure if considering the current condition of roads in Ayacucho Region.



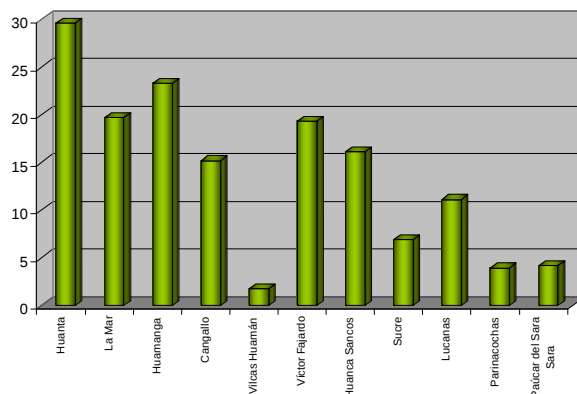
Source: JICA Study Team, March 2010

Figure 11.9.1 Composition of Road Infrastructure Projects in 1st Priority Group

In addition, the distribution of the 1st priority sub-projects by province is shown bellow.



PROVINCIA	INVERSION (S/.)	No. DE PROYECTOS
Huanta	29,5676181	10
La Mar	19,6838799	18
Huamanga	23,3083092	19
Cangallo	15,1747588	10
Villas Huamán	1,785672	1
Víctor Fajardo	19,5593425	7
Huanca Sancos	16,1191518	5
Sucre	6,93577567	3
Lucanas	11,1181772	8
Parinacochas	3,93561729	5
Paúcar del Sara Sara	4,2035442	2
Total	151,391847	88



Source: JICA Study Team, March 2010

Figure 11.9.2 Distribution of Road Infrastructure Projects in 1st Priority Group by Province

11.9.4 Development Program

11.9.4.1 Composition of Development Program

The road development program consists of the following 6 projects:

- Road Infrastructure Development Project
- Acosvinchos District Main Road Improvement Project
- Vilcanchos-Ccaruaccocco District Main Road Construction Project
- Ayahuanco-Sntillana-Liochegua District Main Road Construction Project
- Community Roads Participatory O&M Promotion Project
- Road Improvement and O&M Strengthening Project

The comprehensive implementation of these projects will bear the effective use of the project fund for road sector.

11.9.4.2 Outline of Development Program

(1) Road Infrastructure Development

(a) Background / Objective
The mudslides caused by the rains block the connection to many of these localities, therefore, it is necessary to build, improve, rehabilitate and maintain these roads, as well as the construction of complementary structures (bridges, culverts, walking bridges, gutters, walls, etc). This project seeks to improve the access and communication of the localities with the local, regional and domestic markets and the basic social services and to optimize the time of travel and reduce the road accident rate.
(b) Component
This project has 3 components based on the degrees of intervention as well as the materials and constructive processes. These 3 components are (i) Construction and Maintenance of Roads, (ii) Rehabilitation of Roads and (iii) Construction of Bridges and Road-related Structures.
<u>Component 1: Construction and Maintenance of Roads</u>
The Roads of the Region have a deficient maintenance, and, in spite of their categorization, they do not comply with the established standard, i.e. the road network is composed by compacted roads, car trails and a considerable number of bridle paths. There are critical sections that allow the circulation of only one vehicle at the time. There is lacking drainage and protection infrastructure in many sections, as well as a lack of preventive signs, which are more urgent than the informative or regulatory signs because they prevent drivers, especially, of closed curves and areas of limited visibility. The selected projects have been qualified as such basically because they are located in extremely poor areas with high growth potentials and they will help to mitigate the effects of natural phenomena and have irradiation effects for projects of high or medium intensity. Also, over 70% of the perfiles have been approved and 80% of the projects are in the jurisdiction or the regional or local governments.
<u>Component 2: Road Rehabilitation</u>
Most of the roads are compacted roads or car trails, which generates the need to constantly rehabilitate their surface due to the rains and continuous use. Over 90% of the projects are in areas categorized as very poor or extremely poor; the number of beneficiaries is very large; however, the costs vary according to the type of road and, specifically, the type of roadway surface. 95% of the projects have approved perfiles, and they are, therefore, suitable for updating.
<u>Component 3: Bridges and Road-side Structures</u>
The topography of the regions is very rugged; in addition, there are many water resources and streams in the area. Due to this type of relief and the presence of water and rains, the roads often get blocked. There is some existing infrastructure but as the use increases and more population settlements appear, it becomes necessary to build more vehicle and walking bridges. Therefore, the construction of a number of these structures is proposed, according to the different needs and capacities of the different areas. In addition, road-related structures, such as containment walls, steps, stairways, slabs, mainly made of cyclopean concrete, have been proposed as support structures in areas located in hillsides or that have a very rugged topography. These works strengthen the continuity of the roads' operation, especially during rainy season. For this component of sub-projects or works the study level required the perfil, and over 90% of these perfiles have already been approved.
(c) Period
2011-2020 (10 years)
Implementation period for each component is shown below:
- Component 1: Construction and Maintenance of Roads (6 years from 2012 to 2017)
- Component 2: Road Rehabilitation (4 years from 2012 to 2015)
- Component 3: Bridges and Road-side Structures (2 years from 2012 to 2013)

(d) Target Area	
Whole Ayacucho Region	
(e) Project Cost	
- Construction and Maintenance of Roads:	S/.79,700,000
- Road Rehabilitation:	S/.25,000,000
- Bridges and Road-side Structures :	S/.6,900,000
Total	S/.111,600,000

(2) AcosVinchos District Main Road Improvement Project.

(a) Background / Objective	
The main economic activity in the project area is agriculture and stockbreeding. In face of this background, the objectives to be accomplished are (i) Improvement of the accessibility of the population to the local markets and basic services and (ii) Assurance of a permanent transit of vehicles for passenger and load transportation.	
(b) Component	
This Project consists of the improvement of the road to the level of compacted road, with the purpose of eliminating critical sections and rectifying the route, besides the construction of containment and erosion-control walls. This road has a length of 70.22 Km. The financing will be done by the Municipality of Acosvinchos and Rural Provias, besides the support given by the benefited communities and the authorities of the populated centers, who have signed an agreement committing to bear the costs for the rehabilitation and maintenance of the roads, so they may be transitable during all the seasons of the year. This project has a minimal environmental impact, which shall be mitigated in accordance with the recommendations given with such purpose. Appropriate signs shall be installed and road education campaigns shall be implemented, as well as measures for the prevention of work accidents. Also, resources for environmental mitigation have been considered, since the project will generate deforestation due to the movement of soil, rock blasting, slope cuts; as well as environmental contamination due to the use of harmful elements such as fuels and lubricants. These effects will be mitigated with the implementation of reforestation actions in the surroundings of the project.	
(c) Period	
2012-2013 (2 years)	
(d) Target Area	
Target area is Acosvinchos District of Huamanga Province	
(e) Project Cost	
S/.6,400,000	

(3) Vilcanchos-Ccaruaccocco District Main Road Construction Project

(a) Background / Objective	
All the benefited population belongs to the rural area, and their exclusive economic activities are agriculture and stockbreeding, basically for self-consumption, with a small exceeding margin that goes to the regional market. There is a deficient level of accessibility to the localities of Ccaruaccocco, Urancancha, Antacocha and Miraflores, which limits the transportation of load and passengers. The objectives of the Project are to (i) improve accessibility to the communities of Ccaruaccocco, Urancancha, Antacocha, to facilitate the transportation of load and passengers and (ii) support the community people for access to the local, regional, and domestic markets and for enjoyment of the basic social services.	
(b) Component	
Construction of a compacted local road with a length of 18.39 Km., including the construction the road platform and surface conformation, construction of road-related structures and drainage (walls, culverts, sewers, gutters), implementation of security elements and signposting, among others; construction of two bridges of reinforced concrete slabs on steel beams; of 30 m of length: Ccaruaccocco Bridge, over Ccaruaccocco River and San Juan Bridge (30.0 m.) over Pampas River.	
(c) Period	
2014-2016 (3 years)	
(d) Target Area	
Target areas are 4 communities, 2 Districts and 2Provinces. These are localities of Urancancha, Antacocha and San Juan de Miraflores in the District of Vilcanchos, Province of Víctor Fajardo, and the locality of Ccaruaccocco, District of Paras, Province of Cangallo, Region of Ayacucho.	
(e) Project Cost	
S/.7,400,000	

(4) Ayahuanco-Sntillana-Liochegua District Main Road Construction Project

(a) Background / Objective	
The agriculture in the Province of Huanta consists of small agricultural activities and a farming economy with limited or non-existing accumulation capacity. Most of the farmers only produce enough for self-consumption, few produce for local or regional markets. This	

agriculture is characterized for its simple traditional technology that involves a considerable amount of manual labor. Their agricultural, livestock and forest products have difficult access to the local markets. In order to improve such situations, the Project aims to (i) improve the access of the agricultural, livestock and forest products to the local markets and (ii) integrate the populations of this area in order to provide them with access to the main health services.

(b) Component

The project consists of improving the route of a car trail that goes through the following places: Callqui Pass, locality of Cayramayo, Llameroccasa Pass and Locality of Llamanniyoc; Cross from the Puna to the Low Forest through the Pass in the Muchacocha Hill to the Gully of Caballuyoc. Then cross of the Gully of Caballuyoc, Gully of Samarinahuaycoc, and Gully of Montehuasi in the right riverbank of the Viscatán River, until the localities of Tincuya and Pampa Aurora. This road will integrate the north districts of Ayahuanco, Santillana and Llohegua to the Province of Huanta. It has a length of 94,936 Km., and it includes the construction of 2 small bridges of 6 meters over the Samarinahuayco and Jatumpampa gullies. This project is one of the new projects proposed by the GRA. Also, the participation of the communities through the ceding of necessary lands and the maintenance of the road has been proposed.

(c) Period

2017-2020 (4 years)

(d) Target Area

The Project is located in the locality of Ayahuanco, in the District of Ayahuanco, the locality of Santillana in the District of Santillana and the Locality of Llohegua in the District of Llohegua, Province of Huanta, Region of Ayacucho.

(e) Project Cost

S/.20,300,000

(5) Community Roads Participatory O&M Promotion Project

(a) Background / Objective

In 2008 the local or rural road network of Ayacucho was the most vulnerable, due to its condition and its low intervention coverage, equal to 15%; in contrast with the 50% and 70% of intervention coverage for the regional and national networks respectively. The budgets of the regional and local governments are insufficient for the demand of the rural roads. This becomes a vicious circle: without roads there is no distribution of products, and without distribution, the farmers of the poorest rural areas do not have sufficient incomes. To improve these situations, the proposed activities are to (i) promote the self-sustenance of the road maintenance by rural communities, (ii) promote the formalization of road maintenance small firms in rural communities, and (iii) maintain the road network in operation with transit conditions appropriate for the distribution and exchange of products from communities.

(b) Component

The project aims to promote the participation of the poor peasants of the Region for the road maintenance of their community. This would consider the experiences of the rural road programs of the Ministry of Transportations and Communications and GRA. These programs have financing from the National Government, loans from the IDB and the World Bank. However, these funds are limited and do not cover the road network in general. The proposal seeks to conduct a Pilot Project jointly with the community, which accomplishes the continuous maintenance of the roads with local resources and contribution of the manpower. Maybe in the future a small percentage of the production of the community could be contributed, creating small funds that could be used to buy tools for the community. The capacity-building in road maintenance shall be conducted in Quechua language by a facilitator in order to train workmen and even operators. It is likely that it will be conducted by educators from the region and experts in maintenance. The presence of all the community members (both men and women) is very important.

(c) Period

2011-2013 (2.5 years)

(d) Target Area

The project will be conducted in an area or community selected by GRA. The conditions for such selection are that, within possible, the area has a high growth and development potential, is an area in extreme poverty, has the largest variety of projects to be implemented and the need for periodic maintenance is urgent.

(e) Project Cost

S/.300,000

(6) Road Improvement and O&M Strengthening Project

(a) Background / Objective

There is an overlapping of functions regarding the management of the road infrastructure and transportation. Currently, there is a system of multiple participation in the construction, maintenance and rehabilitation of roads and a weak regulation of the transportation and transit. The Region is very large and for its monitoring and supervision it is necessary to strengthen the Regional Department of Transportation and Communication and the Regional Department of Infrastructure. Also, the District Municipality of Paras has a limited operational capacity to develop works of infrastructure, operation and maintenance. Other districts such as Anco and Luricocha are in the same situation and will also be supported by this project.

In consideration of the administrative capability on road, the objectives of the project are to (i) Strengthen the capacities of the departments

related to road infrastructure and road security in Ayacucho Region, and (ii) Provide an adequate operational capacity to the areas of Infrastructure and Local Economic Development of the District Municipalities of Paras, Anco and Luricocha so they may develop works of infrastructure, operation and maintenance.

(b) Component

This project seeks to strengthen the institutions in charge of the Road infrastructure and Transportation Development. In the first place, the task of the coordinating agencies shall be supported. These coordinating agencies are, according to their functions, the Regional Department of Infrastructure and the Regional Department of Transportation. The proposal consist of providing technical assistance through experts in different levels is proposed, in the first place, for the reengineering of the organization and its functions; also, assistance in matters of Road Infrastructure Management and in Transit and Transportation Regulation shall be provided. Furthermore, the provinces shall join to purchase equipment for road maintenance, which is required by the local governments. This type of help is very useful, especially, for maintaining the local integrated network and facilitating the mobility of the population and their products. This type of support is localized in areas of extreme poverty: Paras (Cangallo), Anco (La Mar), Luricocha (Huanta). However, it can be replicated in other districts with similar limitations.

(c) Period

2012-2014 (3 years)

(d) Target Area

The project targets the whole Ayacucho Region. Also, three local governments of districts in extreme poverty will receive support; i.e.: Paras, Anco and Luricocha.

(e) Project Cost

S/.6,750,000

(7) Target Area of Development Program

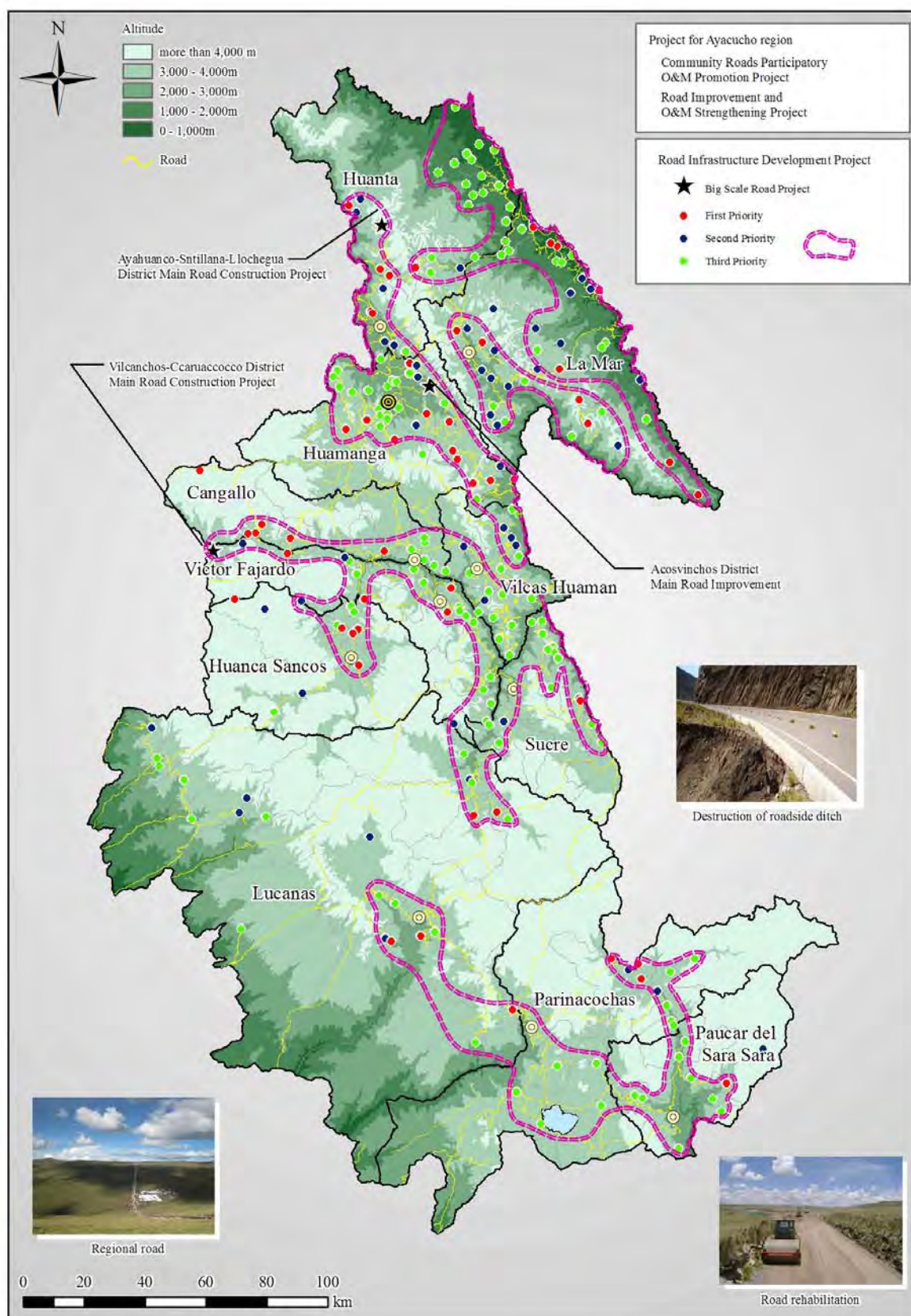
The development projects proposed above are listed in Table 11.9.7 based on regional characteristics by province and altitude described in Table 10.3.2, and illustrated in Figure 11.9.3.

Table 11.9.7 Target Area of Development Program

Zone	No.	Province	Altitude (m)	Road Infrastructure Development Project	Acosvinchos District Main Road Improvement Project	Vilcanchos-Caruaccocco District Main Road Construction Project	Ayahuanco-Srtililana-Liochegua District Main Road Construction Project	Community Roads Participatory O&M Promotion Project	Road Improvement and O&M Strengthening Project
Whole Region								⊙	⊙
North	1	Huanta	2,000-4,000	⊙	⊙				
	2		< 2,000	⊙					
	3	La Mar	2,000-4,000	⊙					
	4	Huamanga	2,000-4,000	⊙			⊙		
Central	5	Cangallo	≥ 4,000	⊙					
	6		2,000-4,000	⊙					
	7	Vilcas Huaman	2,000-4,000	○					
	8	Victor Fajardo	≥ 4,000						
	9		2,000-4,000	⊙		⊙			
	10	Huanca Sancos	≥ 4,000	⊙					
	11		2,000-4,000	⊙					
	12	Sucre	≥ 4,000						
	13		2,000-4,000	⊙					
South	14	Lucanas	≥ 4,000						
	15		2,000-4,000	⊙					
	16	Parinacochas	≥ 4,000						
	17		2,000-4,000	⊙					
	18	Paucar del	≥ 4,000	○					
	19	Sara Sara	2,000-4,000	⊙					

Remark: ⊙ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: Prepared by the Study Team

Figure 11.9.3 Regional Development Map by Sector (Road Sector)

11.10 Agricultural Products Distribution and Agro-processing

Aiming at improvement of livelihood of poor peasants which is the priority development subject, the development program on Agricultural Products Distribution and Agro-processing is proposed based on the results of analysis on present conditions mentioned in Chapter 4.

11.10.1 Development Objective

The agricultural and livestock sectors of Ayacucho Region absorb 87,000 farmers with 1,715,000 ha of farmland, and carry out the traditional agriculture for approximately 70 thousand ha, and the extensive livestock industry with 11,000 ha of pasture and 1,230,000 ha of pastureland. The average household in the Ayacucho Region has the cultivated land of less than one ha and domestic animals of 4.5 heads of cow and 15 heads of sheep/goat/alpaca. Most of farm income generally depends on income from the cash crops cultivated in small area and income from domestic animals. The income of the farmers depends on the small quantity sales of the surpluses produced in the small property and of the dairy by-products. Moreover, their products are of low quality and unstable in the quantity of production depending on the climatic vulnerability. It is very difficult for the farmers to leave the chain of poverty because of the difficulties to improve their production, causing by various factors. To take off from the chain of poverty, it is necessary to take measures to improve the production with better quality, assuring their market and of added bigger value.

On the other hand, regarding to the tendencies of the public investment, it is hoped to have a great advance in the agricultural development through the foreseen actions of the irrigation projects. There are plans to irrigate 6,100 ha through the Sierra Irrigation Project that will be implemented by AgroRural and new projects of irrigation foreseen in this Study (new projects: about 22,000 ha, rehabilitation project: about 11,000 ha, technical irrigation: about 14,000 ha). The key to drive to the success is to assure the markets for the derived production of the projects. With these circumstances, the objective of development program was decided to improve the sales prices of products by value added and to expand the market of productions that poor peasants produce, through promotion of agricultural products distribution and agro-processing, and finally to improve the conditions of rural life and to assure the agricultural economy in Ayacucho Region.

11.10.2 Basic Policies for Formulation of Development Program

In the formulation of Development Program for Agricultural Product Distribution and Agro-processing, the following points were considered with the purpose of contributing to the high-priority areas of this Study:

- To have positive effects to mitigate the vulnerability of the peasants in poverty.
- To have the positive effects to elevate the conditions of the poor peasants life.
- To have the positive effects to strengthen the institutional capacities

In a practice form, taking into consideration the current situation of the sector, through the implementation of the Master Plan, it will be converted to the rural farmers from the traditional subsistence agriculture toward innovated agricultures, including farmers inside distribution chains. The current situations and subjects for agricultural products distribution and agro-processing, and basic policies for formulation of development program are mentioned the following table.

Table 11.10.1 Current Situations, Subjects and Basic Policies for Formulation of Development Program

Current Situation and Theme	Basic Policies
<u>General Matter: Agricultural products distribution and agro-processing system toward enhancement of cocompetition of potential agricultural products in Ayacucho Region is not established. Especially, it is necessary to introduce the measures to settle the following constraints:</u>	
<u>1. The basic information to strengthen the market is lacked. Besides, the quality control system and its infrastructure are not constructed. To construct the infrastructure and promote the agro-processing, it is necessary to establish the market distribution system.</u> - Market information is not sufficiently transferred to producers. Especially, the access to the information of markets of the commercial products (Potato, Coffee, Cocoa, Avocados, etc) is difficult for producers. - Importance of quality control and quality improvement and their measures are not sufficiently transferred to producers. In specific terms, the problem is that products of dairy, sheep and alpaca are in low quality, and consequently, it is forced to sell at cheap price. - Loss of products due to lack of market infrastructures, especially storage facility for basic cereals and lack of cold transportation facility for dairy offer the subjects.	<u>Support to Distribution System of Agricultural Product Markets</u> - Improvement of the popularization chain of the Marketing Information - Promotion of channels of distribution of cocoa and coffee. - Improvement of the distribution structure of cereals. - Improvement of the distribution chain of marketing products (potatoes). - Improvement of the marketing chain of derived products of sheep and camel. - Improvement of the distribution chain of the daily Products. - Improvement of the distribution chain of the niches products. - Improvement of the distribution chain of small animals
<u>2. Inefficiency of Infrastructure of Distribution</u> - In spite of being aware of the importance of distribution infrastructure, there do not exist clear guidelines of distribution infrastructures in the Ayacucho Region. Due to this, no necessary action is not made. - In particular, infrastructures of local fairs and of slaughterhouse are deficit. - There does not still exist the distribution structure that facilitate to sell in other regions.	<u>Improvement of Distribution Infrastructure</u> - Institutional strengthening to support to the installation of infrastructure of distribution. - Support to the construction of infrastructure of fairs and local markets. - Support to the construction of slaughterhouse - Support to the installation of wholesaler market. - Support to the storing facilities
<u>3. Nonexistence of Promotion of Agro-processing</u> - Need of promotion of agro-processing is understood, but there is no idea how to establish the agro-processing factory. - There are motivations to promote the agro-processing using various materials at farmers' level, however it could not proceed due to lack of fund and technology. - Potato, main crop in Ayacucho Region, is in surplus condition at market, however the marketable alternative crops could not be found. - Sanitary condition of agro-processing products in Ayacucho Region is not in good condition, hence it is indispensable to improve the sanitary control technology to seek the market channel at outside of the region.	<u>Improvement of Agro-processing Structure</u> - Installation of agro-processing promotion center - Support to the installation of private agro-processing. - Support to the community facilities of agro-processing. - Support to agro-processing facility for new business type - Support for the installation of treatment facilities for wools of alpaca and vicuña. - Support for improvement of controls of sanitary

Source: JICA Study Team

11.10.3 Policy for Formulation of Development Program

(1) Approach toward Basic Policy

Taking into consideration the basic policy mentioned above, development program will be formulated using the following approach:

- Step-wise approach based on hard look at development scenario
- Narrowing of potential agricultural products
- Maximization of profit effect by narrowing target areas
- Preparation of plan in consideration of construction condition of infrastructures
- Effective use of existing SNIP sub-projects

(a) Step-wise Approach Based on Hard Look at Development Scenario

The following 3 scenarios are considered for the trend in agricultural production in Ayacucho Region

- Scenario 1: Increase in production based on the past trend. No large increase in irrigation area
- Scenario 2: 6,100 has of irrigation area will be increased by the Program of AgroRural
- Scenario 3: Increase in irrigation area by implementation of irrigation projects proposed in the Master Plan; 47,000 has of increment of irrigation area, being 22,000 ha of newly incorporated irrigation area, 11,000 ha of rehabilitation of irrigation area and 14,000 ha of technical irrigation area

As the results of study on 3 scenarios mentioned above, the easily attainable Scenario 1 was selected for formulation of the Master Plan. As for the Scenario 2 and Scenario 3, it was judged that certain time would be required for heghtening the needs to construction of distribution infrastructure and agro-processing after implementation of other projects, so that these are not considered in this development program. The following table shows the balance of major crops in the Scenario 1.

Table 11.10.2 Balance of Major Crops in Scenario 1

Crops	2007			Hypothesis 1 2020 with same consumption per capita			Hypothesis 2 2020 with supposition in consumption per capita on the average of 5 neighboring countries		
	Consump. (ton)	Produc. (ton)	Difference (ton)	Consump. (ton)	Produc. (ton)	Difference (ton)	Consump. (ton)	Produc. (ton)	Difference (ton)
Yucca	15,300	8,496	-6,804	17,647	2,994	-14,653	17,647	2,994	-14,653
Coffee	1,102	4,435	3,333	1,271	2,487	1,216	1,271	2,487	1,216
Maize	7,956	22,314	14,358	9,176	15,151	5,974	14,411	15,151	739
Potato	44,099	169,481	125,382	50,864	192,962	142,099	50,864	192,962	142,099
Wheat	31,237	9,387	-21,850	36,029	6,714	-29,314	49,875	6,714	-43,161
Bovine Meat	2,450	17,552	15,102	2,826	19,136	16,310	18,791	19,136	345
Milk	28,787	24,348	-4,439	33,203	26,545	-6,658	84,349	26,545	-57,804

Note: in regarding the values estimated in the year 2020, the consumed volume was estimated based on the data of FAO and the productions were estimated in accordance with the tendencies of evolutions of the productions in the last 10 years.

Source: JICA Study Team

The above balance is the result of estimaion based on the trend of past actual production of agriculture and livestock in Ayacucho Region. The result indicates that deficiency would exist in the wheat, yucca, and milk, possibly of the meat of bovine in case the consumption tendency changes that of the neighboring countries ago. In these products, small farmer will have a chance to participate in the beneficiaries of increment of demand, if the government takes adequate measure to support small farmers.

(b) Narrowing of Potential Agricultural Products

In order to prepare the plan which the poverty reduction effect is high, the development progrim was preapaed for agricultural products which are presently produced at poverty area and expected for contributing to self-production and income increase in the future. With such viewpoints, the potential crops in Ayacucho Region and the reasons of selection for them are mentioned in the following table:

Table 11.10.3 Potentials Crops and Selection Reasons

Potential Crop	Reasons for Selection
Potato	This is one of a few product marketed in the region. However, the farmers are vulnerable to the changes of potato prices. To minimize the vulnerability of this factor, it is necessary to introduce the projected cultivations in accordance with the tendencies of the prices. It is necessary to structure the means of popularization of information of prices and of demands to the associations of farmers and municipalities.
Cacao & Coffee	These products are the important products for the lower parts of the Provinces of Huanta and La Mar, being important income source for the farmers. Potentialities of growth of the world market exist.
Cereals	These products are base of the diet of the farmers. To improve the diet of families, it is necessary to increase the availability of consumptions. Since great quantity of having loss through the bad storage system, it is necessary to improve the storage infrastructure and of mills to facilitate the transformation of products for diet.
Niches Products (Tara & Tuna)	The Tuna and the Tara are cultivated in the lands of strong slope, and are very important income source for the farmers that live in that area. In the case of the Tara, several companies that are cultivating it as lucrative activities exist. In the event of the small farmers it is necessary to structure a storing system and to improve the quality for a better distribution.
Daily Products	The majorities of rural farmers carry out the agricultural combined practices of crops and cattle activity, having small quantities of heads of bovine. Those derived of the milk they constitute important source of revenues for the small farmers. The improvement of quality of the daily products that bears the pleased value of the products contributes the improvement of entrance of the small farmers.
Small Animals (Cuy)	For those farmers in a small areas of lands, the breeding of Cuyes is being important income source and of diet. The improvement of distribution net of these products increases the income of the farmers. The improvement of distribution net of Cuyes is an important necessity for the small farmers.

Source: JICA Study Team

From the above table, the develop potential is judged to be put on arrangement of market information, recommendation of agro-processing, promotion of niche field, activation of dairy products, and activation of small animal raising. Thus, priority is given to these projects, and the following improvement measures are considered effective.

Table 11.10.4 Improvement Measures for Potential Agricultural Products

Potential Products	Priority Area	Improvement Measures
Potato	Huamanga Cangallo	To disclose the information of prices in the market; prices of agricultural inputs, and the pertinent information to the farmers to diminish their dependence of the middlemen in the purchases of inputs and sale of the products. To strengthen the associations and the farmers to be able to program their cultivations and sale of the crops.
Cacao & Coffee	La Mar Huanta	- To improve the quality of the products through the improvement of facilities of dry patio and post harvests treatments. - To add the value of the products through the processing of coffee. - To build the distribution mechanism through the association, installing the centers of storing of the products to diminish the dependence of farmers regarding the middlemen.
Cereals	Huamanga Cangallo Huanta	- To install the storage infrastructures to diminish the loss of post harvests. - To Build Mills of cereals to supply to the communities.
Niches Crops(Tara & Tuna)	Huanta Cangallo Huamanga	- To form the production areas through the strengthening of associations of the farmers, gathering product in community level. - Through farmers associations of the products, it is marketed directly to the market, conquering the distribution channels gradually. - To Increase added value of the products through the agriculture prosecution.
Daily & Livestock Products	Cangallo Huamanga Lucanas	- With the introduction of control of sanity in milking, the price of the products is valorized. - Through the strengthening of the associations of the farmers, it is channeled its directly diminished products the intervention of the middlemen. - To transform the associations of those producing of Cachipa to that of modern farmers of daily to give added bigger value and to open the markets.
Camels	Lucanas Parinacochas	Through the combined storing and treatment search shears, to improve the quality of the products to elevate the added value.

Small Animals (Cuyes)	Whole Ayacucho Region	- Through the strengthening of the farmers association , to form new smaller areas farmers of animals. - Through the strengthening of associations, it is channeled the sales of their products directly to the market. To install centers of Industry of Cuyes.
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Source: JICA Study Team

(c) Maximization of Profit Effect by Narrowing Target Areas

In formulation of development program, a priority was placed on the number of beneficiaries (poor peasants) for potential products and the large project area so as to accrue the high benefit. In concrete terms, the above mentioned improvement measures will be executed in the pilot projects at principal districts as shown in the following table and project effect will be verified. And the effective measures will be applied to the surrounding areas.

Table 11.10.5 Mayor Production Districts of Major Crops

Potential Products	Principal Districts (mayor 5 districts)
Potato	Acocro, Chiara, Vinchos, Tambillo Los Morochucos
Livestock(Milk & Beef Cattle)	Los Morochucos Chiara Laramate, Llauta, Huac-huas
Cacao & Coffee	Ayna, Sivia, Santa Rosa, San Miguel Llochegua
Niches Crops (Tara & Tuna)	Hunta, Luricocha Cangallo Pacaycasa, Ocros
Small Animals (Cuyes)	Departamento
Andes Crops (Quinoa & Quiwicha)	Acocro, Chiara, Coracora Vilcas Huaman
Cereals	Vinchos, Acocro Totos Huanta

Source: JICA Study Team

(d) Preparation of Plan in Consideration of Construction Condition of Infrastructures

The distribution in Ayacucho Region is largely classified into (i) route linking to main road La Libertador centering Huamanaga Province, (ii) route linking Cangallo Province, Victor Fajardo Province and Vilcal Huaman Province to main road La Libertador, and (iii) route centering Puquio. In particular, the road development plan to link Huamanaga to Abancay is under preparation, and it is expected to improve the distribution condition in the future. In this area, as the comparatively flat area for agriculture and livestock extends and has high potential for agriculture and livestock development, the development program is executed centering on this area.

(e) Effective Use of Existing SNIP Sub-projects

In the development program, supplemental inputs will be made as a base of plan preparation of sub-projects if required, to raise the effect of sub-projects. However, the sub-projects related to agricultural products distribution and agro-processing sectors are only 36 in number, that are not enough to improve the market and distribution in Ayacucho Region. Hence, the development program is formulated to realize the combined effect by adding the new sub-projects to the sub-projects with high effect, which are regarded as sample project.

(2) Evaluation and Prioritization of SNIP Sub-projects

With the purpose to evaluate and to prioritize the existing SNIP sub-project, these were classified and evaluated in the following way.

(a) Number of SNIP Sub-project

The number of SNIP sub-projects in the area of agricultural products distribution and agro-processing sectors was 36 in total. As shown in the following table, Huanta Province has the largest number of sub-projects, and followed by Huamanga Province and Licanas Province in turn.

(b) Classification of SNIP Sub-projects

The sub-projects were classified into (i) Strengthening of distribution system, (ii) Improvements of the Infrastructure of Distribution and (iii) Improvement of the Agro-processing. The distribution of the sub-projects and requested budgets are as follows:

Table 11.10.6 Number of Sub-project by Province on Agricultural Products Distribution and Agro-processing

Province	Nos. of Sub-projects
Huanata	8
La Mar	3
Huamanga	6
Cangallo	2
Vilical Huaman	3
Vicor Fajardo	2
Huancasancos	0
Sucre	4
Lucanas	5
Panicochas	1
Paucar del Sara Sara	2
Total	36

Source: JICA Study Team

Table 11.10.7 Typology of the Sub-projects of Distribution and Agro-processing Industry Registered in SNIP

Items		Number of Projects	Beneficiaries	Budget Requested (s/)	Budget corrected to Price of 2009 (s/)
Strengthening of the Distribution System	Improvement of the Popularization Chain of Marketing Information	1	58,053	72,304,090	80,402,148
	Improvement of Channels of Distribution of Cocoa and Coffee	2	8,630	2,893,881	3,085,302
	Improvement of Distribution Structure of Cereals.	5	11,234	3,508,660	3,816,175
	Improvement of Distribution Chain of the Marketing Products (Potatoes)	2	65	196,864	210,644
	Improvement of Marketing Chain of derived products of camel	1	200	137,529	147,156
	Improvement of Distribution Chain of the Daily Products	5	2,933	521,997	588,134
	Improvement of Distribution Chain of the Niche Products.	3	8,955	2,421,079	2,698,555
	Improvement of Distribution Chain of Small Animals	2	57	213,413	228,352
Improvement of Distribution Infrastructure	Institutional Strengthening to support to installation of Infrastructure of Distribution				
	Support to Construction of infrastructure of Fairs and Local Markets.	4	28,130	905,532	968,919
	Support to Construction of Slaughterhouse	1	3,152	1,026,703	1,098,572
	Support to Installation of Wholesaler Market				
	Support to Storing Facilities	4	1,265	534,984	581,001
Improvement of Agro Industry Structure	Institutional Strengthening to motivate Installation of Agro-processing Center				
	Support to Community Facilities of Agro-processing.	6	24,235	6,746,212	7,486,367
Total		36	157,569	91,410,944	101,311,325

Note: The Project related to the Improvement of Chain of Popularization of the Information of Market is of Sierra Exporter Project; its environment the National level.

Source: JICA Study Team

Sub-projects for agriculture sector are 825 in number as of April 2009. Out of them, those for agricultural products distribution and agro-processing sector are 36 in number, which are 4% of total number of sub-projects

for agriculture sector and 6.2% of total budget requested. As far as these figures concerned, it is deemed that Ayacucho Region is not highly interested in agricultural products distribution and agro-processing projects.

(c) Evaluation Method of SNIP Sub-projects

Sub-projects were evaluated from viewpoints of relevance, effectiveness, efficiency, impact and sustainability. Evaluation criteria for each item are as follows:

Table 11.10.8 Evaluation Criteria for Sub-projects for Agricultural Products Distribution and Agro-processing

Item	Indicators		Points	Reference
Relevance	Poverty	Extreme Poverty (P3)	30	Correlation with Master Plan's Goal
		High Poverty (P2)	18	
		Poverty (P1)	6	
Effectiveness	Soil Potential	High Potentiality (A, P; Cropping Lands, Pasture)	30	Adequation with Potentiality
		Meddle Potentiality (F: Forest)	18	
		Low Potentiality (X: area de Conservation)	6	
Efficiency	Cost by Beneficiary	Investment per beneficiary< S/ 1,000	10	Efficiency of Investments Cost
		Investment per beneficiary >S/1,000 y < S/2,0000	6	
		Investment > S/ 2,000	2	
Impact	Environmental and Social Impact	No negative impact. Exist positives impacts,	5	Socio Environmental Impacts
		No significant impact, exist alternative solution	3	
		Significant Impact. No exist alternative solution	1	
	Influence	High possibility to influence other zone	5	Level of Influences
		Moderate influence for other zone	3	
		Low influence for other zone	1	
Sustainability	Institutional Strengthening	Administrate by Local Government Level (GL)	10	
		Administrate by Regional Government (GR)	6	
		Administrate by Central Governmments (GN)	2	
Maximum Points			90	
Minimum Points			18	

Source: JICA Study Team

(d) Results of Evaluation of Sub-projects Registered

Using the mentioned evaluation approaches, it was carried out the evaluation of the subprojects and they were ordered by points order adding their budgets. The priorities were categorized in the first 20% of the budget (1st Priority Group), those located among 20% to 40% budgets (2nd Priority Group) and the remaining (3rd Priority Group) ones. The result is indicated in the following table:

Table 11.10.9 Number of Subprojects in accordance with Provinces and Priority

Province	1 st PriorityGroup	2nd PriorityGroup	3rd PriorityGroup	Total
Huanta	3	1	4	8
La Mar	-	1	2	3
Huamanga	2	-	4	6
Cangallo	-	-	2	2
Vilcas Huamán	-	1	2	3
Víctor Fajardo	-	-	2	2
Huanca Sancos	-	-	-	0
Sucre	1	-	3	4
Lucanas	3	-	2	5
Parinacochas	1	-	-	1
Paucar del Sara Sara	1	-	1	2
Total	11	3	22	36

Note: the subprojects of Priority 1 are the subprojects of high evaluation points that are inside 20% of budget requested total. The subprojects of priority 2 are among 20 to 40%.

Source: JICA Study Team

Priority sub-projects by project type are as follows:

Table 11.10 10 Number of SNIP Sub-projects by Project Type and Priority

Project Type	1st Priority Group	2nd Priority Group	3rd Priority Group	Total
Strengthening of Distribution System	5	2	15	22
Improvement of Distribution Infrastructure	4		5	9
Improvement of Agro-processing	3	1	3	7
Total	12	3	23	38

Source: JICA Study Team

Taking into the above, the contents of the projects composing the development program are worked out focusing on the sub-projects included in the 1st priority group.

Table 11.10.11 Priority Subprojects for Each Project

Project Type	Sub-projects
Strengthening of Distribution System	• Improvement of the Distribution of Daily Products in the district of Chiara; SNIP 10339. • Improvements of the Installation of Equipments and Setting in Operation of Plant Cheese maker in the City Coracora Provinces of Parinacochas - Ayacucho; SNIP 88936. • Distribution of the Honey of Bee; SNIP 96764. • Promotion and Incentive of Consumption of Native Products for the Security would Feed in the Valley of Sondondo in the Provinces Of Lucanas; SNIP 66266. • Managements of Pre harvest of Avocado Fruit; SNIP 96708
Improvement of Distribution Infrastructure	• Installation of the Agricultural, Agro industrial, Handmade and Folkloric XV Provincial Fair of the Provinces of Paucar of Sara Sara - Ayacucho; SNIP 82065. • Center of Storing of Lucma and Avocado - Luricocha; SNIP 99638. • Construction Of the Field Ferial in the Town of Querobamba, Province Of Sucre - Ayacucho; SNIP 88841. • Promotion of permanent sale points for the Articulation of those Producing of the District of Puquio, Provinces of Lucanas, Department of Ayacucho to the local market. SNIP67103
Improvement of Agro-processing	• Strengthening of the Productive Capacities and Installation of an Agro industrial plant of Cereals, inside the mark of the Security would Feed and Sustainable Agriculture in Communities of the District of Puquio, County of Lucanas - Ayacucho.; SNIP 73007. • Technical Attendance for the strengthening of those Producing of the Productive Chain of Industrial Oat in the Districts of Chiara, Acocro and Morochucos, Counties of Huamanga and Cangallo - Ayacucho; SNIP 95452

Source: JICA Study Team

11.10.4 Development Program

11.10.4.1 Composition of Development Program

The agricultural activities in Aycucho Region are conformed by potato, cocoa and coffee and of cattle activities of milk and of cattle breeding. The distribution system of these products is in the precarious level, except for potato. Especially, the state of the distribution structures of milk is precarious level, although the production of milk is economically important source for the small farmers. Even existing potential market in a milk market of the region, due to the poor distribution system, the milk produced in the Region occupies insignificant in the market. To improve the life conditions of poor peasants, it is necessary to strengthen the distribution system by improving their quality. In this development program, using the subprojects registered in SNIP, the following projects are proposed to enlarge their markets and to give value added to their products;

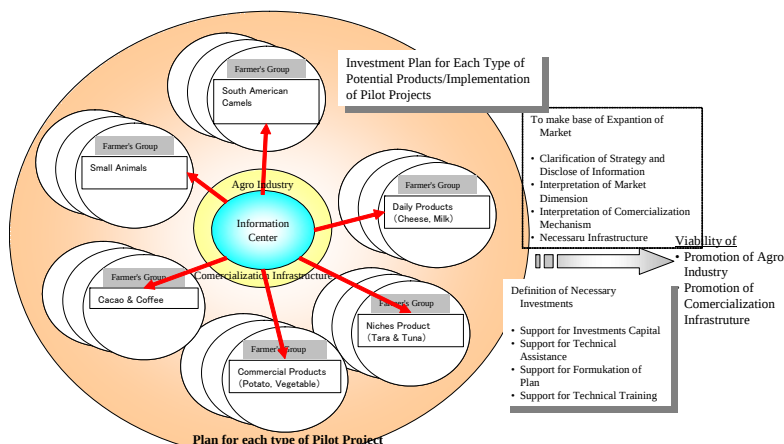
- Market Distribution System Establishment Project for Agriculture Production
- Distribution Infrastructure Construction Promotion Project
- Agro-processing Industry Promotion Project

11.10.4.2 Outline of Development Program

(1) Market Distribution System Establishment Project for Agriculture Production

(a) Background / Objective

Support for the Strengthening of Commercialization System of Potential Products



The distribution and agro-processing in the Region is at a low development level, except moderate infrastructures of the municipal markets, like part of the distribution infrastructure. The agro-processing is also in the same situation and there exist homemade small establishments only. The majorities of producers practice the traditional farming practices for their self consumption with limited income opportunity. In the future, it is necessary to develop the agriculture and livestock based on the market mechanisms in order for these producers to participate in market. At first, it is necessary to convert the farmers from the subsistence agricultures toward to the modern farmers. The Project

will implement the pilot projects with the purpose to seek for the appropriate measures of participating in the market and applying different types of pilot sub-projects in potential products, such as the improvement of mechanisms of popularization of information of markets, improvement of distribution channels and strengthening of the association.

In the Project, the strategy on potential crops will be clarified, and the size of market, market mechanisms and the necessary infrastructures will be identified. In concrete terms, construction of distribution infrastructure and agro-processing promotion works will be executed to expand market of potential agricultural products through pilot project centering on construction of markets information center on agricultural products. The pilot project will be carried out at high production potential area for potential agricultural products and also for producers association with high awareness on participation in it.

(b) Component

1) Support to Establishment of Markets Information Center on Agricultural Products

This component has the objective to structure the popularization mechanism of the markets information (prices, negotiated volumes, etc.) to the farmers and the associations of farmers so that they can program and to project through the real information of the market. It will also strengthen the information regarding cropping technologies, regulation of markets, etc., to be able to adjust their productions to the direction of the market of consumer. With this purpose, it will be structured in GR-DRA the Information Center, sufficiently equipped with technological information and of market. The foreseen activities are;

- Study of Structuring of the distribution.
- Collection of Information and popularization of them, especially on the potential products.
- Installation of the Information Center of Distribution.
- Support to the combined activities of the associations of farmers

The information to be disclosed to producers association, consists of information of internal and main markets (Prices and negotiated volumes, etc.), information of markets potentials as export destination, regulation of vegetable Sanitary and use of agriculture toxics and practice agricultural applied in other regions. In this project, the mechanism will be studied of to transfer and to disclose the information toward the farmers to evolve from agriculture of subsistence to a modern agriculture.

2) Support to Improvement of Distribution Channels of Cocoa and Coffee

These activities will be implemented in the lower parts of the Provinces of Huanta and La Mar where produce Cocoa and Coffee, with the purpose of motivating these cultivations, and finally to improve the income of the poor peasants in these areas. It will be improved the infrastructures of drying patio and of laundry to improve the quality of the products. It will be also established the agro Industry center of coffee to give bigger added value. The pilot projects will be implemented with the participation of the associations of farmers to develop the following investments;

- Construction of community Drying patio and Post-harvesting Facility
- Installation of primary Agro-processing Center
- Support to Participation of Producers Association in Markets
- Support to the promotion of the Coffee and Organic Cocoa

The support will be carried out mainly by the technical assistance to improve their products. Through these activities, the possibilities will be studied of giving added value of the products of coffee and cocoa produced in the region.

3) Support to Improvement of Distribution Structure of Cereals

This component, with the purpose to improve the distribution mechanism of the products cereals and to increase the marketed volume of

this product, will be carried out for support to community Facilities of drying installation and warehouses of cereals and support to community Facilities of mills. The target is the area and/or the producers association which expect the above-mentioned works.

4) Support to Improvement of Distribution Chain of Market Products (Potatoes)

This component will be implemented in the main productions districts of potatoes: Acocro, Chiara, Vinchos, Morochucos and Tambillo where more than 500 ha are cultivated, to improve the distribution mechanism. The following activities will be developed;

- Support to the improvement of system of popularization of information.
- Support to the improvement of the mechanism of storing of products

Through the support activities to the improvement of system of transmission of information, the mechanisms will look for to transfer the information at the hands of the farmers. In the development of cooperative consignment, study will be made for change from “the system which the producers will bring the products to the market”, to “ the system which the producers association collect the products and send them to the market” In addition to the construction of facility, quality control system will be studied to seek for possibility of giving value added to cooperative consignment system.

5) Support to Improvement of Market Chain of Derived Products of Sheep and Camel

These activities will be implemented with the purpose of improving the revenues of the rural farmers that live in the High Andean Part where farmer don't have other alternatives of survival. In this product, the control of quality of the products has great importance to improve the farmer's income. At the moment, the rural farmers lack the infrastructure that facilitates better quality of the products, being forced to sell in low prices. As the measures for this problem, it will be constructed the necessary infrastructure to improve the quality of the products. The foreseen activities are the followings;

- Installation of the Agro-processing of wool of Sheep, Alpaca and Vicuña.
- Center of Storing

The installation of agro-processing of wool will look for to improve quality of the products to incorporate added bigger value

6) Support to Improvement of Distribution Chain of Dairy Products

This component will be implemented to improve the income of the farmers, through improvement of quality of the dairy products. Measures to improve quality are construction of cheese production factory, improvement of milk collection facility, support to sanitary control at production process, technical support to value added production, and support to distribution process. These are realized by pilot project on comprehensive market and distribution system. By this activity, it will lean on the distribution chains from the origin until the sales points. The foreseen activities of this component are;

- Support to improvement of control of sanity of the daily products
- Support to the installation of centers of Storing.
- Support to the Installation of community Establishments of Transformation of cheese.
- Support to the strengthening of the Associations

This component will be carried out with the existent associations to find the appropriate strategies to improve its qualities of the products and finally to open markets, not alone in the region also in other regions as well as of metropolitan Lima.

7) Support to Improvement of Distribution Chain of Niches Products

This component will be developed to motivate the niches products. As the market of niches products are limited and much defined, it is necessary to carry out the specific studies of this topic, investigating the consumption propensities and their preferences.

(c) Period

2011-2014 (4 years)

(d) Target Area

The projects areas are as follows;

Table 11.10.12 Target Area for Strengthening of Distribution System

Component	Area
Improvement of the Popularization Chain of the Marketing Information	11 provinces + GR
Improvement of Channels of Distribution of Cocoa and Coffee	Huanta y Huamanga
Improvement of the distribution Structure of Cereals.	11 provinces
Improvement of the Distribution Chain of the Marketing Products (Potatoes)	Huamanga, Cangallo
Improvement of the Marketing Chain of derived products of camel	Lucanas
Improvement of the Distribution Chain of the Daily Products	Huamanga, Cangallo y Parinacochas
Improvement of the Distribution Chain of the Niches Products.	Huanta, Huamanga, Cangallo
Improvement of the Distribution Chain of Small Animals	11 provinces

Source: JICA Study Team

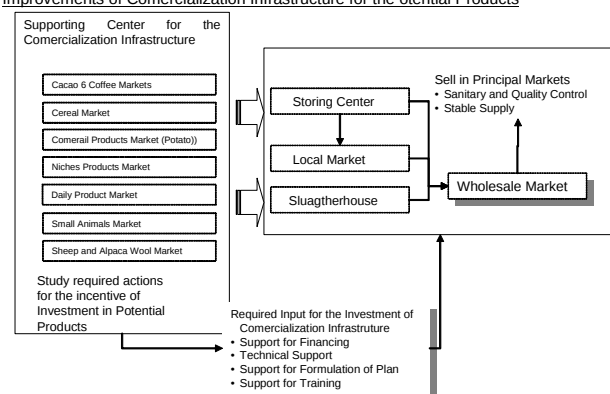
(e) Project Cost

1st Priority Sub-project Group	S/10,500,000
2nd Priority Sub-project Group	S/11,300,000
3rd Priority Sub-project Group	S/20,800,000
Total	S/42,600,000

(2) Distribution Infrastructure Construction Promotion Project

(a) Background / Objective

Improvements of Comercialization Infrastructure for the otential Products



The current situation of the distribution infrastructure is in a precarious stage, provoking the deterioration in the quality of the products such as damage of products and decomposition loss of agricultural products because of the distribution operations under poor sanitary conditions. This cause difficulty in the distribution of their products and of opening new markets, because of deteriorated quality and unstable quantity. The SNIP sub-projects requested in the distribution area are only 9 subprojects. However, it will be necessary to meet increased demand in the area of their infrastructure with future developments in the implementation of the projects. It is necessary to structure the base of the possible projects of distribution infrastructure for

potential crops and promoted crops, through institutional strengthening to support the installation of distribution infrastructure center, with the objective of enlarging the market and the competitiveness of the products of Ayacucho Region in the medium and long term. It would require to install the distribution infrastructures to be able to align the production with the demands of the market so as to ensure the new market for potential crops. In this Project, the storing centers, the fairs and local markets, camels and the market wholesaler were implemented. The Center to Support the distribution Infrastructure will be responsible for channeling the inputs required for the distribution infrastructure, financial so much support, technician, formulation of the Project and qualification of human resources.

(b) Component

1) Support to Installation of Distribution Infrastructure Center

This activity looks for to support the installation of infrastructure of the local governments' distribution and of associations, through the Installation of the Strengthening Center of Infrastructure of Distribution. This center will carry out the two main activities; (i) formulation of the Plan of Infrastructure of Distribution and (ii) support to the local Governments and associations. The Plan of infrastructure of Distribution will be formulated to establish the strategies of the necessary facilities of distribution, being adjusted to the scenario of development of the Department. This Center, based on this Plan of Infrastructure, will give support in the implementation of the distribution infrastructure. The support topics would be (i) support to the relating documentations to SNIP, (ii) guidance to regulation on construction of infrastructures, planning procedure and budget arrangement, and (iii) support to planning of infrastructure. In addition, development plan on distribution infrastructure will be prepared for medium and long terms.

2) Support to Construction of Infrastructure for Local Markets

This activity will be made aiming at modernization of local markets in Ayacucho Region, and consist of support to installation of local markets, support to sanitary control and support to strengthening of association. Especially, in support to installation of local markets, all provincial governments in Ayacucho Region will prepare the installation plan of local markets under support of this activity.

3) Support to Construction of Slaughterhouse

This activity will be carried out to modernize the existing slaughterhouse. The activities will be prioritized in the counties where it exists cattle activities, as well as of the Provinces of Huamanga, Cangallo and Huanca Sancos. The activities are (i) support to the Installation and modernization of slaughterhouse, (ii) support to the control of sanity, (iii) support to the means of transports (cold Camera, etc.), and (iv) support to producers associations.

4) Support to Installation of Wholesaler Market

This activity will aim at expansion to market of agricultural products in Ayacucho Region, and will provide function for the existing markets in Ayacucho City as wholesale market. The main activities are (i) support to the installation of Infrastructure of having wholesaler market and (ii) support to the popularization of information to the users.

5) Support to Storing Facilities

This activity will be carried out to develop the infrastructures of storing of the potential products. The serious support environment are (i) installation of warehouse of cereals, (ii) cold camera of milk, (iii) installation of warehouse of potato, (iv) installation of warehouse of cocoa and coffee and (v) packing house of tuna. These activities will be conducted as per request by producers entity which need the improvement of distribution in the potential area.

(c) Period

2013-2018 (6 years)

(d) Target Area

The target areas are as follows:

Table 11.10.13 Target Area for Improvement of Distribution Infrastructure

Project	Target Area
Institutional Strengthening to support to the installation of Infrastructure of Distribution	GR-DRA
Support to the Construction of infrastructure of Fairs and Local Markets.	11 Provinces
Support to the Construction of Slaughterhouse	Huamanga, Cangallo, Huanca Sancos, y others
Support to the Installation of Wholesaler Market	Huamanga
Support to the Storing Facilities	11 Provinces

Source: JICA Study Team

(e) Project Cost

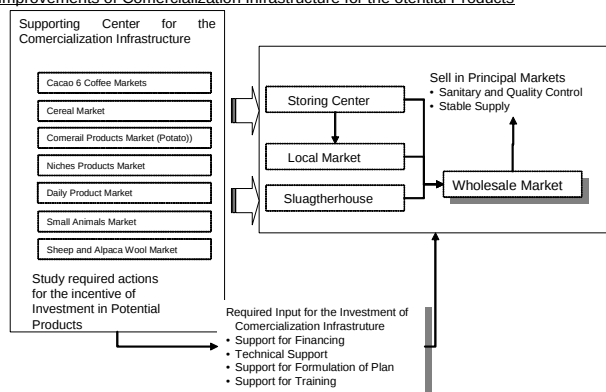
1st Priority Sub-project Group	S/.7,300,000
2nd Priority Sub-project Group	S/.9,100,000
3rd Priority Sub-project Group	S/.46,000,000
Total	S/.62,400,000

(3) Agro-processing Industry Promotion Project

(a) Background / Objective

It is considered that the agricultural production in Ayacucho Region will be increased in the near future with the implementation of proposed several projects in the Master Plan. Especially the irrigation projects would realize the increase in production in the developed areas which would bring about the possibility of occurrence of over production. It is therefore important to motivate the agro-processing facilities as the motors to increase the market of the products. Especially it is necessary to develop the market of commercial products and milk. At the

Improvements of Comercialization Infrastructure for the otential Products



moment, the products of Ayacucho Region are marketed in nature with low price, except the cheese. In particular, as for dairy products, the cheese (cachipa) produced in Ayacucho Region doesn't have enough quality to conquer the market, being limited to the local market with low price of products. In this circumstance, the farmers are already aware of the necessity of the improvement of quality. In order to conquest this situation, for example, milking producers associations are eager to construct the dairy processing facility. At present, the requested matters are milling of cereals, dairy processing, slaughterhouse and oil mill. In reply to these requests, the Project aims to give value added to local products and development of new market through promotion of agro-processing.

(b) Component

1) Institutional Strengthening to Motivate Installation of Agro-processing Promotion Center

This activity will be implemented to motivate the agro-processing facilities through support to the installation of agro-processing promotion center, installation of the center of support, and support to the formulations of plan of facilities of agro-processing.

2) Support to Installation of Private Agro-processing

This activity will be carried out to support the facilities of agro-processing of mills, tara, daily, etc. to motivate the private sector investments. The supports will be carried out for construction of factory, acquisitions of licenses for sales and financial arrangement for construction of factory.

3) Support to Community Facilities of Agro-processing

This activity supported the facilities of agriculture community prosecutions. The foreseen actions are support for the community constructions of mills, support for the constructions of center of transformation community cheese dairy, support for constructions of plant of cuyes and support for constructions of slaughterhouse. For these facilities, support will be made for raw material production to sales.

4) Support to Promotion of Facilities for New Type Agro-processing

This activity will be carried out to promote the facilities of new agro-processing. The planned facilities are potato milling factory, jam factory and oil factory. The possible activities are planning, support to supply of materials and sales plan, financial support and technical support.

5) Support to Installation of Beneficiaries Plant for Wool of Sheep, Alpaca and Vicuña

With the purpose of motivating the activities of camel's upbringings, it will be carried out the installation of plants of processing of wools of sheep, Alpaca and of vicuñas through the technical assistance and financial support.

6) Support to Improvement of Sanitary Control Technology	
With the purpose of improving the sanitary quality they will be it will support the sanitary control in the interested associations.	
(c) Period	
2017-2020 (4 years)	
(d) Target Area	
The target areas are as follows;	
Table 11.10.14 Target Area for Improvement of Agro-Processing Structure	
Contents of Project	Target Area
Institutional Strengthening to motivate the Installation of Agro-processing	GR-DRA
Support to the Installation of Private Agro-processing	Huanta, Huamanga
Support to the Community Facilities of Agro-processing	11 Provinces
Support to the New Type of Agro-processing	Huanta, Huamanga
Support to Installation of Beneficiaries Plant for Wool of Sheep, Alpaca and Vicuña	Lucanas, Parinacochas
Support to sanitary Control	Huanta, Huamanga, Cagallo
Source: JICA Study Team	
(e) Project Cost	
1st Priority Sub-project Group	S/3,700,000
2nd Priority Sub-project Group	S/9,100,000
3rd Priority Sub-project Group	S/5,500,000
Total	S/18,300,000

(4) Target Area of Development Program

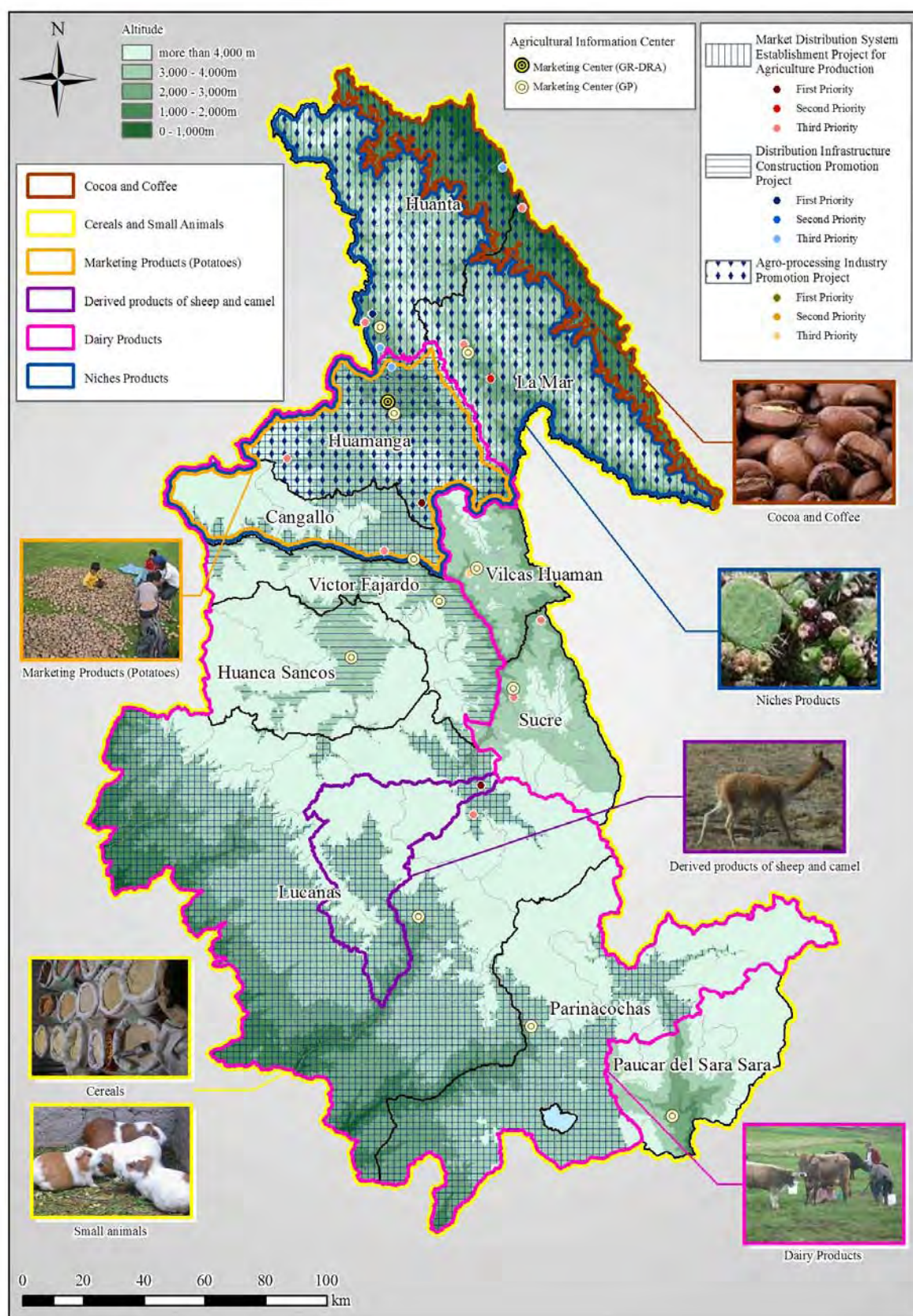
The development projects proposed above are listed in Table 11.10.15 based on regional characteristics by province and altitude described in Table 10.3.2, and illustrated in Figure 11.10.1.

Table 11.10.15 Target Area of Development Program

Zone	No.	Province	Altitude (m)	Market Distribution System Establishment Project for Agriculture Production	Distribution Infrastructure Construction Promotion Project	Agro-processing Industry Promotion Project
Whole Region						
North	1	Huanta	2,000-4,000	◎	○	◎
	2		< 2,000	◎	○	◎
	3	La Mar	2,000-4,000	◎	○	◎
	4	Huamanga	2,000-4,000	◎	◎	◎
Central	5	Cangallo	≥ 4,000	○		
	6		2,000-4,000	◎	◎	○
	7	Vilcas Huaman	2,000-4,000	△	○	
	8	Victor Fajardo	≥ 4,000	△		
	9		2,000-4,000	△	◎	
	10	Huanca Sancos	≥ 4,000	△		
	11		2,000-4,000	△	◎	
	12	Sucre	≥ 4,000	△		
	13		2,000-4,000	△	○	
South	14	Lucanas	≥ 4,000	○		○
	15		2,000-4,000	◎	◎	
	16	Parinacochas	≥ 4,000	○		○
	17		2,000-4,000	◎	◎	
	18	Paucar del	≥ 4,000	△		
	19	Sara Sara	2,000-4,000	△	○	

Remark: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: Prepared by the Study Team

**Figure 11.10.1 Regional Development Map by Sector
(Agricultural Products Distribution and Agro-processing Sector)**

11.11 Institutional Capacity Building/Training Plan

11.11.1 Development Objective

Local institutional reinforcement and training will be carried out in order to reinforce the rural organizations (*GRA, local governments and rural communities*) aiming at the priority subject "improvement of living standard and mitigation of vulnerability of the poor peasants".

11.11.2 Basic Policies for Formulation of Development Program

The present situation and problems, and the basic concepts for project formulation regarding the institutional reinforcement and training program are listed as shown below.

Table 11.11.1 Present Situations, Problems and Program Formulation

Present Situations and Problems		Basic Policies
- Based on the hearings from GRA, local governments and community organizations, INEI statistics, and the existing capacity development plans, it is apparent that there exists "lack of capacity in the Regional Government", "lack of capacity in the local governments", "lack of coordination among relevant institutions". It is also obvious that the needs for capacity development are various. - In order to utilize the limited resources more efficiently and to implement development projects in a concerted manner within the region, it is necessary that the regional government and local governments involve themselves in a close coordination in about every aspect of their administration. - Capacity development of the regional government and local governments with their own initiatives is limited. On the other hand, the donor-assisted projects and the trainings conducted by the private consulting firms are many.	⇒ ⇒ ⇒	<u>Priority to the institutions/organizations and themes which have more relevance to the development challenges of this Study</u> Since the needs for the capacity development cover a broad range of institutions/organizations and themes, focus is given on those which are closely related to "income-generation of poor peasants and mitigation of their vulnerability". <u>Strengthening of Coordination among Organizations through Joint Training</u> The projects will embrace the training/learning environment where the staff of different institutions/organizations learn how to coordinate and collaborate. <u>Efficient Planning by Absorbing Lessons from Existing Donor-assisted Projects and Training Programs Offered by Private Sector</u> The capacity development programs offered by donors and private consulting firms are mostly based on the extensive needs assessment. Reviewing the details of these programs provides relevant information in the planning of the projects of this Study as well.

Source: JICA Study Team

11.11.3 Approach to Formulation of Development Program

The following approaches were employed for the programming of institutional capacity building/training plan.

(1) Program Formulation based on Analyses of Requirements from Wide Viewpoints

There are many institutions and subjects which are concerned with the capacity building. To identify the high priority requirement, the requirements from various sources shall be analyzed to formulate the program.

(2) Focus on Sectoral Cross-cutting Themes

In this Master Plan, the programs including relevant institutional reinforcement projects are proposed in each development sector such as agriculture, rural roads and social development. Based on this situation, this chapter will focus on the institutional capacity building/training plan which would cover sectoral cross-cutting themes.

(3) Analyses of Projects Registered in SNIP

As indicated in Table 11.10.2, almost all the projects proposed in SNIP in the administration sector of Ayacucho Region are for improvement and extension of the government offices and procurement of equipment. Installation of air conditioners in a provincial government office or procurement of construction machinery for road improvement, for example, can be considered in a broad sense as the institutional reinforcement projects, however, they do not have direct concern with the priority subject of this Master Plan. Some projects of capacity building such as training on local tax levy are found in the list, but they are very few. In addition, some projects of participatory development planning are found among the projects of non-civil works and equipment procurement, however they generally schedule an ad hoc workshop for project formulation, which does not match the concept of capacity building of this Master Plan. It should be noted that the institutional reinforcement and human development are complicated components to be incorporated in public investment, and this type of projects are still few under the limited financial resource. Therefore, the projects of local institutional reinforcement and human development actually registered in SNIP do not coincide with the real requirements. By this reason, the projects listed in SNIP shall not be taken into consideration for analysis of the requirements for the institutional reinforcement and training program.

Table 11.11.2 Project of Administration Sector Registered in SNIP

Project Type	Number of Project (Total 114)
Construction and procurement	105
Institutional reinforcement and human development (Participatory development planning)	9 (3)

Source: JICA Study Team

11.11.4 Development Program

11.11.4.1 Composition of Development Program

Considering the above mentioned discussion, the following two projects are proposed for the institutional capacity building/training plan.

- Support Capability Strengthening Project for Production Organization by Local Governments
- Promotion Capability Strengthening Project for Public Investment Works by Local Governments

The outlines of these projects are given hereunder.

11.11.4.2 Outline of Development Program

(1) Support Capability Strengthening Project for Production Organization by Local Governments

(a) Background / Objective In Peru, the major parts of the administrative works have been transferred to the regional governments and the local governments (provincial and district offices) in course of the decentralization reform since the establishment of Basic Decentralization Law in 2002. At the local government level, there have been since before social development division and infrastructure division, however, some municipalities do not have ODEL yet. In Ayacucho region also, the majority, 90 district offices have not established ODEL as of November 2009. Thus, the important policies such as support for producers' organizations, employment acceleration, farmers' income increase have not been implemented satisfactorily.
(b) Component 1) Support for ODEL Establishment In the district offices where ODEL has not been established, supports for establishment of the offices and procurement of equipment will be executed. 2) Joint Training Focusing on Rural and Economic Development Joint training will be held for the regional government staff in economic development division, the local government staff (including staff

other than ODEL), rural community's associations (Junta Directiva) on income increase, institutional management, fund raising and so on. Institutional knowledge about economic development is needed for raising the necessary funds. Therefore, besides the ODEL staff of local governments, the staff of general division, planning subdivision and budget planning division are proposed to participate. As the target area is all Ayacucho Region, the training will be carried out simultaneously in three areas; the northern, the central and the southern parts. The training will be carried out by cluster type (group training) in the central city of each area.

3) Technical Assistance to ODEL of Local Governments

Capacity development will be conducted in terms of preparation of institutional management manuals (*ROF, MOF, PAP, etc.*), project cycle management, monitoring and evaluation methods, and policy programming. Through the implementation of pilot projects for capacity development and productivity improvement of the producers' organizations, the support for capacity building will be realized in accordance with the particular objective of ODEL. Pilot projects will be carried out just in three selected areas, which will be identified in this Master Plan, so that the experience be shared among several local governments.

(c) Period

2012-2015 (3.5 years)

(d) Target Area

This project will be executed for 90 district offices. There is no project registered in SNIP which is closely related to this project.

(e) Project Cost

S/.13,100,000

(2) Promotion Capability Strengthening Project for Public Investment Works by Local Governments

(a) Background / Objective

In Peru, for the purpose of efficient use of public resources, National Public Investment System (SNIP) was introduced in 2000, and the Ministry of Economy and Finances (MEF) established the procedures and regulations for formulation, evaluation and implementation of public investment projects. SNIP is in decentralization process since January 2007, and the authorization for project implementation has been transferred to the regional and local governments.

The local governments still lack the basic knowledge regarding the role of the governments in efficient distribution of public funds, and project cycle management. In addition, they do not understand well the peculiar procedures and regulations of SNIP at individual and institutional levels, thus, the project formulation, evaluation and implementation are not realized smoothly.

From these viewpoints, this Project will conduct the training for the 11 provincial and the 111 local governments' staff in general division, budget planning subdivision, administration office and technical divisions (economic development, social development and infrastructure) on SNIP and project cycle management, so that the local governments become able to implement the public investment projects smoothly.

(b) Component

1) Establishment of OPI

Supports will be provided for the local governments which do not have OPI yet, and OPI office shall be established and necessary equipment shall be procured. About 60 local governments have not opened OPI office as of November 2009.

2) Training on SNIP and Project Cycle Management

By this component, comprehensive training will be conducted on SNIP and project cycle for three technical offices such as ODEL, ODSL and Infrastructure, which are responsible for project formulation and execution like formulation unit (UF) and executing units (UE), and OPI staff as the evaluation section. In addition, "project cycle management training" and "SNIP and outcome management training" will be given to the staff of resolution organizations (Órgano Resolutivo), too. As the target area is all Ayacucho region, the training will be made in three zones such as the northern, the central and the southern parts, and the cluster type training (group training) will be adopted in the central cities of the three areas. Moreover, OPI staff will join in short-term intensive class in Lima (DGPM of MEF) on criteria for public fund investment.

(c) Period

2012 - 2014 (2.5 years)

(d) Target Area

This project is carried out for 60 local governments in Ayacucho. No project with close relation to this project is found in SNIP list.

(e) Project Cost

S/.10,600,000

(3) Target Area for Development Program

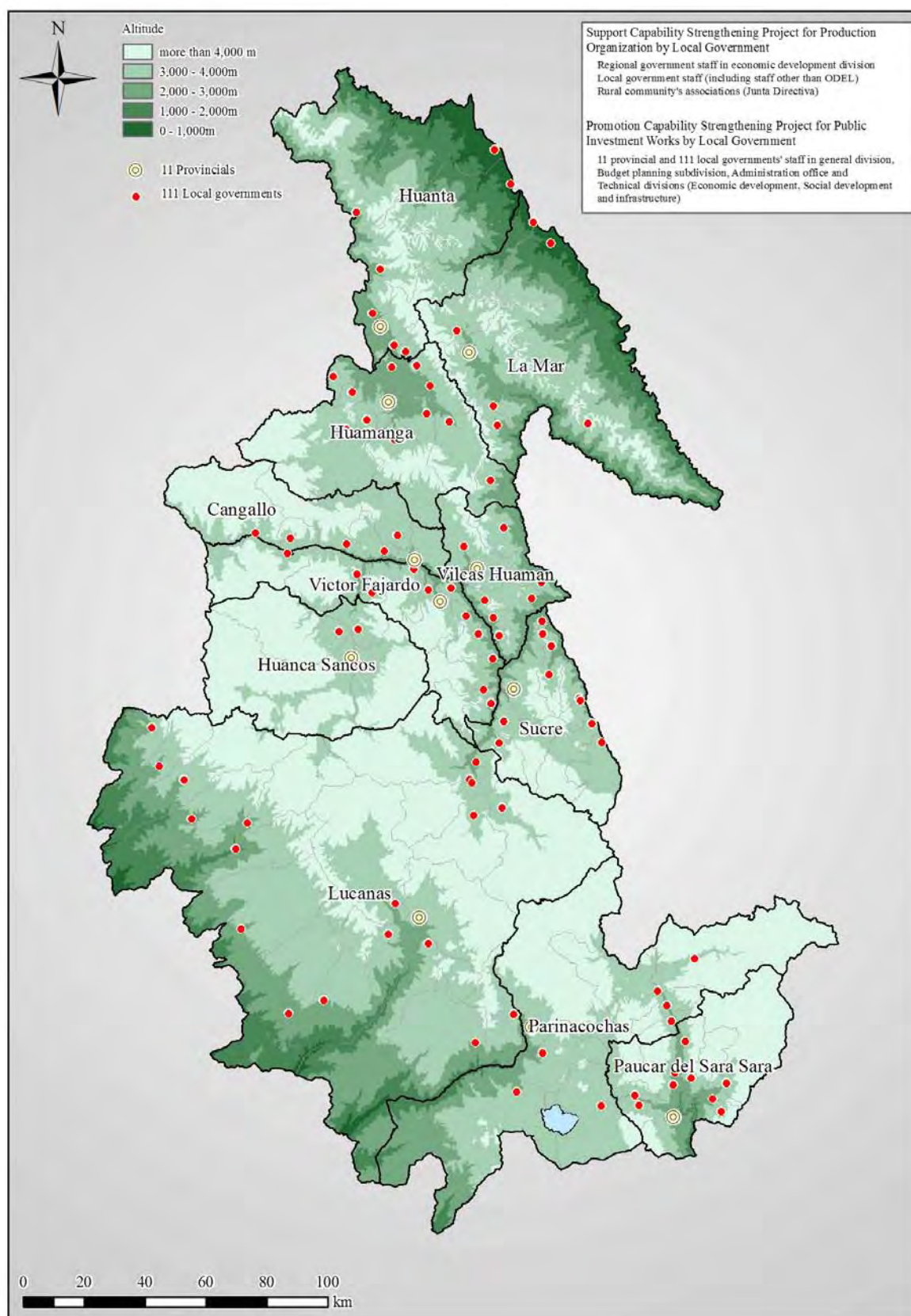
The development projects proposed above are listed in Table 11.11.3 in accordance with zonal characteristics by province and altitude described in Table 10.3.2, and illustrated in Figure 11.11.1.

Table 11.11.3 Target Area of Development Program

Zone	No.	Province	Altitude (m)	Support Capability Strengthening Project for Production Organization by Local Governments	Promotion Capability Strengthening Project for Public Investment Works by Local Governments
Whole Region				◎	◎
North	1	Huanta	2,000-4,000		
	2		< 2,000		
	3	La Mar	2,000-4,000		
	4	Huamanga	2,000-4,000		
Central	5	Cangallo	> 4,000		
	6		2,000-4,000		
	7	Vilcas Huaman	2,000-4,000		
	8	Victor Fajardo	> 4,000		
	9		2,000-4,000		
	10	Huanca Sancos	> 4,000		
	11		2,000-4,000		
	12	Sucre	> 4,000		
	13		2,000-4,000		
South	14	Lucanas	> 4,000		
	15		2,000-4,000		
	16	Parinacochas	> 4,000		
	17		2,000-4,000		
	18	Paucar del	> 4,000		
	19	Sara Sara	2,000-4,000		

Remark: ◎ (Strong Relation), ○ (Moderate Relation), △ (Small Relation)

Source: JICA Study Team



Source: JICA Study Team

**Figure 11.11.1 Regional Development Map by Sector
(Institutional Capacity Building/Training Plan)**