Type of Vehicle Circulating in National Road PE-32S

Bus service in national road PE 32-A (Cangallo-Huancapi) is conducted by microbuses and cargo goes in the superior part of the vehicles)

Transit of Vehicles Interrupted near Area of Works

In departmental roads passage is frequently interrupted by works, road is narrow and there is no shoulders, large vehicles have difficult to pass

5.3.3 Existing Road Net and Conditions of Development

Paved roads account for about 5% of the existing roads in Ayacucho Region. The remaining 95% are unpaved of which the conditions are largely influenced by maintenance, rainfall and, topography and altitude.

(1) National Roads

Presently PROVIAS NACIONAL is responsible for the National Road Network, being assigned to the VIII Zone of Ayacucho Region, and is in charge of the regular maintenance. Regular maintenance works in Ayacucho Region is carried out by local microenterprises (*MYPES*), and considered in the budget of the 4-Years Plan "Proyecto Perú" that started in FY 2009.

Table 5.3.9 Paved Sections by Direct Administration

Section	Approved Budget for 2009 (S/.)	Longitude (km)
DV Pisco PTA - Pejerrey - San Clemente- Choclococha Bridge	900,000.00	201
Choclococha Bridge – Ayacucho and 03S Junction – Quinua	800,000.00	200
Izcuchaca - Huancavelica	350,000.00	75
Total	2,050,000.00	476

Source: PROVIAS NACIONAL, ORLANDO GALLARDO S., AYAC – HVCA, XIII Zone

Table 5.3.10 Pictures of Works in Paved Roads, Libertadores Road

Geological failure and landslide

Supaymayo Sector Km. 322+000

Collapse of drainage

Apacheta Km. 231+000

Treatment of Fissure

Ccarhuapampa Km. 204+700

Source: PROVIAS NACIONAL, ORLANDO GALLARDO S., AYAC – HVCA, XIII Zone, September 2009

Table 5.3.11 Sections Administrated by PROVIAS NACIONAL (Contrats of Peru Project)

Road	Longitude (km)	Type of surface	Amount of contract (S/.)	Duration (years)	Progress (%)
Bridge Choclococha-Ayacucho-Huanta and Junction R3S – Quinua	234	Paved			
Quinua – Tambo – San Francisco Route 028B 270+000 Km.)	180	Compacted	126,000,000	5	Starting on Oct-2009
Ayacucho – Pampas Bridge	143		47,000,000	5	20
Izcuchaca- Mayocc-Huanta	147		54,000,000	3	75
Huancavelica-Castrovirreyna -Pampano (Route 03S 264+000 km) *	264		90,000,000	5	Starting on Dec-2009
	968	Total	317,000,000	5	

(*) Routes not part of GORE Ayacucho jurisdiction

Source: PROVIAS NACIONAL, ORLANDO GALLARDO S., AYAC – HVCA, XIII Zone, September 2009

Total rehabilitation of Libertadores Road has been programmed to start in the second half of 2010 by contracting third parts.

Table 5.3.12 Works Conducted in Roads Administered by PROVIAS NAC

Section	Before	During	After
HUANTA–AYACUCHO Regular maintenance works, cleaning of ditches, landslides and general repair for the replacement of asphalt reinforcement. KM 379+200			
HUANTA–AYACUCHO Works of Slurry Seal reinforcement placement tests KM 367+200			
TAMBO-MACHENTE-SAN FRANCISCO Emergency works, surface shaping and road improvement KM 84+700			
IZCUCHACA-MAYOCC HUANTA Periodical maintenance works of urgent road KM 285+300			

Section	Before	After
IZCUCHACA– MAYOCC - HUANTA Existing situation of ALLCOMACHAY Bridge, change of wood and braces KM 319+000 September 2,009		

Ayacucho – Andahuaylas Shaping and ditch cleaning.	 KM 266+000	 KM 139+000

Source: PROVIAS NACIONAL, ORLANDO GALLARDO S., AYAC – HVCA, XIII Zone, September 2009

An emergency budget was applied to the Ayacucho - San Francisco paved road, so that it is in good conditions and traffic volume is considerable. In parallel to the said works the study for road asphalt pavement is to be concluded this year. In the section Ayacucho - San Francisco – Punta de Carretera a budget of S/. 126 million was estimated for maintenance during the next five years. Furthermore, asphalt paving of this road is scheduled to be conducted and presently there are in commencement conditions to a paved road of C. A.= 7.5 cm.

(2) Regional Roads

Although RGA is in charge of regional roads, PROVIAS DESCENTRALIZADO is working towards decentralization of road management, establishing institutional and financial mechanisms and strengthening local capacities. However, until now all projects or roads have not been transferred to the Provincial Institutes of Ayacucho Region.

PROVIAS DESCENTRALIZADO recommends working in the formulation of the road development plan with the cooperation of all governmental entities in order to avoid social and political pressure. Likewise, it promotes the presence of FRONTPREL not only in road conditions survey but also in execution and maintenance of works.

Out of passable roads, 50% has road base and the other 50% has not road base. Regular maintenance was conducted for 381 km. with budget of RGA and 664 km were conducted under the Program of Departmental Roads (*PCD*), according to 2008 data of RGA. The former works were conducted with insufficient equipment and limited budget, while the later PCD program has enough budget to carry out a proper work by carrying out the necessary site tests and employing the required equipment.

(3) Local roads

The length of community road network in Huamanga Province is estimated at 1,060 km in total (*PVPP, year 2003*). Local roads including community roads and livestock roads, are under the administration of province and district municipalities.

Impediments for the construction of local roads are lack of budget, direct administration and differences in the realization of contracts with third parts.

Another problem identified for emergency measures was that although some communities requested road rehabilitation works to Provias descentralizado, they were directed to RGA, that in turn sent them to the province municipality and finally to the entity in charge, IVP. In case of Huamanga Province, as each entity counts on with the cooperation of the province municipality, such situations have not occurred.

RGA has the IVP office in the 11 provinces each. As Huamanga and Lucanas are better equipped with facilities and machinery, they have to provide support to other provinces. The method of road rehabilitation is shows below.

Sub-base Compacting

Settling and Extending Stabilized Base

Source: PROVIAS DESCENTRALIZADO

Presently the IVP of Huamanga Province undertakes regular maintenance in 10 sections of which the total length becomes to 126.75 km, although they are in charge of the entire local road network in the province.

Table 5.3.13 Details of Road Sections under IVP – Huamanga Province

No	Maintenance section	District	Maintenance Length	Contractor (M.E)	Maintenance conditions
1	Junction Acocro Acocro y Empalme Pampamarca Pampamarca	Acocro	13.82 km.	A.C.M.V.D.C. " Las Estrellas de Pumaccahuancca"	Good
2	Junction R3S y Junction R3N	Acocro	6.79 km.	A.C.M.V.D.C. " Las Estrellas de Pumaccahuancca"	Good
3	Junction Tinte -Tinte and Junction Yanamilla - Yanamilla	Tambillo	9.26 km.	A.C.M.V.D.A. "Tambillo"	Good
4	Chupas Chiara Quishuar	Chiara	12.535 km.	A.C.M.V.D.C "Bella Vista - Chiara"	Regular
5	Muyurina Niño Yucaes	Tambillo	9.020 km.	A.C.M.V.C. "Los Andes de Acocro"	Good
6	Santa Elena - Huatatas	San Juan Bautista	2.234 km.	A.C.M.V. "Union Regional"	Good
7	AA.HH.Primavera - Yanamilla Branch Santa Elena Yanamilla	Ayacucho, Jesus Nazareno	5.340 km.	A.C.M.V. "Union Regional"	Good
8	Muyurina Muruncancha km. 29 and Muruncancha Sayhuapata	Quinua	17.99 km.	Empresa ZALA SAC	Good
9	Casacancha, Rosaspata, Ccochapampa Putacca	Vinchos	24 km.	A.C.M.V.D.A. "Virgen de Cocharcas de Arizona"	Good
10	Laramate Chacco Bridge	Stgo de Pischa, San José Ticllas y Pacaycasa	25.757 km.	Empresa de Mantenimiento Vial de Carreteras "Santiago Apostol" SAC	Good

Source: IVP-Huamanga, Operation Management, November 2009

During the period 2008-2009 other 6 sections of local roads were rehabilitated, as seen in the following table

Table 5.3.14 Maintenance Sections of IVP (2008-2009)

Nº	District	Section		Distance (KM)	Cost (S/.)	Present Condition
1	Ocros	Rehabilitation	Muña - Pumaccahuancca-Cceraocro-Mayabamba-Pata Pata	28.500	1,457,509	Finished
2	Tambillo	Rehabilitation	Tambillo - Niño Yucaes	15.152	727,296	Finished
3	Socos	Rehabilitation	Chanchoccocha – Acraybamba	7.850	469,757	Finished
4	Acos Vinchos Quinua	Rehabilitation	Niño Yucaes - Pamparque - Acosvinchos - Colpa - Sanya - Suso - Paraccay – Chihuampampa	19.630	980,728	Finished

Nº	District	Section		Distance (KM)	Cost (S/.)	Present Condition
5	San Juan Bautista	Rehabilitation	Miraflores-Pucara-Orccohuasi	15.000	771,588	Finished
6	Chiara	Rehabilitation	Qochaqocha-Chanchayllo - Huarapite	13.450	783,401	Finished
Total				99.582	5,190,279	

Source: IVP-Huamanga, Operation Management, November 2009

(4) Budget for Roads

The following table shows the budget of investment related to road rehabilitation at national road, regional road and local road levels in year 2008.

Table 5.3.15 Regional Government Budget for Departmental and Rural Roads (2008)

Government level	Entity	Construction	Rehabilitation or Improvement	Periodical maintenance	Regular maintenance.	Budget	Executed amount	Total km
		km	km	km	km	S/. million	S/. million	
Regional	GRI	35.4	43.00			4.69	2.55	
	DR of T and C				381.00	3.10	1.80	
	PCD			664.00		15.70	8.90	
Total 1		35.4	43.00	664.00	381.00	23.49	13.25	1,123.40
Local	IVP Huamanga				126.65	0.29	0.29	
				44.28		0.48	0.36	
			99.58			5.19	2.43	
	IVP La Mar				54.99	0.13	0.13	
	Provías Descentralizado PTRD	188.5	143.11	76.00		10.01	7.46	
	Provías Descentralizado RO	53	60.77	74.00		6.16	5.58	
Total 2		241.5	303.46	194.28	181.64	22.26	16.25	920.88
National	Provías Nacional		995.88		24.5	846.80	0.00	
Total 3		0	995.88	0	24.5	846.80	0.00	1,020.38
Total of quoted enties		276.9	1,342.34	858.28	587.14	892.55	29.50	3,064.66

Source: Prepared according to information provided by regional and local entities in charge of road projects execution and management in Ayacucho, year 2008

Rehabilitation was executed for 1,123 km to 2,056 km, say 55%, of total length of the regional road network.

Regular maintenance was carried out only for 921 km to 6,374 km, say 14%, of total length of local roads, and these numbers correspond to the data of only two of the 10 provinces. Provias Descentralizado-Zonal Ayacucho conducting projects with budget of the Decentralized Rural Transportation Program (*PTRD*) also shows a trend in reducing the volume of work implementation. The following table shows the budget for public investments in the local and departmental road network for years 2008/2009.

Table 5.3.16 Regional Government Budget for Public Investments in regional and local roads of Ayacucho (2008/09)

Road	Extension (km)	Activity	Budget 2008/09
San Francisco - Sivia - Llochegua – Canayre	87	Pre investment Study	3,061,300
Pampachiri - Negro Mayo	69	Detailed Design	
Cangallo – Huancapi	24	Rehabilitation	
8 Sections	497	Periodical Maintenance	2,549,225
Río Bado Bridge	0.03	Detailed Design	22,500

Road	Extension (km)	Activity	Budget 2008/09
Molinohuayco Bridge	0.04	Detailed Design	148,050
Transferences to the GRA			10,555,778
Improvement of Briddle Paths, , Provinces of Cangallo, Huanta and La Mar	71	Study	110,589
	121	Works	
Rehabilitation of Local Roads in the Provinces of La Mar, Vilcashuamán, Huanta, Cangallo, Huamanga	156	Study	22,043,043
	342	Works	
Periodic Maintenance of Local Roads in the provinces of Lucanas, La mar, Cangallo, Huamanga, Huanta, Sucre, Vilcashuamán and Parinacochas	19	Study	3,522,688
	193	Works	
Agreement between Provías Descentralizado and the Municipality of Parinacochas			
Santa Bárbara Bridge	0.08	Works	---
Yauca-Cora Cora Road	12	Works	---
Total			42,013,173

Source: MTC Report (January 15, 2010)

In relation to national roads, according to the Statistical Bulletin of the First Semester of 2008, approximately 1,020 km of a total of 1,451.11 km. of the national road network, corresponding to 75% is presently being attended. The following table shows the budget of public investment in national roads for 2010.

Table 5.3.17 Budget of Regional Government Public Investment for National Roads in Ayacucho Region (2010)

Road	Extension (km)	Section	Route	Total Cost	Budget 2010	Activity
Nazca - Puquio-Chalhuanca-Abancay (IIRSA Sur)	---	Urban Zone Puquio	PE- 30	12,852,024	1,400,000	Work
Ayacucho - Andahuaylas - Abancay	386.82		PE - 3S			Work
	256.5	Ayacucho - Andahuaylas				
	50	Ayacucho (0+000 to 50+000)		125,497,003	57,300,000	
	48	km 50+000 – Ocros		124,980,000	45,500,000	
	56	Ocros – Chincheros		141,370,000	62,600,000	
	56	Chincheros - km 210+000		86,000,000	41,800,000	
	46.5	km 210+000 - Andahuaylas		170,300,000	47,400,000	
	130.32	Andahuaylas – Abancay				
	53.2	Andahuaylas - Dv Kishuara		95,426,686	38,200,000	
	77.12	Dv Kishuara - Huancarama - Pte. Sahuinto		197,210,000	70,700,000	
Ayacucho - San Francisco	146.42	Quinua - San Francisco	PE - 28B			Work
	52.4	km 26+000 - Chalhuamayo		94,500,000	43,400,000	
	93.92	Chalhuamayo - San Francisco		174,000,000	72,800,000	
Huanta - Mayocc - Izcuchaca	27.75	Mayocc - Huanta (27,75 km)	PE - 30	23,730,000	946,000	Work
Regular Maintenance	200	Pte. Choclococha - Ayacucho y Emp. R3S- Quinua		752,590	---	Regular Maintenance
Asignation 2009	2.78	Zona Urbana Puquio		10,630	---	
Mantenimiento y Emergencia	270	Quinua-San Francisco-Pichari-Punta de Carretera		1,222,849	---	
Pisco - Ayacucho	162.81	San Clemente – Choclococha Bridge		39,000,000		Periodical Maintenance
Pisco - Ayacucho	166	.Choclococha Bridge - Ayacucho		1,030,000		
Huancayo - Ayacucho	96	Allcomachay Bridge - km 313+940	PE - 3S	---		
Total				1,287,881,782	482,046,000	

Source: MTC Report (January 15, 2010)

Table 5.3.18 "Proyecto Perú" Investment Budget in Ayacucho Region

Road	Distance (km)	Activity	Start	End	Total Cost	Budget 2010
Road Corridor Huancayo - Imperial - Izcuchaca - Ayacucho and Imperial - Pampas - Mayocc	421.49	Road Conservation	Feb-08	---	54,270,000	3,700,000
Ayacucho - Andahuaylas Corridor – Sahuinto Bridge	384.5	Road Conservation	Nov-08	---	45,540,000	7,400,000
Corridor Junction. PE-3S - La Quinua - San Francisco - Union Mantaro (Ene Bridge) - Punta de Carretera	306	Road Conservation	Dec-09	---	126,076,195	8,500,000
Total					225,886,195	19,600,000

Source: MTC Report (January 15, 2010)

It is possible to assess that all roads at national, regional and local level do not count on with the proper budget. Insufficiency of budget for roads is a great issue for small district municipalities in the rural area.

5.3.4 Road Maintenance Conditions, Support to Road Maintenance and Communitarian Participation

As mentioned above, considering the improper local road management conditions, and according to the decentralization policies and decentralized PROVIAS, GRA is promoting road maintenance with participation of population through training microenterprises in road maintenance.

In case of Huamanga Province there are about 30 proponent micro-enterprises, with an experience between 3 to 5 years, which answer to the calls for bidding conducted by the Institute of Province Roads to be qualified to one year contract. (*Proposal of MEMV: one worker for each 3 km, unit cost of works S./200 per km.*).

Such population participative type maintenance system has an important role in local roads maintenance. According to the results of surveys conducted with representatives of road maintenance micro-enterprises (*MEMV*) the following problems related to the promotion of local road maintenance could be identified.

- The parameter of personnel by km for maintenance works should be 2 workers for each 3 km. In relation to unit cost, parameter of S/.200 per km is not enough considering that besides including the general tax for sales, MEMV have to cover expenses of temporal technical personnel required by the supervision.
- Sometimes the distances to transport material from quarries or the volume of material removed by cleaning exceed the distance that can be covered on foot with wheelbarrow. In order to make transportation of material more efficient evaluation of transportation means with trucks, for instance is required.
- Roads should be leveled with motor graders every 3 months for a proper maintenance but such does not occur and works are not done efficiently.
- A supervisor should go to the site to verify the maintenance but actually such supervision is not carried out at the proper occasion.
- Technical reports are monthly submitted to the MEMVs and although it provides an opportunity to make requirements such as equipment support, due attention is not given.
- Works are requested to local microenterprises in order to create enterprises at rural areas they do not generated profits so accumulation of capital by the enterprises is almost impossible.
- Contracts are made according to the extension and they should include engineering structure maintenance

works as well as other factors such as price adjustments.

- Most contracts are one year period (January to December) but budget for the contractors are assigned around May, so it is not certain if works are to be conducted in the period from January to April.

As can be observed, management of road maintenance micro-enterprises in rural areas is still incipient. On the other hand they have an important role in local roads maintenance so it is extremely important for them to be technically and financially strengthened.

5.3.5 Rehabilitation Plan of Road Infrastructure

There were 4,878 sub-projects registered in SNIP as of April 2009 for Ayacucho Region, Out of them, 629 sub-projects corresponding to the road sector (111 under evaluation, 518 approved).

Of those, 213 sub-projects are located in extreme poverty zones (P3) and there are 13 types of works to be implemented, as shown in the following table.

Table 5.3.19 SNIP Sub-rojects by Province at Extreme Poverty Zones

Provincia		Total	1	2	3	4	5	6	7	8	9	10	11	12	13
Huanta	Costo	40,676,920	1,428,394	547,960	640,013	6,689,276	3,494,868	0	0	0	23,720,816	1,150,240	0	3,005,353	0
	Cantidad	24	5	1	1	2	1	0	0	0	5	4	0	5	0
La Mar	Costo	85,224,247	1,042,721	3,995,294	10,813,301	39,224,101	0	0	4,874,423	0	18,162,218	972,324	308,000	5,831,865	0
	Cantidad	52	5	2	3	16	0	0	5	0	7	7	2	5	0
Huamanga	Costo	103,005,945	623,665	0	730,800	15,865,469	31,309,465	42,367,461	2,802,587	4,500	5,285,158	1,788,398	801,548	1,426,894	0
	Cantidad	33	2	0	1	7	2	2	3	1	6	2	5	2	0
Cangallo	Costo	14,419,066	1,209,874	810,584	0	5,018,228	0	0	0	0	2,756,592	2,508,986	0	2,032,761	82,041
	Cantidad	14	5	1	0	3	0	0	0	0	2	1	0	1	1
Vilcas Huaman	Costo	44,367,567	434,720	3,491,803	9,185,562	8,286,288	0	2,365,629	0	0	16,899,893	182,508	477,400	3,043,764	0
	Cantidad	27	3	1	2	3	0	1	0	0	7	1	6	3	0
Victor Fajardo	Costo	49,594,526	1,966,384	0	0	18,084,182	0	0	8,577,056	0	15,715,725	4,633,779	0	617,400	0
	Cantidad	26	9	0	0	5	0	0	4	0	4	3	0	1	0
Huanca Sancos	Costo	25,395,657	248,439	0	0	8,920,519	0	0	0	0	11,202,449	0	693,000	4,331,250	0
	Cantidad	14	1	0	0	3	0	0	0	0	4	0	4	2	0
Sucre	Costo	11,526,540	0	0	0	1,632,385	0	0	0	0	9,894,155	0	0	0	0
	Cantidad	5	0	0	0	1	0	0	0	0	4	0	0	0	0
Lucanas	Costo	2,003,997	556,600	0	0	0	0	0	135,281	0	1,235,116	0	77,000	0	0
	Cantidad	7	2	0	0	0	0	0	1	0	2	0	2	0	0
Parinacochas	Costo	10,422,439	0	0	0	0	0	0	3,052,112	0	1,604,685	3,215,017	0	2,550,625	0
	Cantidad	8	0	0	0	0	0	0	3	0	1	3	0	1	0
Paucar del Sara Sara	Costo	4,085,233	0	0	1,343,848	0	0	0	2,317,885	0	0	0	423,500	0	0
	Cantidad	3	0	0	1	0	0	0	1	0	0	0	1	0	0
Total	Costo	390,722,137	7,510,797	8,845,641	22,713,524	103,720,448	34,804,333	44,733,090	21,759,344	4,500	106,476,807	14,451,252	2,780,448	22,839,912	82,041
	Cantidad	213	32	5	8	40	3	3	17	1	42	21	20	20	1

Item 1: Construction of roads and sidewalks at urban zones (inclination filters in urban zones, sidewalks and pavement)
Item 2: Purchase of equipment (Provinces of Cangallo, Vilcashuaman, La Mar and Huanta)
Item 3: Construction of local communication roads between the capital and the communities)
Item 4: Construction of connection roads to the main departmental road (Many projects with distinct contents, extension of road width, change of surface, drainage and filtration works, rehabilitation works in general)
Item 5: Rehabilitation and improvement of main roads (rehabilitation includes widening of road)
Item 6: Construction of airport and terminal (Located in Huamanga province, implementation by PROINVERSION administered by the regional government; Improvement of Terminal for passengers and cargo in Huamanga city)
Item 7: Construction of bridges and pontoons (construction to connect to the existing roads). Mainly for substitution or repairing due to flood. Said projects are located in the provinces of Huamanga, Lucanas, La Mar, Victor Fajardo, Parinacochas and Paucar del Sara Sara. It attends close to 102,207 beneficiaries)
Item 8: Rehabilitation of bridge (One project. Use of wood locally obtained to reduce costs)
Item 9: Construction of small roads (42 projects, corresponding to around 30% of the total budget of the 213 projects)
Item 10: Rehabilitation of small roads (from existing conditions)
Item 11: Rehabilitation of trails (from existing conditions)
Item 12: Rehabilitation or rural roads (from existing conditions)
Item 13: Projects with other municipalities (Improvement of roads by local communities)
Source: JICA Study Team

5.3.6 Problems and Constraints in Road Infrastructure

Considering the antecedents of Project Profiles and the requests of transportation infrastructure developments, the following problems and constraints concerning road infrastructure development could be taken up.

Table 5.3.20 Problems and Constraints for Road Development

Direct Cause	Problems and Constraints
Improper road maintenance and conservation	・ Lack of maintenance and conservation works supervision ・ Lack of training for road maintenance personnel ・ Insufficient maintenance due to lack of capital and equipment of road maintenance companies ・ Difficult to purchase required equipment for companies due to off contract work requirements and impossibility to accumulate capital, consequently no profits.
Unfavorable factors due to Andean climate impacts	・ Adverse phenomena, frosting of roads at high altitudes, unpaved roads difficult access during rainy season, etc. ・ Excess of dust in dry season cause damage to communities adjacent to the roads
Accessibility affected	・ Due to climate damage there are road sections without access by lack of periodical and regular maintenance, road blockage is frequent ・ Road bad conditions frequently cause accidents, vehicles are continuously damaged and trip conditions for passengers and cargo transportation are bad. ・ Due to bad accessibility, trips take too much time causing damage to products that require rapid transportation ・ Fuel and transportation costs are high
Inaccessibility to markets and services	・ Restricts agricultural reactivation in Ayacucho surroundings ・ Difficulty for the passage of large trucks due to bad road conditions (goods have to be transported in small trucks to a point, increasing transportation costs. Impeding factor for the promotion of products that need huge loads) ・ Difficulty of agricultural products conveyance (zones with bad conditions of access cannot produce for commercialization)
Limited Socioeconomic connections	・ Difficulty of access to the market due to bad transit conditions and high transportation costs (strengthens conditions for self-consumption) ・ Difficulty of access to services such as hospitals ・ Limitation of opportunities to convey products to markets and opportunities of earn income as well as the purchase of basic staple goods ・ Social isolation due to bad road conditions
Investment	・ Local investments are not promoted making the generation of new business difficult ・ Priority level for road infrastructure is reducing ・ Inadequate plans of road infrastructure delays regionalization

Source: JICA Study Team

As the result of the analysis of problems and constraints, the "mitigation of vulnerability faced by poor peasants" has been identified as one of the priority issues of development for poor peasants at Ayacucho Region. In order to settle this priority issue, it was confirmed that an utmost attention has to be paid to the priority sector "road rehabilitation and maintenance". Implementation of projects related with "road rehabilitation and maintenance" is mandatory in order to settle the problems and constraints mentioned below.

- Lack of a road network to support the distribution system to link producing zones with the markets.
- Road deterioration with frequent interruptions causing unstable access to markets
- Lack of road network connecting remote communities with main roads
- Unpavement of main roads connecting markets with main cities that are the focal center of agricultural products distribution
- Lack of regular and proper maintenance of roads by local governments, entities in charge and community participation

5.4 Water Supply and Sewerage

5.4.1 Policies, Institutions and Programs

(1) National Level

Water supply and sewerage programs are conducted by Ministry of Housing, Construction and Sanitation (*MVCS*). As the national policies, the following programs are prepared.

- Multi-annual Strategic Sector Plan 2004-2006 by MVCS
- Policies and Strategies 2007-2011 by MVCS
- National Strategy for the Promotion of the Private Sector in the Sanitation Service Firms by MVCS
- Institutional Strategic Plan 2008-2015 by MVCS

(2) Regional Level

In Ayacucho Region, Regional Department of Housing, Construction and Sanitation (*DRVCS*) is responsible for water supply and sewerage at the regional level, however, no regional development plan is prepared so far.

"The Institutional Strategic Plan 2008-2015" aims at improvement of the service coverage of water supply and sewerage by 16.6% and 18.6%, respectively, by 2015 in the rural areas of their populations less than 2,000. It also plans to install water supply pipelines for 330,340 households.

5.4.2 Present Water Supply and Sewerage Development and Existing Programs

(1) Present Situation of Existing Water Supply and Sewerage Services

In accordance with the national census conducted by INEI in 2007, the situation of infrastructures in Ayacucho Region is summarized in Table 5.4.1.

Tabled 5.4.1 Service Ratio of Water Supply and Sewerage

Infrastructure	Peru		Ayacucho Region	
	All	Rural Area	All	Rural Area
Coverage Ratio of Water Supply Services (Family Number Basis)				
Indoor Piping	54.8%	13.1%	40.3%	14.4%
Outdoor Piping	8.9%	8.7%	10.9%	10.4%
Cooperative Facility	3.8%	3.6%	4.1%	5.9%
Water Wagon	4.2%	1.2%	0.9%	2.0%
Well	8.1%	18.8%	3.6%	4.8%
River, Stream, Spring	16.0%	50.6%	33.5%	55.7%
Neighbor	3.2%	2.8%	4.7%	4.4%
Others	1.2%	1.3%	1.9%	2.3%
Coverage Ratio of Sewerage Services (Family Number Basis)				
Indoor Piping	48.0%	1.7%	25.3%	1.3%
Cooperative Facility	6.1%	0.8%	4.9%	0.8%
Lavatory with Septic Tank	4.9%	5.2%	4.1%	4.8%
Lavatory without Septic Tank	21.8%	47.3%	29.9%	46.4%
River, Stream	1.8%	3.1%	2.1%	1.7%
None	17.4%	42.0%	33.8%	44.9%

Source: INEI National Census 2007

It is observed that Ayacucho Region is below the national level in terms of water supply and sewerage system, and that for rural areas are much less developed than urban areas.

As a part of water supply and sewerage development in rural areas, "National Program of Rural Water and Sanitation - PRONASAR" and "Water for All Program - PAPT" have been established. PRONASAR projects the

enlightenment on sanitation, and expansion and reinforcement of operation and maintenance system through the improvement of water supply and sewerage facilities and the activities of zonal groups (*Administrators Group of Sanitary Services - JASS*) in rural areas. On the other hand, PAPT targets that all the Peruvian people can have a sustainable access to sanitation services of water and sewage, through investment up to US$ 4,042 million during 10 years between 2006 and 2015.

PDRC 2007-2024 prepared by GRA, establishes the following as the mid-term goals to be achieved in the period from 2007 to 2011.

- The families which have no access to water shall be decreased from 29% to 14%.
- The families which have no sewerage and lavatory shall be decreased from 38% to 27%.

Central and Southern Sierra Special Project (*PESCS*) is executing projects in agriculture, water supply, electrification and road network in the central and southern part of Sierra (Ayacucho Region as well as Apurimac, Huancavelica and Cusco). PESCS was an agency under the control of National Development Institute (*INADE*), but has been transferred to MINAG. The projects executed since 2004 by PESCS are listed in Table 5.4.2.

Table 5.4.2 Water Supply and Sewerage Projects by PESCS in Ayacucho Region

Condition	Nos.	Beneficiaries	Cost (S/.)
Executed	5	15,312	14,307,754
In Execution	1	1,183	831,102
To be Executed	6	23,922	11,421,674

Source: Information obtained from PESCS

FONCODES also executes water supply and sewerage projects in rural areas. It is noted that the FONCODES Ayacucho Regional Office covers only 8 provinces in the northern and central parts of Ayacucho Region, and the 3 provinces in the southern part belong to the FONCODES Ica Regional Office. The data on the water supply and sewerage projects already executed by FONCODES in Ayacucho Region during the period 1992-2009 were obtained in the FONCODES headquarters in Lima, which are summarized in Table 5.4.3.

Table 5.4.3 Water Supply and Sewerage Projects Executed by FONCODES in Ayacucho Region (1992-2009)

Province	Water Supply		Sewerage	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Total Ayacucho Region	706	37,813,364	296	19,176,798
Huanta	103	5,530,093	32	1,402,884
La Mar	118	5,975,349	40	1,615,026
Huamanga	177	9,168,556	85	4,252,609
Cangallo	68	2,953,668	55	2,915,781
Vilcas Huaman	57	3,109,790	32	1,838,675
Victor Fajardo	38	2,749,628	19	1,667,667
Huanca Sancos	20	991,256	8	1,076,684
Sucre	19	1,106,524	1	25,950
Lucanas	68	4,513,513	19	3,472,595
Parinacochas	33	1,392,302	3	390,101
Paucar del Sara Sara	5	322,685	2	518,826

Source: Data obtained from FONCODES Headquarters in Lima

(2) Existing Water Supply and Sewerage Programs

The sub-projects of water supply and sewerage registered in SNIP in Ayacucho Region as of April 2009 are summarized in Table 5.4.4.

Table 5.4.4 Summary of Water Supply and Sewerage Sub-projects in SNIP

Province	Executed/Being Executed		To be Executed			
			Approved		To be Approved	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Total Ayacucho Region	54	41,616,854	551	319,247,192	65	73,795,264
Huanta	0	0	72	35,731,410	14	4,104,207
La Mar	17	6,947,588	99	40,959,810	12	2,537,507
Huamanga	22	22,108,884	114	134,997,698	17	44,649,242
Cangallo	2	4,858,459	46	14,163,915	10	6,812,924
Vilcas Huaman	3	2,926,249	47	12,681,891	3	6,285,471
Victor Fajardo	5	3,170,277	40	18,055,321	4	2,884,106
Huanca Sancos	0	0	15	8,323,651	1	1,515,691
Sucre	0	0	31	8,893,721	3	1,975,294
Lucanas	5	1,605,397	28	12,369,798	0	0
Parinacochas	0	0	25	11,135,509	1	3,030,822
Paucar del Sara Sara	0	0	34	21,934,468	0	0

Source: Inventory Survey on SNIP Sub-projects (April 2009)

Among the total 670 sub-projects of water supply and sewerage sector, 171 were proposed by the central government, 26 by GRA, and 473 by the local governments.

5.4.3 Water Resources and Rural Water Supply System

The water supply and sewage service in Peru is low in general, and extremely low in rural areas. Table 5.4.5 shows the service ratio at the national level and at provincial level in Ayacucho Region.

Table 5.4.5 Service Ratio of Water Supply and Sewerage in Ayacucho Region by Province

Item	Water Supply *1		Sewerage *2	
	Available	Unavailable	Available	Unavailable
Peru Average	67.4%	32.6%	59.0%	41.0%
Lima Metropolitan (incl. Callao)	84.3%	15.7%	84.8%	15.2%
Ayacucho Region Total	55.3%	44.7%	34.2%	65.8%
Huanta	46.8%	53.2%	32.7%	67.3%
La Mar	23.6%	76.4%	23.4%	76.6%
Huamanga	74.7%	25.3%	55.4%	44.6%
Cangallo	45.9%	54.1%	17.6%	82.4%
Vilcas Huaman	52.7%	47.3%	13.2%	86.8%
Victor Fajardo	55.4%	44.6%	25.1%	74.9%
Huanca Sancos	22.6%	77.4%	19.1%	80.9%
Sucre	61.0%	39.0%	16.5%	83.5%
Lucanas	54.2%	45.8%	21.2%	78.9%
Parinacochas	58.6%	41.4%	27.2%	72.8%
Paucar del Sara Sara	71.3%	28.7%	22.0%	78.0%

**1: judging on availability of indoor and outdoor piping, and cooperative facility*

**2: judging on availability of indoor piping, cooperative facility and lavatory with septic tank*

Source: INEI National Census 2007

Development level of water supply and sewerage in Ayacucho Region is quite low compared with the national average level. Particularly rural areas remain extremely poor in water supply and sewerage development. It is observed also that the coverage rate of water supply and sewerage varies much among provinces. Huamanga Province, where the regional capital is located, shows higher service ratio, on the other hand, La Mar and Huanca Sancos Provinces have quite low rates.

While in urban areas, water supply companies have their designated coverage areas (for example, a company EPSASA covers Ayacucho City), small water supply systems are built independently and managed by JASS.

5.4.4 Operation and Maintenance of Facilities

JASS, mentioned hereinabove, has the main role in operation and maintenance of water supply and sewerage facilities. As needed, JASS informs and requests the local governments for the repair of damaged facilities. It is common that the materials for maintenance are covered by public expense, and the beneficial inhabitants conduct the maintenance works themselves. As in rural areas, few water measuring devices are installed, a water fee is equally collected by household.

5.4.5 Administrative Supports and Beneficiaries Participation in Water Supply and Sewerage Development

PRONASAR states that the public sector and private sector as well as the beneficiaries shall participate together in water supply and sewerage developments. PRONASAR Management Units (*UGP*) are responsible for implementation of the projects, and the regional, provincial governments, private enterprises and villagers manage, operate and maintain the systems.

5.4.6 Problems and Constraints for Development

Based on the collected information and interviews to the GRA staff concerned, those in Table 5.4.6 are identified as the problems and constraints in water supply and sewerage development in rural areas of Ayacucho Region.

Table 5.4.6 Problems and Constraints in Water Supply and Sewerage Development

Problem	Constraints
High Cost	As the villages are generally in small scale, the beneficiaries are limited, therefore the investment per beneficiary becomes rather costly.
	Because the villages are commonly located in isolated areas, high transportation costs of construction materials and labor are required.
	The dominant sloped areas cause the water supply to each family technically difficult, or costly.
	Small-scale construction works in remote areas are not attractive for construction firms.
Social Difficulties	The development of water supply and sewerage in Ayacucho Region in 1980-2000 is delayed due to security problem.
Low Awareness in Sanitation	The farmers are accustomed to the traditional water resources such as rivers and springs.
	The farmers do not imagine the life with hygienic sanitation system which can be realized by water supply and sewerage facilities.
	The farmers are not likely to comply with the water fee payment.

Source: JICA Study Team

5.5 Rural Electrification

5.5.1 Policies, Institutions and Programs (Central and Region Level)

(1) Central Level

Peru in 2007, generated the electric power of 28,110,081 MWh (*Source: Perú en Números 2008*), consisting of 68% by hydropower and 32% by thermal power (Wind power and solar power are insignificant in comparison with the said hydraulic and thermal powers). Electrification projects are managed by the Ministry of Energy and Mining (*MEM*). "National Plan of Rural Electrification (*PNER*) 2006-2015", prepared by the agency in charge, Directorate General of Rural Electrification (*DGER*) under MEM, states the following targets.

- Raise the rural electrification ratio to 57.9% by 2011 and 70% by 2017
- Allocate the budget totaling S/. 3,000 million to rural electrification during the period 2008-2011
- Establish the integrated system for appropriate support and management for the projects already executed and to be executed

(2) Regional Level

For Ayacucho Region, 64 projects are incorporated in this "National Plan of Rural Electrification (*PNER*) 2006-2015" with the total investment of US$ 60 million for the beneficiaries of 241,094 persons.

5.5.2 Present Rural Electrification Development and Existing Programs

The electrification rate of Peru by region is given in Table 5.5.1.

Table 5.5.1 Electrification of Peru by Region

Region	Researched Household Number	Electrified Household	
		Household Number	(%)
Peru Total	6,754,074	5,079,518	75.2%
Tumbes	50,005	40,746	81.5%
Loreto	176,046	109,333	62.1%
Piura	389,685	262,516	67.4%
Cajamarca	333,311	137,857	41.4%
Amazonas	90,645	44,459	49.0%
Lambayeque	254,488	196,037	77.0%
San Martin	173,646	104,444	60.1%
Lima Metropolitan (incl. Callao)	2,291,343	2,141,634	93.5%
Pasco	66,889	46,635	69.7%
Ancash	260,087	192,706	74.1%
Huánuco	180,731	80,250	44.4%
La Libertad	384,842	281,145	73.1%
Junín	303,218	225,834	74.5%
Ucayali	97,191	63,638	65.5%
Huancavelica	112,817	63,479	56.3%
Ica	180,828	139,522	77.2%
Ayacucho	163,147	85,364	52.3%
Apurímac	106,445	60,787	57.1%
Cusco	303,974	198,709	65.4%
Madre de Dios	27,494	18,981	69.0%
Arequipa	309,892	264,136	85.2%
Moquegua	49,099	39,636	80.7%
Puno	363,432	211,830	58.3%
Tacna	84,819	69,840	82.3%

Source: INEI National Census 2007

The electrification rate in Ayacucho Region is as low as 52.3%, while the national average one holds 75.7%. Ayacucho Region is in the 4th place from the bottom in Peru. The electrification rate in Ayacucho Region by province is presented in Table 5.5.2.

Table 5.5.2 Electrification Ratios in Ayacucho Region by Province

Province		Researched Household Number	Electrified Household	
			Household Number	(%)
Ayacucho Region Total		163,147	85,364	52.3%
North	Huanta	23,210	10,305	44.4%
	La Mar	21,407	5,525	25.8%
	Huamanga	55,444	39,985	72.1%
Central	Cangallo	9,828	3,348	34.1%
	Vilcas Huaman	7,092	1,337	18.9%
	Victor Fajardo	8,013	4,455	55.6%
	Huanca Sancos	3,506	1,494	42.6%
	Sucre	3,837	2,124	55.4%
South	Lucanas	19,325	9,666	50.0%
	Parinacochas	8,221	4,714	57.3%
	Paucar del Sara Sara	3,264	2,411	73.9%

Source: INEI National Census 2007

While Huamanga Province, which has the regional capital, shows rather high rate, the northern provinces other than Huamanga Province and the central provinces have low electrification. It is targeted that the rate of non-electrification households shall be decreased from 48% in 2005 to 32% in 2011 in the mid-term program of PDRC 2007-2024.

Central and South Sierra Special Project (*PESCS*) has realized the electrification projects during the period 2004-2009 as given in Table 5.5.3.

Table 5.5.3 Electrification Projects by PESCS in Ayacucho Region

	Nos.	Beneficiaries	Cost (S/.)
Completed	1	1,996	1,088,299

Source: Information obtained from PESCS

FONCODES also implements rural electrification projects. It is noted that the FONCODES Ayacucho Regional Office covers only 8 provinces in the northern and central parts of Ayacucho Region, and the three provinces in the southern part belong to FONCODES Ica regional office. The data on the rural electrification projects already executed by FONCODES in Ayacucho Region during the period of 1992-2009 were obtained in the FONCODES headquarters in Lima, which are summarized in Table 5.5.4.

Table 5.5.4 Rural Electrification Projects Executed by FONCODES in Ayacucho Region (1992-2009)

Province	Nos.	Cost (S/.)
Total	120	11,026,371
Huanta	6	623,435
La Mar	1	44,140
Huamanga	32	2,612,072
Cangallo	2	216,515
Vilcas Huaman	6	626,393
Victor Fajardo	6	790,925
Huanca Sancos	14	1,413,482
Sucre	21	1,704,609
Lucanas	24	1,987,410
Parinacochas	5	566,990
Paucar del Sara Sara	3	440,400

Source: Data obtained from FONCODES Headquarters in Lima

According to the SNIP sub-project inventory survey carried out in April 2009, 97 sub-projects are categorized as rural electrification development as summarized in Table 5.5.5.

Table 5.5.5 Summary of SNIP Electrification Sub-projects in Ayacucho Region by Province

Province	Executed/Being Executed		To be Executed			
			Approved		To be Approved	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Ayacucho Region Total	16	46,938,841	66	101,226,771	15	52,567,292
Huanta	1	11,647,937	7	9,195,738	2	13,090,948
La Mar	1	13,988,965	13	18,039,418	1	16,244,308
Huamanga	5	3,966,659	10	32,265,490	5	8,528,840
Cangallo	4	1,460,877	22	14,419,802	4	9,067,181
Vilcas Huaman	1	8,985,331	1	182,318	0	0
Victor Fajardo	1	642,104	4	19,976,538	1	46,660
Huanca Sancos	0	0	1	1,263,026	0	0
Sucre	1	1,188,248	2	537,730	0	0
Lucanas	2	5,058,720	1	275,148	0	0
Parinacochas	0	0	1	1,520,210	1	3,096,566
Paucar del Sara Sara	0	0	4	3,551,353	1	2,492,789

Source: SNIP Project Inventory Survey (April 2009)

Among the total 97 electrification sub-projects in SNIP list, 12 are applied by the central government, 19 by GRA, and 66 by the local governments.

5.5.3 Existing Power Generation and Transmission Systems

In Ayacucho Region, Regional Department of Energy and Mining (*DREM*) under GRA is responsible for electrification. In Peru, concession system is applied for the power development, i.e. the governments authorize power companies to generate, transmit and distribute the electricity in designated areas. In the case of Ayacucho

Region, the electricity is supplied in the northern part of the region by Mantaro station (*Electrocentro Co.*), in the central eastern part by Machu Picchu station (*Electro Sur Este Co.*), and in the southern part by Marcona station (*Electro Sur Medio Co.*) as illustrated in Figure 5.5.1.

The data[2] obtained from Regional Department of Energy and Mining of GRA indicates that 9 hydropower and 4 thermal power stations are in operation in Ayacucho Region. Transmission is classified into 2 classes; SEIN: transmission from central and SSAA: transmission to remote areas, and 6.68 MW is transmitted totally.

Source: GIS Database of Ayacucho Region

Figure 5.5.1 Power Transmission Lines in Ayacucho Region

5.5.4 Operation and Maintenance of Facilities

An interview was realized at a power company, Electrocentro, which is supplying electricity in the northern part of Ayacucho Region. This power company covers 7 provinces in Ayacucho Region for 85,000 contracted households, out of which 30,000-35,000 are in urban areas. While the Ministry of Energy and Mining (*MEM*) constructed the principal power transmission lines, Electrocentro constructed the transmission lines below the principal power lines and is operating the power supply. It is usual to set the electricity charge in rural areas higher than that in urban areas taking into consideration the construction costs of facilities. For instance, the tariff shows S/.0.36/kWh for urban areas and S/.0.55/kWh for rural areas. The tariff for electricity is determined by the Supervision Organization of Investment in Energy and Mining (*Osinergmin*) under MEM.

5.5.5 Problems and Constraints for Development

The problems in rural electrification and their possible constraints are presented in Table 5.5.6.

Table 5.5.6 Problems and Constraints for Development in Rural Electrification

Problem	Constraints
High Cost	Construction of transmission lines to remote areas costs much, especially in hilly undulation.
	The transportation cost for construction materials becomes higher in remote rural areas.
Social Difficulties	The development of water supply and sewerage in Ayacucho Region in 1980-2000 is delayed due to security problem.
Low Profitability	High construction cost in rural areas is not feasible in comparison with the expected low revenue, where the electricity demand will be quite limited.
	The poor farmers cannot afford the electricity charge so raised to cover the high construction cost.

Source: JICA Study Team

Considering the above-mentioned situations, small pilot solar power generation system is being introduced in the remote rural areas.

5.6 Other Rural Infrastructures

5.6.1 Education

The education system in Peru consists of preschool (2 years for 4-5 year-old children), primary school (6 years from

[2] *Source: Annual Statistics 2005 - Directorate General of Electricity, Ministry of Energy and Mining (MEM)*

6 years old), secondary school (5 years from 13 years old) and superior school (5 years). The primary and the secondary schools are compulsory education, however, it is not rare that over-aged adults enter those schools. The school year starts in March and ends in December. The children aged 6 years in June reach the school age to enter the primary school in March next year. The class curriculum follows the framework designated by the Ministry of Education (*MINEDU*), but unique contents are allowed to a certain extent in some subjects such as history and geography in accordance with the locality. The school fees are free for the 11 years of public primary and secondary schools.

Figure 5.6.1 Primary School Classroom
The Central Area of Vinchos District, Huamanga Province

As the national education policy, the Ministry of Education elaborated "National Education Program 2021". The said Ministry is executing "National Program of Literacy Mobilization (*PRONAMA*) 2006-2011" to teach reading/writing and basic mathematics to 2 million people. In addition, "National Plan of Education for All 2005-2015" has also been elaborated as a long-term program for the reinforcement in educational system for primary and secondary schools.

As a part of "Juntos Program", which is a direct financial support system for the poor people, a monthly subsidy of S/.100 is paid to each poor family to support the schooling of their children.

PDRC 2007-2024 (*Wari Plan*) elaborated by GRA presents the development goals to be achieved during the period 2005-2011. Among them, the following are categorized in the primary education and infrastructure in education sector.

- Increase the third semester educational achievement from 82.8% to the actual national average 89.7%
- Increase the third semester schooling rate from 87.5% to 93.8%
- Increase the rate of enough performance in communication of the second year from 4.6% to the actual national average 15.1%
- Increase the mathematics test pass rate of primary second grade from 3.5% to the actual national average 9.6%
- 80% of the actual illiterate people (19.5%) become literate
- Increase the schools with sufficient equipment and furniture from 148 to 172 in number
- Increase the repaired school from 35.5% to 41.5%
- Decrease the schools without appropriate maintenance to 43%
- Increase the schools with sufficient materials and teachers by 8%

The Regional Department of Education elaborated "Ayacucho Regional Education Project 2006-2021 (PER-A)" which describes the principles of education, present problems, policies and strategies.

(2) Present Situation of Education and Existing Programs

In Sierra of Peru, particularly women still have low school attendance rates and literacy rates. Table 5.6.1 shows the national and provincial rates of non-attendance to school and illiteracy.

Table 5.6.1 Rates of Non-school Attendance and Illiteracy

Province	Family with Children who do not Attend to School	Illiteracy	
		All	Women
National Average	7.0%	7.1%	10.6%
Ayacucho Region Average	7.7%	17.9%	26.9%
Huanta	8.6%	21.0%	31.2%
La Mar	12.7%	24.1%	34.9%
Huamanga	5.9%	12.7%	19.1%
Cangallo	8.9%	26.7%	40.1%
Vilcas Huaman	8.1%	26.2%	39.2%
Victor Fajardo	8.0%	22.5%	36.6%
Huanca Sancos	6.0%	18.3%	30.3%
Sucre	5.8%	18.6%	29.1%
Lucanas	6.1%	15.7%	24.4%
Parinacochas	5.7%	17.3%	25.6%
Paucar del Sara Sara	5.3%	14.5%	22.6%

Source: INEI National Census 2007

Ayacucho Region shows that the rates are far worse than national average in both the school attendance and illiteracy rates. The illiteracy rate of Ayacucho is in the third place from the bottom. At the provincial level, it is observed that the northern part except Huamanga Province presents the lower education level, and the education level of women is remarkably low.

In Table 5.6.2, the numbers of schools and population are listed for comparison purpose.

Table 5.6.2 Comparison of Number of Schools and Population

Province	Population	Primary		Secondary		Superior
		Nos.	Population per School	Nos.	Population per School	Nos.
Ayacucho Total/Average	612,489	1,230	498	230	2,663	28
Huanta	93,360	161	580	10	9,336	5
La Mar	84,177	200	421	22	3,826	1
Huamanga	221,390	210	1,054	48	4,612	11
Cangallo	34,902	83	421	19	1,837	1
Vilcas Huaman	23,600	91	259	15	1,573	0
Victor Fajardo	25,412	56	454	12	2,118	1
Huanca Sancos	10,620	21	506	6	1,770	1
Sucre	12,595	54	233	15	840	0
Lucanas	65,414	204	321	44	1,487	5
Parinacochas	30,007	103	291	27	1,111	2
Paucar del Sara Sara	11,012	47	234	12	918	1

Source: INEI National Census 2007 (Population)/Ayacucho GIS Data (Numbers of Schools)

The northern part of Ayacucho Region shows the higher rate of population per school. The primary schools are insufficient especially in Huamanga Province, and the southern part of the region is abundant in schools per population. Furthermore, due to insufficient number of teachers, some schools operate classes with multiple grades in one classroom, or only in the first grades.

FONCODES also executes the infrastructure projects of education. It is noted that as

Table 5.6.3 Education Infrastructure Projects Executed by FONCODES in Ayacucho Region (1992-2009)

Province	Nos.	Cost (S/.)
Ayacucho Region Total	720	61,302,148
Huanta	69	5,026,960
La Mar	92	8,371,707
Huamanga	118	6,145,314
Cangallo	48	4,748,344
Vilcas Huaman	69	8,468,941
Victor Fajardo	53	5,355,652
Huanca Sancos	30	4,980,212
Sucre	34	3,380,399
Lucanas	134	8,681,765
Parinacochas	32	2,369,260
Paucar del Sara Sara	41	3,773,594

Source: Data obtained from FONCODES Headquarters in Lima

mentioned previously, the FONCODES Ayacucho Regional Office covers only 8 provinces in the northern and central parts of Ayacucho Region, and the 3 provinces in the southern part belong to FONCODES Ica Regional Office. The data on the education infrastructure projects already executed by FONCODES in Ayacucho Region during the period 1992-2009 were obtained from the FONCODES headquarters in Lima, which are summarized in Table 5.6.3.

The sub-projects in education sector registered in SNIP as of April 2009 are summarized in Table 5.6.4.

Table 5.6.4 Summary of SNIP Education Sub-projects by Province

Province	Executed/Being Executed		To be Executed			
			Approved		To be Approved	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Ayacucho Region Total	135	604,712,914	518	453,236,763	109	122,250,344
Huanta	10	7,688,656	74	39,169,112	14	22,147,005
La Mar	15	11,583,178	103	50,042,088	14	16,798,787
Huamanga	42	214,583,951	111	74,201,508	44	58,648,590
Cangallo	10	9,394,452	39	21,722,372	8	4,939,905
Vilcas Huaman	8	4,626,138	37	20,671,439	10	1,700,466
Victor Fajardo	21	338,642,591	39	25,689,381	7	8,395,733
Huanca Sancos	4	2,523,194	6	168,936,825	2	3,808,024
Sucre	2	1,785,562	11	11,637,096	6	3,772,339
Lucanas	13	5,231,383	32	10,140,177	3	1,819,495
Parinacochas	7	6,587,027	23	7,750,380	0	0
Paucar del Sara Sara	3	2,066,782	43	23,276,385	1	220,000

Source: SNIP Project Inventory Survey (April 2009)

While the national government presents 49 among 762 sub-projects, GRA and the local governments present 177 and 536, respectively.

(3) Problems and Constraints in Education Development

Table 5.6.5 shows the possible problems and constraints envisaged with education development.

Table 5.6.5 Problems and Constraints Envisaged with Education Development

Problems	Constraints
Insufficient Infrastructure	The construction costs of schools per student tend to be high as the villages are in remote areas and their sizes are small.
	The transportation costs of construction materials and labor rise for remote villages from cities.
	The budget relating to education is allocated by the Ministry of Education. However, the major part of the budget is spent for personnel expenses such as salary, bonus and allowances for teachers, and little is left for the infrastructure.
	In the urban areas, the students are increasing and require a lot of budget. Therefore, the rural areas cannot acquire sufficient budget.
Social Difficulties	The development of education in Ayacucho Region in 1980-2000 is delayed due to security problem.
Low Rate of School Attendance	The local custom "Machismo" disregards the women's human rights, and hinders them from attending school.
	In Ayacucho domestic violence is popular, and lots of children do not go to school due to the abuse by their farther.
	The majority of the teachers are permanent employed. That makes the transfer of the teachers difficult, and the education levels become imbalance among the provinces.
	If a school is unavailable in the village, children give up going to school because they have to walk a long distance.
	Some rural families do not let their children go to school because they are required as labor force.

Source: JICA Study Team

5.6.2 Healthcare

(1) Policies, Institutions and Programs

The Ministry of Health (*MINSA*) is responsible for the healthcare. "National Strategic Plan 2008-2011" and "National Integrated Plan of Health - July 2007" are elaborated by MINSA as the national policies.

The Regional Department of Health prepared "Analysis on the Situation of Healthcare in Ayacucho (*ASIS*) - 2007" and analyzed the present situation and problems in healthcare administration of Ayacucho Region.
In PDRC 2007-2024, it is proposed to have at least two excellent hospitals with modern equipment by 2011.

(2) Present Situation and Existing Programs in Healthcare

The Regional Department of Health is responsible for the administration of health and medical care in Ayacucho Region. Its geographical divisions are different from those of administrative divisions (see Figure 5.6.2). This is due to why the traffic convenience to the local medical services is taken into consideration. Ayacucho Region, consisting of 11 administrative provinces, is divided into seven blocks (*redes*) for healthcare administration, and further into 30 sub-blocks (*microredes*). The correlations between the administrative provinces and the healthcare blocks are given below.

Source: Analysis on Situation of Health in Ayacucho – 2007

Figure 5.6.2 Administration Division of Healthcare in Ayacucho Region

- Huanta Block: Western part of Huanta Province (3 sub-blocks)
- San Francisco Block: Eastern part of Huanta Province and eastern Selva part of La Mar Province (2 sub-blocks)
- San Miguel Block: Western part of La Mar Province (3 sub-blocks)
- Huamanga Block: Huamanga Province (9 sub-blocks)
- Centro Block: 5 Provinces (Cangallo, Vilcas Huaman、Victor Fajardo、Huanca Sancos、Sucre) (6 sub-blocks)
- Puquio Block: Lucanas Province (4 sub-blocks)
- Cora Cora Block: Parinacochas and Paucar del Sara Sara Provinces (3 sub-blocks)

The medical institutions, number of medical expert and ambulances in Ayacucho Region by block are listed in Table 5.6.6.

Table 5.6.6 Number of Medical Institutions, Medical Experts and Ambulances in Ayacucho Region by Block

Block	Medical Institutions				Medical Expert		Ambulance
	Hospital	Health Center	Health Post	Total	Doctor	Nurse	
Ayacucho Total/Average	8	51	336	395	218	310	55
Huanta	1	3	30	34	25	36	3
San Francisco	1	4	30	35	26	30	6
San Miguel	1	1	23	25	17	32	6
Huamanga	1*	17	82	99	54	91	14
Centro	1	11	82	94	37	58	8
Puquio	1	11	46	58	28	44	10
Cora Cora	2	4	43	49	32	19	8

Source: Analysis on the Situation of Healthcare in Ayacucho (ASIS) - 2007
*Note *: Regional Public Hospital (Ayacucho City)*

As the statistic data such as population by healthcare block and number of healthcare institutions are not available, the comparison between the population obtained by INEI National Census by province and the numbers of healthcare institutions by healthcare block are made and then summarized in Table 5.6.7.

Table 5.6.7 Comparison between Number of Healthcare Institutions and Population

Province	Population	Number of Healthcare Institution				Population per Institution
		Hospital	Health Center	Health Post	Total	
Total Ayacucho Region	612,489	8	51	336	395	1,551
Huanta La Mar	177,537	3	8	83	94	1,889
Huamanga	221,390	1	17	82	100	2,214
Cangallo Vilcas Huaman Victor Fajardo Huanca Sancos Sucre	107,129	1	11	82	94	1,140
Lucanas	65,414	1	11	46	58	1,128
Parinacochas Paucar del Sara Sara	41,019	2	4	43	49	837

Source: INEI National Census 2007 (Population), Analysis on the Situation of Healthcare in Ayacucho (ASIS) - 2007

While Huamanga Province, where the regional capital is located, has few healthcare institutions even taking into consideration its dense population, the southern part has more healthcare institutions per person.

A visit was made to a Health Center in Vinchos District, Huamanga Province (Figure 5.6.3). This is literally the core healthcare center of Vinchos sub-block, serving for about 3,000 inhabitants and governing 14 healthcare posts. Because no telephone network is available, wireless radio is used for the communication with the healthcare posts, and just 3 healthcare posts have radio system.

Figure 5.6.3 Hospital Room
(Health Center in Vinchos District)

FONCODES is executing infrastructure projects for health institutions. As mentioned previously, the FONCODES Ayacucho Regional office covers only 8 provinces in the northern and central parts of Ayacucho Region, and the 3 provinces in the southern part belong to FONCODES Ica Regional Office. The data on the healthcare infrastructure projects already executed by FONCODES in Ayacucho region during the period 1992-2009 were obtained from the FONCODES headquarters in Lima, which are summarized in Table 5.6.8.

Table 5.6.8 Healthcare Infrastructure Projects Executed by FONCODES in Ayacucho Region (1992-2009)

Province	Nos.	Cost (S/.)
Ayacucho Region Total	104	10,911,183
Huanta	12	1,372,591
La Mar	10	1,172,342
Huamanga	19	1,865,519
Cangallo	2	106,220
Vilcas Huaman	5	675,706
Victor Fajardo	14	1,965,890
Huanca Sancos	4	218,293
Sucre	8	1,211,623
Lucanas	21	1,401,709
Parinacochas	3	343,847
Paucar del Sara Sara	6	577,443

Source: Data obtained from FONCODES Headquarters in Lima

The major health insurance systems for receiving medical services are Social Insurance (*EsSalud*) and Integral Health Insurance (*SIS*). EsSalud is applicable for the employees of

governments and registered enterprises, and their families. However, the medical institutions where EsSalud is applied are quite limited. SIS covers the students of public schools (primary, secondary and superior) and extremely poor rural families. The entrance fee for SIS is free (though the registration is required) and the medical fee is not necessary. The medical institution or local government nearby judge whether or not the family is classified as extremely poor. There are other insurance services in private sectors, but they are mainly for urban wealthy families.

The rate of health insurance registration by province is listed in Table 5.6.9.

The main reasons why they do not apply for health insurance are that their children do not go to school, They find no advantage because medical institution is unavailable nearby, so that they do not understand the system of health insurance.

In SNIP as of April 2009, healthcare sub-projects are registered as summarized in Table 5.6.10.

Table 5.6.9 Registration Rates of Heath Insurance

Province	SIS	EsSalud	Others	None
Peru Average	18.5%	17.9%	6.5%	57.7%
Ayacucho Average	42.7%	9.7%	2.5%	45.3%
Huanta	37.1%	13.3%	4.3%	45.5%
La Mar	63.0%	5.0%	1.4%	30.7%
Huamanga	59.5%	9.1%	0.7%	30.7%
Cangallo	43.0%	5.2%	1.8%	50.2%
Vilcas Huaman	44.3%	5.0%	1.5%	49.3%
Victor Fajardo	34.0%	10.5%	1.5%	54.1%
Huanca Sancos	52.7%	12.5%	1.5%	33.4%
Sucre	39.3%	10.5%	1.6%	48.7%
Lucanas	57.2%	14.1%	1.1%	27.7%
Parinacochas	51.6%	11.9%	1.8%	34.8%
Paucar del Sara Sara	46.0%	6.4%	1.0%	46.7%

Source: INEI National Census 2007

Table 5.6.10 Summary of SNIP Healthcare Sub-projects by Province

Province	Executed/Being Executed		To be Executed			
			Approved		To be Approved	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Ayacucho Total	28	74,363,590	243	214,781,373	21	93,012,930
Huanta	4	3,603,562	39	14,066,149	3	2,317,550
La Mar	3	2,111,390	54	14,934,201	3	8,761,228
Huamanga	10	57,061,860	46	138,874,712	7	72,573,487
Cangallo	4	3,608,912	11	6,677,378	2	362,000
Vilcas Huaman	0	0	6	1,648,584	1	124,000
Victor Fajardo	2	366,178	20	9,909,672	0	0
Huanca Sancos	0	0	10	2,550,951	0	0
Sucre	1	1,999,811	6	3,855,277	0	0
Lucanas	2	3,027,249	27	15,757,340	5	8,874,665
Parinacochas	1	607,984	8	1,874,660	0	0
Paucar del Sara Sara	1	1,976,644	16	4,632,449	0	0

Source: SNIP Inventory Survey (April 2009)

Out of 292 SNIP sub-projects, 23 were applied by the central governments, 205 by GRA, and 64 by local governments.

(3) Problems and Constraints in Healthcare Development

Table 5.6.11 shows the problems and constraints in healthcare development in Ayacucho.

Table 5.6.11 Problems and Constraints in Healthcare Development

Problem	Constraints
Lack of Infrastructure	The budget is absolutely insufficient.
	The transportation costs of construction materials and labor become higher in the isolated rural areas.
	Due to unavailable infrastructures such as electricity and water supply, medical equipment cannot be introduces.
Social Difficulties	The development of healthcare in Ayacucho Region in 1980-2000 is delayed due to security problem.

Problem	Constraints
Shortage of Specialist	Medical doctors and nurses do not hope to work in remote rural areas where living circumstances are inconvenient.
	Medical institutions with insufficient medical equipment are unattractive for doctors and nurses.
	The income in rural medical institutions will be lower that in urban areas.

Source: JICA Study Team

5.6.3 Telecommunications

(1) Policies, Institutions and Programs

Telecommunication system is managed by the Ministry of Transportations and Communications (*MTC*). In Peru, 2,673,352 landline telephones are available or 9.6 lines per 100 persons in 2007. As for mobile phones, 15,417,247 sets, or 55.6 sets by 100 persons (*Source: MTC*). For reference, Japan has 55,165,000 landline telephones (43.0 lines per 100 persons), and 101,698,000 mobile phones (79.3 sets per 100 persons) in 2006 in accordance with Ministry of Internal Affairs and Communications of Japan.

In Peru, while landline phones are available in only 798 districts, mobile phones and internet can be used in 1,356 and 1,853 districts, respectively.

MTC is responsible also for TV and radio broadcasting, and internet. The development goals to be accomplished during the period 2009-2011 presented on the website of MTC[3] are listed below.

- Installation of 22.9 million mobile phones (79 per 100 persons) by June 2009
- Installation of 3.1 million landlines (11 lines per 100 persons)
- Installation of 775,000 internet lines at the national level
- Installation of TV sets in 1,230 communities, TV and radio in 350 communities through Assistance Project for Communal Communication (*PACC*)
- Installation of HF radios in 120 communities
- Installation of public communication equipment (public telephone or public internet) in 19,000 communities through Investment Fund for Telecommunications (*FITEL*)
- Installation of TV sets and FM radios in 700 communities, and HF radios in 550 communities

(2) Present Situation of Telecommunications and Existing Programs

Ayacucho Region has very limited telecommunication system. Table 5.6.12 shows the household ratio which has no communication means such as telephone and internet.

This table indicates that even Huamanga Province, where the regional capital is located, is less developed than the national average in telecommunication infrastructures, and other 10 provinces show severely poor figures.

Figure 5.6.4, Figure 5.6.5 and Figure 5.6.6 present the availability of landline phones, mobile phones and internet in Ayacucho Region by district, respectively. If even one access point of phones or internet is available in the district, that

Table 5.6.12 Households without Telecommunication Means

Province	Households without any Telecommunication Means
National Average	46.7%
Ayacucho Average	78.6%
Huanta	81.5%
La Mar	88.7%
Huamanga	57.3%
Cangallo	95.1%
Vilcas Huaman	99.2%
Victor Fajardo	95.5%
Huanca Sancos	99.8%
Sucre	95.1%
Lucanas	90.9%
Parinacochas	85.2%
Paucar del Sara Sara	83.8%

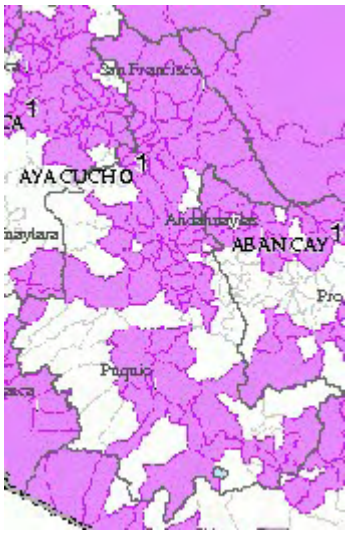
Source: INEI National Census 2007

[3] *http://www.mtc.gob.pe/portal/logypro/MTC_2006_2008_2011.pdf*

district is marked with color. Landline telephone is unavailable in almost all the districts, and still some districts do not have mobile phone and internet services.

Source: MTC Statistic Office 2008

Figure 5.6.4 Landline Phone Availability by District



Source: MTC Statistic Office 2008

Figure 5.6.5 Mobile Phone Availability by District

Source: MTC Statistic Office 2008

Figure 5.6.6 Internet Availability by District

Regional Department of Transports and Communications (*DRTC*) of Ayacucho says that through the above mentioned FITEL, a project is being carried out to install new public phones in rural communities by utilizing the collected charges from the already installed phones. Some public phones are installed with solar cell panels to supply the power for phones. TVs (parabola antenna, TV set and power source) and radios are also being installed in rural areas through PACC. SNIP sub-projects in telecommunication sector including those projects are summarized in Table 5.6.13.

Table 5.6.13 SNIP Telecommunication Sub-projects in Ayacucho Region

Province	Executed/Being Executed		To be Executed			
			Approved		To be Approved	
	Nos.	Cost (S/.)	Nos.	Cost (S/.)	Nos.	Cost (S/.)
Ayacucho Region Total	1	107,708,549	80	32,027,172	3	128,172
Huanta	0	0	7	302,946	0	0
La Mar	0	0	11	477,273	1	22,500
Huamanga	1	107,708,549	10	29,009,052	0	0
Cangallo	0	0	6	260,073	2	105,672
Vilcas Huaman	0	0	1	42,873	0	0
Victor Fajardo	0	0	10	428,730	0	0
Huanca Sancos	0	0	4	171,492	0	0
Sucre	0	0	9	385,857	0	0
Lucanas	0	0	12	517,311	0	0
Parinacochas	0	0	8	345,819	0	0
Paucar del Sara Sara	0	0	2	85,746	0	0

Source: SNIP Project Inventory Survey (April 2009)

Out of 84 sub-projects, 81 are applied from the central governments and 3 are from the local governments. No sub-project from GRA is found.

(3) Problems and Constraints in Telecommunications

Table 5.6.14 shows the problems and constraints in telecommunication development.

Table 5.6.14 Problems and Constraints in Telecommunication Development

Problem	Limiting Factor
High Cost	Installation of telephone lines to remote areas, especially in undulated zone, require more cost.
	The transportation cost of construction materials and labor will be higher in rural areas far from urban area
	To broadcast TV and radio to remote areas, relay stations are required. In the hilly areas, more number of stations or expensive parabola antennas become necessary
	In the rural community where electricity line has yet reached, solar power generation has to be installed.
Social Difficulties	The development of telecommunication in Ayacucho Region in 1980-2000 is delayed due to security problem.
Low Profitability	Considering that the call and internet access will not be so frequent in rural areas, the charge to be collected will not cover the installation cost.
	If the telephone charge is raised to recover the installation cost, poor farmers cannot afford it.

Source: JICA Study Team

5.7 Study on Process of National System of Public Information (SNIP）

5.7.1 Proportion of Tax Revenue in National Superintendence of Tax Management in Ayacucho Region to National Tax Revenue

Tax revenue in National Superintendence of Tax Management in Ayacucho Region is S/.260 million equivalent to 0.5 % of national tax revenue. Tax is paid at the place where the private company is legally domiciled, so that it does not include the tax of private companies like mining companies being legally domiciled outside of Ayacucho Region. The following table shows the transition of tax revenue of Ayacucho Regional Government and Central Government:

Table 5.7.1 Transition of Tax Revenue for Central Government and Ayacucho Regional Government

Items		2005	2006	2007
Tax Revenue	Central Government (S/. million)	35,589	45,485	52,808
	Ayacucho Regional Government (S/. million)	18	21	26
Growth Rate	Central Government Tax Revenue (%)		28	16
	Ayacucho Regional Government Tax Revenue (%)		17	24

Source ： Perú en Números 2008.Instituto Cuanto S.A

As shown in the above table, tax revenue from 2005 to 2007 for both Central Government and GRA has been increased steadily.

5.7.2 Modified Institutional Budget (*PIM*) and Original Institutional Budget (*PIA*) in Ayacucho Region

There are two types of budget for each government agency; PIS to be prepared in November of previous year and PIM to be modified as required throughout a year. PIA for Ayacucho Region in 2008 was S/.460 million equivalent to 3.9% of national total budget of S/.11,700 million. The population of Ayacucho Region is equivalent to 2.2% of total population of Peru and GDP of Ayacucho Region contributes to 0.84% of GDP of whole country.

(1) Transition of PIA and PIM

As for 2008 budget in GRA, its original budget was S/.460 million, but finally revised at S/.353 million. Likewise, 2005 budget was changed from S/.285 million to S/. 353 million.

The original budget and the modified budget for Ayacucho Region are in increasing tendency. PIA was increased by 17% and PIM by 15% from 2005 to 2008. In addition, the allocation of investment budget was increased from 27 points to 33 points. As for the working budget, it attained at 91% of PIM which is higher than 82% of average one in whole country, which means the efficient use of budget.

(2) Tendency in Investment

The following table indicates the transition of budget from 2005 to 2008. PIA means the original budget and PIM means the modified one.

Table 5.7.2 Budget for Ayacucho Region (2005 to 2008) (Unit:S/.000)

Item	2005		2006		2007		2008	
	PIA	PIM	PIA	PIM	PIA	PIM	PIA	PIM
Expenditures(except financial expenditures)	246,919	307,898	284,725	383,939	330,980	471,379	418,819	492,270
Recurrent expenditure	226,944	258,260	252,093	300,806	292,521	333,502	328,585	357,978
Capital expenditure	19,974	49,638	32,631	83,132	38,460	137,877	90,234	134,293
Investment	18,749	44,358	31,037	79,558	37,060	133,902	87,330	127,722
Preparation of management and plan	2,830	4,630	3,007	3,449	3,006	3,091	2,900	4,659
Agriculture	6,587	14,385	12,193	17,993	10,792	44,274	25,614	26,374
Mitigation measurements	272	957	4756	3,558	750	3,574	424	400
Security measurements	0	0	0	0	0	0	1,311	6,730
Education/culture	1,334	2,832	1,156	3,623	2,284	4,614	11,849	12,760
Energy/resources	0	728	2,626	771	1,336	17,234	0	11,810
Commerce and industry services	200	1,010	0	320	296	780	952	1,764
Health and water supply and sewage	0	0	423	10,853	1,612	12,325	13,082	9,794
Transportation	7,526	19,041	10,555	37,890	16,584	47,410	28,485	52,758
Urban and housing development	0	774,	600	1,100	400	600	2,713	676
Financial investment	0	0	0	0	0	0	0	0
Other capital expenditures	1,225	5,279	1,594	3,573	1,400	3,975	2,904	6,571
Social welfare expenditure	37,630	45,110	40,839	42,090	41,106	41,682	41,342	41,732
Financial cost	0	0	0	0	0	0	0	0
Total	284,550	353,009	325,564	426,029	372,087	513,062	460,161	534,003

Source: Portal de Transparencia Económica del Ministerio de Economía y Finanzas (May 2009)

The following table shows the transition of investment budget for GRA

Table 5.7.3 Transition of Investment Budget for Ayacucho Regional Government by PIM (unit:S/.000)

Item	2005	2006	2007	2008
Investment	44,358.6	79,558.9	133,901.7	127,721.7
Management and Plan	4,629.6	3,449.7	3,090.7	4,658.7
Agriculture	14,385.1	17,993.1	44,273.6	26,373.4
Social Vulnerability Measurements	957.4	3,557.9	3,574.3	400.0
Security Measurement	0	0	0	6,729.5
Education/Culture	2,832.1	3,623.4	4,614.4	12,759.5
Mining/Energy Resource	728.1	771.5	17,233.6	11,809.6
Commerce and Industry/Service	1,010.4	320.0	780.2	1,763.6
Health/Water Supply and Sewage	0	10,853.3	12,324.5	9,793.9
Transportation	19,041.3	37,889.9	47,410.5	52,757.6
Urban and Housing Development	774.4	1,100.0	600.0	675.7

Source: Portal de Transparencia Económica del MEF 2009 y cuadro anterior

The investment budget, as mentioned in the above table, was annually increased by 42%. In particular, the annual average increase rate was 65% for education/culture sector, 53% for energy and 41% for transportation. The investment to agriculture sector in 2007 was rapidly increased from S/.18 million to S/.44 million, but that in 2008 was decreased to S/.26 million. GDP of agriculture was 25% and rural area population occupy 36% of total economic activity population.

5.7.3 Possibility of Use of SNIP

In order to implement the proposed subprojects, it is necessary that these should be approved through the SNIP process. SNIP was established aiming to execute the more effective allocation of public fund that is in detail stipulated in the law Nº 27293 and the regulation D.S.Nº 221

Organization of SNIP consists of Implementation Unit and Formulating Unit (*UF*), Investment Programming Office of Regional Government (*OPI-GR*) and Investment Programming Office of Central Government (*OPI-GN*) to evaluate and approve the proposed programs under the jurisdiction of General Directorate of Multiannual Programming of Public Sector (*DGPM*) of MEF.

Formulating Unit is an agency requiring to prepare the sub-projects and to obtain the approval from Investment Programming Office (*OPI*). It is also requested to execute the study necessary for SNIP process as required. Implementation Unit is an agency to ensure the budget and to implement the projects after obtaining the approval of SNIP. In implementation of the projects the required budget should be included in PIA. In case of emergency or availability of budget in central government, such process is not always required. Basically, the sub-projects prepared by the regional government and/or the local government could be authenticated by OPI-GR. In case of implementation of sub-projects under foreign aid, it is essential to obtain the approval of DGPM.

In case that the possibility of implementation by foreign aid is groped, it is necessary to study an implementation method by contacting with DGPM at beginning of planning. As the implementation method, it is thinkable to apply the independent project approach (implementation by each project), program approach and package approach, but the appropriate one is different from the project contents.

(1) SNIP Process

The Public Investment Project (*PIP*) is regulated as follows, due to its regulation.

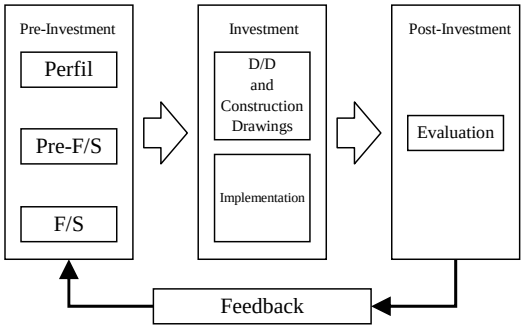
> The public investment means the activities to recover, improve, expand, and produce the productive capacity using the public fund for all or a part of investment fund.

PIP is possible to execute as the independent project approach or investment program (PI). The investment program is possible to execute by the independent project approach, program approach or package approach, but the package approach is desirable to be small-scaled investment, similar investment pattern, and also a group of projects similar to planning and investment cost. The merit of program approach or package approach, not independent approach, is able to execute in an integrated form by composing the projects as one group without applying each project.

(2) Process and Project Cycle of SNIP

General process of SNIP is shown in the right figure.

The SNIP process is planned so as to make more effective public project investment by dividing it into the Pre-investment, Investment and Post-investment. The Pre-investment stage is further divided into the following 4 stages, for which the required study contents are different by the project scale.



Source: JICA Study Team

Figure 5.7.1 SNIP Process

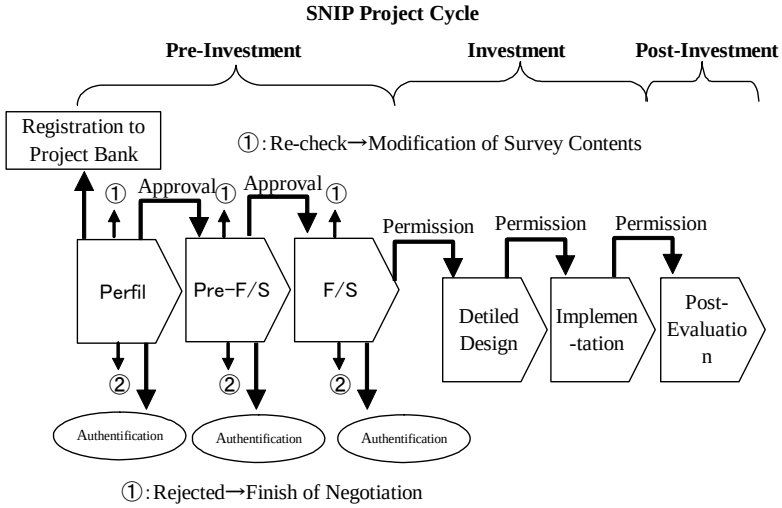
Table 5.7.4 Project Division by SNIP

Project Division	Investment Amount	Required Study
Simple Investment	<S/.1,200,000	Simple PERFIL(prepared based on form)
Small scale	S/. 1,200,00 – S/.6,000,000	PERFIL
Medium scale	S/. 6,000,00～ S/. 10,000,000	PRE-F/S
Large scale	> S/.10,000,000	F/S

Source ：prepared by JICA Study Team based on MEFHome Page

The project cycle specified in SNIP is shown in the right figure.

The simple and small-scaled projects could be implemented by the study at PERFIL level. The medium-scaled project and the large-scaled projects could be implemented through the approval by the study at Pre-F/S level and F/S level, respectively. In order to implement the project with approval only, it is necessary to procure the budget by each Formulating Unit (*UF*) itself.



Source ：prepared by JICA Study Team based on MEF Home Page

Figure 5.7.2 Project Cycle Specified in SNIP

(3) Member of SNIP in Regional Government

In Ayacucho Region as well as other regions, OPI and UF of Regional Government are established based on SNIP under jurisdiction of governor.

The regional government can approve the projects without setting the budget limitation within regional government budget, if guarantee of central government can be obtained. However, the required fund should be included in PIA prepared in November of previous year. Concurrently, it is necessary to obtain the approval at the required study level based on the project scale. In case that the project fund requires the foreign aid, it is essential to obtain the approval of DGPM of MEF.

(4) Possibility of Implementation of Regional Government Projects

OPI-GR keeps 115 projects as of May 2009 although those are in different level. The required project cost is S/.320 million. Out of them, the projects judged to be executable are 59 in number. In the regional government projects as well as the whole projects, the project number is ranked in order of agriculture, education, transportation, heath and water supply and sewage.

Table 5.7.5 Projects under IPO of Ayacucho Regional Government as of May 2009

Sector	Nos. of Project	Present Situation				Investment Amount (S/.000))	Investment Amount (%)
		EF	V	NV	EE		
Management and Plan	8	2	5		1	3,973	1.24
Agriculture	41	11	19	1	10	171,725	53.67
Social Vulnerability Measurements	2	1	1			1,072	0.33
Security Measurement	0						
Education/Culture	29	7	14		8	58,911	18.41

Sector	Nos. of Project	Present Situation				Investment Amount (S/.000))	Investment Amount (%)
		EF	V	NV	EE		
Mining/Energy Resource	1				1	4,922	1.54
Commerce and Industry/Service	2	1	1			600	0.19
Health/Water Supply and Sewage	8	1	5		2	12,878	4.02
Transportation	23	2	13		8	65,334	20.42
Urban and Housing Development	1		1			559	0.17
Total	115	25	59	1	30	319,973	100.00

Remarks: EF: under preparation; V: feasible, NV: unfeasible, EE: under evaluation

Source: OPI-Gobierno Regional de Ayacucho

The following table indicates the required investment amount approved by May 2009 by OPI-RG, the budget included in PLM in 2008 and the occupation rate of required investment amount to PIM budget.

Table 5.7.6 Required Investment Amount for OPI-GR Approved Projects and PIM Budget in 2008

Items	Required Investment Amount Approved by OPI-GR (S/.000)	PIM Budget in 2008 (S/.000)	Occupation Rate of Required Investment Amount to PIM Budget
Whole	99,943	127721.7	78%
Management and Plan	1,520	4658.7	33%
Agriculture	48,948	26373.4	186%
Social Vulnerability Measurements	0	400.0	
Security Measurement	0	6729.5	
Education/Culture	16,354	12759.5	128%
Mining/Energy Resource	4,922	11809.6	42%
Commerce and Industry/Service	0	1763.6	0%
Health/Water Supply and Sewage	2,130	9793.9	22%
Transportation	26,068	52757.6	49%
Urban and Housing Development	0	675.7	0%

Source : Assumed based on data from OPI-Gobierno Regional de Ayacucho

(5) Package and Program Approaches

SNIP recognizes the execution of projects by package and program approaches. The package approach specified in SNIP is that small-scaled and simple projects with similarity could be packaged and also treated as a part of program.

The meaning of program is that in the projects with the same purpose, individual or packaged ones could be aggregated for their implementation. According to the SNIP's stipulated article (*Art. 17 de la Directiva 002-2009 EF*), it is required to compose the program as follows:

- Execute projects within the fixed period
- Be able to settle problems by one approach or plural approaches
- Accrue benefits from each Public Investment Project (*PIP*) composing program and also to attain the determined purpose
- Include the pilot program, study component and management program to attain the program purpose
- Independently accrue benefits from each PIP

Mention the following items in report in case of including the package approach in Investment Program (*PI*) and issuance of approval on it:

- Period which the package approach is approved
- Criteria on execution of post-evaluation

- Process for applying new PIP in one package
- Possibly maximum input amount by package approach
- Mechanism reflecting opinions of local people and local governments
- Registration at project bank by UF for each PIP and application of member of package approach to OPI in-charge

Conditions of PIP applying package approach are as follows:

- Be small-scaled
- Be similar with unit prices, scale and design, etc.
- Consistency with strategies of each sector, regional government and local governments
- Have the same purpose
- Standardize finding approach and approval of each PIP
- Have the same function or program

Chapter 6 Grappling of Donor Agencies and Trend of Donors and NGOs in Ayacucho Region

6.1 Grappling of Donor Agencies and Action of Government of Peru

According to the data of the Development Assistance Committee (*DAC*) of Organization for Economic Cooperation and Development (*OECD*), the total of gross receipt amount by GOP shifted from US$ 610 million in 2001 to US$ 7.4 million in 2007, as shown in Table 6.1.1. Out of that, the gross receipt amount from the DAC member countries has decreased year by year, but that from international agencies is tended to increase although the amount is not large.

Table 6.1.1 Transition of Gross Receipt Amount for ODA (2001 to 2007)

Unit: million US$

Year	Total Amount of Gross Receipt for ODA			DAC Member Countries				International Agencies	
	Total Amount (1)	Grant	Loan	Total Amount (2)	Grant	Loan	Ratio of (2)/(1) (%)	Amount (3)	Ratio of (3)/(1)(%)
2001	610.05	421.77	188.28	575.32	389.04	186.28	94.31	33.41	5.48
2002	625.03	393.03	232.00	584.37	357.42	226.95	93.49	38.26	6.12
2003	651.50	469.52	181.98	586.86	406.52	180.34	90.08	61.43	9.43
2004	656.74	470.64	186.10	615.69	429.77	185.92	93.75	37.06	5.64
2005	710.42	537.60	172.82	628.09	455.32	172.77	88.41	77.55	10.92
2006	677.90	515.97	162.93	582.62	427.34	155.28	85.94	89.32	13.18
2007	741.86	491.18	250.68	637.38	386.95	250.43	85.92	90.55	12.21

Source: OECD Website (http://www.oecd.org/, as of January 2009)

In addition, the DAC's data shows that the top ten donors to GOP are USA, Japan, German, Spain, EC, UK, Netherland, Norway, Switzerland and France in turn according to the accumulated receipt amount from 2001 to 2007. USA was a top donor from 2001 to 2006, but fallen to a third donor in 2007. Japan maintained a second donor following USA, but became a top donor in 2007 due to re-start of new acceptance of Japanese loan by change of administration in 2006. As for the international agencies, EC has always maintained a top donor.

Table 6.1.2 Gross Receipt Amount for ODA

Unit: million US$

Country/Agency	2001	2002	2003	2004	2005	2006	2007
(1) DAC Member Countries							
Japan	182.05	157.48	161.85	175.81	136.71	110.21	153.52
Spain	32.21	38.79	44.70	58.74	71.71	93.59	120.21
USA	193.21	182.50	231.38	203.01	180.87	211.86	117.43
Norway	2.15	1.43	9.02	1.25	3.34	1.41	94.39
German	94.77	45.99	56.24	69.26	140.23	59.3	54.61
Canada	9.48	7.86	11.06	14.25	15.38	14.48	20.09
Belgium	4.24	7.09	7.35	10.56	17.09	17.89	16.60
Switzerland	8.93	10.91	15.70	20.04	15.28	14.12	14.57
France	7.58	9.14	13.92	16.97	13.48	19.60	14.05
UK	7.47	84.42	4.49	6.56	3.32	22.14	6.66
Sweden	2.68	3.94	3.48	4.55	3.59	4.03	5.77
Others	5.82	10.94	6.65	11.63	8.70	9.12	15.34
Sub-total	575.32	584.37	586.86	615.69	628.09	582.62	637.38
(2) International Agencies							
EC	21.38	16.08	41.65	13.62	42.15	54.05	65.20
GFATM	-	-	3.52	10.42	17.75	12.73	12.23
IDB(Special Fund)	3.03	4.36	2.22	1.91	1.68	9.88	2.76
UNFPA	1.59	6.39	1.56	1.54	1.25	1.27	1.49
IFAD	-	1.84	1.20	0.18	0.05	-	-
UNDP	0.57	0.66	0.71	0.82	0.66	0.87	0.81

Country/Agency	2001	2002	2003	2004	2005	2006	2007
WFP	1.33	2.11	1.86	1.23	3.47	0.61	0.71
Others	4.54	5.85	7.80	6.11	8.82	8.43	5.98
Sub-total	32.44	37.29	60.52	35.83	75.83	87.84	89.18
Other Donors	1.32	2.4	3.21	3.99	4.78	7.96	13.93
Total	609.08	624.06	650.59	655.51	708.70	678.42	740.49

Source : OECD website(http://www.oecd.org/, as of January 2009)

On the other hand, GOP established the Peruvian International Cooperation Agency (*APCI*) in April 2002, to promote the cooperation and coordination between donors and GOP. Since February 2005, APCI has held a donors' meeting at the rate of once a month, and prepared the strategic framework papers "International Cooperation Strategy" mentioning the fields requiring the foreign aids (grant) in June 2006. In addition, APCI established the taskforce in June 2007, to have meetings among donors toward the actualization of Paris declaration. APCI is in charge of technical cooperation, but does not get involved in loan projects.

6.2 Priority Fields of Major Donors in Assistance

6.2.1 International Agencies

Table 6.2.1 shows the priority fields of major international agencies in assistance for Peru.

Table 6.2.1 Priority Fields of Major International Agencies in Assistance

International Agencies	Priority Fields in Assistance	Remarks
(1) World Bank (*WB*)	(a) Economic Growth - Support of macro economy policy and mitigation of vulnerability for natural disaster and social confrontation - Preparation of infrastructure for economic growth and economic integration by conclusion of free trade agreement through preparation of economic infrastructure and improvement of business environment - Management of natural resources and mining industry which have sustainable development (b) Social Development - Improvement of access to basic social infrastructure services - Promotion of land registration - Improvement of indexes on education, health and nutrition (c) Modernization of Nation - Promotion of decentralization - Strengthening of management of public sector - Enlightenment of nation on rule of law and administration of justice	CPS: Country Partnership Strategy (2007 -2011)
(2) European Commissions (*EC*)	(a) Modernization of nation, Strengthening of governance (b) Support to grant of citizenship of people who have no citizenship due to remote living, and their social participation (c) Support to comprehensive social development at region having social alienation and many poverty and high poverty.	Country Strategy Paper (2007 -2013)
(3) Inter-American Development Bank (*IADB*)	(a) To improve economic productivity and competitiveness by removing institutional obstacles which hamper systematic investment for human capital and promotion of investment and productivity (b) To execute protection measures for vulnerability groups and poverty mitigation measures through improvement of efficiency of social policy (c) To establish the modernized and decentralized efficient nation	Peru's Operational Strategy (2007 - 2011)
(4) United Nations Development Program (*UNDP*)	(a) Democratic governance (b) Fighting poverty (c) Energy and resources environment (d) Technology of information and communication (e) Prevention of natural disaster and HIV/AIDS	

International Agencies	Priority Fields in Assistance	Remarks
(5) International Fund for Agricultural Development (*IFAD*)	(a) Furnishing of fund for settlement of land conflict, support to land registration and promotion of better management of natural resources to activate farmers' property and resources. (b) Strengthening of service provider of private sector, development of market aiming at improvement of farmers' access to technical support and financial service. (c) Support to establishment of agriculture related to enterprises by farmers close to small and medium scale towns and promotion of non-agriculture economic activities for strengthening coordination between town and rural area. (d) Promotion of participation of community and community organization to decision making and fund management on project implementation	

Source: Poverty Profile (JBIC, 2007) and updating by access to relevant website

6.2.2 Bi-lateral Aid

The priority fields of bi-lateral aid for Peru are explained below:

Table 6.2.2 Priority Fields of Bi-lateral Aid Donors

Donor	Priority Field	Remarks
(1) Japan	(a) Poverty Measures - Preparation of infrastructure for water supply and small-scaled irrigation system through financial assistance focusing on agricultural infrastructure and support to modernization of agricultural production technology - Execution of project contributing to improvement of living environment at poverty region (b) Support to Social Sector - Support to re-training to present teachers and procurement of teaching materials and educational facilities - Training of medical service staff and procurement of teaching materials to health and medical facilities as well as improvement of family plan and maternal and child health - Practical use of new information and communication technology (c) Preparation of Economic Infrastructure - Preparation of economic infrastructure such as transportation, electricity, information/communication indispensable for maintaining sustainable growth - Preparation of infrastructure related to energy such as oil and natural gas, promotion of mining development in environmental consideration in mining sector which is a main exporter, and strengthening of character of agriculture and fishery industry for expansion of food production (d) Environmental Conservation - Support to improvement of global environmental problems such as warming and city environmental problem such as air and water contamination, industrial waste and industrial public contamination - Cooperation with natural disaster measures due to El Niño phenomenon	Aid Plan for Peru, August 2000 Executing Agency: JICA
(2) USA	(a) Strengthening of democratic process and democracy (b) Economic growth at economic corridor (creation of job opportunity to poverty) (c) Promotion of health of people who have high risk on disease (d) Management of sustainable natural resources (e) Promotion of change of alternative crops from narcotic crop cultivation at narcotic crop cultivation region (f) Expansion of basic education opportunity with high quality for women at rural area. (g) Improvement of livelihood of people living in national border with Ecuador	Aid Strategic Papers (2002 -2006) Executing Agency: USAID
(3) German	(a) Strengthening of democracy, participation of community, strengthening of public administration - Guarantee of citizenship for everybody - Fighting corruption - Participatory policy making for well-balanced economic growth and poverty reduction (b) Supply of clean water and sewage purification - Strengthening of technical and financial capability for water supply and sewage authority and local government of central and provincial cities	Executing Agency: GTZ

Donor	Priority Field	Remarks
	(c) Sustainable rural area development and ensuring of natural resources and bio-diversity - Improvement of agricultural productivity - Improvement of farmer's income through expansion of agricultural production market.	
(4) Spain	(a) Strengthening of democratic management and participatory society（Promotion of participatory democracy and political diversity, strengthening of democracy, institutional development of public services on decentralization process and good governance） (b) Sufficiency of basic and social needs (nutrition, education, public health, maternal and child health, prevention of HIV/AIDS) (c) Promotion of economy and enterprise network（small-scaled enterprises and support to producers） (d) Improvement and conservation of environment（conservation of sustainable bio-diversity and environmental management system） (e) Esteem of culture in development framework (f) Promotion of gender equality (g) Prevention of disputes and peace building	Aide Strategic Papers for Peru (2005 -2008) Executing Agency : AECI
(5) Canada	(a) Improvement of quality of education for poverty (b) Equality of opportunity of education (c) Execution of efficiency of educational services (d) Improvement of governance by democratisation and reform of public sector (e) Stable economic growth benefiting poverty	Bi-lateral Program for Peru (2005 -2009) Executing Agency : CIDA

Source: Poverty Profile (JBIC, 2007) and updating by access to relevant website

6.3 Activities of Donors and NGOs in Ayacucho Region

6.3.1 Donor Agencies

(1) International Agencies

According to the International Cooperation Department of Ayacucho Regional office, international agencies working in Ayacucho Region are UNICEF and FAO as of May 2009. The major activities by these agencies are as follows:

Table 6.3.1 International Agencies Working in Ayacucho Region

Project	Agency	Purpose	Duration
(1) Education and Health Strengthening Cooperation Program	UNICEF	Strengthening of access to taking of enough nutrition and hospital by pregnant woman and children	2009
(2) Capacity Development of Organization	USAID/ UNICEF	Improvement of national administration system, Improvement of efficiency of local government, Strengthening of local economic development, Support to coordination committee among departments, Improvement and strengthening of people participation in decision making and monitoring	2009
(3) Rehabilitation and reconstruction of damaged facilities by El Niño and Field School Execution Project	FAO	To open the field school to train the regional people on the relevant projects such as crop cultivation and animal husbandry as mainspring of regional socio-economic development	2007 - 2010

Source: Ayacucho Regional Office

As can be seen in these purposes, the international agencies mainly execute the support activities to mitigation of vulnerability and poverty reduction for regional people. The supported fields are education, health and agriculture.

(2) Bi-Lateral Aid

In Ayacucho Region, USA, German and Belgium provided the support activities as of May 2009. The contents of activities are as follows:

Table 6.3.2 Donors Working in Ayacucho Region (Bi-lateral Basis)

Project	Donor	Purpose	Duration
(1) Wari Regional Development Strategic Implementation Plan	USA (*USAID*)	Intervention to production system focusing on settlement of chronic malnutrition and guarantee of social protection method for vulnerable family and community	2008 - 2010
(2) Economic Environmental Zoning and Extent Preparation Project	Germany	- Advice on course of management of natural resource and environment for natural resource department and environment department of Ayacucho Regional Office - Establishment of technical group which prepares working plan, in environment committee of Ayacucho Regional Office - Preparation of projects on environmental matters to be executed for 2 years	2008 - 2010
(3) Domestic and Sexual Violence Eradication Integrated Project	Belgium	Support to mentally unstable living situation occurred by terrorism	2003 - 2012
(4) Project on strengthening and communalisation of production group on camel family animal, tara, avocado, dairy farming and handcraft	Belgium	Support to local government to make betterment of economic cycle and support to food chain targeting small and medium landholders.	2003 - 2012
(5) Tara Regional Conference	Netherlands (*SNV*)	Stabilization of livelihood of poor farmers who produce Tara using private sector and strengthening of tara selling to outside of region	2009 - 2011

Source: Ayacucho Regional Office

Tara production system supported by Netherlands which links the small-scaled tara production farmers with the private sector, is one of poverty reduction measures. The small-scaled famers can obtain the stable income by cultivating tara under contract with tara producers (private sector). On the other hand, the tara producers ensure stable supply of raw materials of tara. As a result, both parties can obtain benefit using this system. GRA is also supporting so that this system can be smoothly promoted in institution.

6.3.2 NGOs

As of May 2009, there are many NGOs working in Ayacucho Region. Out of them, the NGO activities related to the Study are given below:

Table 6.3.3 NGO Activities Related to the Study in Ayacucho Region

Activities	NGO	Purpose	Duration
(1) Children Good Growth Promotion Project	Taller de Promocion Anidina (*TADEPA*)	To improve growing condition of children below 5 years old by preparing good hygiene environment at Cangallo Province	2009 - 2011
(2) Improvement of Access to Benefit and Protection of Law and Livelihood of Vulnerable and Poor Regional People	Asociación Servicion Educativos Rurarles (*SER/CCCUNCH*)	Improvement of life and poverty production of aged persons in extreme poverty and their family.	Feb. 2008 - Feb. 2011
(3) Improvement Project of Drinking Water and Hygiene System for Village People	Asociación Servicios Educativos Rurarles (*SER*)	Contribution to Social Priority Needs of Village People at Huamanga and Cangallo Provinces	Dec. 2008 - Jan. 2011
(4) Promotion of Community Organizations for Agriculture, Natural Environment and Food Security	Instituto de Promocion Agropecuaria y Comunal (*IPAC*)	Strengthening of community organizations, and training and dissemination of environmentally friendly organic farming	Jan. 2009 - Jan. 2012
(5) Improvement of Hygiene System by New Technology	Instituto de Acondcionamiento Territorial y Desartrollo Humano (*INATED*)	Establishment of sewage purification system at Urpay village, to contribute to improvement of hygiene situation and fundamental knowledge of village people on public hygiene and environmental custom	Five months
(6) Training and technical support on Organo Production	Santa Ana de Huambalpa	Promotion of commercialization of Oregano at Huambalpa District, to ask for socio-economic welfare involving village people	Jan. 2009 - Dec. 2009

Source : Ayacucho Regional Office

The major activities of NGOs in Ayacucho Region are provided for environment, hygiene and agriculture sectors. These activities are small-scaled and conducted at village level. Out of these activities, those by SER/CCCUNCH are similar to the purpose of the Study. According to SER/CCCUNCH, their activities have been conducted from February 2008 and are scheduled to be finished by February 2011. The contents of activities are divided into two components; support to aged persons (gender) and improvement of livelihood. In the improvement of livelihood, SER/CCCUNCH proposes the preparation of high-quality seeds and safe foods, and how to send products to market. In addition, SER/CCCUNCH trains the farmers how to cover crops with vinyl and straw as countermeasure for cold-weather damage.

Chapter 7 Study on Participatory Approach in Ayacucho Region

7.1 General

As can be seen in preparation procedure of development plan in Ayacucho Region as described in Chapter 3, the participation of inhabitants is prerequisite and taken in every steps of preparation of development, project implementation and O&M in Ayacucho Region and also in every levels of development objective area in development at regional level to community level, in line with the decentralization reform in Peru.

7.2 Significance of Participatory Approach

The experiences and lessons learned on the participatory approach executed in the agricultural development projects so far under the decentralization reform, lead to the following effects as the expected results of participatory approach in the Ayacucho Region.

Table 7.2.1 Expected Effect by Participatory Approach in Agriculture Development Project

Effects	Details of Major Effects
Improvement of transparency of projects	・Improvement of accountability to people ・Prevention and control of corruption and degeneration
Promotion of decentralization	・Consistency of National policy and local development policy ・Strengthening of local staff resources
Promotion of consent formation among regions	・Development policy and course control among province, district and community ・Regional complement of human resource, facility and technology
Promotion of consent formation among sectors	・Development policy and course control among sectors ・Multi-sectoral complement of human resource, facility and technology
Reflection of inhabitants' needs	・Consistency local demands with local development policy ・Smoothness of project preparation, etc.
Promotion of participation willingness to projects	・Improvement of awareness to projects ・Enlightenment of awareness to project purpose, etc.
Saving of project cost	・Offer of labour force filling construction cost, etc. ・Offer of land, local materials, etc.
Improvement of capability of O&M of project facilities	・Establishment of O&M system after project ・Offer of labour force, etc.
Mitigation of friction of social culture	・Smoothness of project implementation ・Decrease of conflict on rights and interests, etc.

Source : JICA Study Team

With expecting the above-mentioned effects, the participatory approach is widely introduced at preparation stage for each development plan in Ayacucho Region. In line with the participatory approach plan, the participation of inhabitants is executed at the implementation and O&M stages of the project.

7.3 Method of Participatory Approach

As the effects by the participatory approach mentioned above can be expected, the participatory approach fitted to the characteristics of each project is applied.

7.3.1 Regulations on Participatory Approach

The application of participatory approach in Ayacucho Region, conducted in accordance with the following regulations in Peru. According to these regulations, the development projects in Peru are required to apply the participatory approach.

Table 7.3.1 Regulations on Participatory Approach in Peru

Basic Regulations
Constitución Política. Art. 195.2 Cap. XIV del Titulo IV Ley de Reforma Constittucional Ley 27680 (Community participation in Peru Constitution)
Ley de Bases de la Descentralización Ley 27783 (Community Participation in Decentralization)
Ley Orgánica de Gobiernos Regionales Ley 27867 (Community Participation in Regional Administration)
Ley Orgánica de Municipalidades Ley 27972 (Community Participation in Provincial and District Administration)
Major Regulations
Ley Marco del Presupuesto Participativo y su Regalmento DS 171-2003-EF (Community Participation in Budget Preparation)
Instructivo para el Proceso PP 2006 Instructivo 001-2005-EF/76.01 Resolución Directoral 006-2005-EF/76.01 (Community Participation in Budget Preparation)
Ordenanzas Municipales Provinciales y Distritales que reglamentan procesos PDC y PPP (Community Participation in Provincial and District Regulations)
Ley No 28411, ley General de Sistema Nacional de Presupuesto (Community Participation in National Budget System)
Directiva 011-2005-EF/76.01, para la programación, formulación y aprobación del presupuesto de los gobiernos regionales (Community Participation in Planning, Preparation and Approval of Regional Government Budget)

Source: JICA Study Team

7.3.2 Approach by Local Governments

Under the legal system on community participation in Peru, GRA and provincial and district governments expect the effect of community participatory approach and apply it to every agricultural development projects.

In particular, in the agriculture development projects in Ayacucho Region, an attention is paid upon the community participatory at the stage of preparation of development plan and implementation plan in the region. The following table shows the opportunity and purpose of community participation at the said stage.

Table 7.3.2 Opportunity and Purpose of Community Participation at Preparation Stage of Development Plan in Local Administration in Ayacucho Region

Participation Opportunity	Participation	Purpose
Working Group	Relevant agencies/ departments, Experts, etc.	Preparation of basic concept and principle by experts grasping local conditions and community needs at initial and medium stages of planning.
Workshop /Seminar	Relevant agencies/ departments community, etc	Reflection of community opinions and needs into the project implementation plan at initial and medium stages of planning. Besides, calling of attention on enlightenment of community toward implementation of project.
Public Hearing	All communities	Obtaining of consensus of community at initial and medium stages of planning.

Source: JICA Study Team

With setting of opportunity of community participation at planning stage, the local governments intends to prepare the development plan and implementation plan to realize smooth implementation and O&M of projects, fitted to local characteristics.

7.3.3 Approach at Community Level

In the agriculture development project at community level in Ayacucho Region, it is required that community participatory approach is positively applied to the stages from planning to implementation and O&M. In not only the public works based on the legal system in Peru, but also the development projects by international agencies and NGOs as mentioned in Chapter 6, community participatory approach is actively used.

Respective executive agencies have respective community participatory approaches. In Ayacucho Region, the typical example of community participatory approach at community level is seen in the small river basin management project by PRONAMACHCS as described in Sections 4.5 and 5.2.

In PRONAMACHCS, the community participatory approach is incorporated at the stage of project implementation

process as shown in Table 7.3.3. In particular, to promote the participation of community at stages of implementation and O&M of projects, the positive attention is given to the activities of "analysis" and "activity" at the planning stage. In addition, to heighten the participation rate of community at the initial stage of projects, the awareness enlightenment to promote the participation of community, especially women is conducted for key informants such as chiefs of district offices and communities prior to holding of workshop and seminar.

Table 7.3.3 Project Implementation Procedure and Community Participation in PRONAMACHCS

Step	Activities	Details of Activities for Community Participation	Purposes of Activities on Community participation
Boundary	Selection of Objective Area	・ Prioritisation by executing agency and representatives of communities	・ Confirmation of community organizations and community cooperative system in objective area
Selection	Selection of Priority Projects	・ Prioritisation by executing agency and representatives of communities	・ Confirmation of community needs
Analysis	Comprehensive Participatory Judgement (*DGP*)	・ Analysis of problem and development potential toward proposal of alternative plan to settle problem	・ Strengthening of community function by cooperative works ・ Confirmation of present community conditions using knowledge and information of community ・ Grasping and systematisation of problems and potential of communities
	Important Analysis	(The same with participatory analysis)	(The same with participatory analysis)
Planning	Community Activity Plan (*PAC*)	・ ・ Prioritisation of activities in consideration of ・ insufficient resources ・ ・ Arrangement between communities	・ Preparation of alternative plan toward problem settlement and use of potential and development ・ Classification of alternative plans for problem settlement along fitness of community. ・ Prioritisation of alternative plans for problem settlement along knowledge and information of community ・ Documentation of decision of communities
	Individual Plans	(The same with community activity plan)	(The same with community activity plan)
Implementation		・ Offer of labour force, land and local materials	・ Improvement of efficiency and smoothness of projects
Evaluation	Evaluation Workshop	・ Evaluation of community activity plan executed in the previous year ・ Preparation of community activity plan to be executed in the next year	・ Awareness of communities ・ Share of common recognition of activities executed in the previous year ・ Preparation of activity plan by cooperative works
	Monitoring	・ Regular report on Management and O&M	・ Transparency of project

Source: Prepared by JICA Study Team based on PRONAMACHCS data

7.4 Problems and Subjects on Participatory Approach

As mentioned above, the community participatory approach is actively employed to the agricultural development project in Ayacucho Region. However, the community participatory approach is not always used in a suitable manner for measure, methodology and time, so that there are not less projects which have not sufficient effects from it.

With the experiences and lessons learned from agriculture development projects executed so far in Ayacucho Region, the following problems and subjects are clarified in the community participatory approach:

Items	Present Conditions (Major Problems/Constranis)	Subjects
Inhabitants	· Lack of communication (low literacy rate to Spanish) · Extant traditional gender discrimination (machismo) in home (non-approval on participation of wife and daughter by husband, lack of decision-making right of wife and daughter, lack of understanding on rolaes of wife and daughter by husband, etc.) · Limited available time for participation due to busyness (farming system bound by unchangeable working hours, long working hours for production and life by women, etc.) · Limited properties of individual and family (offer of labour force, materials, fund without compensation) · Low accessbility to participation site by inhabitants living at remote area (non-preparation of road.communication)	· Social-cultural consideration (creation/increase of participation opportunity in quechua language) · Gender consideraion (awareness enlightenment of inhabitants on gender consideration) · Life improvement in home (production system, lifestyle, awareness enlightenment of clarification of roles in fimily, eic.) · Awareness enlightenment on participation in project (Improvement of concern to project, awareness enlightenment to roject purpose, etc.) · Formation and activity of group on life improvement (Improvement of life in home trough cooperative activities) · Preparation of basic infrastructures at remote area (rural roads, telephone/internet, etc.)
Community	· Difficulty in reflection of needs of poverty people and social gender (overemphasis to opinions of influential cperson and consesionaires) · Extant traditional gender discrimibnation in rural area (machismo) (lack of debate by men and women, non-approval of women participation by men, Non-possession of decision-making right by women) · Weakening of traditional cooperative concept (dwindling of cooperative recognition, decrease of opportunity of cooperative works, etc.) · Lack of active capability of planning by community (no grasping of inhabitants' needs and development potential, etc.) · Lack of leadership (lack of opportunity of capacity building of leaders, lack of women leaders, etc.)	· Social culture consideration (awareness enlightment of traditional custom in rural society and poverty people and social gender) · Gender consideraion (Awareness enlightenment of gender consideration to community organization and farners organization) · Strenthening and reformation of community organization (strengthening of capability of leaders of community organization, strengthening of coordination among community organizations) · Strenthening and training of leaders within communities (discovery and training of young and women leaders)
Local administrations (Regional government) (Provincial government) (District government)	· Community participatory system oriented by administration (Insufficient consideration of needs of inhabitants and community and limited site visits in number and in time) · Insufficient capability of administration staff on paricipatory approach (insufficiency and lack of opportunity of capacity building) · Insufficiency and lack of facilitator in administration side (lack of capable staff, insufficiency and lack of opportunity of capacility building)	· Diffusion and expansion of suitable existing community participatory approach (abstraction of experiences and lessons learned from existing approaches) · Re-study on community participatory approach (establishment of community participatory system along social conditions in Ayacucho Region) · Training of local government staff (strengthening and modification of existing training program, increase of opportunity of training of district government staff)
Donors (Central government) (International agencies) (NGOs)	· Community participatory system oriented by donors (Insufficient consideration of needs of inhabitants and community and limited site visits in number and in time) · Insufficient coordination with local administrations (deviation from development policy and principles from local administration, non-occurrence of synergy effect)	· Consideration of Ayacucho characteristics (grasping of social culture and administration system) · Stregthening of coordination of donors with local administration agencies (stregthening and reorganization of adjustment function in development projects)

Source: JICA Study Team

Figure 7.4.1 Present Conditions and Subjects on Community Participatory Approach in Rural Area Development Projects in Ayacucho Region

It is essential that the local administration agencies and community organizations should employ the effective and efficient community participatory approach for rural area development project covering every sectors taking into consideration the problems and subjects mentioned above.

Chapter 8 Preparation of Zoning Map and Land Use Map

8.1 Outline of GIS Related Activities

GIS related activities under the JICA Study are categorized into following tasks. The detailed information in each task is described in the following sections.

(1) Preparation of Zoning Map of Ayacucho Region

In order to formulate regional development plan in Ayacucho Region in consideration of various natural and socio-economical conditions in the region, a zoning map was prepared based on the rate of poverty and land use potential map. The zoning map is used in Chapter 11 to prioritize the SNIP sub projects.

(2) Preparation of Land Use Map

It was found through the JICA Study that any present land use map was not available in the region. Under this situation, JICA and GRA decided to make the land use map as an additional TOR of the Study.

(3) Preparation of SNIP MAP

Prior to implementation of any type of projects required public investment, the project is obligated to be registered into SNIP system in MEF. Although the system secures free access through internet, GRA did not have a list of proposed projects by the provincial and district governments as well as the central government. Therefore, the JICA Study Team prepared the list and finally compiled the information as a document of SNIP MAP.

(4) Discussion on Information Management in Ayacucho Region

Through a course of the JICA Study and the GIS seminar described in Chapter 1, future information management in Ayacucho Region was discussed with the counterpart organization.

8.2 Preparation of Zoning Map

8.2.1 Objective of Zoning

Most parts of Ayacucho Region are located in the highland areas under various topographic and soil conditions. However, the appropriate land use was not realized because of limited high potential areas for agriculture and pasture, which are the main income sources for local farmers in Ayacucho Region. Therefore, most farmers living under the low potential areas are vulnerable under the undesirable climate for the above agricultural practices, and thus this is one of the main reasons of poverty in the region.

Under the above situation, the single packaged development approach is not effective. The following development approaches were required for formulation of the efficient and effective regional development plan, that is, to categorize the region by natural and socio-economic environment, to prepare different development programs by each category; and to prioritize the activities in each program based on the characteristics of each category.

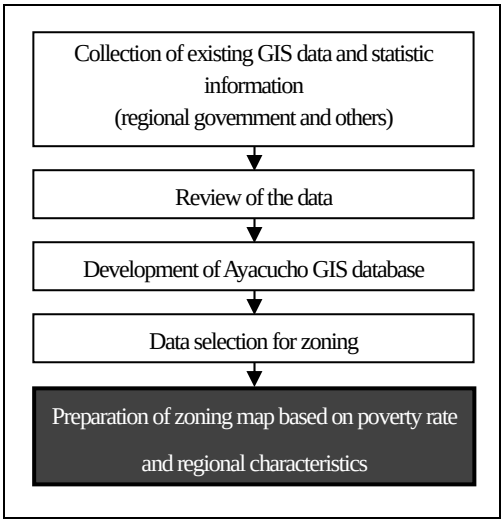
In order to realize such approach, GIS (*Geographic Information System*) data linked with statistic information is useful especially on visualization and analysis in the region. A lot of GIS data and statistic information have been developed in the region by several organizations individually and utilized for integrated and long term regional development planning. However, such multi-sector development plans plan cannot simply be used for the objectives of this JICA Study which are mitigation of vulnerability and income generation for poor peasants.

In order to achieve the study objectives and formulate a poverty reduction plan for the poor peasants, a zoning map

for the region was newly prepared as fundamental information.

8.2.2 Zoning Process

Figure 8.2.1 shows the process of zoning. To ensure consistency of existing development strategies at central and regional levels, existing GIS data and statistics were collected and analyzed for the zoning.



Source: JICA Study Team

Figure 8.2.1 Zoning Process

8.2.3 Basic Information for Zoning

The GIS and statistic data have been developed individually by different organizations. For pre-processing for zoning and regional development planning, the data accuracy and availability were checked and finally integrated into a GIS database, namely Ayacucho GIS database.

(1) Collection of Existing Data

All the existing GIS and statistic data were provided by the counterpart organizations. Because GIS data at national level and outputs of the past studies were included, the data were used for the zoning. In parallel with the collection, interview survey on data management and utilization was carried out to the counterpart organization.

(2) Review of the Data

Collected GIS data and statistic information were reviewed from the data accuracy and availability points of view. The reviewed results are summarized in the following table.

Table 8.2.1 Problems Found through the Review and Solution in the Study

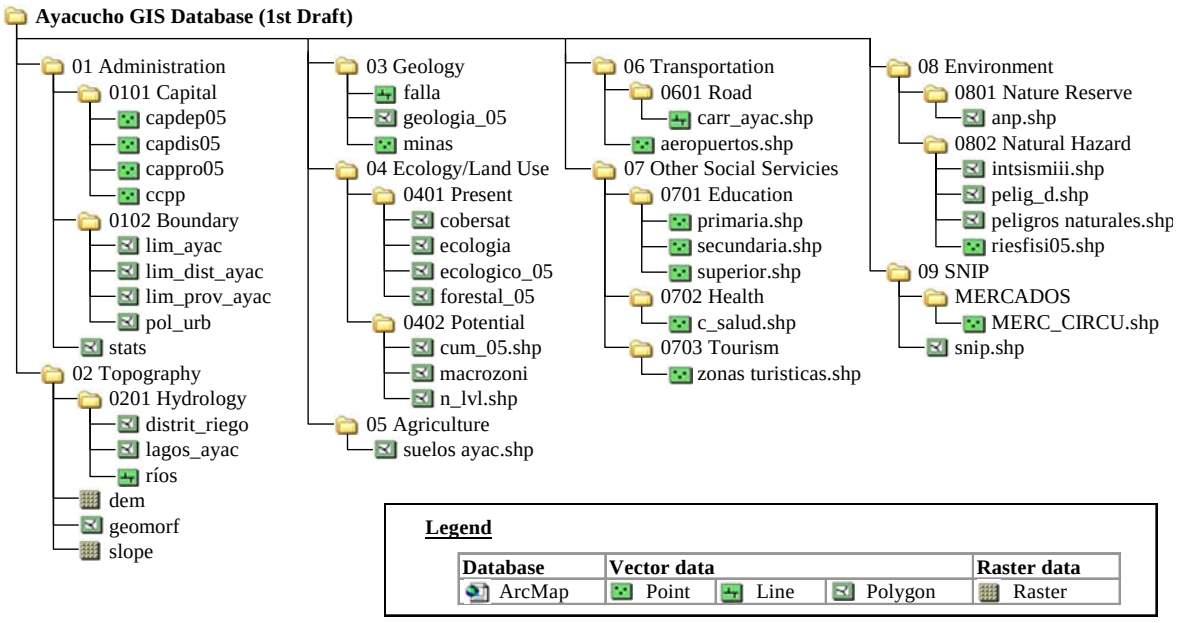
Problems	Situations in Case Problems are not solved	Solutions in the Study
Technical problems		
1 Regarding administrative boundaries of the region, provinces and districts, data discrepancy was found between GIS data provided by the regional government (elaborated by IGN) and the area published in the statistics (elaborated by INEI)	If the statistical information is considered to be correct, any type of analysis based on the GIS data would be invalid.	As the discussion result with the regional government, the GIS data provided by the regional government was decided to be used for the study.
2 Topology errors were found among GIS data. For example, there are differences between the soil and vegetation map and the administrative boundary.	To calculate the areas by using different GIS data, the total area would be different. On the other hand, too much modification might cause the degradation of accuracy of the original data.	After the verification of the topology errors, minimum modification was applied to the GIS data used for the zoning.
3 Some unnecessary information were remaining in the attribute tables.	Unnecessary information would cause misunderstanding of GIS data for other users in future.	Through the discussion with the counterpart, unnecessary and unknown information was deleted.
4 Present land use map was not available in the region.	Master plan formulation based on the present situation would be difficult.	After discussions with the counterpart and JICA, present land use map was decided to be prepared under the study as an additional work component.

Problems	Situations in Case Problems are not solved	Solutions in the Study
Administrative problems		
5 The sources of some GIS data were unclear. In addition, some GIS data was not finalized.	Comparing information with different data reliability would cause degradation of the accuracy of analysis results.	Low reliable data was not used. In addition, to keep data quality and reliability for future, the used GIS data in the study was integrated into a GIS database.
6 Due to lack of financial and human resources, information on natural conditions was not updated.	Master plan formulation based on the present situation would be difficult.	After discussions with the counterpart organization, only available GIS data was used for the formation of the master plan.
7 Data management and sharing system among organizations concerned in the region was not established.	In the future, there is high possibility that which organization has the latest information.	Through the study, GIS database and the land use map were prepared to start data sharing among organizations concerned.

Source: JICA Study Team

(3) Development of Ayacucho GIS Database

The reviewed GIS data were categorized by themes, and integrated into a GIS database. In addition to the existing data, three GIS data collected through the study were also integrated into the database, which are SNIP database, location information of existing local markets and land use map.



Source : JICA Study Team

Figure 8.2.2 Data Structure of Ayacucho GIS Database

(4) Selection of GIS Data for Zoning

GIS data to be used for the zoning were selected taking into consideration GIS data directly linked with income generation of poor farmers who earn their living by agriculture, forestry and animal husbandry, and minimization of categories after zoning.

Table 8.2.2 Used Data for Zoning

Data Type	Data name	Data content
Natural conditions		
Land use potential map	cum05	This data was an environmental zoning map prepared by INRENA based on natural vegetation, soil, topography, etc. The Ayacucho region was categorized into potential areas for agriculture, animal husbandry and production forest, and areas to be conserved. Under the above categories agricultural potential areas can be used for other uses such as animal husbandry and production forest. Animal husbandry potential area cannot be used for only agricultural lands. In case of production forest potential areas, the lands cannot be used for agriculture and animal husbandry. Namely, the order of high land applicability is agricultural land > pasture land > production forest > conservation area.
Social conditions		
Monetary poverty rate	stats	This GIS data is converted from district basis statistics in 2007 compiled by INEI and includes population (in urban area and rural area), monetary poverty rate, and non-monetary poverty rate (Index: living condition, water supply, education, health service, etc.). Monetary poverty rate was used for the zoning.
Reference data		
Vegetation map	forestal05	This vegetation map was created by INRENA and includes the categories of lakes and residential areas. By overlaying on the land use potential map, lakes and residential areas were classified by the different categories in the land use potential map.

Source: JICA Study Team

8.2.4 Preparation of Zoning Map

(1) Pre-processing for Zoning

In order to prepare the zoning map, following pre-processing was applied to the selected GIS data:

- Since topology errors were identified between the poverty rate map and the land use potential map, the land use potential map was modified based on the poverty rate map; and
- Location information of lakes and residential areas which should not be categorized in the target areas for the M/P. Based on the vegetation map data, these areas were extracted from the land use potential map as different categories.

(2) Zoning Criteria

To minimize the number of zones in the zoning map, the following zoning criteria were prepared. Finally, the region was categorized into 27 zones in total.

Table 8.2.3 Zoning Criteria

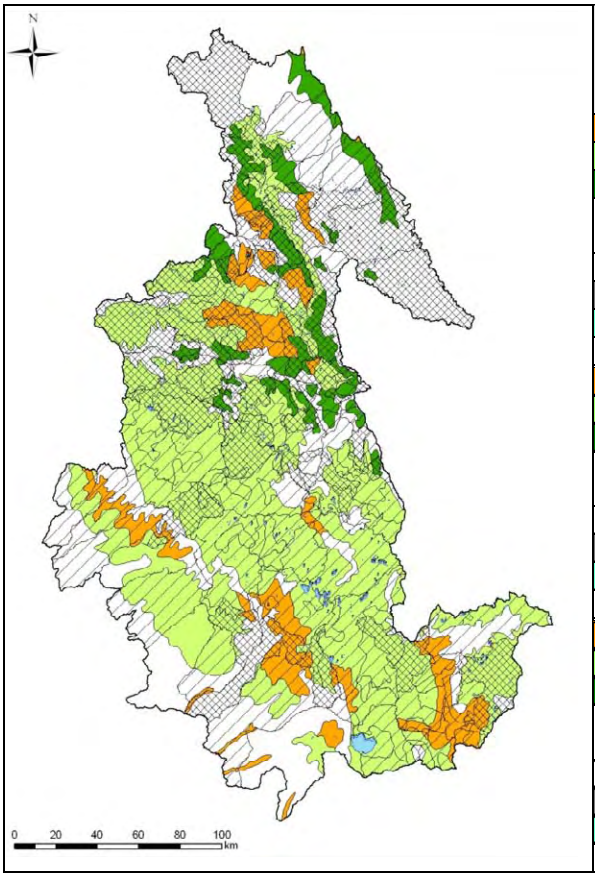
Data type	Before the classification	After the classification	
Monetary poverty rate	Less than half of the population is economically poor.	P1 (Poor)	
	More than half of the population is economically poor.	P2 (Very Poor)	
	More than 4 in 5 persons are economically poor	P3 (Extremely Poor)	
Land use potential map	Suitable land for agriculture	A	A: Suitable land for agriculture
	Arable lands with conservation efforts	Xa	
	Suitable land for grazing	P	P: Suitable land for grazing
	Grazing lands with conservation efforts	Xp	
	Suitable lands for forest production	F	F: Suitable lands for production forest
	Lands for forest production with conservation efforts	Xf	
	Conservation land	X: Conservation land	
	Residential area	CP: Residential area	
	Lake	L: Lake	

Source: JICA Study Team

(3) Results of Zoning Map

Zoning map and summary sheet are shown in the following figure. In most of all suitable areas for agricultural

activities, areas with conservation efforts are mainly dominated. These areas are assumed to be high risk zone for agricultural activities such as low fertility lands, water shortage, soil erosion, etc. Therefore, if the areas need to be used for agricultural activities, conservation efforts should be coupled. However, the suitable areas without conservation efforts are limited. In addition, such conservation areas are actually used for the agricultural activities. Under these conditions, the areas with conservation efforts were categorized in the potential land for agricultural activities in this Study.



Area		Area (km^2) Total	(with conservation efforts)
	P1-A	403.66	(317.07)
	P1-P	1,147.16	(1,062.45)
	P1-F	194.65	(191.48)
Total of suitable areas for agricultural activities		1,745.47	(1,571.00)
	P1-X	2,758.83	(2,758.83)
	P1-CP	4.09	
	P1-L	2.33	
P1 Total		4,510.72	(4,329.83)
	P2-A	2,345.04	(1,458.17)
	P2-P	12,193.03	(8,341.72)
	P2-F	932.23	(249.94)
Total of suitable areas for agricultural activities		15,470.30	(10,049.83)
	P2-X	6,594.87	(6,594.87)
	P2-CP	0.93	
	P2-L	56.21	
P2 Total		22,122.31	(16,644.70)
	P3-A	1,443.41	(456.56)
	P3-P	6,914.83	(4,301.11)
	P3-F	1,821.35	(163.78)
Total of suitable areas for agricultural activities		10,179.58	(4,921.45)
	P3-X	6,687.11	(6.687.11)
	P3-CP	0.00	
	P3-L	8.44	
P3Total		16,875.14	(11,608.56)

Source: Prepared by JICA Study Team, based on land use potential map provided by INRENA and data from National Census from INEI, 2007

Figure 8.2.3 Zoning Result

Table 8.2.4 shows zoning results by provinces. In general, suitable areas for grazing mainly dominate in most provinces. On the other hand, agricultural lands are limited around only 10% of whole areas. In addition, suitable areas for agriculture are comparatively wide-spread in Huamanga, Cangallo, Lucanas, Parinacochas and Paucar del Sara Sara Provinces. Considering the definition of land use potential map, these provinces could practice various types of agricultural activities.

On the other hand, more than half of areas of Huanta and La Mar Provinces were dominated by conservation areas and suitable areas for production forest which should not be used for agriculture and pasture. However, the areas are also used for agriculture in actual. To formulate development plan in the areas, careful consideration would be required such as agriculture in coupling with conservation efforts of soils and ecosystems.

The zoning results were used for prioritization of sub projects (not implemented projects registered in SNIP database) in Chapter 11.

Table 8.2.4 Zoning Results by Provinces

Province	P1 (Poor)				P2 (Very poor)				P3 (Extremely poor)			
	Area (km^2)	Percentage of P1			Area (km^2)	Percentage of P2			Area (km^2)	Percentage of P3		
		A	P	F		A	P	F		A	P	F
Huanta	786.37	0.6	1.5	24.3	1,183.64	4.6	14.6	19.4	1,889.40	5.4	14.6	15.9
La Mar	0.00	0.0	0.0	0.0	914.70	0.4	0.9	20.6	3,387.57	3.4	7.3	8.6
Huamanga	119.72	54.7	0.0	2.6	760.59	35.3	30.0	17.7	2,077.71	18.3	42.3	21.0
Cangallo	0.00	0.0	0.0	0.0	185.10	38.2	0.0	32.1	1,686.26	13.8	52.8	8.5
Vilcas Huaman	0.00	0.0	0.0	0.0	228.46	0.0	3.5	61.4	976.83	12.7	25.5	40.9
Victor Fajardo	0.00	0.0	0.0	0.0	754.95	0.0	49.0	13.8	1,509.06	0.0	58.7	11.0
Huanca Sancos	0.00	0.0	0.0	0.0	1,355.65	0.0	96.0	0.0	1,480.23	0.0	89.0	3.7
Sucre	143.82	0.0	71.7	0.0	1,166.55	0.0	62.0	6.4	476.00	0.0	54.4	6.1
Lucanas	1,747.85	5.4	41.8	0.0	10,689.18	10.7	57.4	0.0	2,022.62	16.3	40.8	0.0
Parinacochas	1,563.86	11.0	14.1	0.0	3,742.82	8.2	72.3	0.0	577.23	7.4	85.0	0.0
Paucar del Sara Sara	149.10	45.4	54.6	0.0	1,140.68	43.7	47.4	0.0	792.23	14.7	75.0	0.0
Total	4,510.72	8.9	25.4	4.3	22,122.31	10.6	55.1	4.2	16,875.14	8.6	41.0	10.8

Source: Prepared by JICA Study Team, based on land use potential map provided by INRENA and data of the National Census from INEI, 2007

Note: The highlighted columns mean the highest percentage in each zone

8.3 Preparation of Land Use Map

8.3.1 Background

It was clarified through the JICA Study that any present land use map was not available in Ayacucho Region. The land use map could be basic information 1) to formulate a land use plan, as well as 2) to confirm the accuracy of existing statistics especially on agriculture, and 3) to clarify characteristics by the zones prepared through the JICA Study.

Under the above situation, JICA decided to prepare the land use map in Ayacucho Region as an additional component of this Study, using high resolution satellite images.

Prior to making the land use map for whole Ayacucho Region, a sample area, which was Huamanga and Cangallo Provinces, was set in order to confirm effectiveness of satellite images for making the land use map. For this purpose, several types of satellite images were purchased and intensive field investigation was carried out in the sample area.

The reasons why the above two provinces were selected are as follows:

1) Huamanga Province is located in the elevation between 2,000 and 4,000 m, and Cangallo province is between 3,000 and 5,000 m, respectively. Various and different activities in Ayacucho Region can be observed in these provinces such as agriculture, livestock and forestry. Therefore, these provinces can be a representative area to know typical land use in the region except for Huanta and La Mar Provinces where are located in lower elevation areas.

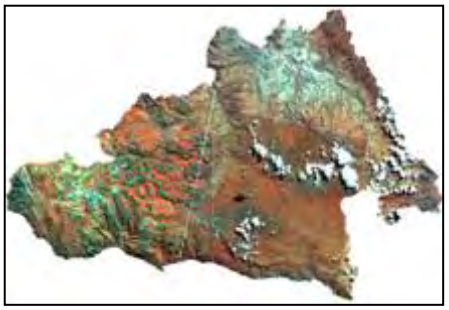
2) Because these two provinces are located near to Ayacucho City, it is easier to compare the actual land use with the satellite images through field investigation than other provinces.

3) One of the counterpart personnel of GIS belongs to Cachi Project where is implemented in the above provinces. Therefore, his knowledge on the field can be used for satellite image analysis and land use map preparation.

8.3.2 Steps for Preparation of Land Use Map

(1) Selection and Purchase of Satellite Images

Selected satellite images are five types and all the images were acquired after 2006. The purchased images are summarized in Table 8.3.1. In addition, ALOS AVNIR2 satellite images in the sample area are illustrated in Figure 8.3.1. Since the satellite images in the figure are false color combination, red colored areas indicate vivid vegetation. Grassland or agricultural areas are located in light red areas and forests are in dark red areas. On the other hand, cloud, bare ground with high reflectance, roads, etc. look white.



Source : Prepared by JICA Study Team, based on the satellite images provided by RESTEC

Figure 8.3.1 ALOS AVNIR2 Satellite Images in Sample Area

Table 8.3.1 Summary of Collected Satellite Images

	Resolution	Type/ Image size	Coverage area	Remarks
1	ALOS AVNIR2 (Provided data by RESTEC)			
	10 m/pixel	Color/ 70km x 70km	Sample area (Total: 8 scenes)	To compare the appearance of satellite images in rainy season and dry season, ALOS AVNIR2 were selected. Whole sample area was covered by these satellite images.
2	ALOS PRISM (Provided data by RESTEC)			
	2.5 m/pixel	Panchromatic/ 35km x 35km (Some images are 70km x 35km)	Whole Ayacucho Region except for Huanta, La Mar, eastern Parinacochas, Paucar del Sara Sara Provinces (Total: 25 scenes)	ALOS PRISM was mainly used for making land use map because of cheaper price with high resolution. Unfortunately, Ayacucho city was completely covered by clouds. However, clear views were obtained in other areas.
3	SPOT5 (Provided data by SPOT Image)			
	2.5 m/pixel	Panchromatic/ 60km x 60km	Southern sample area and eastern Parinacochas, Paucar del Sara Sara Provinces (Total: 6 scenes)	In order to compare with the appearance of ALOS PRISM, SPOT5 satellite images in the southern sample area were purchased. As a comparison result, SPOT5 showed shaper view than ALSO PRISM. In addition, this type of satellite images was used to cover eastern Parinacochas and Paucar del Sara Sara provinces which could not be covered by ALOS PRISM.
	5.0 m/pixel	Panchromatic/ 60km x 60km	Huanta and La Mar Provinces (Total: 5 scenes)	In Huanta and La Mar provinces, ALOS PRISM and SPOT5 with resolution of 2.5 m/pixel were not available. Therefore, lower resolution images were purchased.
4	ASTER VNIR (Provided data by ERSDAC)			
	15 m/pixel	Color/ 60km x 60km	Almost all Ayacucho Region (Total: 15 scenes)	ASTER VNIR has similar spatial resolution to ALOS AVNIR2 and it is cheaper than others. Therefore, ASTER images were mainly used to cover whole Ayacucho Region.
5	LANDSAT7 ETM+ (Provided pictures by GLCF)			
	15m/pixel, 30m/pixel	Panchromatic Color/ 180km x 180km	All Ayacucho Region (Total: 8 scenes)	Some parts of ASTER images were covered by clouds. In addition, ASTER images could not cover whole Ayacucho region. In order to complement ASTER images, LANDSAT 7 images were used. It needs careful consideration that these images were acquired around 2000 even though the images are freely provided.

Source: JICA Study Team, detailed technical specification of each satellite image to be checked in the following web pages
RESTEC (Remote Sensing Technology Center of Japan) - http://www2.restec.or.jp/top_e.html
Tokyo SPOT IMAGE – http://www.spotimage.co.jp/web/en/?countryCode=JP&languageCode=en
ERSDAC (Earth Remote Sensing Data Analysis Center) - http://www.ersdac.or.jp/eng/index.E.html
GLCF (Global Land Cover Facility) - http://www.landcover.org/index.shtml

The color satellite images (*AVNIR2*) and the panchromatic satellite images (*ALOS PRISM*) of the sample areas are compared in Figure 8.3.2. Since the image quality of SPOT5 is similar to ALOS PRISM, and ASTER VNIR is to ALOS AVNIR2, those satellite images were neglected in the figure.

As clearly shown in the figure, color images provide easier understanding on differences of objects. Therefore, the

color images are useful and easy to manage for beginners of satellite image analysis, especially on identification of forests, lakes, residential areas, bare ground, etc. Besides, these images are effective to monitor the changes of land cover from bare ground to grassland or agricultural lands season to season because colors of the image vary with the density and activeness of vegetation.

On the other hand, panchromatic high resolution satellite images are more suitable when shapes of objects are important factor for identification of objects like small scale agricultural lands. Plots of agricultural lands can be clearly differentiated with others in the sample area. In this case, utilization of high resolution satellite images enables to heighten the accuracy of satellite image interpretation. These images are also useful to digitize road alignment because even local roads can be observed clearly.

Both images have advantages and disadvantages. It was clarified through this Study that both types of images should be used for making the land use map accurately.

Image of ALOS AVNIR2 in Urban Area

(White dots: houses, a line from top to bottom: air strip)

Image of ALOS PRISM in Urban Area

(Road alignment and houses are clearly indentified.)

Image of ALOS AVNIR2 in Rural Area

(Although large scale farms can be identified, small scale farms could not be identified in this image. The brown dots are trees.)

Image ALOS PRISM in Rural Area

(It is possible to identify farm plots by using panchromatic satellite image)

Image of ALOS AVNIR2 in Highland Area

(Center of the image: forest. Black spots in upper left and lower left of image: lakes. The color image enables to identify the type of objects instinctively.)

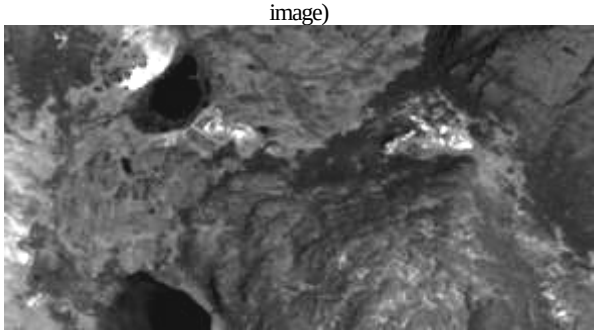


Image of ALOS PRISM in Highland Area

(Although the shape of objects can be recognized easily, identification of the type of objects needs detailed field investigation and long period of experiences of satellite image interpretation.)

Source: Prepared by JICA Study Team based on provided data by RESTEC

Figure 8.3.2 Comparison of Obtained Satellite Images in Sample Area

(2) Field Investigation

Field investigation is indispensable for making land use map based on the satellite image analysis. As clarified in the above figure, only paper work has a high possibility to misinterpretation. Thus, field investigation was carried out with printed satellite images and handy GPS in the sample area in October – November 2009 (1st investigation) and March 2010 (2nd investigation) in order to compare actual land use at the field with appearance on the images. The information collected at the field was used as references for digitizing of satellite images on the display.

Since the period of 1st field investigation coincided with the beginning of rainy season in 2009-2010, planting of potatoes was starting in a part of agricultural land and land preparation for cultivation was observed at the field. Collected information and pictures are shown in the following figure.

Agricultural lands in steep areas. Two important lessons were obtained in this figure, that: 1) Trees are planted at the fringe of agricultural lands; and 2) Most of mountaintops are not cultivated.

The steep slope areas in the shaded side of mountains are not used. But these areas cannot be observe clearly in the satellite images because of mountain's shade. Field investigation is indispensable to solve these problems.

Highland area in rainy season. All the areas are covered by vegetation, so that in the color satellite images there is no difference between pasture and agricultural lands. In this case, because the shapes of agricultural plots are important factor for interpretation, panchromatic high resolution satellite image should be used.

Source: JICA Study Team

Figure 8.3.3 Representative Land Use in the Rural Areas of the Sample Area

In addition to the above, following points were clarified through the field investigation:

1) Irrigation areas can be identified partially because some of irrigation canals can be detected using high resolution satellite images. However, it is not high precision and some irrigation areas would not be identified. Therefore, for the land use map in this Study, agricultural lands did not divided by irrigated and not irrigated.
   When GRA recognizes the importance of such classification and extension workers can be mobilized under their responsibility in the future, identification of irrigation areas in the whole Ayacucho region would be possible.
2) It is also possible to extract reforestation areas within the forest areas using high resolution satellite images based on density and patterns of trees on the images. However, as anticipated, it was impossible to detect reforestation areas immediately after plantation. Therefore, forests were not separated into two types, which are natural forests and reforestation areas, in the land use map of this Study.

(3) Preparation of Land Use Map

Based on the above field investigations, the land use map was created by visual interpretation of the satellite images. The scale of the map was approximately 1:50,000 which was the highest accuracy among GIS data available in the regional government.

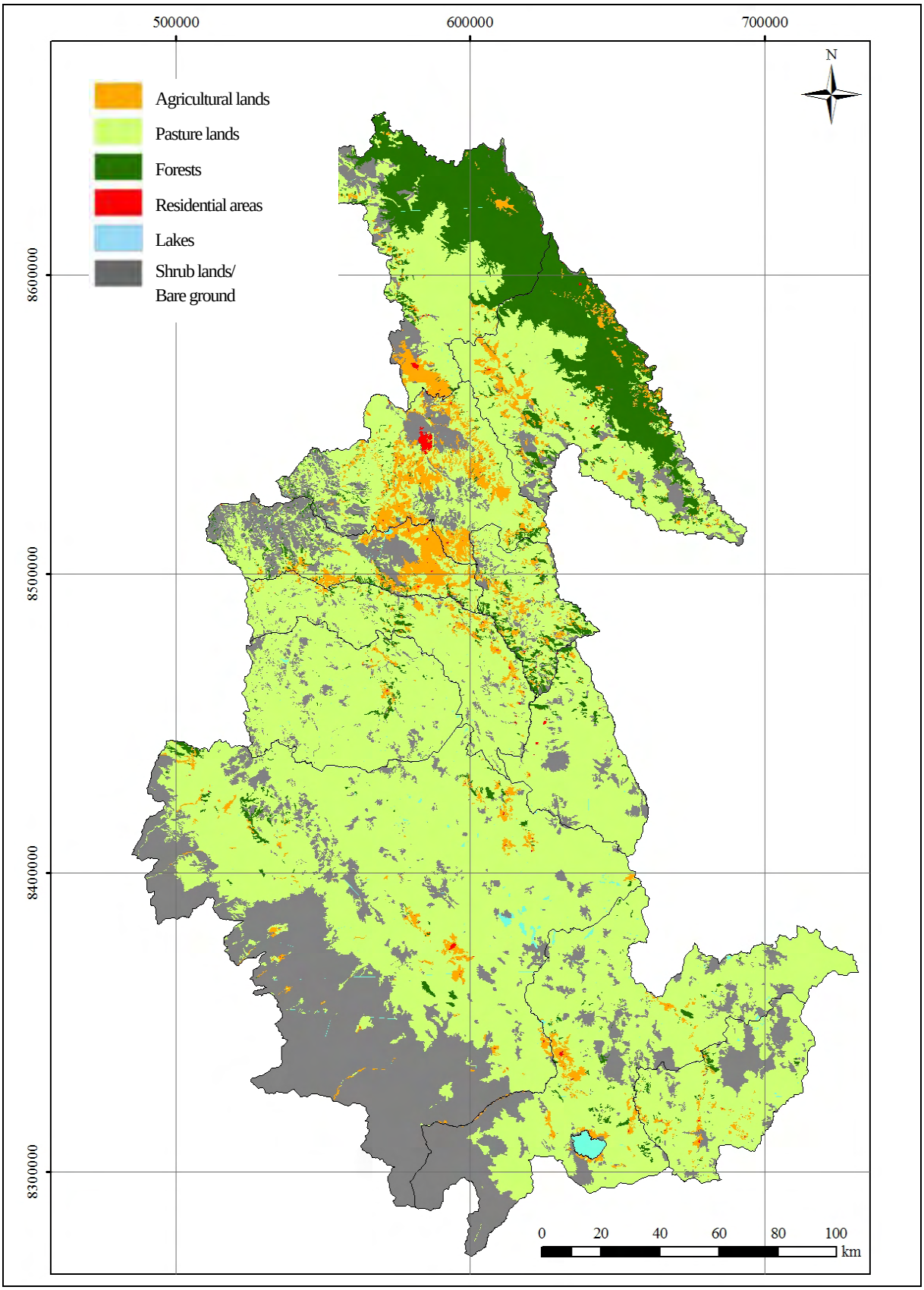
The land use map and the summary sheet by provinces are shown in Figure 8.3.4 and Table 8.3.2, respectively. Categories of the map are: (i) Agricultural lands; (ii) Grasslands; (iii) Forests; (iv) Residential areas; (v) Lakes; and (vi) shrub lands/bare ground. As shown in the table, the area of grasslands and shrub lands/bare grounds was 85% of the Ayacucho region. On the other hand, agricultural land was limited only 5% and mainly distributed in the 4 northern provinces of the region.

Table 8.3.2 Summary of Land Use in Ayacucho Region by Provinces

Provinces	Agricultural lands	Pasture lands	Forests	Residential areas	Lakes	Shrub lands/ Bare ground	Total
Huanta	195.66	1,500.91	1,843.10	7.14	1.59	311.01	3,859.41
	5%	39%	48%	0%	0%	8%	100%
La Mar	254.32	2,107.04	1,586.86	8.22	2.51	343.32	4,302.27
	6%	49%	37%	0%	0%	8%	100%
Huamanga	557.36	1,724.73	77.94	29.88	3.87	564.24	2,958.02
	19%	58%	3%	1%	0%	19%	100%
Cangallo	353.80	770.26	79.00	5.11	5.61	657.58	1,871.36
	19%	42%	4%	0%	0%	35%	100%
Vilcas Huaman	107.21	798.92	159.75	2.31	0.68	136.42	1,205.29
	9%	67%	13%	0%	0%	11%	100%
Victor Fajardo	106.04	1,964.55	47.69	4.67	0.70	140.36	2,264.01
	5%	87%	2%	0%	0%	6%	100%
Huanca Sancos	22.61	2,562.58	34.18	1.14	4.62	210.75	2,835.88
	1%	91%	1%	0%	0%	7%	100%
Sucre	7.32	1,536.80	39.18	3.86	0.46	198.75	1,786.37
	0%	87%	2%	0%	0%	11%	100%
Lucanas	227.40	8,754.89	128.38	7.99	43.26	5,297.73	14,459.65
	2%	60%	1%	0%	0%	37%	100%
Parinacochas	152.24	4,189.60	58.50	3.35	13.58	1,466.64	5,883.91
	3%	71%	1%	0%	0%	25%	100%
Paucar del Sara Sara	57.57	1,596.39	31.39	2.33	3.38	390.95	2,082.01
	3%	76%	2%	0%	0%	19%	100%
Total	2,041.53	27,506.67	4,085.97	76.00	80.26	9,717.75	43,508.18
	5%	64%	9%	0%	0%	22%	100%

Source: Prepared by JICA Study Team based on the provided data by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5), and ERSDAC (ASTER VNIR)

Remarks: Upper columns: area (km^2), Lower columns: percentage in each province



Source: *Prepared by JICA Study Team based on the provided data by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5), and ERSDAC (ASTER VNIR)*

Figure 8.3.4 Present Land Use Map in Ayacucho Region

Comparing with the zoning map, it was clarified that agricultural use of the lands is limited especially in Lucanas, Parinacochas and Paucar del Sara Sara Provinces although relatively wider potential areas of agriculture are spread in the provinces. In the original land use potential map prepared by INRENA, the agricultural potential areas in those three provinces are categorized as potential agricultural lands with conservation efforts and its limitations are mainly shortage of water resources and soil erosion. Through introduction of irrigation facilities as well as soil conservation works, it is anticipated that these areas change to agricultural lands in the future.

Updating of the land use map needs further field investigations to compare actual land use with the satellite images. As promised by the regional government, it is required to improve the accuracy of the map through intensive field investigations in the whole region on their responsibility. The updating work should be conducted through the implementation of "Basic Information Arrangement Project for Vulnerability Mitigation Capacity Building" as stated in Chapter 11.

8.3.3 Analysis on Land Use Map

(1) Comparison with Existing Agricultural Statistics

Table 8.3.3 shows a comparison result of the land use map with the agricultural statistics surveyed in 1994. The statistics needs to be carefully used because it targets only registered lands. Besides, the categories of land uses in the statistics are not same as the map. Therefore, the statistics could not be compared simply with the map.

As a result, the area of agricultural lands in the region seemed not to be drastically changed in the past 15 years. Though the area in Huamanga and Cangallo Provinces is increased, the area in Huanta, La Mar and Lucanas Provinces is decreased. There is a possibility of misinterpretation in the provinces because the field investigation in Huanta and La Mar Provinces was restricted. For example, agricultural lands in forests, perennial crop cultivation and orchards might be categorized as forests. However, through observation on the satellite images, some parts of developed agricultural lands in forests seem to be changed to pasturelands. In terms of water resources, these two provinces can be better agricultural lands because of relatively much rainfall than in other provinces. But due to steeper slope in the provinces, a risk of soil erosion would be higher than others. So it is strongly recommended to the regional government that the risk be assessed through ground truth at the sites and measures against soil erosion be taken, if necessary.

There has been a doubt on the reliability of the statistics since the survey conducted in 1994. Even though further field investigations and updating works are required, it can be concluded that the land use map prepared under this Study helps to assess the reliability. Coupling with satellite image analysis, the accuracy of agricultural census would be improved in the future. From this point, the land use map should be updated periodically by the regional government.

Table 8.3.3 Comparison between Existing Agricultural Statistics and Land Use Map

Province	Agricultural statistics surveyed in 1994					Land use map			
	Agricultural lands (1)	Pastures (2)-1	Mountainous areas/ Grasslands (2)-2	Others (3)	Total	Agricultural lands (1)	Grasslands/ shrub lands/ bare ground (2)	Others (3)	Total
Huanta	273.54	369.26	70.01	74.89	787.70	195.66	1,811.92	1,851.83	3,859.41
	35%	47%	9%	9%	100%	5%	47%	48%	100%
La Mar	465.33	714.27	369.07	348.17	1,896.84	254.32	2,450.36	1,597.59	4,302.27
	25%	38%	19%	18%	100%	6%	57%	37%	100%

Province	Agricultural statistics surveyed in 1994					Land use map			
	Agricultural lands	Pastures	Mountainous areas/ Grasslands	Others	Total	Agricultural lands	Grasslands/ shrub lands/ bare ground	Others	Total
	(1)	(2)-1	(2)-2	(3)		(1)	(2)	(3)	
Huamanga	382.81	1,006.78	141.73	213.26	1,744.58	557.36	2,288.97	111.69	2,958.02
	22%	58%	8%	12%	100%	19%	77%	4%	100%
Cangallo	163.36	1,170.12	70.72	112.37	1,516.57	353.80	1,427.84	89.72	1,871.36
	11%	77%	5%	7%	100%	19%	76%	5%	100%
Vilcas Huaman	77.63	337.45	160.88	57.94	633.90	107.21	935.34	162.74	1,205.29
	12%	54%	25%	9%	100%	9%	77%	14%	100%
Victor Fajardo	92.86	646.50	119.94	43.23	902.53	106.04	2,104.91	53.06	2,264.01
	10%	72%	13%	5%	100%	5%	93%	2%	100%
Huanca Sancos	29.37	806.48	26.45	51.33	913.63	22.61	2,773.33	39.94	2,835.88
	3%	88%	3%	6%	100%	1%	98%	1%	100%
Sucre	39.69	558.86	146.76	226.87	972.18	7.32	1,735.55	43.50	1,786.37
	4%	58%	15%	23%	100%	0%	98%	2%	100%
Lucanas	347.32	5,215.36	130.34	97.88	5,790.90	227.40	14,052.62	179.63	14,459.65
	6%	90%	2%	2%	100%	2%	97%	1%	100%
Parinacochas	148.78	1,316.86	120.44	82.35	1,668.43	152.24	5,656.24	75.43	5,883.91
	9%	79%	7%	5%	100%	3%	96%	1%	100%
Paucar del Sara Sara	62.86	19.92	3.09	59.19	145.06	57.57	1,987.34	37.10	2,082.01
	43%	14%	2%	41%	100%	3%	95%	2%	100%
Total	2,083.56	12,161.93	1,359.44	1,367.49	16,972.42	2,041.53	37,224.42	4,242.23	43,508.18
	12%	72%	8%	8%	100%	5%	85%	10%	100%

Source: *Agricultural statistics – Agriculture Census 1994. The census was only surveyed in registered areas, thus the total area of each province is different from actual area.*
Land use map - Prepared by JICA Study Team based on the provided data by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5), and ERSDAC (ASTER VNIR)

Remarks: *Upper columns: area (km^2), Lower columns: percentage in each province*

(2) Comparison with Topography

Present land use of Ayacucho Region by elevation and slope ranges is summarized in Table 8.3.4. This table indicates traditional efforts by farmers to mitigate vulnerability of agricultural practices.

Higher elevation areas with low temperature at night are mainly dominated by pasturelands, shrub lands and bare ground. On the other hand, most of agricultural lands and residential areas are distributed in the areas of lower than 4,000 m which are under moderate climate condition. These facts imply farmers' measures against vulnerability on climate. Similar measure is observed in land use by slope steepness. Agricultural lands are rarely distributed in the steep areas with more than 75% of slope, and such steep areas are remained as pasturelands or forests. This implies that farmers living in such mountainous areas have been carefully managed the limited land especially against soil erosion.

Forests are mainly in slope areas with 30-75% of steepness. These areas are not suitable to use for agricultural activities such as crop harvesting and animal husbandry because they have a high possibility of degradation of soil fertility by erosion. Several types of reforestation programs were implemented in recent years. The impacts caused by the programs are considered to be reflected on this result. However, the total areas of forests are still limited. Therefore, further reforestation efforts are required for the next generation.

Table 8.3.4 Land Use by Elevation and Slope Ranges in Ayacucho Region (km^2)

Items		Agricultural lands	Grasslands	Forests	Residential areas	Lakes	Shrub lands/ Bare ground	Total
Elevation	< 2,000m	359.54	2530.97	1210.34	31.48	1.99	2598.43	6732.75
	2,000-3,000m	127.46	480.50	1741.50	4.67	0.00	1776.60	4130.73
	3,000-4,000m	1531.08	11147.47	1038.15	38.73	12.50	2664.03	16431.96
	> 4,000 m	23.45	13347.73	95.98	1.12	65.77	2678.69	16212.74
Slope	< 1%	44.42	590.63	7.13	2.24	10.81	279.12	934.35
	1-5%	224.52	2802.87	68.15	14.21	46.69	1027.30	4183.74
	5-15%	577.89	6637.90	273.92	30.20	17.07	2189.57	9726.55
	15-30%	680.52	8150.09	882.53	19.73	4.31	2808.42	12545.60
	30-75%	508.00	8843.77	2565.83	9.47	1.38	3289.05	15217.50
	> 75%	6.18	481.41	288.41	0.15	0.00	124.29	900.44
Total		2041.53	27506.67	4085.97	76.00	80.26	9717.75	43508.18

Source: Agricultural statistics – Agriculture Census 1994. The census was only surveyed in registered areas, thus the total area of each province is different from actual area.
Land use map - Prepared by JICA Study Team based on the provided data by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5), and ERSDAC (ASTER VNIR)

Table 8.3.5 shows the area of agricultural lands by slope ranges and provinces. Similar tendency was observed in all provinces in the table, that is agricultural lands are mainly distributed in the area with 15-30% slope steepness. Considered topographic condition of Sierra region, it can be concluded that farmers in most provinces select relatively gentle slope areas within the limited available lands for cultivation. On the other hands, agricultural lands in La Mar Province is mainly located in steep areas (steepness: 30-75%). Taken into consideration on relatively much rainfall in the province, measures against soil erosion should be applied to the agricultural lands in the province. After the necessity of soil conservation is confirmed through detailed field investigation, measures as shown in Chapter 11 should be taken in the province.

Table 8.3.5 Distribution of Agricultural Lands by Slope Ranges in Ayacucho Region (km^2)

Province		Slope						Total
		< 1%	1-5%	5-15%	15-30%	30-75%	> 75%	
Huanta		2.49	17.46	67.62	54.88	50.57	2.64	195.66
La Mar		1.05	7.57	34.09	74.38	134.46	2.77	254.32
Huamanga		17.38	87.61	200.13	185.53	66.68	0.03	557.36
Cangallo		12.41	60.39	126.97	92.20	61.40	0.43	353.80
Vilcas Huaman		2.13	7.61	20.72	34.61	42.12	0.02	107.21
Victor Fajardo		0.06	1.36	11.29	43.18	50.08	0.07	106.04
Huanca Sancos		0.05	1.00	6.16	9.23	6.14	0.03	22.61
Sucre		0.02	0.18	0.21	1.26	5.65	0.00	7.32
Lucanas		1.58	11.92	53.38	110.78	49.73	0.01	227.40
Parinacochas		7.09	27.39	44.72	52.04	20.87	0.13	152.24
Paucar del Sara Sara		0.16	2.03	12.60	22.43	20.30	0.05	57.57
Total	Area	44.42	224.52	577.89	680.52	508	6.18	2041.53
	Percentage	2%	11%	28%	34%	25%	0%	100%

Source: Agricultural statistics – Agriculture Census 1994. The census was only surveyed in registered areas, thus the total area of each province is different from actual area.
Land use map - Prepared by JICA Study Team based on the provided data by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5), and ERSDAC (ASTER VNIR)

(3) Comparison with Zoning Map

Table 8.3.6 shows the result compared between the land use map and the zoning map. In the relation to poverty rate, agricultural areas and grasslands in the poor areas (P1) are relatively smaller than in the very poor areas (P2) or extremely poor areas (P3). On the other hand, residential areas and shrub lands/bare ground in P1 areas are larger

than in P2 or P3 areas. It is assumed in P2 and P3 areas that unstable areas for agriculture and grazing cannot help developing for agricultural activities because only the way to improve their income is to pioneer the limited lands as much as possible.

In comparison with the land use potential, 41% of suitable lands for agricultural use have been already developed. That means there is a possibility to double the area of agricultural lands. Furthermore, the suitable lands for agriculture with conservation efforts are remained as uncultivated lands. In coupling with taking measures against soil erosion and drought by developing irrigation system, it is anticipated to expand agricultural lands in the future. On the other hand, most of potential areas for grazing including the areas to apply conservation efforts are mainly grasslands. Therefore, further expansion of grazing areas would be difficult.

Table 8.3.6 Land Use by Zones in Ayacucho Region

Items		Agricultural lands	Pasture lands	Forests	Residential areas	Lakes	Shrub lands/ Bare ground	Total
Poverty Rate	Poor area (P1)	69.26	1,568.09	693.61	16.54	0.40	2,162.82	4,510.72
		2%	35%	15%	0%	0%	48%	100%
	Very poor area (P2)	745.43	14,908.23	1,515.55	33.44	61.11	4,858.56	22,122.32
		3%	68%	7%	0%	0%	22%	100%
	Extremely poor area (P3)	1,226.84	11,030.35	1,876.81	26.02	18.75	2,696.37	16,875.14
		7%	66%	11%	0%	0%	16%	100%
Land use potential	Suitable for agriculture (A)	794.17	900.87	34.44	34.76	5.09	190.98	1,960.31
		41%	45%	2%	2%	0%	10%	100%
	Suitable for agriculture with conservation efforts (Xa)	100.56	1,748.32	62.17	2.67	0.50	317.58	2,231.80
		5%	78%	3%	0%	0%	14%	100%
	Suitable for grazing (P)	126.84	5,487.07	46.23	4.73	13.05	871.83	6,549.75
		2%	84%	1%	0%	0%	13%	100%
	Suitable for grazing with conservation efforts (Xp)	156.16	10,336.28	133.73	3.47	41.81	3,033.83	13,705.28
		1%	76%	1%	0%	0%	22%	100%
	Suitable for production forest (F)	295.02	1,703.70	195.62	9.06	0.47	139.16	2,343.03
		13%	73%	8%	0%	0%	6%	100%
	Suitable for production forest with conservation efforts (Xf)	47.09	5.25	531.14	2.41	0.00	19.31	605.20
		8%	1%	88%	0%	0%	3%	100%
	Conservation area (X)	516.27	7,287.74	3,082.19	14.82	4.75	5,135.04	16,040.81
		3%	46%	19%	0%	0%	32%	100%
	Others	5.42	37.44	0.45	4.08	14.59	10.02	72.00
		8%	51%	1%	6%	20%	14%	100%
Total		2,041.53	27,506.67	4,085.97	76.00	80.26	9,717.75	43,508.18
		5%	64%	9%	0%	0%	22%	100%

Source: Poverty rate - Classified by the JICA Study Team based on economic poverty rate surveyed in Census 2007 by INEI 2007 1) Percentage lower than 50% (poor), 2)more than 50% and less than 80%(very poor) , 3 more than 80%(extremely poor)
Land use potential – Based on the land use potential map by INRENA, It was classified in 8 categories by JICA Study Team 1) Agriculture (A), 2 Grazing (P), 3 Production forests (F), 4) Agriculture with conservation efforts, 5) Grazing with conservation efforts, 6) Production forests with conservation efforts, 7) Conservation areas, and 8) Others (residential areas and lakes)
Land Use Map - Prepared by JICA Study Team based on data provided by RESTEC (ALOS PRISM, AVNIR-2), Tokyo SPOT IMAGE (SPOT5) and ERSDAC (ASTER VNIR)

Remarks.: Upper columns: area (km^2), Lower columns: percentage in each zone

It must be noted that agricultural lands exist in unstable areas for agriculture. Especially in conservation areas, around 500 km^2 of agricultural lands were identified by satellite image analysis. One of the reasons of such land use would be limited suitable agricultural lands. In Ayacucho Region, the area of suitable lands for agriculture including the areas to be considered land conservation is only 4,192 km^2 (1960 km^2 + 2,232 km^2), which is 9.6% (4,192 km^2/ 43,508 km^2) of total area of the region. It is assumed that farmers living in the region develop lands for their income

generation although they recognize the lands as unsuitable. Importance of agriculture with environmental conservation and extension of agricultural practices under vulnerable circumstances was reminded through the above fact finding.

(4) Necessity of Rezoning

Finally, it was considered to reclassify Ayacucho Region based on the land use potential map, poverty rate and the land use map.

Through the above analysis, it was clarified that the present land use in Ayacucho Region is not completely fit with the land use potential. However, in terms of income generation in accommodation with environmental consideration, discrepancy between the present land use and the land use potential should be solved in the future. In addition to this, the zoning map is categorized into 24 zones, which are based on the poverty rate (3 categories) and the land use potential (8 categories), thus, the number of categories is much enough to formulate detailed planning.

Because of the above reasons, the zoning map shown in Figure 8.2.3 was decided to be used for the following planning.

8.4 Update of the GIS Database - Elaboration of SNIP MAP

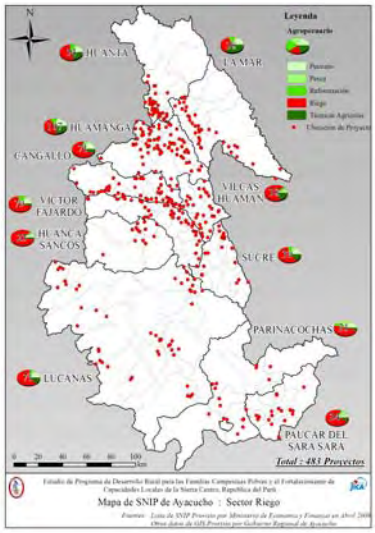
In the SNIP sub-project list of Ayacucho Region collected through this JICA Study, names of villages where proposed projects are to be implemented were included. Based on the GIS data of village location, the SNIP list was converted to GIS data and integrated into the Ayacucho GIS database in order to utilize for development planning in each sector.

To visualize the distribution of such projects by sectors, SNIP MAP was elaborated by the JICA Study Team and the data in Spanish was transferred to the regional government. The summary of SNIP MAP is described in Table 8.4.1.

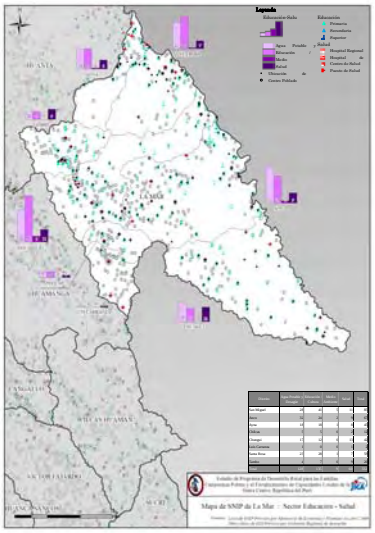
Table 8.4.1 Summary of SNIP MAP

1. Background of preparation of the SNIP MAP	The projects registered in SNIP without being executed in the Ayacucho region until April 2009 will be illustrated in a series of maps and charts, showing 1) Project type, 2) location 3) quantity, in order to contribute acceleration of regional development for the future.
2. Media	Electronic file (PDF+EXCEL)
3. Content of SNIP map	4 chapters in total
Chapter 1: Summary of SNIP projects in the Ayacucho region	Maps of SNIP project by sectors and provinces in all Ayacucho region. Following four main themes are set and number of SNIP projects are calculated by provinces and illustrated as maps in each theme: (i) Administration and commercial activities, (ii) Agricultural activities, (iii) Health and education, and (iv) Others (communications, transport and living condition).
Chapter 2: Summary of SNIP projects by provinces	Maps of SNIP project by the above 4 main themes and districts in each province. Compared with Chapter 1, these maps show more detailed information.
Chapter 3: Detailed maps of SNIP projects	A series of map sheets to show the distribution of SNIP projects by the above themes. The Ayacucho region is classified into 36 sheets and locations of the projects are indicated in each sheet.
Chapter 4: SNIP project list	This list is linked with the detailed maps of SNIP projects in Chapter 3. Following information are included in the list: (i) SNIP code, (ii) Project name, (iii) Category of sector in this JICA study, (iv) Location of project, (v) Costs required, (vi) No. of beneficiaries, and (vii) Page number of the SNIP MAP which projects are shown.

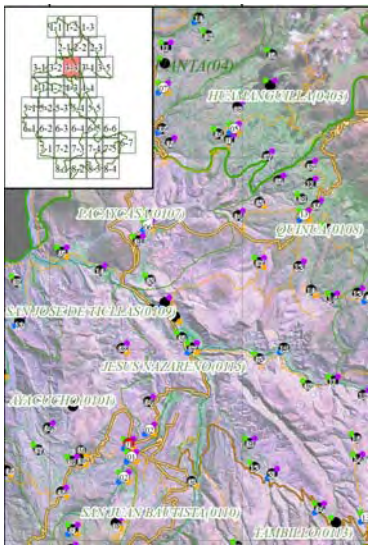
4. Samples of each chapter



Chapter 1: SNIP MAP on agricultural sector (Irrigation)



Chapter 2: SNIP MAP on health and education sector in La Mar province



Chapter 3: Detailed map of SNIP projects (Huamanga province)

Codigo SNIP	Nombre del Proyecto de Inversión Pública	Categoria del Equipo del Estudio de JICA	Costo de Inversión (S./)	Beneficiarios
Codigo Ubicación : 020203		**Codigo Mapa**	**UTM_X**	**UTM_Y**
Provincia : Cangallo , Distrito : Chuschi , Localidad : Chacolla		**4-2**	**575789**	**8494634**
57399	Instalacion De Sistema De Riego Por Aspersion Chacolla, Distrito De Chuschi, Provincia De Cangallo - Ayacucho	Riego	100,000	410
104520	Pequeño Sistema De Riego Accoccasa - Chacolla	Riego	250,897	420
62071	Sustitución Y Construccion De Infraestructura De La Institucion Educativa Publica Nº38188/Mx-P Chacolla, Distrito De Chuschi, Provincia De Cangallo - Ayacucho.	Educación y Cultura	344,287	1,166
110939	Aulas Ie N. 38188 Mx-P Chacolla Bid Iii Reemp.	Apoyo Social	270,000	250
38221	Mejoramiento De Energía Electrica Del Centro Poblado De Chacolla	Energía y Recursos Minerales	520,228	1,089
79670	Construccion De Pistas Y Veredas En El Perimetro Del Parque Principal Del Centro Poblado Chacolla, Distrito De Chuschi, Provincia De Cangallo - Ayacucho	Caminos	191,738	1,277
92769	Construccion Cerco Perimetrico Cementerio De Chacolla Distrito De Chuschi, Provincia De Cangallo - Ayacucho	Vivienda	64,391	650
Codigo Ubicación : 020204		**Codigo Mapa**	**UTM_X**	**UTM_Y**
Provincia : Cangallo , Distrito : Chuschi , Localidad : Chuschi		**4-2**	**570143**	**8498214**
111199	Módulos Demostrativos De Crianza Tecnificada De Cuyes A Nivel De Granjas Familiares En El Distrito Chuschi -Provincia Cangallo - Región Ayacucho	Pecuario	150,000	1,080
112798	Fortalecimiento De Las Capacidades Productivas Agropecuarias Y Organizacionales Con Familias De La Comunidad Campesina San Juan De Uchuyri - Chuschi - Cangallo - Ayacucho	Pecuario	42,150	40
90716	Mejoramiento Y Reforestación Sostenible De Laderas Degradadas Del Distrito De Chuschi, Provincia De Cangallo - Ayacucho	Reforestación / Conservación Ambiental	5,995,562	5,458
73258	Mejoramiento De Canal De Riego Chuschi-Uchuyri, Provincia De Cangallo - Ayacucho	Riego	100,000	3,408
105371	Instalacion Del Sistema De Riego Tecnificado En La Localidad De Aqchimachay, Distrito De Chuschi, Provincia De Cangallo - Ayacucho	Riego	267,373	265
12893	Rehabilitacion,Mejoramiento Y/O Ampliacion De Los Sistemas De Agua Y Saneamiento De Chuschi, Distrito De Chuschi, Provincia De Cangallo, Departamento De Ayacucho	Agua Potable y Desagie	2,567,008	3,002
108227	Pir Pcm Chuschi - Los Morochucos - Mp. Bellodp E1	Educación y Cultura	115,000	600
108210	Pir Pcm Chuschi - Los Morochucos. Mp. Bellido S1	Salud	102,000	3,432
100195	Aulas Ie Nro - 38126 Chuschi Bid Iii - Reemp.	Apoyo Social	270,000	180
107832	Prise Chuschi - Bid Iii	Apoyo Social	145,000	460
88056	Mejoramiento Y Ampliación De La Central Hidroeléctrica De Catalinayocc, Distrito De Chuschi, Provincia De Cangallo - Ayacucho.	Energía y Recursos Minerales	7,880,059	7,342
112870	Mejora De Las Capacidades Competitivas Para La Produccion Y Comercializacion De Artesania Textil De La Asociación De Ayllus Agropecuarios Multiservicios E Industrial Pirhuamarca - Quispillaccta "Agromiulp Condes Marques	Promoción de Comercio	58,272	30
62225	Construccion De Pistas Y Veredas En Las Avenidas 28 De Julio, Chikllarazo Y Los Jirones Arequipa, Mariscal Cáceres, Lucanas Y Pedro Cárdenas - Chuschi, Provincia De Cangallo - Ayacucho	Vivienda	650,850	1,948
92715	Construccion Cerco Perimetrico Del Cementerio Paraiso De Chuschi, Provincia De Cangallo - Ayacucho	Vivienda	81,702	550

Chapter 4 SNIP project list
(Columns are painted by the themes of SNIP projects)

Source: JICA Study Team

8.5 Discussion on Information Management with GRA

Through this JICA study including the GIS seminar as described in Chapter 1, JICA Study Team continued to discuss future information management with organizations concerned in Ayacucho Region. Especially in the GIS seminar, stakeholders in the organizations exchanged their opinions and deepened their understandings on future applicability of GIS and remote sensing techniques for regional development. This seminar provided a good opportunity to them to consider that: (i) satellite images would be a powerful tool for verification of agricultural statistics at least; and (ii) GIS and remote sensing could be utilized for planning, monitoring and evaluation not only in farmers' income generation and mitigation of vulnerability, but also in development of various social sectors such as health, education, etc.

The land use map of the region was prepared and GIS database was developed through the Study. It means foundation was established to share their information with each other and discuss various themes based on the same data among different organizations. To utilize such outcomes continuously, further efforts of the regional government are required. GRA commenced activities for macro zoning of the region in terms of economical development and environmental consideration in 2009. The activities are being activated now because of more

budgets allocated in this year. It is strongly expected that GRA updates and upgrades their information system continuously.

Finally, demands on development and management on information system proposed by GRA are summarized in the following table.

Table 8.5.1 Demands on Development and Management on Information System in Ayacucho Region

Sector	Agriculture	Road infrastructure	Water resources / Watershed management	Administration
Required information				
- Spatial information	- Land use of rainfed and irrigation areas, pastures, natural and artificial forests - Locations of facilities for irrigation, agro processing and aquaculture - Markets of agro products	Road alignment (location of roads with their widths)	- Watershed boundaries - Locations of meteorological stations	Locations of villages, education and health facilities
- Statistics / surveyed data	Data of agriculture census and information concerned	- Road type (national, regional, local) - Road condition (paved, unpaved) - Damaged roads, etc.	- Discharge records in major rivers - Meteorological information - Establishment of new meteorological stations and discharge measurement and start recording	Census at village level, education census, and information by health facilities
Applicability of the outputs from the JICA study - Satellite images, - Land use map - GIS database	A part of the above required spatial information was prepared and integrated into the Ayacucho GIS database through this study. Further efforts are expected to improve data accuracy by using the satellite images and the land use map. In addition, some parts of remaining spatial information and statistics require inventory surveys by using GPS and questionnaire surveys. Accuracy and reliability of such information can be improved by the surveys by using the satellite images and land use map. Locations of any type of facilities would be measured with high accuracy when the satellite images are used in case of new construction of the facilities. If such surveyors can use GPS, location data will be more accurate.			
Related projects proposed in this JICA study (Refer to Chap. 11)	I-(d)-1: Reforestation Plan Preparation Project I-(e)-7: Irrigation Basic Information and Database System Building Project	I-(f)-6: Road Improvement and O&M Promotion Project	II-(a)-2: Climate Monitoring Strengthening and Observation Network System Establishment Project for Vulnerability Mitigation Capacity Building	II-(a)-1: Basic Information Arrangement Project for Vulnerability Mitigation Capacity Building

Source: JICA Study Team

Chapter 9 Analysis on Vulnerability Encountered by Poor Peasants and Development Needs

9.1 General

The poor peasants in Ayacucho Region are constantly facing various problems and development constraints. As a result, poor peasants have many subjects to mitigate their poverty situation. "Mitigation of Vulnerability" is also one of them. As mentioned later, "Vulnerability" is defined as "Damages caused by natural disaster" in Ayacucho Region. Therefore, this chapter discusses the vulnerability measure focusing on natural disaster including climate change.

Regarding to countermeasure for vulnerability relating to livelihood improvement, these are included in development programs for livelihood improvement.

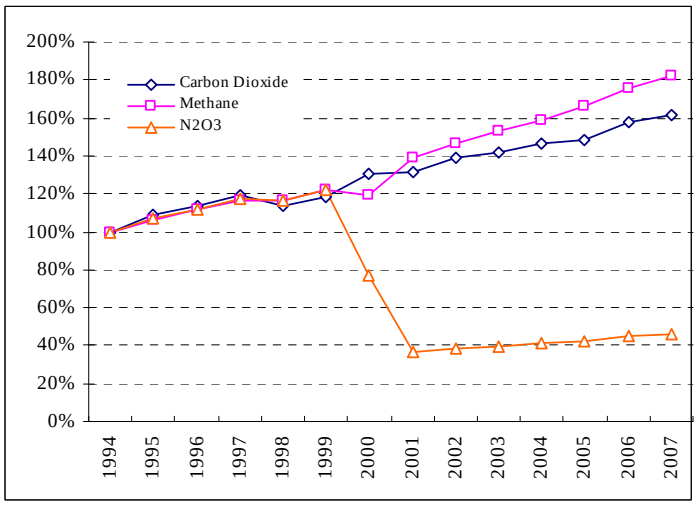
9.2 Climate Change in Peru

In Peru as well as other countries in the world, affection of climate change to economic activity is concerned. Peru was signatory to "the Kyoto Protocol" of the 3rd Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in 1997. Currently, many activities on global warming and clean development mechanisms are in operation mainly by the Ministry of Environment (*MINAM*).

Table 9.2.1 Amount of Emission of Greenhouse Gases in Peru (1994-2007)

Greenhouse Gases		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Carbon Dioxide	1,000 t	67,854	73,750	77,136	80,626	77,223	80,468	88,584	89,207	94,169	96,475	99,377	100,728	107,259	109,466
	% respect to 1994	*100%*	*109%*	*114%*	*119%*	*114%*	*119%*	*131%*	*131%*	*139%*	*142%*	*146%*	*148%*	*158%*	*161%*
Methane	1,000 t	812	862	905	948	946	992	965	1,128	1,188	1,241	1,289	1,349	1,425	1,479
	% respect to 1994	*100%*	*106%*	*111%*	*117%*	*117%*	*122%*	*119%*	*139%*	*146%*	*153%*	*159%*	*166%*	*176%*	*182%*
N2O3	1,000 t	45	48	50	53	52	55	34	17	17	18	18	19	20	21
	% respect to 1994	*100%*	*107%*	*112%*	*117%*	*116%*	*122%*	*77%*	*37%*	*39%*	*40%*	*41%*	*42%*	*45%*	*46%*

Source: Anuario de Estadísticas Ambientales 2008, Dirección Técnica de Demografía e Indicadores Sociales, INEI



Source: Anuario de Estadísticas Ambientales 2008, Dirección Técnica de Demografía e Indicadores Sociales, INEI

Figure 9.2.1 Amount of Emission of Greenhouse Gases (1994=100%)

Percentage of emission of greenhouses gases in Peru against total emission of the world is only 0.4%, however, the emission tend to increase year by year.

As shown in Table 9.2.1 and Figure 9.2.1, emission of greenhouse gases is increasing. The emission amount in 2007 is increased by 61-82% compared with 1994 (+ 61% for carbon dioxide, +82% for methane).

Regarding to emissions by economic sector in 2006, transportation sector has high share in nitrogen oxide emission (83.3% of total emission) and mining / industrial sector have high share in sulfur oxide (66.0% of total emission). The shares of agricultural sector on emission of gasses mentioned above are very low (0.09% and 0.63%).

However, there is a relation between greenhouse gasses and environment of rural area considering high share of emission of the gasses by deforestation (45% of total emission).

Affection of global warming notably in Peru is precisely reflected by glaciers. Twenty twp percent (70 billion m^3) of glaciers in Peru is disappeared during the past 25 years. In addition, surface of major glacier areas is decreased by 44.3% at maximum during 33 years from 1970 to 2003 as shown in Table 9.2.2. GRA organized a seminar on climate change in October 2009. Participants in the seminar reported the "movement and expansion of suitable production area and insect habitat" and also pointed out the "lack of specific activity" and "Lack of meteorological data" as constraints for carrying out sufficient problem analysis.

Table 9.2.2 Decrease of Surface of Major Glaciers Area

Glacial Area	1970 Inventory with aerial photos	2003 Inventory with satellital images	Decrease of Surface	Percentage
	Km2	Km2	Km2	%
Santa Cruz	45.96	30.67	-15.29	-33.3%
Parón	33.44	22.57	-10.87	-32.5%
Lalanganuco	42.9	34.53	-8.37	-19.5%
Quebrada Onda	68.82	53.97	-14.85	-21.6%
Quillcay	44.71	35.8	-8.91	-19.9%
Negro	19.07	14.81	-4.26	-22.3%
Grupos Pongos, Raria, Caulliraju	51.68	28.79	-22.89	-44.3%
Grupos Huascarán - Chopicalqui	65.54	51.34	-14.2	-21.7%
Total	372.12	272.48	-99.64	-26.8%

Source: Anuario de Estadísticas Ambientales 2008, Dirección Técnica de Demografía e Indicadores Sociales, INEI
Ministerio de Agricultura – Institute Nacional de Recursos Naturales (INRENA)

MINAM is promoting application of clean development mechanism. MINAM estimated that reduction of 1.5 billion ton of emission of greenhouse gasses is possible through investment of approximately S/.15.3 billion for 34 projects approved by the end of 2006 and other 150 projects in the future.

In the seminar mentioned above, application of clean development mechanism for Ayacucho Region was discussed, too. It concluded that the application is difficult due to less forest resources at present.

9.3 Vulnerability of Ayacucho Region

9.3.1 Characteristics and Countermeasure to Vulnerability in Ayacucho Region

Peru is tackling the countermeasures against vulnerability at national level. Central authority related to the vulnerability in Peru is the National Civil Protection Institute (*INDECI*). INDESI plays a role of preparation of policy and institutions such as Civil Protection System, establishment of data base on natural disaster, countermeasure for prevention of natural disaster and also distribution of materials like "Manual on Countermeasure to Natural Disaster" which shows measures during and after occurrence of the disasters.

GRA also established the Civil Protection Committee (*CDC*) composing of members of departments of GRA under INDESI. CDC plays a role for monitoring and discussing countermeasures against vulnerability. CDC prepared the Plan for Protection of Disaster in 2006 and also analyzed threat of frequent natural disasters as shown table below.

According to the analysis, natural disasters such as dry, heavy rain, cold etc., has strong influence to Agriculture, Transportation, Education and other sectors. More specifically, GRA understood that the damages caused by natural disaster is the important vulnerability

Table 9.3.1 Damages caused by Natural Disaster in Ayacucho Region by Sector

Sector	Natural Disaster	Others
Agriculture	Dry, Heavy Rain, Flash Flood, Heavy Rain, Hail	Lost of natural resources due to environmental deterioration and inadequate natural management, Increase of deforestation which cause desertification, Deterioration of pasture due to insufficient management and overgrazing, Insufficient irrigation facilities, Poor road network, Lost of farming land due to erosion, Decrease of forest area due to over land reclamation, use of firewood and construction material, Un use of recyclable energy, Desertification / deterioration of soil and water resources due to overgrazing, Increase of soil erosion
Transportation / Communication	Flash Flood, Landslide, Earthquake, Cold	
Education	Strong Wind, Earthquake, Strong Rain, Fire	Traffic accident, Bad behaviour, Drug addiction, Alcohol addiction
Health	Strong Wind, Concentrated Heavy Rain, Landslide, Flush Flood, Lightning Storm, Dry, Cold, Snow, Earthquake	Epidemic, Traffic accident, Fire, Psychiatric disease, Bad Behaviour, Crime, Alcohol addiction, Demonstration, Strike, Social Violence
Housing Construction Sanitary	Landslide, Earth Quick, Strong Rain, Flash Flood, Strong Wind	Fire
Energy Mining	Landslide, Mudslide, Strong Rain, Fire	Contamination, Gas leakage
Manufacturing	Earthquake, Flush Flood, Cold, Dry, Strong Wind	
Commercial Truism	Earthquake, Landslide, Fire, Cold, Dry	Social Clime, Clime, Traffic accident
Working Condition Employment	Earthquake	Bad Behaviour, Delinquency, Terrorism

Source: Plan Regional de Prevencion y Atencion de Desastres, Comite Regional de Defensa Civil Ayacucho, 2006

In addition, the review on the plan shows that three elements and characteristics of vulnerability of Ayacucho Region are identified as shown in table below.

Table 9.3.2 Elements and Characteristics of the Vulnerability of Ayacucho Region

Elements	Sample
Elements and phenomenon which cause decrease of living level	・ El nino phenomenon cause decrease of agricultural production by abnormal rain ・ La nina phenomenon cause decrease of agricultural production by dry ・ There is a lack of road network for carry patient ・ Low literacy rate causes decrease of opportunity for work
Lack of capacity to take countermeasure to avoid the elements and phenomenon	・ Communication network for early transmission of information on abnormal whether cannot be established ・ Drainage to response abnormal rain cannot be constructed. ・ Irrigation facilities to response dry cannot be constructed ・ Vaccination to response epidemic cannot be carried out. ・ High cold resident variety to response cold cannot be developed ・ Sufficient educational service to improve literacy rate cannot be provided
Lack of capacity to minimize the damage when the elements and phenomenon are occurred.	・ No sufficient deposit to buy food when agricultural production is drastically decreased ・ No bond (asset) to borrow money when agricultural production is drastically decreased ・ No other income resource when agricultural production is drastically decreased by dry

Source: JICA Study Team

From the above, vulnerability of poor peasant in Ayacucho Region is defined as "Deterioration of Living Condition of Poor Peasant caused by Natural Disaster" in this Study.

9.3.2 Problems and Constraints of Development of Poor Peasants

In Ayacucho Region, several natural disasters such as El Nino, dry, heavy rain, hail, cold, flood, landslide frequently occur as shown in table below. Especially, dry at southern area (Lucanas, Parinacochas, Paucar del Sara Sara

Provinces), frequent landslide and soil flowage in whole area of the region are serious problem causing enormous damage to agriculture and livestock which are important income source of poor peasants and also, obstruction of road network which is indispensable for transportation of agricultural products as mentioned in Section 5.3.

Table 9.3.3 Major Natural Disasters Affected Agriculture and Livelihood (1995-2005)

Year	Natural Disaster	Damaged Area	Affection to Agriculture
1995	Dry	Whole of the Region	Loss of crop and livestock
1998	El Nino Phenomenon	Whole of the Region	Loss of crop by concentrated heavy rain, flood and landslide
1999	El Nino Phenomenon	Whole of the Region	Loss of crop by concentrated heavy rain, flood and landslide
2001	Earthquake, Hail	Paucar del Sara Sara	Damage of Irrigation Facilities
2002	Snow, Cold (Low Temperature)	Vilcas Huaman, Lucanas, Parinacochas, Paucar del Sara Sara.	Loss of crop and livestock
2003	Dry, Cold (Low Temperature)	Lucanas, Parinacochas, Paucar del Sara Sara	Loss of crop and livestock, Population outflow, Malnutrition, Decrease of water resources (Water discharge)
2004	Dry, Cold (Low Temperature)	Lucanas, Parinacochas, Paucar del Sara Sara	Loss of crop and livestock, Population outflow, Malnutrition, Decrease of water resources (Water discharge)
2004	Strong Wind	Lucanas, Parinacochas, Paucar del Sara Sara, Cangallo, Victor Fajardo	Loss of crop
2005	Dry, Cold (Low Temperature)	Lucanas, Parinacochas, Paucar del Sara Sara	Loss of crop and livestock, Population outflow, Malnutrition, Decrease of water resources (Water discharge)
2005	Strong Wind	Lucanas, Parinacochas, Paucar del Sara Sara, Cangallo, Victor Fajardo	Loss of crop

Source: Plan Regional de Prevencion y Atencion De desastres 2006, GRA

According to result of household survey conducted in the Study, three natural phenomena "Dry caused by La Nina", "Cold" and "Hail" are disasters which affect livelihood in rural area of Ayacucho Region as shown in the following below.

Table 9.3.4 Natural Disasters which affect Livelihood in Rural Area of Ayacucho Region

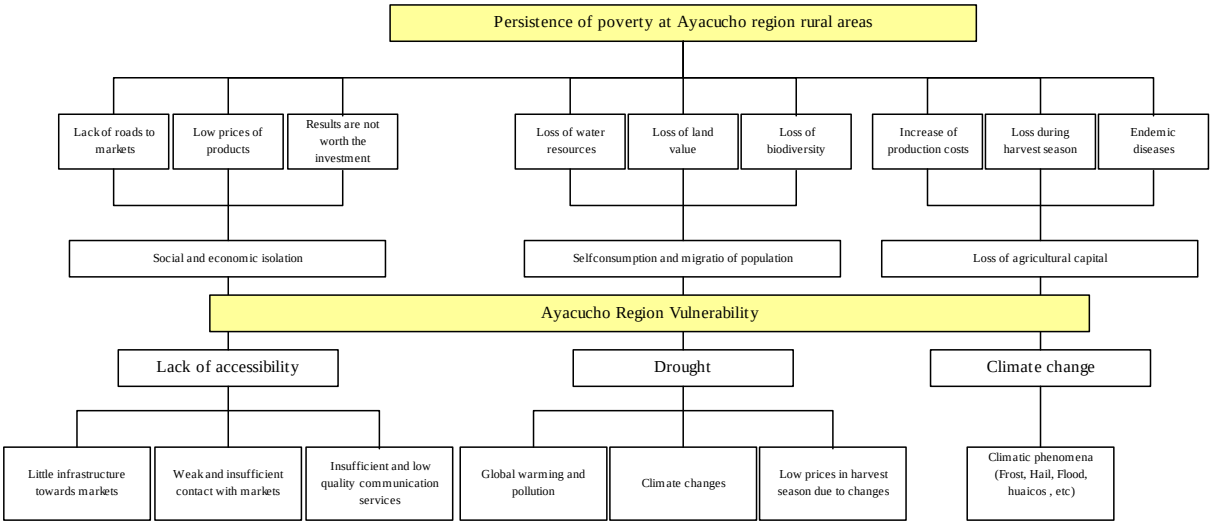
Province	Dry / La Nina	Cold	Flush Flood	Heavy Rain / El Nino	Insect/ Pest	Hail	Others
Huamanga	96	68			5	56	5
Cangallo	88	83	1	1	2	15	
Vilcas Huaman	61	52	7			39	2
Victor Fajardo	35	28	10		4	1	
Huanca Sancos	93	93	16		2	82	13
Sucre	31	31			1	29	
Lucanas	72	71			2	57	
Parinacochas	39	34	3	1	4	16	8
Paucar del Sara Sara	16	14	1		2	1	1
Total	531	474	38	2	22	296	29
	38.1%	34.1%	2.7%	0.1%	1.6%	21.3%	2.1%

Source: Household Survey conducted by JICA Study Team, 2009. Huanta, La Mar Provinces were excluded from survey area due safety matter.

Note: Select 2 natural disasters which affects livelihood more strongly

As the result of PCM workshop with participation of staffs of GRA, diagram about vulnerability and constraints against development was prepared as shown in Figure 9.3.1.

In the PCM workshop, three constraints of development "Lack of accessibility", "dry", "climate change" were set up as cause of vulnerability of Ayacucho Region for problem analysis. It is pointed out that these causes bring about "Social and economical isolation", "Occurrence of auto-consumption and population outflow" and "Loss of agricultural asset" which lead to the permanent poverty situation of rural area.



Source: PCM Workshop by JICA Study Team on 13 June 2009

Figure 9.3.1 Diagram of Problem Analysis on Vulnerability of Ayacucho Region

9.3.3 Subjects on Vulnerability of Poor Peasant

As mentioned above, Ayacucho Region permanently has various problems related to vulnerability such as natural disasters and constraints against development. Under such situation, livelihood of poor peasant is constantly threatened.

To cope with vulnerability of poor peasant, local governments of Ayacucho Region should take action on subjects shown in table below.

Table 9.3.5 Subjects for Vulnerability of Poor Peasant of Ayacucho Region

Category	Subject
Lack of Accessibility	・ Development of road network to connect rural area and market ・ Rehabilitation (Countermeasure for natural disaster such as landslide) of road network ・ Establishment of communication system to improve accessibility to agricultural meteorology and market information
Dry	・ Development of irrigation system and establishment of adequate irrigation management system ・ Re-structuring and strengthening of institutions for use of land and water resource ・ Re-structuring and strengthening of activities for environmental conservation including reforestation
Climate Change	・ Development of low input agricultural technology adaptable to whether variation of Ayacucho Region. ・ Development of agricultural technology adaptable to inclined farming land in mountain area.

Source: JICA Study Team

9.3.4 Countermeasure to Meteolorogical Vulunerability

(1) Activity of INDECI

INDESI monitors and analyses occurrence of disaster, and also prepares and distributes dissemination material on countermeasures before, during and after disaster such as earthquake, cold weather damage and dry weather damage. Major dissemination materials are publicised at INDESI web home page.

COC makes coordination between related specialized institutions, distribution of extension material and monitoring of damage situation. Actually, COC does not implement the specific project.

(2) Activity of GRA

Countermeasures for vulnerability for Agricultural Sector mentioned in "Regional Plan for Prevention and Measure for Disaster 2006" are as following.

Source: INDECI web home page, http://www.indeci.gob.pe/

Figure 9.3.2 INDESI's Dissemination Material for Cold Weather Damage

Table 9.3.6 Countermeasures for Meteorological Vulnerability by GRA

Meteorological Disaster	Countermeasure	Priority
Dry weather	・ Improvement and rehabilitation of existing irrigation system	1
	・ Implementation of project related water resource conservation in most vulnerable area to meteorological disaster	1
	・ Introduction of new irrigation technology	1
	・ Preparation of water resource inventory	1
	・ Effective use of water resources through strengthening of irrigation water users' committee	1
	・ Implementation of program on integrated pest management	2
	・ Introduction of facilities to produce high nutrient and balanced feedstuff	2
Flood, Mudslide	・ Construction of structures for river flood control	1
	・ Promotion of reforestation program	1
	・ Operation and Maintenance (O/M) and cleaning of riverbed	1
	・ Operation and Maintenance (O/M) of irrigation system	1
Hail	・ Improvement of capacity on hail prevision technology	
Snow	・ Activation of Reforestation Program	
Human Disaster	・ Activation of soil sensibility analysis and program on improvement of land use	
	・ Adequate use of water resource	
	・ Protection and recuperation of pasture in highland	

Source: Plan Regional de Prevencion y Atencion de Desastre, Agosto 2008, Comite Regional de Defensa Civil, Ayacucho

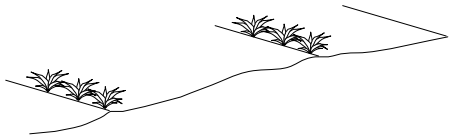
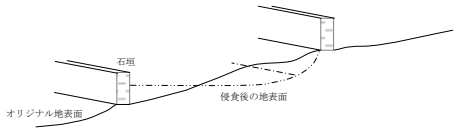
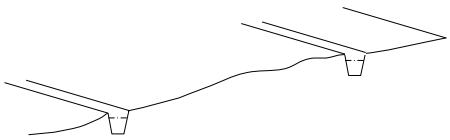
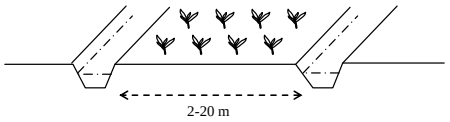
Department of Agriculture of DRA has responsibility for activities related to countermeasure on meteorological vulnerability. However, the activities are not implemented sufficiently due to lack of capacity of staff and budget.

(3) Countermeasure for Vulnerability in Rural Area

Several countermeasures for meteorological vulnerability are taken in rural area. Main traditional and other meteorological countermeasures are as shown in Table 9.3.7

Table 9.3.7 Countermeasure for Vulnerability in Rural Area

Countermeasures	Detailed Explanation
a. Traditional Countermeasure	
Vertical distribution of farming land	・ Method to avoid damage of crops by meteorological disaster distributing farming land at different elevation.
Production of potato and maize	・ Method to secure food and avoid damage of crops by meteorological disaster using crops which is comparatively strong against dry and cold and, has high storage behaviour.
Mixed cropping of different varieties	・ Method to minimize damage of crops by meteorological disaster using multiple varieties which have different characteristic such as drought and cold residences etc..
Dispersion of seeding period	・ Method to minimize damage of crops by meteorological disaster dispersing seeding period. This method especially aims to avoid damage in flowering period.

Countermeasures	Detailed Explanation	
Hedge	・ Method for reduce soil erosion by plants. The plants can reduce water flow physically and by absorption as show in right figure. ・ Simple method by stone is also popular	
Natural Terracing Method	・ Terracing method using natural erosion and hedge. This method can avoid soil erosion and also, can formulate terrace in long term as shown in right figure. ・ 82,570 ha of terrace was formulated by water shed management project during 2000-2008.	
Infiltration canal	・ Method for reduce soil erosion and improve effective use of water resource by plants.	
High Ridge Method	・ Countermeasure for cold using difference of temperature between air and water. This countermeasure is called as Waru Waru. ・ This countermeasure has been used mainly high area (3,800-4,000 m) for production of potato. This method is observed mainly surrounding area of Titicaca Lake. ・ This countermeasure requires much water. Therefore, area for application of the countermeasure is limited.	
Preparation of dried food utilizing cold whether	・ Method to secure food for auto-consumption by dried food producing through freeze treatment. Most popular crop for production of dried food is potato (Cyu-nyo).	
b. Other Countermeasures		
Gravity Irrigation Drip Irrigation Sprinkler Irrigation	・ Method to avoid cold damage by irrigation facility. Cropping at high disaster occurrence period can be removed to other period by expansion of cropping season by irrigation. ・ Many gravity irrigation systems were constructed. Drip and sprinkler irrigation is useful for conserving water. Use of drip and sprinkler irrigation, however is limited.	
Greenhouse	・ Method to avoid cold damage by greenhouse. Use of greenhouse is limited in commercial agricultural area with sufficient farming budget	

Source: JICA Study Team

Out of countermeasures mentioned above, "Vertical distribution of farming land", "Mixed cropping of different varieties" are important agricultural countermeasure to reduce the vulnerability. At the same time, such countermeasures are constraints to realize commercial agriculture due to difficulty of securing constant amount of production.

9.3.5 Vulnerability of Road Network

(1) Problem of Road Network

In Ayacucho Region, delay of development of road network is most serious development constraint factor on access between community and market. Lack of road network causes not only low accessibility between community and market, but also low education and health service and delay of response to urgent occurrence. Under such situation, lack of road network is recognized as vulnerability of the region.

According to the CSC report prepared in 2006, total length of pavement and/or road is only 2,372 km (Pavement: 433.93 km, compacted: 1937,66 km) equivalent to 29% of total length road of 8,169.82 km (national : 746.43 km,

regional : 1049.45 km, provincial : 6,373.94 km) in the region. Out of 433.93 km of pavement road, 425.43 km or 98% is national road, thus, pavement of provincial and regional road is largely delayed. Condition of compacted road located near Ayacucho City at the beginning of rainy season (September - October) was well and no constraint for traffic. However, condition of the road in rainy season is quite bad, especially feeder road.

A part of O&M work of connection road between Toccto (Huamanga Province) and Alapaca (Lucanas Province) is outsourced to community enterprise named as Pymes. Such system creates employment opportunity in the rural area.

Table below shows length of road which is frequently damaged (high risk road), by type of disaster and province.

Out of total length of high risk road, 2.9 km is high risk of damage by debris flow, 5.83 km by land slide and 1.35 km by mud slide. This distribution reflects characteristic of mountain area.

Table 9.3.8 Length of Road frequently Damaged (high risk road), by Type of Disaster and Province (m)

Province	Flood	Landslide	Huaycos	Snow	Total
Huanta	250				250
La Mar, Huanta	350		250		600
La Mar	400	4,000	500	100	4,900
Huamanga		230			230
Cangallo		400		100	400
Vilcashuaman		200			200
Victor Fajardo	150				150
Victor Fajardo, Huanca Sancos	400				400
Fajardo, Sucre	300				300
Huanca Sancos				100	0
Sucre	100				100
Lucanas	300	1,000	400	400	1,700
Lucanas, Parinacochas	100				100
Parinacochas	50				50
Paucar del Sara Sara	500		200		700
Total	2,900	5,830	1,350	700	10,080

Source : Elaborated by JICA Study Team based on Plan Regional de Prevencion y Atencion de Desastre, Agosto 2008, Comite Regional de Defensa Civil, Ayacucho

Above: Closed Feeder Road by Fallen Stone (Victor Fajardo)
Below: Condition of Compacted Road (Ayacucho)

(2) Countermeasure for Vulnerability of Road Sector

Countermeasures of vulnerability for Road Sector mentioned in "Regional Plan for Prevention and Measure for Disaster 2006" are as following.

Table 9.3.9 Countermeasures of vulnerability for Road Sector in "Regional Plan for Prevention and Measure for Disaster 2006"

Disaster	Countermeasure		Priority
Landslide	a. Short Term	・ Implementation of periodical road operation and maintenance work	1
		・ Reforestation at side surface of road	2
		・ Development of caution system of dangerous area	3
		・ Implementation of periodical operation and maintenance work of dangerous road	4
	b. Medium Term	・ Construction of structures for road protection	1
		・ Strengthening of durability of bridge	2
		・ Implementation of periodical operation and maintenance work of road	3
	c. Long Term	・ Implementation of road improvement and rehabilitation work	1
		・ Strengthening of operation and maintenance work of community enterprise	2
		・ Study and analysis of dangerous area	1
		・ Implementation of campaign regarding protection of road network	2

Disaster	Countermeasure		Priority
Mudslide	a. Short Term	・ Reforestation for prevention of river erosion	1
		・ Improvement of side ditch	2
		・ Improvement of structures for road protection	3
	b. Medium Term	・ Installation of structures for riverbank protection	1
		・ Strengthening of durability of bridge	2
	c. Long Term	・ Construction of dam, canal and side ditch	1
		・ Improvement and rehabilitation of road	2
		・ Study and analysis of dangerous area	1
		・ Implementation of campaign regarding protection of road network	2
Earthquake	・ Strengthening of road strength		1
	・ Study and analysis of dangerous area		1
	・ Implementation of campaign regarding protection of road network		2
Snow	・ Implementation of periodical road operation and maintenance work		1
	・ Study and analysis of dangerous area		1
	・ Implementation of campaign regarding protection of road network		2
Debris Flood	・ Strengthening of bridge strength		1
	・ Study and analysis of dangerous area		
	・ Implementation of campaign regarding protection of road network		1

Source : Plan Regional de Prevencion y Atencion de Desastre, Agosto 2008, Comite Regional de Defensa Civil, Ayacucho

9.4 Livelihood Improvement for Poor Peasants

For poor peasants who are in vulnerable environment due to unpredictable weather changes, it is important to improve life conditions using measures which can reduce such vulnerabilities. As mentioned in Chapter 4, several development projects were implemented livelihood improvement for poor peasants in Ayacucho Region. However, some livelihood improvement projects were failed. The successful experiences or lessons learnt are not being reproduced in other communities. There are just a few peasants who can prevent themselves against their vulnerabilities. In this situation, it is required to have a support system which improves life conditions of poor peasants.

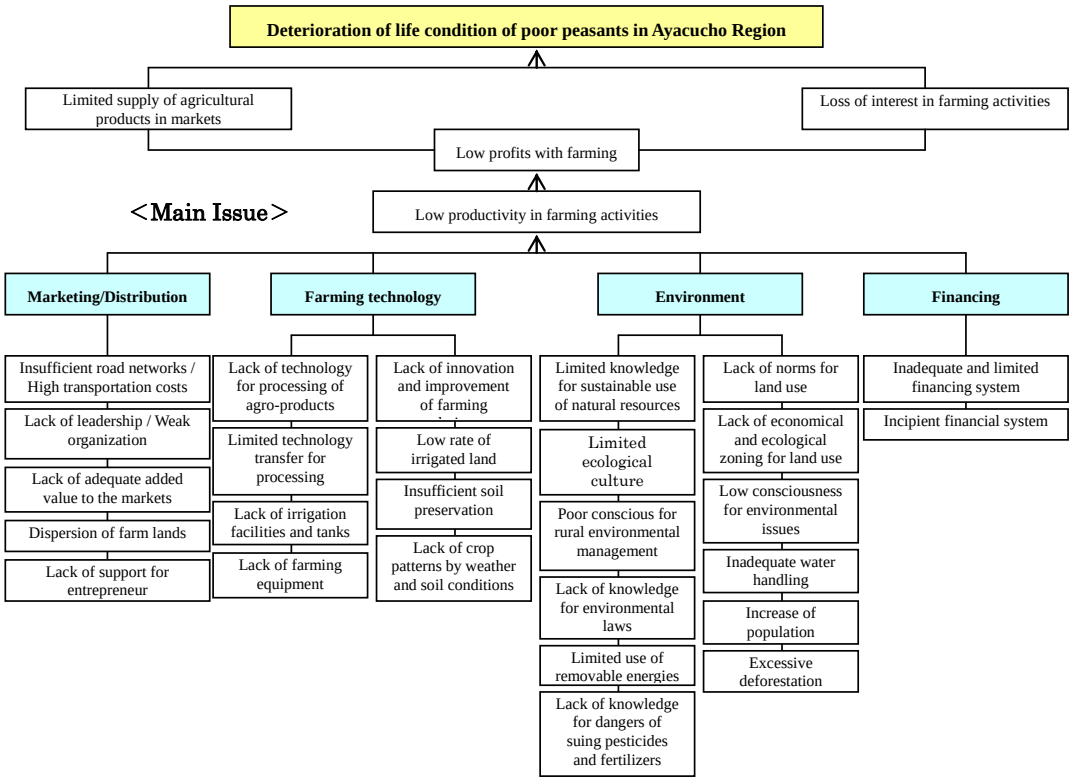
9.4.1 Problems and Constraints of Livelihood Improvement for Poor Peasants

As the result of the PCM (*Project Cycle Management*) workshop, attended by local governmental staff and local authorities in Ayacucho Region, a diagram was outlined regarding problems and constraints of livelihood improvement for poor peasants as shown in the figure below.

According to the analysis conducted by the participants, the core problem was the “low productivity in farming activities”. This main issue led to “low profit in farming activity”, causing “limited supply of agricultural products in market” and “loss of interest in farming activity”, which bring about deterioration of life conditions of the peasant families in Ayacucho Region.

As the result of the analysis of the farming and rural conditions, participants in the workshop pointed out that the problems generated by the “low productivity of farming activities” can be divided in four major issues: “marketing/Distribution”, “farming technology”, “environment” and “financing”.

The diagram below shows problems and constraints to livelihood improvement in rural areas of Ayacucho Region.



Source: Workshop of JICA Study Team, 13 June 2009

Figure 9.4.1 Problem Analysis for Livelihood Improvement in Ayacucho Region

In regards to the above mentioned problems, the table below shows the constraints of livelihood improvement in rural area of Ayacucho Region.

Table 9.4.1 Constraints of Livelihood Improvement in Rural Area of Ayacucho Region

Category	Main Constraints
Marketing/Distribution	- Poor road network to transport agricultural products to markets - Lack of leadership and farmers' organization for collective sale - Poor access to market information - Lack of a support system for entrepreneur
Farming techniques	- Lack of opportunities for training in new farming technology - Lack of agricultural infrastructure such as irrigation. - Poor access to effective and efficient farming facilities and equipment - Lack of socially and environmentally appropriate farming technology
Environment	- Lack of knowledge about environmental issues - Poor interest in environment preservation and management - Lack of land use system - Excessive cutting down of trees for domestic use such as firewoods
Financing	- Limited access to financing systems for poor peasants - Inexistence of a financing system for targeting poor peasants

Source: JICA Study Team

9.4.2 Issues of Livelihood Improvement for Poor Peasants

To realize livelihood improvement in rural areas of Ayacucho Region, rural peasants face problems and constraints such as marketing/distribution, farming technology, environment and access to financing.

Local governments including GRA are to be devoted to the following issues in order to contribute to improve livelihood of the poor peasants in Ayacucho Region.

Table 9.4.2 Major Issues related to Livelihood Improvement for Poor Peasants in Ayacucho Region

Category	Major issues
Marketing/Distribution	- Inadequate road network and communication means to access to information and markets - Strengthening of farmers' organizations related to farming activities, food processing and marketing - Lack of a support system of entrepreneur
Farming technology	- Restructuring and strengthening of an extension system for farming techniques - Improvement of farming infrastructure - Communal system for acquiring farming facilities and equipment - Strengthening of research institutes such as INIA and faculty of agriculture in the Huamanga University
Environment	- Lack of knowledge and diffusion for environmental issues - Lack of land use system with environmental considerations - Expansion and strengthening of reforestation activities for poor peasants
Financing	- Inexistence of a financing system addressed to poor peasants

Source: JICA Study Team

9.5 Capacity of Local Governments Supporting Mitigation of Vulnerability and Improvement of Livelihood

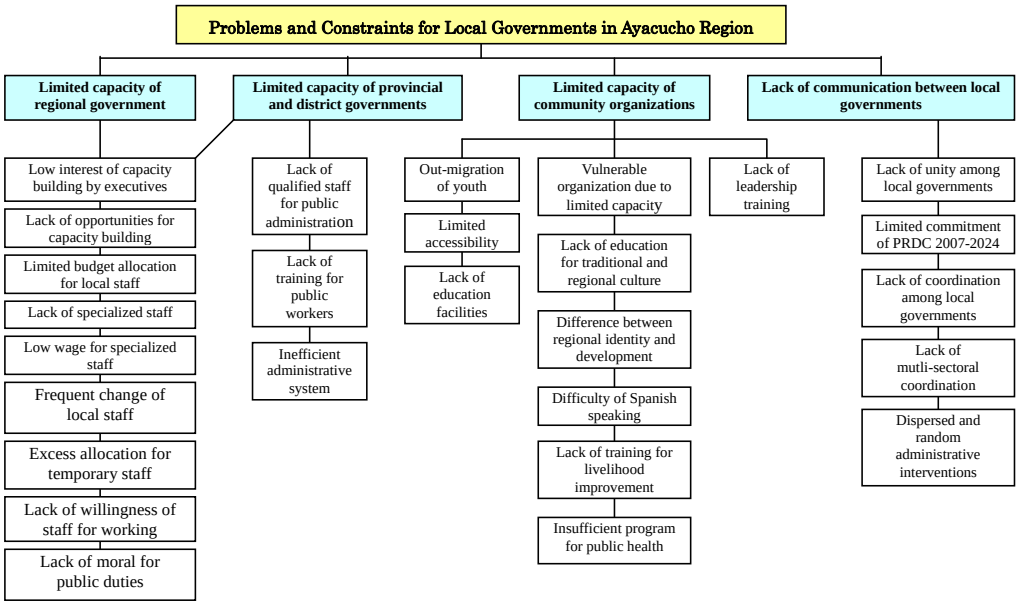
Along with the decentralization process, the local governments' role is essential in supporting mitigation of vulnerabilities and livelihood improvement for poor peasants. As explained in Chapter 3, local governments in Ayacucho Region have been supporting mitigation of vulnerability of the poor peasants and livelihood improvement applying measures to poverty reduction and regional development. However, they have still room to efficiently utilize the limited local resources such as human resources, natural resources, social capitals. As the executing agencies, local governments are requested to increase their administration and operation capacities.

9.5.1 Problems and Constraints of Capacity Building for Local Governments

As the result of the PCM workshop, a diagram was outlined regarding the capacities buildings of the local governments oriented to mitigate communities' vulnerability and improvement of their life conditions.

These problems were indicated: "limited capacity of regional government", "limited capacity of provincial and district municipalities" and "limited capacity of community organizations". The participants also indicated that there was a "lack of coordination between local government authorities" in Ayacucho Region.

Major constraints related to capacity of local governments are shown in the figure below:



Source: Workshop, JICA Study Team, 13 June 2009

Figure 9.5.1 Problem Analysis for Capacity Building of Local Governments in Ayacucho Region

According to the diagram above, a summary was outlined regarding the constraints related to the limited capacity in every level of the local governments. By the way, it was found that the factors limiting the development, faced by the provincial and district governments, are coincident with those by the regional government.

Table 9.5.1 Constraints for Capacity Building of Local Governments in Ayacucho Region

Government level	Main Constraints
Regional Government	- Lack of leadership for decision making and orientation - Lack of institutions to strengthen human resources - Difficulty to guarantee qualified human resources continuously - Lack of consciousness and motivation regarding public services
District and Provincial Municipalities	- Constraints similar to those of the regional government - Inefficient and ineffective administrative system
Community Organization	- Out-migration of youth and decrease of population - Lack of opportunities to strengthen human resources - Limited leadership of community leaders
Local Government Authorities in Ayacucho Region	- Lack of coordination among the governments: regional, provincials, municipals and communities - Lack of inter-sectoral communication - Lack of coordination to carry out PDRC 2007-2024 in Ayacucho Region

Source: JICA Study Team

9.5.2 Issues of Local Governments

In the transition period of the decentralization process in Peru, local governments in Ayacucho Region face problems and constraints such as administrative capacities as a government authority. The content on the necessary training will depend on future studies, however, in order for GRA to realize an efficient regional development and raise its administrative capacity, the following issues are to be taken into account:

Table 9.5.2 Major Issues related to Capacity Building of Local Governments in Ayacucho Region

Local government	Major issues
Regional Government	- Consciousness of local authorities regarding leadership roles - Strengthening and generation of training opportunities for the local staff regarding administration and management - Capacity strengthening of local workers from the regional government regarding administration and management
District and Province Municipalities	- Major issues similar to those of regional government - Restructuring and elaborating an administrative system
Community Organizations	- Strengthening the access to employment opportunities, education, transportation and services - Restructuring community organization system and generation of employment opportunities for administration - Consciousness of the leadership
Local Government Authorities in Ayacucho Region	- Strengthening of coordination between local governments under the decentralization - Strengthening of inter-sectors coordination - Restructuring the executive system related to the integrated development in the region

Source: JICA Study Team

9.6 Development Needs of Poor Peasants

As mentioned above, the poor peasants in Ayacucho Region face several problems and constraints regarding vulnerability and livelihood improvement, and they are still facing a lot more issues to settle. It can be said that the development needs of poor peasants in Ayacucho Region are the poverty reduction measures to cope successfully with them. In the household survey conducted in April and May 2009 in the Study, the poor peasants in 15 different communities in Ayacucho Region were surveyed by interviewing community leaders and key informants in order to know life conditions in those communities. As a result, the following needs were identified, which are shown in table below.

The sector requiring more need of development is the agricultural sector. Out of the 9 provinces, 8 provinces, except by Paucar del Sara Sara Provinces, need the agricultural development, because mitigation of vulnerability and

raising of their life conditions are closely linked to agricultural promotion.

As the sectors indispensable for agricultural promotion, irrigation and agro-processing are selected. As for irrigation, all the communities that irrigation system is not provided, indicated irrigation as the priority sector. The agro-processing was indicated as the priority sector in the southern central part of Ayacucho Region, where the livestock activity is more practiced, but remote from Huamanga Province, the large consumer area.

Other development needs are improvement of road networks, installation of water supply and sewerage facilities and construction of schools. These development needs, as basic infrastructure and human resources development, are essential to achieve vulnerability mitigation and livelihood improvement for the poor peasants in Ayacucho Region.

Table 9.6.1 Development Needs of Rural Communities in Ayacucho Region

Results to the question "Select the 3 main development issues of your community" "agriculture, transportation, health, education, reforestation, water/hygiene, tourism, electricity, food processing, housing, solid waste management, new businesses, others"				
Province	**Selected priority sectors**			
Huamanga (4 communities)	Agriculture: 4 communities	Education: 3 communities	Housing: 2 communities	Sanitation, Health, Transportation: 1 in each community
Cangallo (1 community)	Agriculture, Sanitation, Irrigation			
Vilcas Huaman (2 communities)	Agriculture: 2 communities	Irrigation, Education: 1 in each community		
Victor Fajardo (1 community)	Agriculture, Irrigation			
Huanca Sancos (1 community)	Agriculture, Transportation, Food processing			
Sucre (1 community)	Agriculture, Food processing, Irrigation			
Lucanas (2 communities)	Communities: 2 communities	Agriculture, Irrigation, Education, Transportation, Food processing: 1 in each community		
Parinacochas (2 communities)	Irrigation: 2 communities	Agriculture, Transportation, Education: 1 each community		
Paucar del Sara Sara (1 community)	Transportation, Health, 1 in each community			

Source: Survey conducted to peasant families, Study Team, 2009. Huanta y La Mar Provinces are out of the scope of this study

Note: Selection of the 2 natural phenomena causing more losses

Chapter 10 Development Strategy

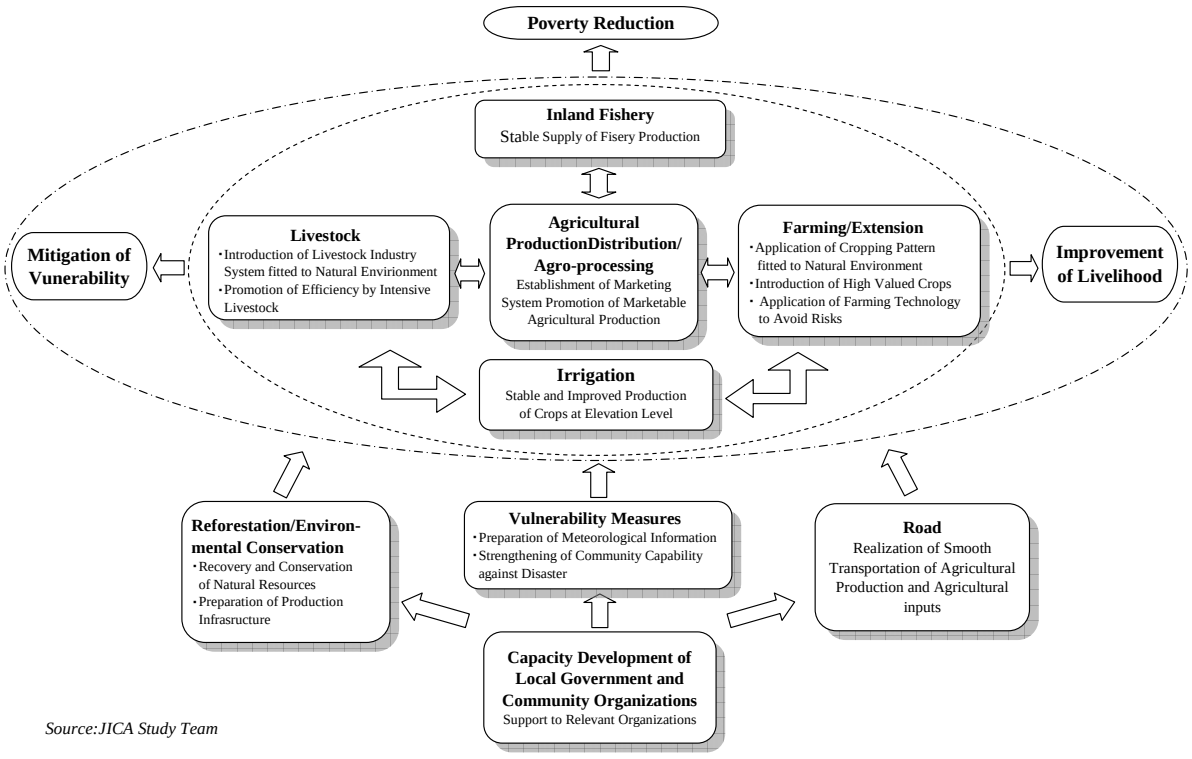
10.1 General

The study was made for national policies on poverty reduction and decentralization, industrial structure and condition of social infrastructure of Ayacucho Region, life conditions clarified by household survey, problems of vulnerability of poor peasants, livelihood improvement and local government organizations clarified by PCM workshop, extent of poverty and suitable land use clarified by zoning, natural and social diversity of Ayacucho Region, information from SNIP sub-projects and new projects, current situation of Ayacucho regional government and local government. Based on the study results, the basic concept of development strategy and the development strategy were worked out as follows.

10.2 Basic Plan of Development Strategy

(1) Roles of Respective Relevant Sectors to Achieve Goal

The Study aims to formulate the program of the rural development for the poor peasants and the local capacity strengthening in the central highlands with the purpose of linking between poor peasants and local, regional, and national markets to improve their income, activity and life. To attain this aim, the relevant sectors are agricultural production distribution/agro-processing, farming/extension, livestock, irrigation, inland fishery, vulnerability mitigation, reforestation/environmental conservation, road and institutional building. In this Study, the concept of basic plan for development strategy considering the relation among these sectors is shown in Figure 10.2.1.



Source:JICA Study Team

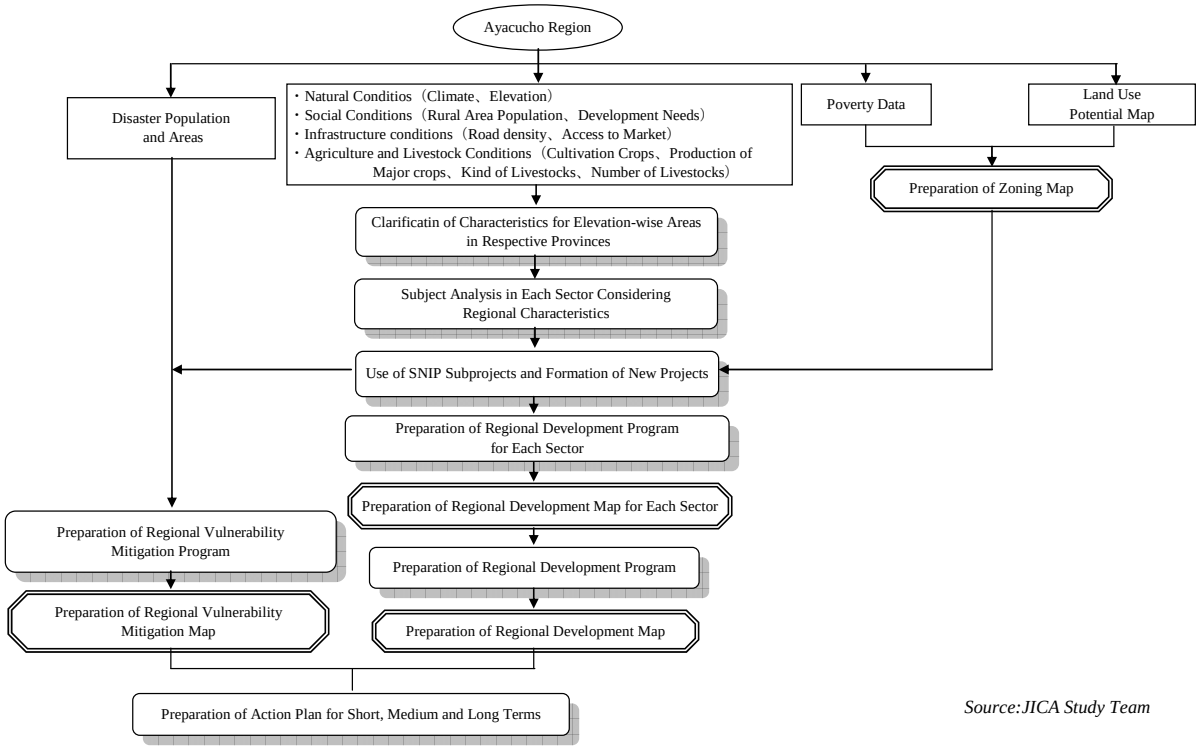
Figure 10.2.1 Illustration of Basic Plan of Development Strategy

Out of sectors mentioned above, the farming/extension, livestock and inland fishery which are related to production activity, should be planed taking into consideration the purpose of sector of agricultural production distribution/agro-processing. It is indispensable to keep a link with irrigation to stabilize and improve the production

of crops and livestock. These will contribute to the attainment of mitigation of vulnerability and improvement of livelihood which the poor peasants face. Also, preparation of infrastructure in road sector and reforestation/environmental conservation sector and execution of vulnerability mitigation measure is essential for effective production activities. Furthermore, the support of relevant government agencies is needed for executing these sector activities as planned. Finally, these activities should lead to the attainment of poverty reduction.

(2) Development Approach Focusing on Regional Characteristics

As mentioned previously, Ayacucho Region shows the various situations on nature, society and agriculture. Thus, it is necessary to prepare the development strategy paying attention on the regional characteristics, to effectively attain the "mitigation of vulnerability" and "improvement of livelihood" which are priority fields in the Study. In the Study, it is decided to apply the development approach as shown in Figure 10.2.2, taking into consideration the above.



Source:JICA Study Team

Figure 10.2.2 Development Approach considering Regional Characteristics

At first, the characteristics of elevation-wise areas for each province are clarified based on the natural conditions (climate, elevation), social conditions (rural area population, development needs), infrastructure conditions (cultivation crops, production of major crops, kind of livestock, number of livestock). In consideration of such clarified characteristics, the subject analysis in each sector is carried out and then the measures necessary for development are elaborated. In parallel to these works, the zoning map is prepared using the poverty data and land use potential map of Ayacucho Region. Based on the zoning map and the results of the subject analysis in each sector considering the regional characteristics, use of existing development plans, say SNIP sub-projects and formation of new projects are conducted toward livelihood improvement of poor peasants. These results are compiled as the regional development program for each sector. In addition, the projects to be implemented for each sector and their development areas are precise by preparing the development map and matrix table showing the proposed projects and the related elevation-wise areas in each province. From these development map and matrix

table prepared for each sector, the regional development program and the regional development map are prepared for further clarification of relation between the proposed projects and the development areas. On the other hand, as for the vulnerability measures, the regional vulnerability mitigation program is prepared based on the regional disaster population and areas, and information from SNIP sub-projects. From this vulnerability mitigation program, the regional vulnerability mitigation map is developed. On the basis of the regional development program and the regional vulnerability mitigation program, the action plan is elaborated for the short term (2011-2014), medium term (2011-2017) and long term (2011-2020).

10.3 Development Strategy

10.3.1 General

Based on the basic plan of development strategy, the development strategy is elaborated. The development strategy is composed of "strategic development goal", "determination of vision, future target, basic idea", "determination of priority development fields, priority development subjects and their respective objectives", "characteristics of elevation-wise area in respective provinces of Ayacucho Region", "reflection of existing plans", "application of comprehensive approach" and "development scenario".

10.3.2 Strategic Development Goal

The purpose of the Study is to formulate the program of the rural development for the poor peasants and the local capacity strengthening in the central highlands with the purpose of linking the poor peasants with local, regional, and national markets to improve their income, activity and life. Namely, the intent of this purpose is precisely "to reduce the poverty through the attainment of not only mitigation of vulnerability but also improvement of livelihood of the poor peasants in Ayacucho Region", which should be the strategic development goal in the Study.

10.3.3 Determination of Vision, Future Target and Basic Idea

(1) Vision

Most of regions located in Andes area have the similar aspects on topography and socio-economy and problems on poor peasants as Ayacucho Region faces. Thus, the vision at 2020 of Master Plan to be formulated in the Study should be "the successful region (advanced region) on measures to poor peasants".

(2) Future Target

Most of households in Ayacucho Region are of low farm income and thus in poverty due to shortage of farming technology and delay in development of production and social infrastructures (irrigation facilities and road). Besides, the life condition of poor peasants including income sinks into instability due to deterioration of social infrastructures and lowering of agricultural production caused by frequent natural disasters. In order to improve such situations, the future target of Master Plan should be "the stabilization of life condition by improvement of capability against natural disasters (mitigation of vulnerability) and the income improvement by strengthening and diversification of means of livelihood".

(3) Basic Idea

The basic idea is decided to be "reflection of regional characteristics and effective use of regional resources", to attain the above mentioned target and also from the viewpoint that the reflection of diverse characteristics of Ayacucho Region and use of regional resources are so effective for project sustainability.

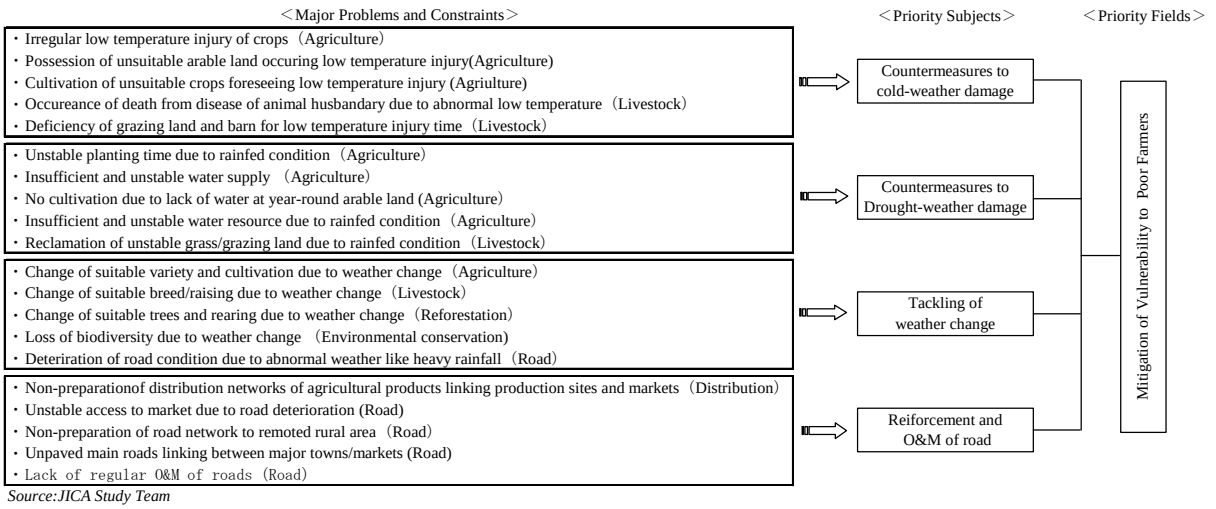
10.3.4 Abstraction of Priority Development Fields and Priority Development Subjects and Their Respective Objectives

There are many subjects to be settled for attaining the mitigation of vulnerability and the improvement of livelihood of poor peasants of Ayacucho Region. The priority development fields and the priority development subjects should be therefore determined aiming to work out the measures effectively to settle these many subjects. Taking into account the results of analysis on the conditions of vulnerability and development needs which the poor peasants of Ayacucho Region face at present, the priority development fields and the priority development subjects were abstracted and also their objectives were determined as mentioned below:

(1) Abstraction of Priority Fields and Priority Subjects through Problem Analysis

Based on the results of study on current conditions on agriculture, irrigation, livestock, distribution of agricultural production, reforestation, environmental conservation and road, and the PCM workshop on vulnerability and livelihood, the major problems and constraints on rural area development in Ayacucho Region are classified into the following 3 priority fields:

(a) Mitigation of Vulnerability of Poor Peasants



Source:JICA Study Team

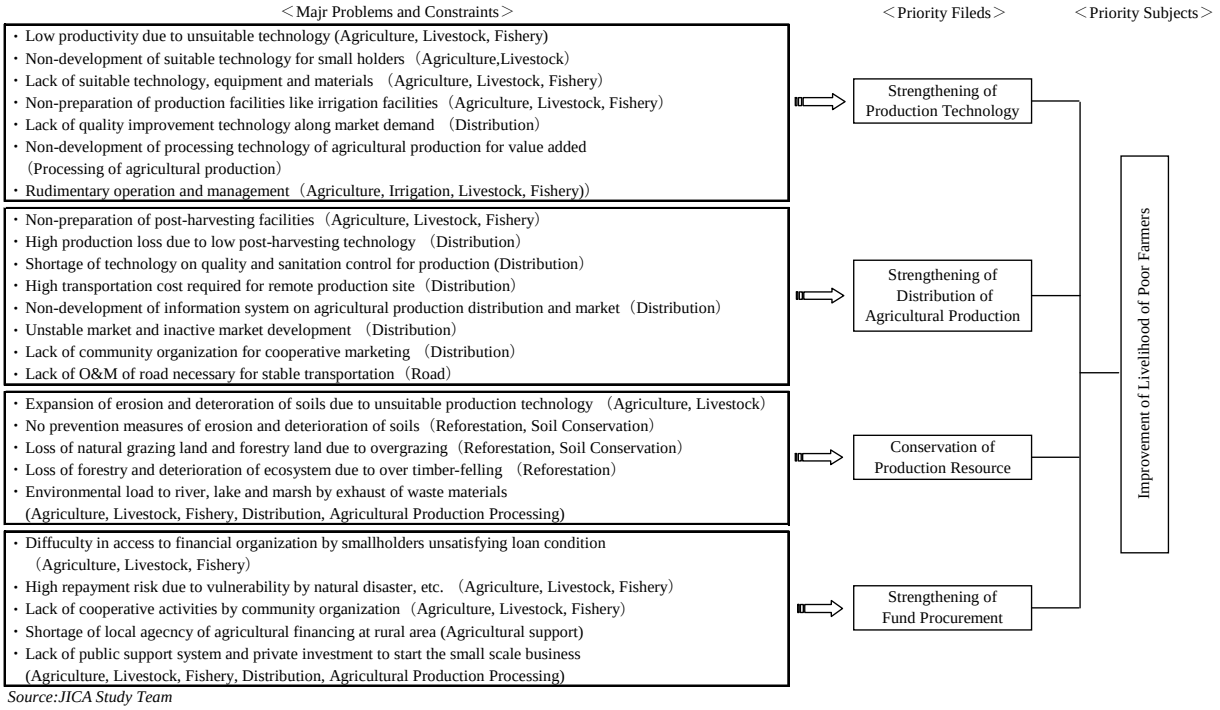
Figure 10.3.1 Priority Fields and Priority Subjects for Mitigation of Vulnerability of Poor Peasants in Ayacucho Region Rural Area

As shown in Figure 10.3.1, the result of analysis on problems and constraints which the poor peasants in Ayacucho Region face currently, shows that the first priority field is the “mitigation of vulnerability of poor peasants”. And then, as the countermeasures to this priority field, 4 priority subjects are abstracted. These are the “Countermeasures to Cold-weather Damage”, “Countermeasures to Drought-weather Damage”, “Tackling of Weather Change”, and “Reinforcement and O&M of Road”.

(b) Improvement of Livelihood of Poor Peasants

As the results of analysis on the problems and constraints which the poor peasants in Ayacucho Region envisage at present, the “Improvement of Livelihood of Poor Peasants” is abstracted as the second priority field as shown in Figure 10.3.2. As the countermeasures to this priority development field, there finds a need to tackle 4 priority subjects; “Strengthening of Production Technology”, “Strengthening of Distribution of Agricultural Production”, “Conservation of Production Resources”, and “Strengthening of Fund Procurement”. In order to realize the “Improvement of Livelihood of Poor Peasants”, the “Mitigation of Vulnerability of Poor Peasants” should be

settled preferentially or be executed at the same time.

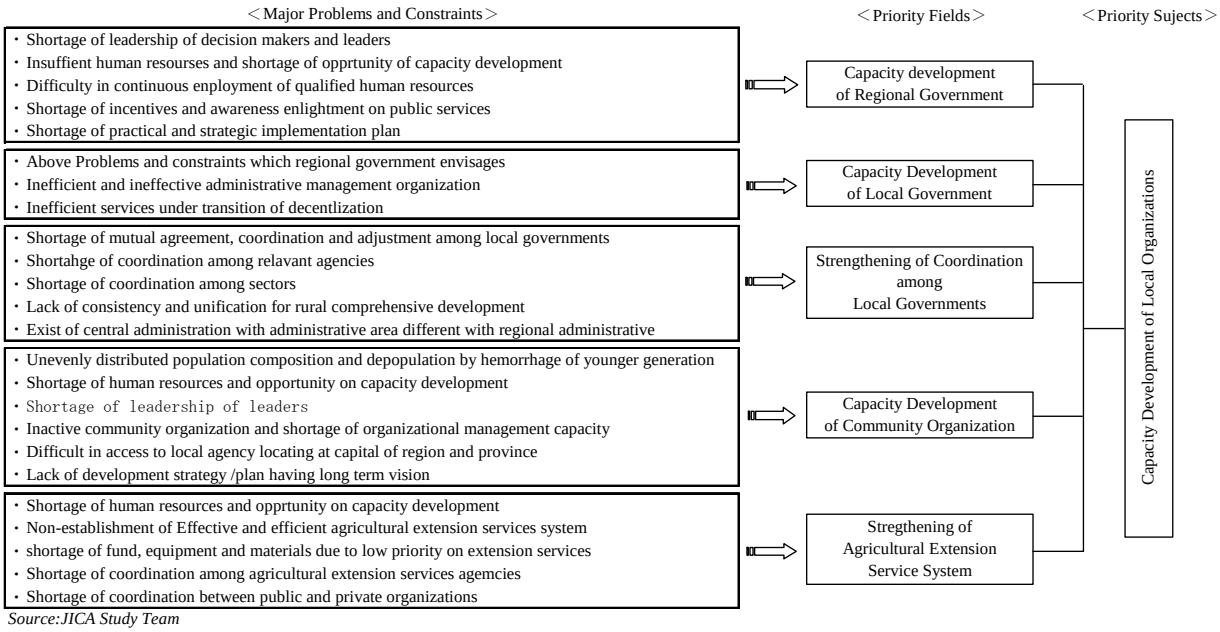


Source:JICA Study Team

Figure 10.3.2 Priority Fields and Priority Subjects for Improvement of Livelihood of Poor Peasants in Ayacucho Region Rural Area

(c) Capacity Building of Local Organizations

To realize the "Mitigation of Vulnerability of Poor Peasants" and the "Improvement of Livelihood of Poor Peasants" mentioned above, the important issues are not only the self-help efforts by poor peasants, but also the support by organizations related to rural area development in Ayacucho Region.



Source:JICA Study Team

Figure 10.3.3 Priority Fields and Priority Subjects for Capacity Development of Local Organizations in Ayacucho Region Rural Area

As shown in Figure 10.3.3, it is clarified that the third priority field which the poor peasants in Ayacucho Region envisage, is the "Capacity Development of Local Organizations" as the results of analysis on problems and constraints which the poor peasants in Ayacucho Region face presently. Also, it is found indispensable that the "Capacity Development of Local Organizations" needs the tackling of five priority subjects such as "Capacity Development of Regional Government", "Capacity Development of Local Governments", "Strengthening of Coordination among Local Governments", "Capacity Development of Community Organization", and "Strengthening of Agricultural Extension Service System".

(2) Objectives of Priority Development Fields and Priority Development Subjects

(a) Objectives of Priority Development Fields

From the results of problem analysis, (i) Mitigation of Vulnerability of Poor Peasants, (ii) Improvement of Livelihood of Poor Peasants, (iii) Capacity Development of Local Organizations are abstracted. The objectives of these priority fields are determined as follows. Namely, for the "Mitigation of Vulnerability of Poor Peasants", its objective is placed on "lowering risk of life standard of poor peasants is mitigated". For the "Improvement of Livelihood of Poor Peasants", the applied objective is that "income of poor peasants is improved". As for the "Capacity Development of Local Organization", its objective is put on "support system to the mitigation of vulnerability and the improvement of livelihood of poor peasants is established" taking into account the on-going decentralization policy.

(b) Objectives of Priority Development Subjects

As can be seen in Figure 10.3.1 to Figure 10.3.3, the priority subjects are determined based on the results of the site investigation, PCM workshop and problem analysis, to cope with the priority fields. The objectives of priority subjects are determined as follows:

Table 10.3.1 Objectives of Priority Development Fields/Priority Development Subjects

Priority Fields/Priority Subjects	Objectives
(a) Mitigation of Vulnerability	Lowering risk of life standard of poor peasants is mitigated.
Countermeasures to cold-weather damage	Cold-weather damages of agricultural products are mitigated
Countermeasures to drought-weather damage	Drought-weather damages of agricultural products are mitigated.
Tackling of weather change	Damage of agricultural products are mitigated.
Reinforcement and O&M of roads	Transportation of agricultural products are smoothly transported.
(b) Improvement of Livelihood	Income of poor peasants is improved.
Strengthening of production technology	Production technology is established and diffused.
Strengthening of distribution of agricultural products	Distribution of agricultural products is smoothly executed.
Conservation of Production Resources	Conservation system of production resources is established.
Strengthening of Fund Procurement	Fund necessary for agricultural production is easily procured.
(c) Capacity Development of Local Organizations	Support system to the mitigation of vulnerability and the improvement of livelihood of poor peasants is established.
Capacity development of regional government	Support capability of organization and staff of regional government is heightened.
Capacity development of local government	Support capability of organization and staff of local government is heightened.
Strengthening of coordination among local governments	Capability of agricultural extension worker is heightened and extension system is established.
Capacity development of community organization	Capability of community staff is heightened and community organization becomes firm.
Strengthening of Agricultural extension service system	Coordination among local governments is effectively conducted.

Source: JICA Study Team

10.3.5 Characteristics of Ayacucho Region on Zone Basis

In order to work out the measures to "mitigation of vulnerability" and "improvement of livelihood" of poor peasants carrying out the agriculture and livestock in Ayacucho Region, the study was conducted for the regional characteristics on them. Taking it into consideration that the Ayacucho Region has topographic variation, it was classified into 19 areas for 3 provinces at northern region, 5 provinces at central region and 3 provinces at southern region by elevation. The study was made for these natural conditions of elevation-wise areas for each province, from viewpoints of the natural condition (climate), social conditions (road, access to markets and development needs), agriculture (kind and production of cultivation crops) and livestock (kind and production of livestock) and also the results of field investigation and the currently obtainable data.

The characteristics and subjects clarified through the study are shown in Table 10.3.2.

Table 10.3.2 Characteristics and Major Subjects of Elevation-wise Areas for each Province

Region	No.	Province	Elevation-wise Area	Agricultural Production	Livestock Production	Characteristics	Major Subjects
Northern	1	Huanta	<2000m	Self-support Crops Commercial Crops Fruit trees, Industrial crops, Luxury crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by perennial crops. This area is located along the Apurimac river and is cultivated with paddy, sugarcane, coffee, cacao, orange and avocado using comparatively much rainfall and mild climate.	Perennial crops (commercial crops) are mainly cultivated, but are not well linked with livelihood improvement. It is necessary to execute the strengthening of production technology and establishment of suitable crop distribution system. As major crops are commercial ones and their production is not much, it is essential to raise commercial value through differentiation by introduction of new variety.
	2		2000m-4000m	Self-support Crops Cereal, Beans, Potatoes Commercial Crops Vegetables, Fruit trees, Industrial crops, Luxury crops	Meats and Milk Pig Shear	Agriculture and livestock areas mainly represented by crop cultivation. Main crops are general crops such as maize and crop diversification is high, of which the number is about 90 kinds. Various crops are cultivated. The production of purple maize is the highest in Ayacucho Region.	There is the good access to Ayacucho City, the biggest market in Ayacucho and crop diversification is high, but these do not link with the livelihood improvement. It is necessary to improve the production and quality by strengthening of production technology and establish the appropriate crop distribution system. It is also important to search the possibility of introduction of new crops and new variety as well we improvement of existing crops.
	3	La Mar	<2000m and 2000m- 4000m	Self-support Crops Cereal, Beans, Potatoes Commercial Crops Vegetables, Fruit trees, Industrial crops, Luxury crops	Meats and Milk Cow, Pig, Goat, Milk Shear Alpaca	Agriculture and livestock areas mainly composed of perennial crops and cultivation crops. In the northern area located along the Apurimac river, paddy, sugarcane, coffee, cacao, and pineapple are cultivated, of which the production is the largest in the Ayacucho Region. The production of potato, orange and onion is higher in the middle and high elevation areas.	The production of perennial crops is prosperous, but does not well link with improvement of livelihood of farmers due to lack of production technology. It is therefore necessary to strengthen the production technology and establish the crop distribution system, to improve the livelihood of farmers. Development need of irrigation and road is high, thus it is essential to accelerate them as one of measures. Major production crops are commercial, but production of them is low in the region, so that it is necessary to re-study how to raise the market value through differentiation by introduction of new variety.
	4	Huamanga	2000m-4000m	Self-support Crops Cereal, Beans, Potatoes Commercial Crops Vegetables, Fruit trees, Industrial crops, Luxury crops	Meats and Milk Cow, Sheep, Alpaca, Pig, Goat, Milk Shear Alpaca	Advanced agriculture and livestock areas. Ayacucho City, the biggest consuming city, exists here. The most productive agriculture and livestock are conducted using the favorable conditions of location. The production of potato, maize and milk, etc. is the largest in the Ayacucho Region. In particular, the production of Acocro and Chiara Districts is the further largest. The agricultural potential and also development needs are high.	The access to the Ayacucho, the biggest consuming city, is good, and the crop diversity as well as production of agriculture and livestock is high, but these do not well link with the improvement of livelihood. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. The development need of technical irrigation as well as road is high, thus the realization of such development need should be accelerated as one of countermeasures. In addition, it is important to tackle with trail treatment toward new product development prior to the other area by utilizing the good condition of location.

Region	No.	Province	Elevation-wise Area	Agricultural Production	Livestock Production	Characteristics	Major Subjects
Central	5	Cangallo	2000m-4000m	Self-support Crops Potatoes Commercial Crops Vegetables	Meats and Milk Pig, Shear Sheep	Advanced agriculture and livestock areas. The high productivity agriculture is made using the comparatively flat topographic condition and the favorable condition of location close to Ayacucho city. Especially, Los Morochucos and Totos Districts show the agricultural productivity of top level in the Ayacucho Region.	The good access to Ayacucho City, the biggest consuming city and lots of production of agriculture and livestock do not well link with improvement of livelihood. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is also important to execute the irrigation and road development because development need of irrigation and road is high.
	6		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Llama, Alpaca Shear Llama	Agriculture and livestock areas mainly represented by livestock. Fur and meat are produced from Llama and Alpaca. Agriculture production is less due to low temperature.	It is difficult to make agricultural production due to severe climatic condition. For this, livestock is the means of livelihood. But the production technology of Llama and Alpaca, main livestock is low ,which cause the low livelihood of farmers. It is necessary to establish the production distribution system and improve the production technology centering on Llama and Alpaca.
	7	Vilcas Huaman	2000m-4000m	Self-support Crops Commercial Crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by livestock. Both agriculture and livestock are not well developed although this area is comparatively close to the Ayacucho City, the biggest consuming city.	The access to Ayacucho City is comparatively good, however both agriculture and livestock have low productivity so that improvement of livelihood is not realized. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high.
	8	Victor Fajardo	2000m-4000m	Self-support Crops Cereal, Beans, Commercial Crops Fruit trees	Meats and Milk Cow, Sheep, Pig , Alpaca, Goat, Milk Shear Sheep, Llama	Agriculture and livestock areas mainly represented by livestock. The comparatively large-scaled livestock is conducted. The production of beef, mutton, pork, goat meat and also wool is at higher level in the region. Agricultural production is high too. Especially, production of peach is the highest in the region, and that of avocado is high.	The livestock centering on animals raised for their meats and milk is developed. The agricultural production is also prosperous. But, the production and quality of them is low which cause the low income of farmers. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high.
	9		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Sheep Shear	Agriculture and livestock areas mainly represented by livestock. The comparatively intensive livestock is applied. The number of livestock per capita is ranked as 2nd in the region. The agricultural production is low due to constraints in natural conditions and lack of access to the large consuming city.	It is difficult to make good agricultural production due to severe climate conditions. To this end, livestock is a means of livelihood. The production of sheep which is a major livestock, is low so that does not contribute to improvement of livelihood. It is necessary to improve the production technology focusing on sheep and to establish the production distribution system for raising the farm income.
	10	Huanca Sancos	2000m-4000m	Self-support Crops Commercial Crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by livestock. The agriculture and livestock are developing due to less population and poor access to market. There are no products with high share in the region	The access to market is poor. The production and quality of production of agriculture and livestock are low. Due to these, the farm income is not improved. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high.
	11		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Sheep Shear Sheep	Agriculture and livestock areas mainly represented by livestock. Agriculture is difficult because of less population, poor access to market and severe natural conditions. Livestock id comparatively large-scaled. It is highlighted that the production of mutton is ranked as 2nd and wool production as 1st in the region.	It is difficult to make good agricultural production due to severe climate conditions. To this end, livestock is a means of livelihood. The production of sheep which is a major livestock, is low so that does not contribute to improvement of livelihood. It is necessary to improve the production technology focusing on sheep and to establish the production distribution system for raising the farm income.
	12	Sucre	2000m-4000m	Self-support Crops Commercial Crops	Meats and Milk Shear Alpaca	Agriculture and livestock areas mainly represented by livestock. Agriculture is developing due to less population and poor access to market. The high share products are alpaca fur and alpaca meat.	The access to market is so poor. The production and quality of centering of agriculture and animal fur are low. Thus, the farm income is not improved. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high.

Region	No.	Province	Elevation-wise Area	Agricultural Production	Livestock Production	Characteristics	Major Subjects
	13		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by livestock. The agriculture and livestock are developing due to less population and poor access to market. There are no products with high share in the region	It is difficult to make good agricultural production due to severe climate conditions. To this end, livestock is a means of livelihood, but the production technology of alpaca which is a main livestock here, is low so that is not competitive at market. It is necessary to improve the production technology focusing on alpaca and to establish the production distribution system for raising the farm income.
Southern	14	Lucanas	2000m-4000m	Self-support Crops Cereal, Beans, Potatoes Commercial Crops Vegetables	Meats and Milk Cow, Sheep, Alpaca, Llama, Goat, Milk Shear Sheep, Llama, Vicuna	Agriculture and livestock areas mainly represented by livestock. This area is a center of production of agriculture and livestock in the southern region because the Puquio, the largest city in the southern region is located. It is characterized by production of vegetables such as carrot, pumpkin, and tomato. The production of livestock is high following Huamanga. The production of beef cattle and goat meat is ranked as 1st in the Ayacucho Region.	The production of meat, animal fur and milk is at top level. The agricultural production is comparatively high. Also, the access to Puquio, a center city in southern region, and Ica province is good. However, these do not link with improvement of livelihood of farmers. It is important to improve the production technology of livestock and market distribution system. It is important to execute the irrigation and road development because development need of irrigation and road is high. The regional government regards the southern region as the inland fishery area because of its high potential by many lakes. Therefore, inland fishery is also important as a measure of improvement of livelihood.
	15		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Cow, Alpaca, Llama, Milk Shear Alpaca, Vicuna	Agriculture and livestock areas mainly represented by livestock. Vicuna fur production is prosperous using the favorite condition which is the largest habitat of vicuna in the Ayacucho Region. The fur production of vicuna is ranked as 1st and that of alpaca as 2nd in the Ayacucho Region. The production of beef cattle and goat meat is ranked as 1st in the Region.	It is difficult to make good agricultural production due to severe climate conditions. Therefore, the livestock is a main means of livelihood of farmers. However, the production technology of beef cattle and fur cattle is low, which does not contribute to improvement of farm income. Vicuna which is high quality fur animal is an important means of farm income, so that the production support system is essential.
	16	Parinacochas	2000m-4000m	Self-support Crops Commercial Crops	Meats and Milk Shear Llama	Agriculture and livestock areas mainly represented by livestock. Agriculture and livestock are developing due to less population and poor access to market. The main product having high share in the Ayacucho Region is fur of Llama only.	The access to market is poor. The production of agriculture and livestock is low. Therefore, the livelihood of farmers is not improved. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high. The regional government regards the southern region as the inland fishery area because of its high potential by many lakes. Therefore, inland fishery is also important as a measure of improvement of livelihood.
	17		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Alpaca, Llama,· Shear Alpaca, Llama	Agriculture and livestock areas mainly represented by livestock. The production of fur animals is developed. The production of meat and fur of alpaca is ranked as 1st in the Region. The production of fur of Llama is ranked as 1st in the Region. In particular, the production of alpaca is prosperous. The quantity of fur of alpaca occupies 25% of that of the Region. The agricultural production is less due to climatic constraint.	It is difficult to make good agricultural production due to severe climate conditions. Therefore, the livestock becomes a means of livelihood of farmers. However, the production technology of alpaca and Llama is low, so that the competition at market is insufficient. It is necessary to improve the production technology centering on alpaca and llama and to establish the production distribution system for raising the farm income. The regional government regards the southern region as the inland fishery area because of its high potential by many lakes. Therefore, inland fishery is also important as a measure of improvement of livelihood.
	18	Paucar del Sar Sara	2000m-4000m	Self-support Crops Commercial Crops Luxury crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by livestock. Agriculture and livestock are developing due to less population and poor access to market.	The access to market is poor. The production of agriculture and livestock is low. Therefore, the livelihood of farmers is not improved. It is indispensable to strengthen the production technology and to establish the production distribution system for raising the farm income. It is important to execute the irrigation and road development because development need of irrigation and road is high. The regional government regards the southern region as the inland fishery area because of its high potential by many lakes. Therefore, inland fishery is also important as a measure of improvement of livelihood.

Region	No.	Province	Elevation-wise Area	Agricultural Production	Livestock Production	Characteristics	Major Subjects
	19		≧4000m	Self-support Crops Commercial Crops	Meats and Milk Shear	Agriculture and livestock areas mainly represented by livestock. It is difficult to execute agriculture due to extremely less population and poor access to market. The livestock is comparatively large-scaled. The number of livestock per capita is ranked as 1st in the Region.	It is difficult to make good agricultural production due to severe climate conditions. Therefore, the livestock becomes a means of livelihood of farmers. However, the production technology of alpaca and Llama is low, so that the competition at market is insufficient. It is necessary to improve the production technology centering on alpaca and llama and to establish the production distribution system for raising the farm income. The regional government regards the southern region as the inland fishery area because of its high potential by many lakes. Therefore, inland fishery is also important as a measure of improvement of livelihood.

Source: JICA Study Team

10.3.6 Reflection of Existing Plans

As the results of inventory survey, it is found that the sub-projects applied to SNIP in Ayacucho Region are estimated at 4,871 as of April 2009. Out of them, the number of the sub-project categorized as "Already implemented", "On-going", "Refused" are 157, 646 and 128 respectively, of which the total number is 931. These sub-projects are omitted from the Study. In addition, the remaining sub-projects are narrowed from relevant sector to the Study. Finally, the following 1,913 sub-projects are taken up for the Study.

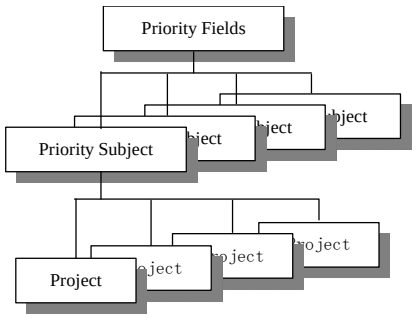
Table 10.3.3 SNIP Sub-Projects for the Study

Sector	Under Evaluation	Approved	Total
(1) Agriculture	432	1,159	1,591
(a) Farming technology	(65)	(85)	(150)
(b) Irrigation	(106)	(411)	(520)
(c) Reforestation/Environmental Conservation	(17)	(70)	(58)
(d) Livestock	(76)	(47)	(146)
(e) Fishery	(7)	(34)	(41)
(f) Road	(158)	(518)	(676)
(2) Social support	143	65	208
(3) Administration	53	61	114
Total	628	1,285	1,913

Source: Inventory Survey

These 1913 sub-projects are taken up as the existing plans for the Study. If these sub-projects are deemed to contribute to the strategic development goal of the Study and located at poverty area, these would be incorporated into the Master Plan.

To attain the objectives of each priority subject and also to effectively execute many sub-projects registered to SNIP, it is necessary to make prioritization for them. For this, the evaluation criterion is prepared for prioritization of them. The evaluation criterion contain the five items such as "relevance", "effectiveness", "efficiency", "impact" and "sustainability".



Source: JICA Study Team

Figure 10.3.4 Relation among Priority Fields, Priority Subjects and Projects

10.3.7 Application of Comprehensive Approach

Poverty is so complicated. In this Study, each priority field has plural priority subjects as shown in the right figure. In addition, it is necessary to apply plural countermeasures to respective subjects. In particular, countermeasures should be worked out for not only "within sector", but also "cross-cutting of sector", which present the complicated

situation. In the Study, therefore, the comprehensive approach is applied aiming to formulate efficient and effective master plan.

10.3.8 Development Scenario

(1) Target Year

The Master Plan is formulated with a target year of 2020, and thus action plan is prepared for 10 years from 2011 to 2020.

(2) Framework of Development

As the effective and comprehensive way, the priority development fields are determined, and then priority development subjects for each priority development field are determined based on the results of present conditions. The priority development subjects are themes to attain the objectives of the priority development fields. In other words, the priority subject becomes a program consisting of plural projects. These projects are newly prepared or follow the existing plans, in consideration of the basic idea of "reflection of regional characteristics and effective use of regional resources".

As for the study on the existing plans, the sub-projects applied to SNIP and the on-going Japanese loan projects are taken up in the Study. In addition, in the study on existing plans and preparation of new projects, effective combination of hardware aspects (infrastructure projects) and software aspects (support projects) is taken into consideration, aiming at timely revelation and ensuring of sustainability of project effect.

(3) Development Scenario for Respective Priority Fields

As mentioned above, the plural priority subjects are determined to attain the objective of each priority development field. As well, plural projects are planned to achieve the objective of each priority development subject. Taking into account this mechanism, the development scenario for each priority development field is explained as follows:

(a) Mitigation of Vulnerability of Poor Peasants

The priority development field of "Mitigation of Vulnerability of Poor Peasants" should be set out urgently as compared with other priority development fields. It should be implemented centering in the short term (2011-2014). In order to attain the objective of "Lowering risk of life standard of poor peasants is mitigated", four priority development subjects are taken up. These are the "Countermeasures to Cold-weather Damage", the "Countermeasures to Drought-weather Damage", the "Tackling of Weather Change" and the "Reinforcement and O&M of Roads". Out of them, the "Countermeasures to Cold-weather Damage", the "Countermeasures to Drought-weather Damage", and the "Tackling of Weather Change" will be executed mainly by GRA and INIA in cooperation with the corresponding departments of relevant provinces and districts under the support of donors and NGOs. As for the "Reinforcement and O&M of Roads", those for the provincial roads will be conducted by the traffic and communication department of GRA, and those for village roads by the provincial office under the contract with the traffic and communication department of GRA under the support of outsourcing and NGOs.

As indicated in the program analysis, respective priority development subjects result from various problems and constraints, so that these are treated as one program.

(b) Improvement of Livelihood of Poor Peasants

In order to achieve the "Income of poor peasants is improved" which is the objective of the "Improvement of Livelihood of Poor Peasants", the necessary activities will be carried out extending from short term (2011-2014) to long term (2011-2020). The four priority subjects of the "Strengthening of Production Technology", the "Strengthening of Distribution of Agricultural Production", the "Conservation of Production Resources", the "Strengthening of Fund Procurement", will be conducted mainly by the agriculture department of GRA in cooperation with relevant departments under support of outsourcing and NGOs. The respective priority subjects of the "Improvement of Livelihood of Poor Peasants" as well as the "Mitigation of Vulnerability of Poor Peasants" will be treated as an independent program each.

(c) Capacity Development of Local Organizations

The "Capacity Development of Local Organizations" aims to support the "Mitigation of Vulnerability of Poor Peasants" and the "Improvement of Livelihood of Poor Peasants" mentioned above, so that its implementation will be made for short time (2011-2014) and medium term (2011-2017). Out of five priority subjects, the "Capacity Development of Regional Government", the "Capacity Development of Local Government", and the "Strengthening of Coordination among Local Governments" will be executed by outsourcing and NGOs. The remaining "Capacity Development of Community Organizations" and "Strengthening of Agricultural Extension Service System" will be performed by the relevant departments of GRA and Provincial Office under support of outsourcing and NGOs.