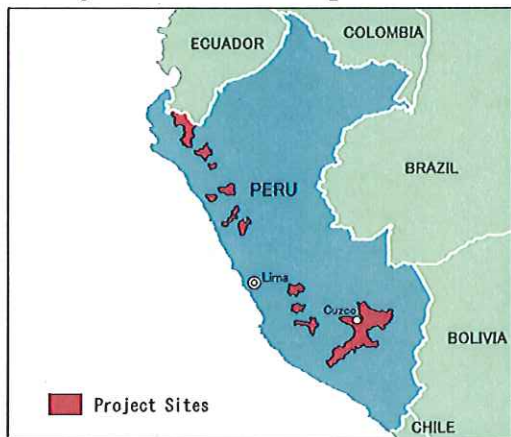


## Peru

### Sierra - Natural Resources Management and Poverty Alleviation Project (II)

Hajime Sonoda (Global Group 21 Japan)  
Field Survey: March 2009<sup>1</sup>

#### 1. Project Profile and Japan's ODA Loan



Map of the Project Sites



Soil Conservation Facilities and Reforestation Work (Cajamarca)

#### 1.1 Background

The Sierra in Peru which accounts for 30% of the national land area receives rainfall predominantly in a three month period, making the land vulnerable to landslides, debris flows and loss of the top soil. The indigenous people of Peru developed terraces covering some 1 million ha of steep slopes and utilised complex irrigation systems to farm in the Sierra. However, these traditional skills were lost during the Spanish rule (1532 - 1821) and many of these terraces were abandoned.<sup>2</sup> In more recent years, the increase of the population resulted in expansion of farm land by cutting down trees, resulting in a vicious cycle of soil loss, depletion of water resources, and declining agricultural productivity. Consequently, farmers in the Sierra were impoverished and many rural inhabitants who could no longer sustain their lives through agriculture moved to urban areas from the 1950's to the 1980's. As of 1995, farmers were engaged in traditional extensive farming in isolated settlements along the steep terrain amidst a harsh natural environment. Productivity was extremely low and poverty was both severe and widespread.<sup>3</sup>

In 1981, the Government of Peru established the Office of the National Programme for Water Resources and Soil Conservation (El Programa Nacional de Manejo de Cuencas Hidrograficas y Conservacion de Suelos: PRONAMACHCS) under the Ministry of Agriculture for the purposes of improving agricultural production and conservation of the natural environment in the Sierra where the concentration of poverty was apparent. The PRONAMACHCS was primarily engaged in promotion of

<sup>1</sup> The methodologies of the evaluation study included interviews with and data collection from the executing agency and a case study at ten villages in Cusco and Cajamarca through field inspection, interviews, workshop and household questionnaire survey (267 samples) with the beneficiaries as well as non-beneficiaries.

<sup>2</sup> The main reasons for this are believed to be (i) the migration of local farmers to avoid forced labour in mines operated by Spaniards and (ii) the destruction of the narrow terraces to accommodate the new farming practice of using cattle introduced by the Spaniards.

<sup>3</sup> As of 1995, 10.5 million, accounting for nearly half of Peru's population, are classified as poor while two-thirds of the population in the Sierra are classified as poor, half of which are classified as extremely poor.



- The introduction of improved potato varieties directly resulted in a significant increase of productivity. The productivity of the new variety was reported to be double that of the native variety.<sup>18</sup>
- Installation of irrigation led to a significant increase in productivity. Potato production increased by more than 60% due to the availability of irrigated water, and it became possible to interplant crops.

(2) Increased productivity of stock farming

- The increased soil moisture made possible by the infiltration ditches has facilitated the growth of grass to double the height in some cases as reported in the beneficiary survey. There has been a highly noticeable increase of grass production as a result of the introduction of improved grass varieties. There is a confirmed case of the height of grass increasing from 2 - 3 cm before the Project to 50 cm after the Project due to the construction of a rainwater infiltration ditch and the introduction of improved grass.
- The increased production of grass in combination with the improvement of cattle species has resulted in the increased production of milk and cattle.<sup>19</sup> In Cuzco Province, there is a confirmed case of cows in the subject villages of the Project now producing double the amount of milk compared to cows in villages not assisted by the Project. There are also cases of a quadrupled amount of milk produced daily per cow and of more than a threefold increase of the sales price of cattle due to better quality of beef.

(3) New Products

- Soil conservation, live hedges and irrigation have made it possible to grow new vegetables and crops on some farmland. Plantation of trees has resulted in the production of firewood and timber, and mushrooms are now picked in some pine forests.

### 2.3.3 Strengthening of Farmers' Organizations

The Project was planned and implemented with the participation of the farmers. Emphasis was placed on the strengthening of the capacity of farmers' organizations through training and on-field guidance to enhance the effects and sustainability of the Project. Many of the newly formed farmers' organizations, such as soil conservation committees, reforestation committees and irrigation committees have accumulated vital experiences through the Project and are now confident of the continuation and further development of joint work in the coming years.

On the other hand, the following issues regarding farmer participation and the strengthening of farmers' organizations have been identified through (i) a series of interviews with engineers and field engineers of the local AGRORURAL offices and leaders of farmers' organizations and (ii) the beneficiary survey.

- Although farmers participated in the planning process, studies to collect information natural resources were inadequate.. There were instances where the requests of farmers did not coincide

---

<sup>18</sup> The cultivation of the improved variety introduced under the Project was supposed to be maintained by the communal fund run by local farmers. However, many such banks appear to have disappeared and the sustainability of this effect is questionable (a more detailed explanation is given in the section on sustainability).

<sup>19</sup> Some farmers have improved their cattle by cross-breeding the indigenous breed with an improved breed on the advice of the extension workers working for the Project.

with the budget or the planned outputs were higher than the farmers' request. As the capacity of the field engineers was not uniform, there were cases where the field engineers failed to provide appropriate advice. Because of the reasons described above, some cases of sub-optimal investment have been observed.

- The training of the benefited farmers cannot be described as sufficient. Some 10 - 20% of those farmers responding to the questionnaire stated that they had no or hardly any training nor guidance. Most of the training sessions actually provided for farmers featured the construction of infiltration ditches and terraces and reforestation and not many sessions dealt with such topics as farming, organizational management, enterprise initiative and marketing. There was a tendency for the experience and ability of the field engineers conducting the training and advice to be concentrated in conservation techniques. Some 80% of the benefited farmers replied that the contents of the training and guidance were useful.
- The committee members of farmers' organizations are mostly men at present. Meanwhile, women are the main force in stock farming and do not leave their villages for long periods of time. Women therefore can presumably play an important role if they take up senior positions.
- Some cases were seen where impact of the Project is limited to members of the benefited farmers' organizations and the extension of such impact to other farmers in the same villages was limited. This is probably because of the absence of efforts at the time of project commencement to establish a relationship to promote collaboration between farmers' organizations and the village administration and also the fact that many beneficiaries did not have enough trust to the Project due to the suspension of input caused by various reasons.

#### **2.3.4 Economic Analysis**

At the time of appraisal, economic analysis was conducted using the increased income due to increased agricultural production and reforestation as the benefit and a reference EIRR (Economic Internal Rate of Return) of 13% was obtained. Recalculation was not conducted in the ex-post evaluation because of the lack of actual data on the productivity and production increase that could represent the entire Project.

#### **2.3.5 Overall Evaluation of Effectiveness**

At the time of appraisal, such effects as the conservation of soil and forests, increase of the agricultural productivity and increase of the agricultural production were expected to take place in some 900 villages under the Project. In reality, however, up to 1,380 villages benefited from the Project and the project benefits lasted for more than three years in 1,000 villages.

The findings of the field survey suggest that the investment under the Project generally achieved the expected effects. Although quantitative data is scarce, the achievement ratio of the targets adopted at the time of appraisal is now believed to be somewhere between 70% and 90%. Given the fact that the actual financial input was 60% of the planned amount (in terms of local currency), the project effects could have substantially exceeded the planned effects at the time of appraisal if financial input had been made as planned through the smooth execution of the Project. In view of the fact that spending of only half of the original budget resulted in a lower achievement level compared to full spending of the budget, evaluation of the effectiveness of the Project as medium (rating: b) is judged to be appropriate.



## 2.4 Impacts

### 2.4.1 Impacts on Environmental Conservation

The Project is inferred to have made an important contribution to the conservation of the soil, forest and water resources in the targeted villages. However, as the Project was implemented targeting only some selected villages among those villages in the same small basins, its impact on soil and forest conservation throughout the micro-watershed was rather partial. In addition, the targeted villages were selected based on the degree of poverty, population size and willingness of the villagers for participation instead of priority in terms of environmental conservation; therefore the targeted villages of the Project did not necessarily correspond to the priority areas for environmental conservation.

In the case of the Jabon Mayu micro-watershed (Cuzco) where the beneficiary survey was conducted, the Project was implemented in eight out of 16 villages in the basin. While the reforestation area under the Project was more than nine times the forest area in 1995, the area where soil conservation measures were employed under the Project was only 4% of the total area of farmland and pasture, clearly indicating that the impact of the Project was restricted to parts of the targeted micro-watershed.

Table 3 Impact on Environmental Conservation in Jabon Mayu Small Basin (Cuzco)

Outline of the Small Basin:		
Area of 153 km <sup>2</sup> ; elevation rate: EL 3,800 m - EL 4,500 m; 16 villages		
Situation in 1995	Land Use: Irrigated farmland	303 ha
	Non-irrigated farmland	4,164 ha
	Pasture land	8,503 ha
	Forest	30 ha
	Shrub land	179 ha
	Wet land (Bofedal)	266 ha
	Erosion : Light	2,357 ha
	Medium	1,690 ha
	Medium-heavy	4,880 ha
	Heavy	4,310 ha
Final stage	753 ha	
Project Contents	Targets: 8 villages	
	Outputs	
	Slow formation terraces	440 ha
	Infiltration ditches	102 ha
	Introduction of improved crops	74 ha
	Introduction of improved grass	138 ha
	Reforestation (plantations)	280 ha

Source: Dianostico Integral de la Microcuenca de Jabon May for the outline of the small basin and the situation in 1995; AGRORURAL for the project contents



Tree Plantation on Slope Suffering from Progressive Erosion (Jabon Mayu Small Basin, Cusco)



Example of Replacement of Natural Shrub Land (Foreground) by Uniform Pine Forest(Cajamarca)

It appears that farmers who participated in the Project have much improved their understanding of how to manage natural resources through soil conservation and reforestation and also of the importance of their proper management. The leaders of farmers' organizations who were interviewed in the course of the beneficiary survey were capable of clearly explaining the importance of soil conservation facilities and reforestation work, their functions in terms of environmental conservation and their construction and maintenance methods.

As all of the land in the Sierra in northern Peru is owned by individuals, reforestation was entirely conducted based on the economic motivation of individual landowners. This hindered the formation of protection forests of which one important presupposition is that the trees in protection forests shall not be cut down.<sup>20</sup> In addition, there were cases which were not necessarily recommendable from the viewpoint of the conservation of natural resources such as the replacement of natural shrub land by a uniform pine forest.

#### 2.4.2 Socioeconomic Impacts

The maximum number of farming households that benefited from the Project is estimated to be some 48,000.<sup>21</sup> Although quantitative data clearly presenting a total picture of the socioeconomic impacts of the entire Project could not be obtained, it is safe to assume that the Project had significant and positive impacts on economic activities and the daily lives of local farmers, i.e. the intended beneficiaries. The socioeconomic impacts confirmed by the field visits and beneficiary survey conducted in Cuzco and Cajamarca are described below.

- Because of the positive contribution of the Project to local agriculture and stock farming, the importance of agriculture and stock farming in the household economy of the benefited farmers increased.<sup>22</sup> Connection between the positive impacts of the project and decline of seasonal labour

<sup>20</sup> In the village communities of the Sierra in southern and central Peru, the land is commonly owned, making it easier to implement protection forests under the Project.

<sup>21</sup> In the Sierra in southern and central Peru where traditional village communities have survived, all villagers basically participated in the Project to benefit from it. In contrast, in the Sierra in northern Peru, only some villagers participated in the Project. There was a tendency for households with more productive resources, such as land and time, to become the principal beneficiaries of the Project.

<sup>22</sup> The percentage of households which cited agriculture and stock raising as the main sources of income among all of the benefited farming households increased from 83% 10 years ago to 93%. Half of the benefited farming households increased the area of cultivation while 60% increased the number of animals they owned.



outside the village was observed, while the same of resettlement of farmers to seek better opportunities could not be confirmed.

- The importance of stock farming as an alternative to unreliable agricultural production as a source of cash income has been increasing in areas with particularly high elevation. It is believed that the Project influenced this change. This tendency is particularly noticeable in Cuzco.
- The stabilisation, increase and diversification of agricultural production as a result of the Project have stabilised and diversified the food supply for home consumption by the benefited farmers. In addition, at least 10% of the benefited farmers have been able to send higher volumes of potatoes to the market.<sup>23</sup>
- The benefited farmers which are engaged in irrigated agriculture replied more frequently that their lives have improved, compared to farmers where irrigation projects were not implemented. This fact implies the possibility that the irrigation component has resulted in a greater benefit than other components of the Project.
- The milk production of the benefited farmers has increased by some 70% in the last 10 years. Apart from a substantial increase of the milk consumption at home, the sales volume of such dairy products as milk and yogurt has increased.
- Reforestation has enabled self supply of firewood and timber for housing and furniture. Moreover, cash income from the sale of pine wood, etc. has become possible.
- It appears that support for entrepreneurial initiatives under the Project has not achieved a significant impact because of the small number of initiatives and a survival rate of some 60% for new businesses.<sup>24</sup>
- The real cash income of the benefited farming households in Cuzco and Cajamarca has increased by approximately 40% in the last 10 years. In Cajamarca, the growth rate of the real cash income of the benefited farming households has exceeded that of the non-benefited farming households. The fact that the monthly expenditure of the benefited farming households is now some 1.5 times higher than that of the non-benefited farming households show a clear difference between the economic activities of the two groups of farming households.<sup>25</sup>
- The actual impacts of the Project on daily life were diverse depending on the specific conditions of the individual sites. The ratio of the benefited farming households responding to the questionnaire survey stating that their lives had considerably improved in the last 10 years was 38% for Cuzco and 71% for Cajamarca. The main reasons were an improved diet, improved housing and increase of the educational expenditure.<sup>26</sup> The causes of such improvement identified

---

<sup>23</sup> Most of the agricultural crops produced in the Sierra are consumed at home.

<sup>24</sup> According to "Mejoramiento de la Operación del Proyecto 'Manejo de los Recursos Naturales para el Alivio de la Pobreza' Contrato PE'P27" (JBIC, 2007).

<sup>25</sup> The monthly amount of expenditure (cash) is 409 N.Sol/month for the benefited farming households and 280 N.Sol/month for the non-benefited farming households and this difference is statistically significant. In Cuzco, a similar comparison was not attempted because of the fact that all of the villagers were basically beneficiaries.

<sup>26</sup> A study on the earlier project by the World Bank found that the beneficiaries in the 10 most successful villages under the Project enjoy an income (cash and non-cash) which is double that of the non-beneficiaries and that the project impacts include improved housing, more purchase of household goods, construction of toilets and increased expenditure on health care, education and medical treatment. Another study on the same project reported that the scale of expenditure by the beneficiaries is some 20% higher than that by the non-beneficiaries.



by farmers were an increase of the number of livestock, increase of milk production, increase of the forest area and increase of the agricultural production in Cuzco. In contrast, farmers in Cajamarca identified the mitigation of agricultural damage by the weather, increase of spring water and soil moisture and improvement of the agricultural productivity along with an increase of the forest area.

### **2.4.3 Contribution to Poverty Alleviation**

In 2007, some 11 million people in Peru were thought to be living in poverty and some 5.4 million, almost half of this figure, lived in the Sierra.<sup>27</sup> The some 48,000 farming households benefited from the Project have a total population of some 230,000, accounting for approximately 2.5% of the Sierra's population. There is no sufficient data on how many households have escaped poverty as a result of the Project. Assuming that half of the benefited farming households have done so, the Project has lowered the poverty ratio in the Sierra by approximately 1%.

## **2.5 Sustainability (Rating: b)**

Some problems have been observed in terms of financing for operation and maintenance and follow-up of subprojects; therefore sustainability of the project is fair.

### **2.5.1 Institutional Aspects**

#### **(1) Benefited Farmers**

The soil conservation, irrigation and reforestation facilities constructed under the Project are transferred to local farmers for their operation and maintenance through collective/group or individual work.<sup>28</sup> According to the findings of the field visits and beneficiary survey, most of the beneficiaries conduct maintenance work at least once a year. While the irrigation facilities are operated and maintained by the irrigation committees organised by farmers, requests for financial assistance to the AGRORURAL and/or a local public body are made in the case of repair beyond the financial and/or technical capacity of farmers.

#### **(2) AGRORURAL**

At the time of appraisal, it was planned that investment to targeted villages in five years. In reality, investment is still continuing for some villages. Following the decline of manpower as well as budgetary cuts of the AGRORURAL, however, project-related activities have been terminated as nearly half of the originally targeted villages, including those in remote areas and those where the willingness of farmers to participate is weak. This situation is the result of the substantial reduction of the manpower and budget allocation at local AGRORURAL offices in the project areas which in turn is necessitated by the priority deployment of manpower and funding for the Phase 3 Project currently in progress and also to areas which have not received any aid in the past.

---

<sup>27</sup> According to the National Institute of Statistics and Information (INEI), the national poverty ratio fell from 48.7% in 2004 to 36.2% in 2008. During the same period, the poverty ratio in the Sierra fell by 10.5 points from 64.7% to 54.2%. In 2007, the ratio of the poor and extremely poor in the Sierra was 60.1% and 29.3% respectively. Limited to rural areas in the Sierra, the ratio of the poor and extremely poor was as high as 73.3% and 40.8% respectively.

<sup>28</sup> Apart from the operation and maintenance of various facilities by individuals, the facilities may be operated and maintained based on the joint work of all community members on set dates (faena) or mutual help involving several households (minga).

For those targeted villages where the related activities are continuing, the AGRORURAL is mainly providing assistance for the production of tree seedlings by means of supplying seeds, plastic bags and tools. A field engineer visits each village approximately once a week to provide advice on various issues raised by farmers, including the production and planting of seedlings. Because these villages are selected based on accessibility and strong willingness by farmers, many of these villages are achieving relatively good results. It appears that some villages can now continue the production of seedlings on a self-help basis. In the case of those villages where related activities have been terminated, it is reported that a field engineer visits every 1 - 2 months when there is time to do so. Because of the lack of funds to provide material assistance, only advice is provided during such visits.

### **2.5.2 Technical Aspects**

#### **(1) Benefited Farmers**

The soil conservation facilities, trees/forests and small-scale irrigation facilities constructed under the Project are operated and maintained by the benefited farmers. While the AGRORURAL has provided training for farmers on the maintenance of the new facilities as part of the Project, these new facilities do not require particularly high skills for daily maintenance. The interviews conducted as part of the field visits and beneficiary survey found that most farmers generally understand the necessity for maintenance and the methods required.

#### **(2) AGRORURAL**

The AGRORURAL has built up its technical capacity based on the experience of various activities in Peru's Sierra but some of such capacity has been lost due to the outflow of personnel following the change of the government in 2001. Although the AGRORURAL has been continuing its capacity building efforts through training, etc., some field engineers in the field are not fully experienced, resulting in a call for better training. The AGRORURAL has no serious weaknesses which threaten the sustainability of the Project but further efforts are required to strengthen its technical capacity.

### **2.5.3 Financial Aspects**

#### **(1) Benefited Farmers**

The maintenance of the soil conservation facilities and planted sites does not incur any special cost apart from the cost of tools. However, it must be noted that as labour is the most important resource for many farmers in the Sierra, farmers may be unable to allocate sufficient time to maintenance work because their priority is those activities which are directly linked to production and income.

In regard to irrigation facilities, it appears that regular collection of the maintenance charge is not a common practice. In many cases, the necessary money is collected from the benefited farmers when repair or other work which costs money is necessary. When the cost of repair, etc. is beyond the financial capability of the farmers, external assistance is sought from a local public body, etc. The observations during the field visits did not discover any cases where funding for the necessary maintenance work could not be made available.

The targeted villages were guided by the AGRORURAL to set up a communal fund called FONCAPCO based on agricultural inputs (seed potatoes, fertilizer, insecticides, etc.) provided under the project component of introducing improved crops. These seed banks have not been well managed and have disappeared in many villages. The repayment rate at the time of project completion (2006)



was 64%.<sup>29</sup> According to the explanations of the AGRORURAL and benefited farmers, the demise of the communal fund is the result of the loss of the seed potatoes due to cold weather and/or the failure to properly hand over operation following the departure of the person originally responsible for the communal fund. The field survey found that the FONCAPCO is still in operation in only one village out of 10 villages visited.

The production of forest tree seedlings requires the purchase of seeds, plastic bags and others except for some species of which the seeds or sprout seeds can be obtained from mature trees. The production of seedlings is still continuing at those villages which receive assistance from the AGRORURAL or a local public body or NGO. The continual production of seedlings is difficult, however, for those villages which do not receive external assistance because of their lack of financial sources.

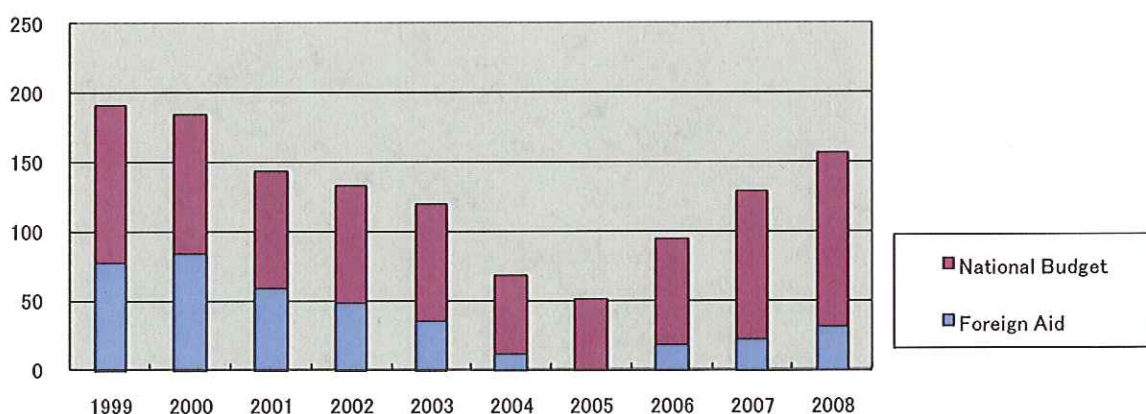
## (2) AGRORURAL

From 1999 to 2005, the annual investment amount of the PRONAMACHCS in the Project dropped considerably. The amount of investment in 2004 and 2005 in particular was less than one-third of the amount in 1999 due to the suspension of the Japanese ODA loan disbursement. After this period, the amount began to recover with government funding to reach the 1999 level in 2008.

In 2009, the PRONAMACHCS was integrated to the AGRORURAL and project investment of US\$ 500 million was planned for a period of five years. As the budget size of the PRONAMACHCS at the time of integration accounted for some 70% of the entire AGRORURAL budget, it is anticipated that some US\$ 70 million (approximately S/. 200 million) will be invested in the projects/programs previously implemented by PRONAMACHCS every year. This figure would signify a 60% increase of the budget for 2008 for the Project.

Based on the above, the actual budgetary allocation to the AGRORURAL is expected to increase in the coming years. However, as funding in the forthcoming years will be prioritized to areas that were not targeted by the past ODA loan assistance, there is no guarantee of an increased budget for follow-up activities for this Project.

Fig. 1 Historical Changes of Investment by the PRONAMACHCS (Unit: S/. million)



Source: AGRORURAL

<sup>29</sup> When a repayment rate of 64% is maintained for three years, the amount of the principal is reduced to approximately one-fourth of the original amount.



#### **2.5.4 Current status of Operation and Maintenance**

The beneficiary survey found that some 5% of the soil conservation facilities had been destroyed by cattle and others while 10% had been abandoned due to the lack of time to conduct maintenance work or the reduced farmland area by the maintenance facilities.<sup>30</sup> However, no situation of critical damage to the soil conservation function of an overwhelming proportion of the soil conservation facilities was observed. Meanwhile, some farmers who have found spare time have continued to construct additional slow formation terraces by themselves after the completion of the Project using the knowledge, skills and tools acquired under the Project. A similar survey reports that the operating rate of such facilities is about 85%.<sup>31</sup> Based on these facts, the situation of facility maintenance by farmers is not perfect but is judged to be within an acceptable range.

The AGRORURAL procured 24 vehicles and 132 motorcycles under the Project. Of these, 23 vehicles and 107 motorcycles are still operable at the time of ex-post evaluation and there are no problems in regard to their maintenance.

### **3. Conclusions, Lessons Learned and Recommendations**

#### **3.1 Conclusions**

This Project aimed at increasing the agricultural productivity in Peru's Sierra where poverty is prevalent while trying to ensure environmental conservation. As this objective conformed to the policies of the Government of Peru, the Project was both highly relevant and necessary. Although only 60% (in terms of local currency) of the project budget was executed, partly because of the suspended disbursement of the Japanese ODA loan by JICA for 33 months, the planned outputs for soil conservation and reforestation were practically achieved with the active participation by the benefited farmers. In total, some 48,000 households (approximately 230,000 persons) in 1,380 villages benefited from the Project. The investment under the Project generally achieved the expected effects in terms of the improvement of environmental conservation as well as agricultural productivity, resulting in many positive impacts on the economic activities and daily lives of the benefited farmers. The achievement rate of the planned targets of the Project is estimated to be 70 - 90%. Given the fact that the actual spending was much lower than originally planned, the effectiveness of the Project is judged to be fair. Although the maintenance situation of the newly constructed facilities is not perfect, it is still within an acceptable range. Meanwhile, the project executing agency has found itself difficult to provide sufficient follow-up for the targeted villages because of a substantial reduction of its manpower and budget. There is a slight concern regarding the sustainability of communal fund management and seedling production by the farmers who were benefited from the Project. Based on the above findings, the Project is evaluated as being moderately satisfactory.

#### **3.2 Lessons Learned**

In the case of a decentralised and participatory project where a complicated execution procedure often increases the work volume of project administration, the planning of a project that matches the execution capacity of the project executing agency is essential along with sufficient support through the consulting service to realize a prompt problem shooting.

In this Project, many farmers' cooperatives individually participated in the procurement process as described in 2.2.2.1, while the Phase 1 and Phase 3 projects simultaneously took place, resulting in a huge work volume for the regional and head offices of the executing agency. In addition, changes of

---

<sup>30</sup> Most of the abandoned soil conservation facility sites are now actually used as farmland.

<sup>31</sup> Final Report for "Evaluación Final del Proyecto 'Manejo de Recursos Naturales para el Alivio de la Pobreza en la Sierra' (ESAN, 2004)"



the personnel in charge and reduction of the budget as well as manpower at the project executing agency led to a decline of its work capacity. Consequently, sufficient project administration by the executing agency became difficult and JICA decided to suspend the disbursement.

Specific issues to be aware of in connection to this lesson are the following.

Firstly, at the planning stage of such a project, the execution capacity of the project executing agency must be carefully examined so that realistic consideration can be done regarding the scale, implementation process, administration system, scope of consulting service, and timing of project execution.

Secondly, when it is difficult to accurately assess the execution capacity of the project executing agency, the status of project execution should be checked at an early stage after project commencement with a view to making any necessary modifications. Alternatively, a Phase 1 project could perhaps be executed on a small scale with little risk while considering the urgency of its execution, and swiftly take the lessons from the implementation of Phase 1 into considerations in preparing the succeeding phases, thereby avoiding hasty implementation of complicated projects<sup>32</sup>.

Thirdly, an adequate consulting service must be in place from the stage of the Phase 1 project to ensure proper and necessary checks and modification of the project components<sup>33</sup>. It is essential that the scope of the consulting service includes identification of problems relating to project execution and examination of possible solutions, evaluation of the project execution performance and project supervisory system and improvement of the execution process and project supervision system based on the results of these examinations and evaluation. Moreover, the TOR (Terms of Reference) must clearly describe the experience and abilities required to satisfactorily perform a range of work so that experts who have similar experiences and are capable of conducting the work in question can be recruited.

### 3.3 Recommendations to the AGRORURAL

- It is necessary for the AGRORURAL to review the current activities in the targeted villages of the Project and to improve the sustainability of the Project using its limited manpower and budget efficiently by means of terminating support for villages which are judged not to require further assistance and reselecting villages requiring continual support activities. The support of the AGRORURAL for the operation of nurseries should continue for the reselected villages while efforts should be made to improve the sustainability of nurseries in other villages through collaboration with a local public body and/or NGO.
- The AGRORURAL should tackle the following issues to improve its approach in the Sierra.
  - > A method to improve the sustainability and multiplication effects of the Project should be clarified by examining the possibility of the active and continuous involvement of the village authority in the preparation and execution processes.
  - > A method to achieve the participation of a local government and NGO in a micro-watershed committee should be clarified to enable the effective functioning of such a committee.

---

<sup>32</sup> The participatory procedure for procurement employed in the first phase project was new to AGRORURAL and it did not have similar experiences in the past on. On the other hand, responding to the strong request by the Peruvian government, an appraisal and a loan agreement of the second phase were carried out shortly after the commencement of the first phase. Therefore, experiences of the first phase were not well reflected to the planning of the second phase.

<sup>33</sup> There was no component for consulting services in the first phase project.

- > The ex-post evaluation of the process and results of investment should be institutionalized to ensure the steady improvement of the project approach and results-oriented project management.
- > While the provision of production and marketing support for agriculture and stock farming in the Sierra is important, an approach which is relevant to a coastal area cannot simply be employed in the Sierra because of the much more severe natural conditions and difficult access to the market. The development and employment of a unique approach for the Sierra is essential to maintain an adequate balance between conservation and production utilising the experience of the PRONAMACHCS for more than 20 years.



Comparison Between the Original Plan and the Actual Results

Item	Components	Original Plan	Actual Results
Outputs	(1) Soil Conservation		
	• Absorption terraces	4,335 ha	1,761 ha
	• Slow formation terraces	17,340 ha	32,116 ha
	• Infiltration ditches	26,010 ha	16,688 ha
	• Installation of improved grass	3,289 ha	9,661 ha
	• Installation of improved crops	15,173 ha	9,420 ha
	(2) Small-Scale Irrigation		
	• Construction/Improvement of Irrigation Channels	521 km	324 km
	• Special irrigation structures	102 sites	1 site
	• Pressurized irrigation	6 sites	48 sites
	• Construction/Improvement of Reservoirs	219 sites	70 sites
• Multi-Purpose Water Supply	107 sites	47 sites	
• Small-Scale Dams	20 sites	0	
(3) Forestry development			
• Nursery for Forest Trees	867 sites	1,158 sites	
• Production of Forest Tree Seedlings	41,750,000	75,900,000	
• Plantations	44,942 ha	40,897 ha	
• Forest Management	8,350 ha	13,663 ha	
(4) Farming Studies and Monitoring	66 studies	16 studies	
(5) Small Warehouses	433 sites	514 sites	
(6) Support for Enterprise Initiative	350 cases	130 cases	
(7) Studies			
• Micro-watershed Studies	141 studies	0	
• Village Agricultural Investment Plan	867 villages	1,380 villages	
(8) Workshop/Training to Strengthen the Organization of the Project Executing Agency	47 times	65 times	
(9) Workshop/Training to Strengthen Rural Organizations			
• Business Management	343 times	128 times	
• Micro-watershed Committee	564 times	445 times	
• Rural Extension	375 times	3,281 times	
(10) Procurement of Vehicles, AV Equipment and Information Communication Equipment		Almost as planned	
(11) Consulting Service			
• Project Supervision	48 MM	29 MM	
• Evaluation	6 units	0 units	
• Audit	10 units	7 units	
Project Period		April 1999 to September 2004 (66 months)	June 1999 to September 2006 (88 months)
Project Cost	<ul style="list-style-type: none"> <li>• Japanese ODA Loan Portion</li> <li>• Executing Agency</li> <li>• Total</li> </ul> Exchange Rate	¥7,259 million ¥2,681 million ¥9,940 million S/. 1 = ¥49.1 (As of July 1998)	¥2,856 million ¥997 million ¥3,853 million S/. 1 = ¥32.7 (average between June 1999 to September 2006)

soil conservation through terracing, and, since 1997 with the assistance of the World Bank, the scope of its activities was expanded to aggressively invest in soil conservation, small-scale irrigation and reforestation projects as well as to strengthen farmers' organizations and the executing agency in a comprehensive and intensive manner while encouraging the active participation of local farmers.<sup>4</sup> In November of the same year, the JICA offered an ODA loan of ¥5,677 million, targeting different areas from those of the World Bank, under the Sierra - Natural Resources Management and Poverty Alleviation Project (Phase 1). Two years later in 1999, Phase 2 of the Project (the subject of this ex-post evaluation) was implemented, followed by Phase 3 another two years later.

## 1.2 Objective

To conserve soil, forests and water resources along with improvement of the agricultural productivity in some 150 small river basins in the Sierra of Peru through investments in soil conservation, irrigation, forestation and capacity development of farmers' organizations and the executing agency, thereby contributing to poverty alleviation in the Sierra Area of Peru.

## 1.3 Borrower/Executing Agency

Government of the Republic of Peru/ PRONAMACHCS<sup>5</sup>

## 1.4 Outline of Loan Agreement

Approved Loan Amount / Disbursed Loan Amount	¥7,259 million (S/.147 million) / ¥2,856 million (S/.87 million)
Exchange of Notes/ Loan Agreement	April 1999/April 1999
Terms and Conditions	Interest Rate : 1.7% Repayment Period (Grace Period) : 25 years (7 years) Procurement : General Untied < Consulting Service > Interest Rate : 0.75% Repayment Period (Grace Period) : 40 years (10 years) Procurement : Bilateral Tied
Final Disbursement	September 2006
Main Contractors (contract amount of ¥1 billion or more)	None
Consultant (contract amount of ¥100 million or more)	Nippon Koei
Feasibility Study (F/S)	None

## 2. Evaluation Results (Rating: C)

### 2.1 Relevance (Rating: a)

This project has been highly relevant with the country's national policies and development needs at the times of both appraisal and ex-post evaluation, therefore its relevance is high.

<sup>4</sup> In April 1997, the World Bank offered US\$ 51 million under the Sierra - Natural Resources Management and Poverty Alleviation Project (PO42442).

<sup>5</sup> Since April 2008, part of the AGRORURAL: Rural and Agricultural Productivity Development Programme)



### **2.1.1 Relevance at Appraisal**

The Second Fujimori Administration identified poverty alleviation as an issue of the highest priority and aimed at maintaining the social welfare expenditure at least 40% of the annual government budget. As described in 1.1 - Background, need for the project was high, as an increase of the agricultural productivity while ensuring environmental conservation was an important task in the Sierra where poverty was widespread and there was an overwhelming need for the Project.

### **2.1.2 Relevance at the Time of Ex-Post Evaluation**

The government of President Garcia inaugurated in 2006 has also upheld poverty alleviation as a national priority with a target of reducing the poverty ratio to less than 30% by 2011.<sup>6</sup> The agricultural policies of the present government emphasize poverty alleviation and the conservation and sustainable use of natural resources.<sup>7</sup> The identified goals of these policies are i) improved competitiveness of the agricultural sector, ii) sustainable use of natural resources and biodiversity, and iii) improvement of basic services and support services for small farmers.

To achieve these policy goals, the Ministry of Agriculture integrated eight projects/programs, including PRONAMACHCS, into the AGRORURAL in 2008. The Ministry plans to invest some US\$ 500 million in impoverished rural areas throughout Peru over a period of five years.<sup>8</sup> The Phase 3 Project scheduled to conclude in 2009 has been in progress following Phase 2. In areas which were not covered either by neither the World Bank nor the Japanese ODA loan, similar projects have been implemented with funding by the Government of Peru.

Based on these facts, the Project is considered to be highly relevant at the time of ex-post evaluation.

## **2.2 Efficiency (Rating: b)**

Although the project cost was lower than planned, the project period was significantly longer than planned; therefore efficiency of the project is fair.

### **2.2.1 Outputs**

#### **(1) Target Areas and Target Villages**

The Project was implemented as planned in 22 Provinces of 8 States<sup>9</sup>. Up to 1,380 villages received some kind of assistance and some 1,000 villages received assistance over three years, exceeding the original target of 867 villages.<sup>10</sup>

---

<sup>6</sup> The Government of Peru defines poor households as those of which the income is below the level required for minimum consumer life. The reference per capita income level in 2007 was S/.229 (approximately ¥7,500) per month.

<sup>7</sup> Ministry of Agriculture, Medium-Term Strategic Plan for Agricultural Sector 2007 - 2011, July 2008

<sup>8</sup> PRONAMACHCS, the executing agency of this Project, accounted for 70% of the total budget of AGRORURAL (2008). Compared to the Fujimori administration, the AGRORURAL places greater emphasis on the improved coordination/linkage of products, distribution and marketing and the improved productivity and competitiveness of the agricultural sector.

<sup>9</sup> States of Huancavelica, Cajamarca, Ayacucho, Ancash, Cusco, La Libertad, Piura and Arequipa.

<sup>10</sup> The Project commenced in 1999 targeting 839 villages and was expanded to 1,380 villages in 2000. The number subsequently fell to 900 - 1,100 villages.

## (2) Outline of Project Outputs

The planned scale of the Project at the time of appraisal was based on an estimate derived from the past experiences. The actual outputs were based on requests by local farmers, and therefore did not necessarily correspond to the planned outputs.

Table 1 Main Project Outputs (Original and Actual)

Components	Original	Actual
Soil Conservation		
• Absorption Terraces	4,335 ha	1,761 ha
• Slow Formation Terraces	17,340 ha	32,116 ha
• Infiltration ditches	26,010 ha	16,688 ha
• Installation of improved grass	3,289 ha	9,661 ha
• Installation of improved crops	15,173 ha	9,420 ha
Small-Scale Irrigation		
• Construction/Improvement of Irrigation Channels	521 km	324 km
• Pressurized irrigation	6 sites	48 sites
• Construction/Improvement of Reservoirs	219 sites	70 sites
• Multi-Purpose Water Supply	107 sites	47 sites
• Small-Scale Dams	20 sites	0 sites
• Special irrigation structures	102 sites	1 site
Forestry development		
• Nurseries	867 sites	1,158 sites
• Production of Forest Tree Seedlings	41,750,000	75,900,000
• Plantations	44,942 ha	40,897 ha
• Forest Management	8,350 ha	13,663 ha
Small Ware house	433 sites	514 sites
Support for Enterprise Initiative	350 cases	130 cases
Procurement of Vehicles, AV Equipment and Information Communication Equipment, etc.	Almost as planned	

Terracing and reforestation, which were components of the soil conservation and forestry development, were actually conducted by the farmers themselves using tools and seedlings provided by the executing agency. Therefore, the actual area of implementation increased or decreased depending on the actual amount of labour input by farmers. As explained later, the disbursement of the project funds were suspended by JICA for a period of 33 months from September 2003 in the fourth year of the Project and only 58.3% of the project budget was actually spent within the project period. Because of this, the actual outputs failed to achieve the planned outputs in the case of some components, such as small-scale irrigation where the amount of the outputs were roughly in proportion to the amount of financial inputs. Meanwhile, the actual outputs exceeded the planned outputs in the case of other components, such as soil conservation and forestry development where the amount of the outputs was depended on the amount of the labour input by farmers. Table 1 compares the planned and actual outputs for the main components of the Project.

### (1) Soil Conservation

The following outputs were achieved under soil conservation using 32% of the total project cost.

#### Terraces

There are two types of terraces to reduce soil loss by surface erosion from the steep terrain, i.e. absorption terraces and slow formation terraces. Both types of terraces were constructed under



the Project by local farmers using tools procured under the Project. There were many cases where trees were planted along the terraces reinforcement as well as to protect the crops from frost and strong winds.

- Narrow absorption terraces are constructed on steep slopes with inclination of more than 30% and can be expected to achieve effects of soil conservation and increase in productivity. However, because of the high construction cost and unsuitability for cultivation using cattle, there was a growing tendency to avoid this type of terrace in the 1990's onwards.
- Slow formation terraces are constructed on gently sloping land. Ridges of up to 80 cm height are made by stacking stones or piling dirt. Using the gradual downward shift of the top soil by rainwater, terraces are created over a period of 5 to 10 years. When a ridge is filled with soil after several years, a second ridge is created. By repeating this process, flat terraces are eventually formed.

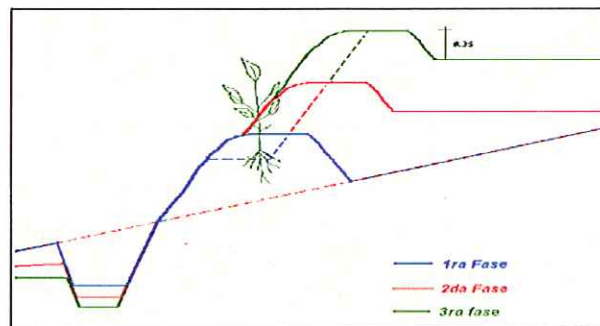


Fig. 1 Phased Formation of a Flat Terrace through Slow Formation Terrace  
(Source: PRONOMACHCS Website)

Under the Project, 1,761 ha and 31,116 ha of farmland were conserved by absorption terraces and slow formation terraces respectively. While the actual output for absorption terraces was lower than the planned output, the actual output for slow formation terraces was far higher than the planned output. The main reasons for these results are (i) the farmers preferred slow formation terraces, which required a lower investment per unit area, meaning a larger area could be covered with the given budget and (ii) the labor input by farmers was greater than originally planned.

#### Infiltration Ditch

Level ditches were dug along the contour lines of gently or steep sloping land. These ditches reduce erosion of the top soil, retain rainwater for ground infiltration to increase the level of soil moisture and recharge aquifers to facilitate the growth of trees and crops at lower areas of the slopes. The ditches were dug by local farmers using tools provided under the Project. 16,688 ha of land was conserved under the Project.





Absorption Terraces  
(PRONAMACHCS Website)



Slow Formation Terrace with Stone Wall  
(Cusco)



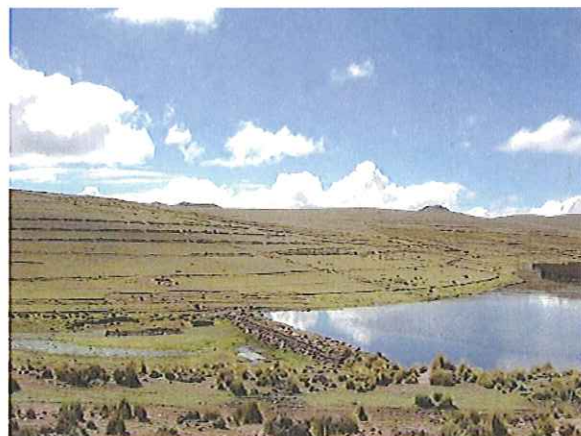
Combination of Slow Formation Terrace,  
complemented with Trees (Cusco)



Combination of Slow Formation Terrace  
and Pine Trees (Cajamarca)



Infiltration Ditch at Highland Swamp



Combination of Infiltration Ditch and Reservoir



#### Installation of Improved Grass and Crops

This component involved the planting of improved potato, maize and grass varieties at farmland where terraces and/or infiltration ditches were constructed. The seeds of improved varieties were procured under the Project and were distributed to farmers. The coverage under the Project was as much as some 19,000 ha and the improved grass in particular was planted in many more areas than originally planned because of the strong request from farmers. In contrast, the actual output regarding the planting of improved crops was lower than planned.

#### Small Warehouse

Using locally available material 514 small warehouses were constructed in order to adequately conserve seeds for potatoes and other agricultural inputs.

### (2) Small-Scale Irrigation

Small-scale irrigation construction work was conducted at 359 sites, using 21% of the total project cost. The average irrigated area per site was approximately 64 ha.

#### Irrigation Channels

Irrigation channels were some 40 cm wide and made of concrete for gravity irrigation. At 35 sites, new channels (totalling 68 km) were constructed while existing channels (totalling 256 km) were improved at 158 sites.

#### Pressurized irrigation

The pressurized irrigation system achieved larger coverage with less water than open irrigation channels, by conducting water to sprinkler pipes through movable vinyl hoses. This system was appreciated by the farmers because of its efficiency, and due to the small scale and shorter construction period, pressurized irrigation systems were set up at 48 sites, exceeding the originally plan.

#### Others (Reservoirs, etc.)

The actual outputs for reservoirs, water channels, small dams and multi-purpose irrigation, the scale of construction of all of which was relatively large with a long construction period, were much lower than the originally planned outputs, partly because of the delay of budget execution resulting in a delay and/or increased cost of the construction work and partly because of the funding constraints explained later in section 2.2.2.1.<sup>11</sup>

### (3) Forestry development

Forestry development work was conducted using 19% of the total project cost.

#### Nurseries for seedlings

Nurseries were established in each targeted village to grow seedlings of several indigenous as well as other species depending on the local climate and soil. The other main species were pine and eucalyptus.

---

<sup>11</sup> The water supply facilities constructed under multi-purpose irrigation are not restricted to provide irrigation water but also to supply water for households as well as animals. In the case of special facilities, such as river crossing, the nominal output amount was small as many such facilities were actually constructed as part of the irrigation channel work.

#### Production of Forest Tree Seedlings

The actual output of 75.9 million seedlings far exceeded the planned output due to the strong demand and participation by farmers. Seedling production was also boosted by the fact that local public bodies in agreement with the AGRORURAL bore part of the seedling production cost.

#### Plantations (Reforestation)

In addition to the creation of small to medium-size forests on common or private land, plantation was conducted along terraces. While many of the newly created forests are production forests which are designed to produce timber in the future, there are cases in South-Central Peru where protection forests were created in water source areas. It is reported that plantation was conducted over some 41,000 ha of land under the Project but this figure includes those area equivalent of a large number of seedlings planted along terraces.

#### Forest Management

The main forest management activities were replanting after one year (to replace dead seedlings) and irrigation for young trees in dry period. Survival ratio of the trees after one year was 70 – 80%.

#### (4) Procurement of Vehicles and Equipment

Vehicles and a range of equipment were procured, using 14% of the total project cost. The actual quantities were 24 vehicles and 132 motorcycles as well as a number of PCs, printers and videos to assist the execution of the Project at the head office of the AGRORURAL and its branches at various project sites.

#### (5) Others

- Support for entrepreneurship primarily targeted women to help them start new businesses related to production of processed dairy products, trout farming and apiculture. The number of cases was lower than planned because of the funding restrictions and increase in the required funding size per case caused by the revision of the implementation process for new enterprise initiatives.
- Micro-watershed studies were not conducted as they were judged not worth the input based on the experience of other projects.
- Workshops to strengthen the capacity of AGRORURAL were held 65 times.
- Training to strengthen farmers' organizations and training for micro-watershed committees were conducted. The number of rural extension training sessions was far higher than planned because of the frequent implementation of small training sessions.
- Consulting services were provided to assist the executing agency in operational planning, management of ODA loan disbursement, financial management, supervision and evaluation of project performance, and coordination with JICA and the Ministry of Economy and Finance throughout Phase 1 and Phase 2 of the Project.





Small Warehouse (Cusco)



Comparison Between Improved Grass and Natural Grass (Indigenous Variety, Cajamarca)



Improved Irrigation Channel (Cusco)



Nursery for Forest Tree Seedlings (Cajamarca)



Support for entrepreneurs  
(Production of Cheese and Yoghurt, Cusco)



Support for entrepreneurs  
(Farming of Trout, Cajamarca)



## 2.2.2 Project Cost

The actual project cost was 38.8% of the planned cost at the time of appraisal. Translated to local currency, the corresponding figure was 58.3% of the planned cost at the time of appraisal. The reason why the actual cost was lower than the planned cost was the funding constraints described in section 2.2.2.1.

Table 2 Project Cost (Original and Actual)

Item	Original (Unit: ¥million)			Actual (Unit: ¥ million)			Actual / Planned
	Yen Loan	Executing Agency	Sub-Total	Yen Loan	Executing Agency	Sub-Total	
Soil Conservation	2,198	148	2,346	1,046	190	1,236	52.7%
Forestry development	1,920	421	2,342	616	133	749	32.0%
Small-Scale Irrigation	1,502	297	1,799	660	138	799	44.0%
Storage for Agricultural Input Materials	936	173	1,109	107	22	128	11.6%
Vehicles and Equipment	197	43	240	117	21	138	57.5%
Assistance for Strengthening of Organizations	0	1,487	1,487	145	456	601	40.4%
Consulting Service	194	43	236	165	37	202	85.4%
Contingency	312	68	381	0	0	0	0.0%
Total (Local Currency: million N.Sols)	7,259 (147.8)	2,681 (54.6)	9,940 (202.3)	2,856 (87.4)	997 (30.5)	3,853 (117.9)	38.8% (58.3%)

Planned: 1 N.Sol = ¥49.1 (July 1998)

Actual: 1 N.Sol = ¥32.7 (average through the project implementation period)

Source: AGRORURAL

### 2.2.2.1 Funding Constraints for the Project and Their Causes

The biggest problem in terms of project implementation was the fact that only 60% of the original project budget was actually disbursed due to various constraints originating from the following incidents.

- From late 1999 to December 2002, the use of foreign aid and counterpart funds was restricted by the Ministry of Economy and Finance because of the tight fiscal situation faced by the Government of Peru.
- Execution of the FY 2003 budget was temporarily suspended due to confusion arising from the planned integration of PRONAMACHCS and another organization (FONCODES)<sup>12</sup> based on a government policy.
- The FY 2002 audit report for the Project pointed out that there were many cases where local offices of PRONAMACHCS had not submitted reports and evidences of their expenditure. As appropriateness of spending could not be confirmed because of the absence of the reports and evidence, JICA took the decision in September 2003 to suspend disbursement for the Project. Disbursement recommenced in May 2006 after measures to prevent such delays were put in place but PRONAMACHCS was unable to implement the Project using the ODA loan in FY 2004 and FY 2005.

<sup>12</sup> The National Compensation and Social Development Fund (Fondo Nacional de Compensacion y Desarrollo Social: FONCODES) was established in 1991 to reduce the number of the poor and has since been engaged in the development of sanitation and economic infrastructure in the Amazon and the Sierra.



- Several factors of the project can be pointed out to explain what led to the suspension of disbursement. One is the huge volume of the project supervisory work required by the local PRONAMACHCS offices because of the individual participation of as many as 1,380 agricultural cooperatives in the procurement process. Another is the parallel implementation of the Phase 1 and Phase 3 Projects, both requiring similar project supervisory work. Furthermore, there was a significant decline of the capacity of PRONAMACHCS since 2001 due to the frequent transfer of personnel and curtailment of the budget and manpower.<sup>13</sup> The consulting service was unable to sufficiently alleviate the problem.<sup>14</sup>

### 2.2.3 Project Period

The Project was originally planned as 66 months from April 1999 to September 2004. The actual period of 88 months from June 1999 to September 2006 was much longer (133% of the planned period). The reason for the extension in project period was the interruption in project implementation due to budgetary constraints mentioned above.

## 2.3 Effectiveness (Rating: b)

The Project is inferred to have achieved some 70 - 90% of the originally planned effects. However, given the fact that only half of the planned project budget was actually used, the effectiveness of the Project is judged to be medium as full spending of the project budget would have produced many more results.

### 2.3.1 Conservation of Soil, Forest and Water Resources

More than 90% of the area where soil conservation or forestry development was conducted (some 81,000 ha) under the Project has been properly maintained and is assumed to be producing the anticipated environmental conservation effects such as the mitigation of erosion, increase of the forest area and retaining of soil moisture. The actual area where these positive effects are believed to have emerged is some 95% of the planned area at the time of appraisal.

A beneficiary survey was conducted to 267 households in 10 villages in Cuzco and Cajamarca. According to this survey, some 30% of the farmland owned by these beneficiaries has been newly conserved under the Project and the number of trees owned by beneficiaries has quadrupled compared to 10 years ago. During the field visits, major changes of the landscape due to increased forests and trees, reduction of erosion due to terracing, increased soil moisture and spring water and better growth of crops and forest trees were seen confirming the environmental conservation effects of the Project.

---

<sup>13</sup> Since the change of the government in 2001 until 2003, many senior government officials left their positions and many of their successors lacked sufficient experience and/or capacity. The arrangements to ensure the smooth handing-over of positions were often insufficient. Many field engineers in the field were also replaced. In subsequent years, having experienced confusion surrounding the proposed integration of the PRONAMACHCS and FONADODES, the Ministry of Agriculture and Ministry of Economy and Finance rapidly reduced the amount of budget appropriation for PRONAMACHCS of which the performance had declined and reduced the manpower of PRONAMACHCS along with the integration of local offices. Consequently, the budget size per local office of PRONAMACHCS was halved and the number of villages and farmers benefited from the Project fell to 70% of the 2001 level.

<sup>14</sup> While the consulting services had been executed as planned, the Terms Of Reference (TOR) did not specified an assignment of financial management specialist. AGRORURAL is not satisfied with the outcomes of the consulting services as the chain of events leading to the suspension of disbursement was not prevented.



### 2.3.2 Improvement of Agricultural Productivity

#### (1) Area of Anticipated Improvement of Productivity (Yield per Unit Area)

The actual area (approximately 50,500 ha) covered by soil conservation by means of terracing and infiltration ditches was 106% of the planned area and the actual area (approximately 19,000 ha) covered through the introduction of improved grass/crops was 103% of the planned area at the time of appraisal. However, as explained in the section on sustainability, there is a possibility that some 15% of slow formation terraces have not been properly maintained. In consideration of the possible low sustainability of the communal fund linked to the introduction of improved crops (refer 2.5.3 (1)), the project's effect on productivity improvement is unlikely to have the level of sustainability anticipated at the time of appraisal.

The newly irrigated area under the small-scale irrigation component and area where the existing irrigation facilities were improved are estimated to be some 4,000 ha and some 19,000 ha respectively. Assuming an operating rate of these facilities of 85%<sup>15</sup>, the actual irrigated area is approximately 19,600 ha in total, consisting of 3,400 ha of new areas and 16,200 ha of existing areas. This is equivalent to slightly less than 60% of the planned area at the time of appraisal.

Based on the above, increase in agricultural productivity is expected to have been achieved at some 70,000 ha of farmland as a result of the Project.<sup>16</sup> This is equivalent to some 80% of the plan at the time of appraisal.

#### (2) Mechanism and Effects of Productivity Improvement

According to the findings of the beneficiary survey, improved agricultural productivity and increased agricultural production are believed to have been achieved under the Project due to the following mechanism.<sup>17</sup> However, it must be noted that quantitative data representing the effects of the entire Project could not be collected.

##### (1) Increased Productivity and Stable Production of Potatoes and Other Main Crops

- Both the absorption terraces and slow formation terraces have had the effect of controlling the decline of productivity due to erosion. In one village, slow formation terraces have increased the productivity of a native potato variety by some 10% while shortening the fallow period from the traditional 7 - 8 years to six years. The soil conservation effect of slow formation terraces is believed to emerge over a relatively long period of 5 - 10 years in accordance with the formation of the terraces.
- The hedges along terraces have had such effects as the mitigation of frost damage to crops, retaining of soil moisture and soil improvement by organic fertiliser (leaves of some species). While agricultural production in the Andean highlands is unstable because of vulnerability to frost damage, many farmers reported that the hedges have changed the micro-climate, reducing the risk of frost damage.

---

<sup>15</sup> Based on a similar project of the World Bank.

<sup>16</sup> The area of improved crops and grass are not included in this figure as they overlap with the soil conservation area.

<sup>17</sup> A household survey involving group interviews and the use of a questionnaire was conducted in 10 villages in Cuzco and Cajamarca Provinces (total of 267 samples).