Ecuador

Catarama River Basin Irrigation Project

External Evaluator: Kenji Momota (IC Net Limited)

Field Survey: September 2005

1. Project Profile and Japan's ODA Loan

Map of project area

Secondary canal outfitted by the project

1.1 Background

While Ecuador is an oil-producing nation whose economy is largely dependent on oil production, its agricultural sector also plays a major economic role, accounting for approximately 46% of the nation's workforce[1]. Increasing agricultural productivity was a challenge for Ecuador's agricultural sector, and its undeveloped irrigation system was given as one of the reasons. In particular, concentrated efforts were made to develop the coastal region of Costa as an agricultural zone, but on account of its undeveloped irrigation system, water shortages during the dry season and water damage during the rainy season were major factors in hampering the region's agricultural productivity increase. In light of such circumstances, the Ecuadorian Government made the development of the nation's irrigation sector the focus of the four-year national development plan established in 1985, in which five large-scale irrigation projects were planned.

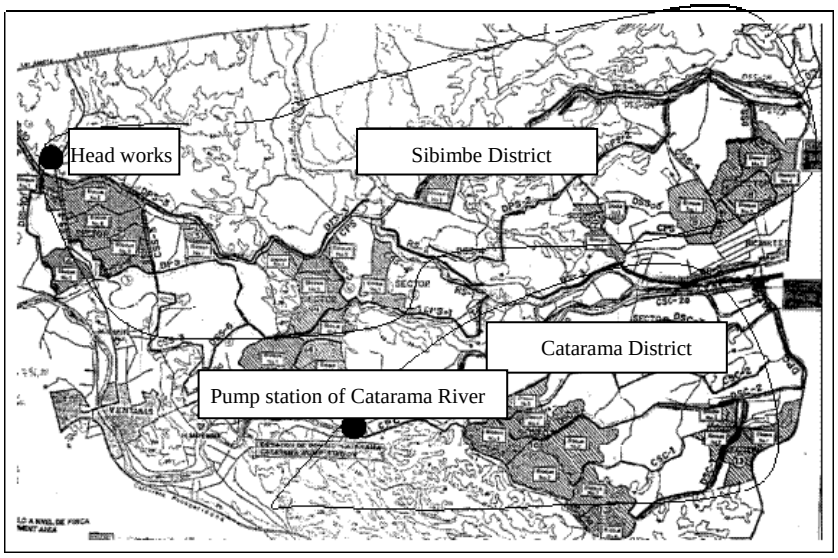
1.2 Objective

To increase agricultural production and improve agricultural productivity by building irrigation and drainage facilities in Ecuador's coastal region of Catarama River Basin, and thereby contribute to the betterment of farmers' livelihood, and encourage economic

[1] Data from 1983, prior to appraisal.

development in the region.

Fig. 1 Project Site



1.3 Borrower/Executing Agency

Borrower: Government of the Republic of Ecuador

Executing Agency: Instituto Ecuatoriano de Recursos Hídricos (INERHI) (at time of appraisal)
Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas (CEDEGE) (at time of evaluation)

1.4 Outline of Loan Agreement

Loan Amount/ Disbursed Amount	8,594 million yen/7,320 million yen
Exchange of Notes Loan Agreement	March 1987 February 1988
Terms and Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	 3.75% 30 years 10 years Partially untied
Final Disbursement Date	February 2003
Main Agreement	Hidalgo & Hidalgo S.A (a local enterprise)

Consultant Agreement	Nippon Koei Co., Ltd.
Feasibility Study (F/S) etc.	Japan International Cooperation Agency (JICA) Development Study: Costa Region Catarama River Basin Agricultural Development Study (1982)

2. Evaluation Result

2.1 Relevance

2.1.1 Relevance at the time of appraisal

The four-year national development plan of 1985-1988 placed great importance on agricultural development. For instance, among the basic policies in four areas, policies on both industrial and land development sought to promote farming and animal husbandry as well as the reform and reclamation of arable land. As a policy that embodies these priority fields, a four-year land development plan was formulated, through which five large-scale irrigation projects were planned. The Catarama River Basin was included in one of ten plans constituting the irrigation plan for the lower Guayas River Basin, an area suited for the cultivation of agricultural products (Lower Guayas River Basin Irrigation Plan). This project had high priority on account of the fact that it was designed to improve poor drainage issues and improve agricultural productivity by developing irrigation in the Catarama River Basin.

2.1.2 Relevance at the time of evaluation

In the current national development plan entitled "Ecuador 2020," the importance of improving agricultural production in coastal regions is identified as a priority policy of the agricultural sector. Besides strengthening international competitiveness, the promotion of rural village development and irrigation development, the improvement of irrigation system, and the transfer of technology to users are among the nine strategic objectives of the agricultural sector policy[2] for the years 2003 to 2008. The development of irrigation and drainage facilities features especially high as a means to achieving those objectives.

2.2 Efficiency

2.2.1 Outputs

[2] While the agricultural sector policy is from the tenure of former President Lucio Gutierrez (2003-2005), improving small-scale farmers' access to water by improving irrigation facilities is also identified as a policy objective under President Alfredo Palacio Gonzalez who was inaugurated in April 2005. Thus, irrigation projects remain important much like before and policy continuity is also maintained.

This project is comprised of two separate plans, the Sibimbe and the Catarama plans. The Sibimbe Plan was designed to develop irrigation on the left bank, in which the Sibimbe River, a tributary of the Catarama River, serves as a water source. The Catarama Plan sought to develop irrigation on the right bank by pumping the water from the Catarama River using a pump. The ODA loan covers all foreign-currency costs of the following.

Item	Plan	Actual performance
1) Sibimbe plan a) Head works b) Irrigation canal c) Drainage canal d) Development of outlying arable lands	Benefited area 3,470 ha a) Max. flow rate 5.0m^3/s b) 54.0km c) 52.2km d) 2,250ha	As planned a) Max. flow rate 4.85m^3/s (roughly as planned) b) 42.1km (roughly as planned) c) 56.1km (roughly as planned) d) 796ha 5) Construction of embankments in lower basin[3] 12.4km
2) Catarama plan a) Construction of pump station b) Irrigation canal c) Drainage canal d) Development of outlying arable lands	Benefited area 2,330ha a) Max. flow rate 3.3m^3/s b) 28.1km c) 24.8km d) 1,850ha	As planned a) Max. flow rate 2.7m^3/s (roughly as planned) b) 26.7km (roughly as planned) c) 15.2km d) 612ha e) Construction of embankments in lower basin 1.3km
3) Procurement of farming machinery	22 tractors, 6 combines, 52 other machines	Cancelled
4) Procurement of facilities for operation and maintenance	Project office, workshop, bulldozers, etc.	Cancelled

For the most part, head works, the pump station, and other main components of the irrigation facility were built according to plan. The irrigation and drainage canals were also constructed largely according to plan, but in the case of the Catarama Plan, the

[3] The construction of banks in the lower basins of Sibimbe and Catarama districts was not initially included within the scope of the plan, but they were built as part of related work of a civil works contract. The amount could not be obtained from the executing agency.

drainage canal was shortened from its original length of 24.8km to 15.2km. This was due to opposition from farmers who owned land where the canals were going to pass through, delays in legal formalities for partitioning lands, and changes in the canal route due to design details.

In addition, the development of outlying arable lands[4] fell far short of the plan (34% of the planned area). The background and reasons for the reduction are as follows:

(1) At the time the details were being designed, the project scope changed, and the original target of 4,100ha was reduced to 2,081ha (50% of the planned area). The reason for the reduction was that the targeted farmers were limited to small farmers having mainly 50 ha or less[5].

(2) Moreover, the actual performance was ultimately reduced to 1,400ha (34% of the planned area, 67% after the change). This reduction was due to farmer opposition, as they disliked the idea of providing arable land for the development of outlying arable lands.

(3) As for benefited areas aside from the 1,400ha cited above (mid- and large-farmers with above 50ha of land), the policy was to have outlying arable lands developed by the farmers themselves at their own expense. At the present time, however, self-financed development has essentially made no progress[6] (See 2.3.1 “Improving Agricultural Productivity”).

(4) Because of insufficient budgeting[7] on the part of the executing agency (the actual expenditure came to roughly 10% of the allocations requested to the Government), development through self-financing cannot take place, and at the present time, there is no concrete plan to do such development.

The development of outlying arable lands is indispensable to using irrigation facilities. This is proving to be a major issue with respect to the manifestation of project effects, and the matter urgently needs to be dealt with by the Ecuadorian Government.

Under this project, the procurement of farming machinery to support farming and the construction of control equipment and facilities for irrigation facilities were part of the

[4] To achieve efficient use of arable lands by constructing small canals in outlying lands, consolidating arable lands (creation of arable land), and other measures.

[5] According to the initial plan made by INERHI, the previous executing agency, farmers having 100ha or less of land were considered small farmers and were targeted for the development of outlying arable lands. However, development was later limited to farmers having 50ha or less of land in the design details of the current executing agency.

[6] There was no official reply regarding the background behind the decision on the self-pay policy. Judging from interview studies conducted on-site, it is believed that a decision was made that financial support could not be provided to middle farmers enjoying a certain income level while the executing agency had little financial margin. Further, while there are examples of such middle farmers independently installing water-drawing pumps and using irrigation facilities, because they can only supply water to the areas around the canals, sufficient effects were not attained.

[7] Due to the tight financial situation of the Ecuadorian Government, government spending tends to be restrained. For example, it is the Government’s policy to ask users to bear a certain portion of the costs of primarily operation and maintenance work with respect to irrigation and drainage projects (not limited to this project).

plans. However, these were cancelled for the reasons below.

(1) Procurement of farming machinery

The farmers covered by the project area already have a fixed number of farming machinery. Not only was the necessity of additional procurements considered low, but there had been problems in the way machinery was used in previous similar projects[8].

(2) Construction of control equipment and facilities

INERHI, the executing agency at the time of appraisal, planned for an operation and maintenance system centered around its own operation and maintenance department. Later on, the Ecuadorian Government's organization was streamlined, and CEDEGE became the executing agency[9]. Based on the policy of the Ecuadorian Government (see Footnote 7), CEDEGE has made the following method the mainstream approach: a method where farmers (irrigation association) commission operation and maintenance work of irrigation facilities directly to a private-sector enterprise. For that reason, the policy of this project was changed to a policy where operation and maintenance facilities would be developed by the users. At present, Hidalgo & Hidalgo, which was responsible for the main agreement of the project, undertakes the actual operation and maintenance work. (See 2.5 "Sustainability").

The pump station of the Catarama Plan has been kept in good condition. However, because agricultural production using irrigation facilities is not proceeding as much as originally planned[10], the pump station rarely operates outside of maintenance periods (out of approximately 300 hours of running time in the past three years, 217 have been for maintenance and 83 were for the provision of water[11]).

In addition, an embankment with a total length of 13.7km was established to prevent flooding in the lower basin.

2.2.2 Project period

At the time of appraisal, the total planned work period was from February 1988 to December 1992, or 59 months. However, the actual work period was greatly prolonged, spanning from February 1988 to December 2002, a total of 179 months (303% of the projected period). Moreover, the loan disbursement deadline was twice extended (see

[8] In the latter half of the 1970s, when procuring farming machinery for the Babahoyo irrigation project and loaning them to farmers, theft of machine parts and other damage were common occurrences, and the machinery could not be used efficiently.

[9] On account of structural streamlining, CEDEGE does not have an operation and maintenance department such as for farming machinery and management facilities.

[10] Because of lingering issues such as undeveloped outlying arable lands and insufficient agricultural technology, efforts to encourage farmers to make use of the irrigation project have not taken hold.

[11] It was running temporarily during emergency situations such as last year's water shortage, but this was not a full-scale operation as an irrigation facility.

the following page). The main reasons for the delay are outlined in the table below.

Table 1 Classification of Reasons the Project Was Delayed

Details	Extent of Delay
1. Starting time of work	
(1) Extension of time for consultant procurement procedures	Approx. 11 months
(2) Extension of time for contractor bidding procedures	Approx. 9 months
2. Work implementation time	
(1) Work stoppage due to El Niño (1997 - 1998) Flooding in the vicinity of the pump station construction site forces work stoppage	Approx. 50 months in total
(2) Delay in land acquisition on account of delayed budgetary allocations from the Government, and a shortage of domestic currency due to an economic crisis	
3. External reasons	
(1) Change in project executing agency (1989) At time of appraisal: Instituto Ecuatoriano de Recursos Hídricos (INERHI) → At time of ex-post evaluation: Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas (CEDEGE)	Approx. 38 months
(2) System review by CEDEGE and change in personnel due to regime changes in 1988 and 1992	Unclear

Background of the extension of loan disbursement deadline

Following the delay in the project's construction period, the loan disbursement deadline was twice extended, and the executing agency has for the third time requested to extend the loan disbursement deadline, but was refused. The background is summarized below.

1. First loan disbursement deadline extension: Two regime changes, change in the executing agency (February 1994)
2. Second loan disbursement deadline extension: Effects of El Niño (February 2000)
3. Disagreement with request for third loan disbursement deadline extension (relating to additional construction for the drainage pump station) (December 2002)

(1) In the plan devised at the time of appraisal, construction of the drainage pump station was supposed to be carried out through self-funding on the Ecuadorian side. However, due to a worsening economic climate, the Ecuadorian side did not provide the financing it was to shoulder.

(2) For this reason, CEDEGE suggested that the drainage pump station be considered as additional work under the ODA loan portion (it was the third request to extend the ODA loan disbursement deadline). However, the request was denied for the reasons below:

1) It was true that by erecting the drainage pump station a greater level of efficacy could be expected in regards to attaining the project's objectives. However, even if the construction were not conducted at that time, the initially targeted area of cultivation would still most likely be exceeded.
2) Regarding construction of the drainage pump station, an impact study or consultation with the local residents and farmers had not been conducted beforehand. Therefore, if reaching an agreement with the local residents and farmers ended up needing some time, it was unclear how much time extension might be needed to complete the construction work.
3) Loan disbursement deadline extensions had already been carried out twice on account of major delays in the project's execution.
4) Owing to the fact that the deadline had been extended twice, the project had been underway for 15 years already, and repayment of the associated principal had begun. Moreover, there were delays in the repayment.

Major delays are by a change in the executing agency, delays in procurement formalities, as well as delays in land acquisition due to insufficient budgetary allocations. Such delays were a reason for objections to the construction of additional

output including the drainage pump station mentioned above, and became a reason the lowered results of the project (See 2.3.2 “Prevention of flood damage”).

2.2.3 Project cost

Under the appraisal plan, approximately 85% of the 10,100 million yen in total project costs, or 8,594 million yen, was to be financed through ODA loans, with the remaining 1,516 million yen to be self-financed by the Ecuadorian Government. The total project costs in the end came to 10,880 million yen (108% of the planned figure), out of which 7,320 million yen were furnished via ODA loans. The portion of the project costs covered by ODA loans was reduced (approximately 85% of the planned figure) for two reasons. First, the procurement of 385 million yen worth of farming machinery and 302 million yen worth of operation and maintenance facilities and equipment were cancelled. Secondly, the scale of development of outlying arable lands was reduced. The local executing agency is bearing the land acquisition costs, but payment of a portion of the costs has yet to be completed[12].

2.3 Effectiveness

2.3.1 Improvement of agricultural productivity

Because cultivation will be possible year round by the development of irrigation facilities through this project, agricultural productivity was expected to rise. The table below compares the area of cultivation before the project was implemented and now.

Table 2. Area of Cultivation at Time of Appraisal and Planned Area of Cultivation[13]

Crop	Indices	At time of appraisal	Plan figures	2004 figures	Percentage compared to plan target
Rice	Area of cultivation (ha)	2,660	4,346	3,000	69.0%
	Production (ton/year)	7,049	21,730	13,380	61.6%
	Yield (ton/ha)	2.65	5.00	4.46	89.2%

[12] Permission to use the land was granted by the executing agency, but roughly US$200,000 in land acquisition fees is still unpaid. Every year in its budget requests, CEDEGE asks the Government to allocate funds for this expense, but for the FY2006 budget as well, the response was that the request will likely be denied.

[13] Given that hardly any time has elapsed since the project’s completion, the executing agency has yet to collect accurate statistical data pertaining to agricultural production. For that reason, for statistical data on agricultural production, estimates based on interview studies conducted by the executing agency have been used.

Soybean	Area of cultivation (ha)	1,140	1,800	550	30.6%
	Production (ton/year)	1,140	5,400	330	6.1%
	Yield (ton/ha)	1.0	3.0	2.2	73.3%
Corn	Area of cultivation (ha)	455	540	750	138.9%
	Production (ton/year)	501	1,890	800	42.3%
	Yield (ton/ha)	1.1	3.5	3.2	91.4%
Cacao	Area of cultivation (ha)	1,435	1,290	469	36.4%
	Production (ton/year)	158	1,097	197	17.9%
	Yield (ton/ha)	0.11	0.85	0.60	70.6%
Coffee	Area of cultivation (ha)	285.00	261.00	-	-
	Production (ton/year)	41.76	213.75	-	-
	Yield (ton/ha)	0.16	0.75	-	-
Other (banana, livestock, etc.)	Area of cultivation (ha)	620	765	560*	73.2%
	Production (ton/year)	-	-	-	-
	Yield (ton/ha)	-	-	-	-
Total	Area of cultivation (ha)	6,571	9,002	5,329	59.0%

Source: Appraisal information packet, and materials provided by CEDEGE

Given a target benefited area[14] of 5,800ha and counting both the rainy and dry seasons, the plan was slating an area of cultivation[15] of 9,002ha. The current area of cultivation, however, comes to 5,329ha,[16] remaining at 59% of planned figure. Excluding coffee, for which data could not be gathered, the ratio of actual to planned

[14] Projected benefited area in the target region.

[15] The total area where rice is actually harvested. If cultivation is carried out separately in the rainy and dry seasons (e.g. second crop), the number of cultivation is combined. The area of developed outlying lands is the area of the portion of the area of cultivation where small canals and farm fields have been developed and efforts are made to ensure the efficiency of arable land.

[16] Figure combining the rainy and dry seasons. Data on actual results for coffee could not be gathered, and it was not possible to obtain individual data for other crops.

figures is 61%. Actual figures for production and yields for many of the crops fall short of their initial targets, but if one compares actual results with those at the time of appraisal, the current figures constitute increases. According to an interview study conducted by the executing agency[17], one of the reasons for the increase was the advancement of the shift from dry-land rice planting to wet-land planting. And aside from the crops listed above, it was confirmed that farmers have succeeded in diversifying their business configuration using irrigation facilities, as, for instance, raising tilapia (a freshwater fish). Even so, overall performance is below target levels. The reason for this according to interview studies with the executing agency and the farmers are as indicated below.

(1) Reasons for lack of infrastructure development and infrastructure use in outlying arable lands

1) Because only approximately 30% of outlying arable lands in the plan were provided with the facilities needed to draw in water for irrigation canals to arable lands, many farmers could not draw in water from the irrigation canal[18].
2) While the annual water fees levied for use of the facilities is relatively high at US$80 per hectare[19], many farmers did not understand the effects of using the irrigation facilities, and so many did not use them[20].
3) Approximately 1,500ha of the benefited area in the lower basin is not suited for agricultural production during the rainy season on account of flood damage, which in turn was due to the fact that the drainage pump station was not set up.

(2) Software deficiencies such as insufficient agricultural technology[21]

1) Because, among other things, soil surveys within the project site were not conducted, technology that exploit irrigation was not disseminated.
2) Because most farmers employ a system wherein they cultivate mainly traditional crops such as rice, soybeans, and corn, they have little knowledge of the production of multiple harvests and high-value-added agricultural produce.
3) Because there is no coordination among farmers, there are no systematic

[17] Because figures representing the time of the original investigation were tallied by INERHI, the executing agency at that time, CEDEGE could not provide a clear conclusion regarding any discrepancies.
[18] According to the executing agency, farmers who have actually seen outlying arable land that has been outfitted expressed a desire to have their lands outfitted likewise.
[19] In the same region, this was set to US$24/ha for the Babahoyo irrigation project and US$10/ha for the Milagro irrigation project. In these projects, because it was possible for the irrigation to exploit differences in elevation, there was no need for an intake pump station that uses electricity, as in this project, and so operation and maintenance fees were set low. The increase in project costs incurred by paying irrigation fees of US$80/ha account for roughly US$10-US$13 of cost increases (US$680) if one applies them to the rice production costs (US$600-US$800/ha) in the figure on the next page.
[20] In an interview survey of farmers conducted at the time of the present investigation, many expressed the opinion that even if they pay the irrigation fees, they cannot be sure whether the benefit (a boost in production) will meet the cost burden.
[21] During the on-site investigation, group interview of 60 benefiting farmer households was conducted (20 households were interviewed each day for three days).

efforts under way to share technology.

4) There is no economic margin to handle capital investment for the production of new agricultural produce. Not only are farmer incomes low, but there is also no functioning agricultural credit system. Because the production costs of rice, soybeans, and corn in particular are high, profitability is low.

Reference: Main Agricultural Produce Production Costs and Price Range (June 2005)

Crop	Price/100 lbs (approx. 45kg)	Production cost/ha
Rice	$18-$22	$600-$800
Corn	$7.5-$8.5	$470-$600
Soybean	$12-$14	$470-$500
Coffee	$55-$65	$180-$280
Cacao	$52-$60	$370-$570

Source: Banco de Nacional Fomento (2005)

*Because these statistics were gathered from various regions, the minimum and maximum figures are shown for each item.

Given all of the above, to effectively use the irrigation facilities and achieve project objectives, it is clear that certain steps need to be taken. Specifically, there is a great need for measures that combine the development of hard aspects such as the development of outlying arable lands, as well as assistance for soft aspects such as for the dissemination of technologies that help achieve high-productivity agriculture via irrigation facilities, and support for an information campaign.

Fig. 2 Interview-based studies of farmers

2.3.2 Prevention of flood damage

It was expected that by providing drainage facilities through this project, it would be possible to reduce flood damage during the rainy season. After the project was completed, because rainfall proved to be half that of a typical year, it was not possible to gather sufficient data to assess the project's efficacy. Even so, it is expected thanks to

the construction of drainage canals and embankments in the lower basin through this project, out of the 2,680ha of land that were being damaged by floods in the rainy season, 1,160ha will be protected. That said, as the drainage pump station that was initially supposed to be constructed through self-funding on the Ecuadorian side (see 2.2.2 “Project period”), some feel that roughly 1,520ha of land furthest downstream continue to be subject to possible flooding just as before[22]. According to a rough estimate[23] by the executing agency, the value of produce saved on lands whose flood damage has been mitigated by the project may reach 187 million yen annually.[24] Solving the drainage water problem and increasing agricultural productivity during the rainy season is important because it enhances project effectiveness.

Table 3. Regions Affected by Flood Damage

Region	Water level of existing drainage	Highest water level during rainy season	Area damaged (ha)
Catarama	9.8m	12.0m	635ha
Sibimbe	9.1m	11.0m	865ha
		Total	1,520ha
		Total damaged area*	3,755ha

Source: CEDEGE

*The total damaged area represents the sum of the yearly area of cultivation of the flooded area of 1,520ha estimated by the executing agency.

2.3.3 Recalculation of Economic Internal Rate of Return (EIRR)

Using the calculation method used at the time of the appraisal, costs were calculated by summing project costs, operation and maintenance costs, and the cost of renewing machinery and equipment. Profit (benefit) was calculated by subtracting the increase in production costs from the increase in agricultural production[25]. When the Economic Internal Rate of Return (EIRR) was recalculated using this method, it had dropped from 10.6%, the value at the time of the appraisal, to 2.14%. The main reason that the internal

[22] In the study conducted from 1999 to 2000, in these regions, the maximum water level during the rainy season surpassed 10m. Areas less then 10m above sea level could not be handled using natural drainage using the existing drainage canals, and 1,520ha were submerged as a result. During this year's rainy season (January-May), rainfall amounted to 180-600 mm, which is average for that region.

[23] Regarding the F/S (from CEDEGE) for construction of the drainage pump station, when comparing annual production figures with and without the pump station, the estimates came to 500 million yen with, and 313 million yen without the pump station (a difference of 187 million yen).

[24] By cultivating in the rainy season, it is possible to achieve three planting seasons for rice, resulting in an increase in annual production.

[25] This targeted four crops—rice, corn, soybean, and cacao—for which figures could be confirmed this time.

rate of return had fallen below target is that agricultural production had not achieved planned values because as the area of cultivation remained at only 60% or so of planned values.

Summing up the above, the effectiveness of the present project can be judged as follows:

1) Findings relating to the project's effectiveness are anticipated for 1,400ha of outlying arable land that has been developed. However, to raise project effectiveness, a supportive environment on the intangible side is needed, including such things as better dissemination of cultivation technology and increased access to farm credit.

2) It is felt that the project's greatest bottleneck to expressing effectiveness is the lack of development of outlying arable land. Under the current circumstances, doubts surround farmers' intentions and their capability of paying their own expenses. Since self-financing is thought to be unlikely, the Ecuadorian Government must do something to improve matters.

3) Excluding 1,500ha of lower basin land, reductions in flood damage are expected thanks to the provision of drainage canals.

4) When requesting a third loan extension, the executing agency asked that it be applied to the drainage pump station that was supposed to have been erected by the executing agency using self-financing. However, considering the political instability and worsening economic indicators at that time, the decision to reject the petition was inevitable. Accordingly, to protect the roughly 1,500 ha of lower basin land from flood damage, the Ecuadorian side needs to take steps to improve matters.

2.4 Impact

2.4.1 Improvement of farmer income

The table below shows trends in annual income classified by the area of cultivation of farmers from the Catarama and Sibimbe districts, respectively, based on a questionnaire survey carried out locally. It seems that the effects of this project have made a definite contribution, as is seen in the increase in income since 2000 at all income levels, or the increase in rice yields resulting from a shift from dry-land planting to wet-land planting (see 2.3.1). That said, if one considers the rate of inflation during that period (from 2000 to 2004 the average was approximately 8.8%),[25] in terms of real income there is no significant increase, and so at the present time, it is not possible to conclude that there has been a clear result in terms of farmer income enhancement.

Table 4. Trends in Farmer Income (2000 - 2004)

(Unit: US$)

At time of appraisal	Plan	Actual performance					
Upper tier: sucres Lower tier: dollars		Area of cultivation	2000	2001	2002	2003	2004
383,000	1,450,000	1-5ha	2,853	3,033	3,308	3,577	3,682
		6-10ha	10,086	11,157	12,063	12,826	13,157
US$2,394	US$9,063	11-20ha	12,827	14,027	14,936	15,879	16,595
		21ha	19,125	20,375	21,625	21,438	21,588

Source: Appraisal and plan figures are based on appraisal information packet, and actual values are calculated based on a questionnaire survey of 45 farmer households that benefited from the project.

* The figures for the appraisal consist of a mean value arrived at by taking the gross value for the entire Catarama region, subtracting the tabulated production costs and dividing that by the number of farmers. An exchange rate of US$1 to 160 sucres (1986) was used.

In addition, the population who benefited from this project was 537 farmer households living in the Catarama region[26]. While there are no accurate demographic statistics, it is estimated that roughly 2,500 people reside in the area. As a secondary benefit of the project, 150-200 jobs were created while the irrigation facilities were being built.

2.5 Sustainability

2.5.1 Executing agency

2.5.1.1. Technical capacity

CEDEGE has six employees assigned to the project. These break down into three people specializing in farming technology, and another three specializing in other technologies. Because they all have some 10 to 20 years of expertise in the technology, it is felt that there are no technical problems with respect to the administration, operation, or management of the project equipment. On the other hand, because CEDEGE is mainly oriented towards water resource development, it needs to strengthen

[26] At the time of the appraisal, there were 400 farm households; the increase is attributed to immigrants who came later.

ties with other organizations in the area of intangible support for such things as farming guidance. (See 2.3.1). To enhance this project's future effectiveness, CEDEGE needs to strengthen its ties with related authorities, the Farm and Livestock Ministry, and international agriculture and husbandry research institutions such as El Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP). It also needs to provide a support structure for such activities.

A contractor has been responsible for the day-to-day handling of irrigation facilities, and it has assigned staff who possess actual management experience with irrigation projects in neighboring areas. The general operation and maintenance of irrigation facilities will eventually be turned over to an irrigation association managed by farmers. After the transfer, no major problems are expected because arrangements have been made to engage the contractor that has been responsible for operation and maintenance so far with providing the staff to handle the practical running of operations.

Fig. 3 Cleaning Work Performed on a Canal

2.5.1.2 Operation and Maintenance system

(1) CEDEGE

The project executing agency at the time of the appraisal was Instituto Ecuatoriano de Recursos Hídricos (INERHI), but in 1989 it changed to Comisión de Estudios para el Desarrollo de la Cuenca del Río Guayas (CEDEGE). This was done because the people who were running the project under CEDEGE, which unified the various water resources development project for the Guayas river basin, were thought capable of efficiently planning and making adjustments during the development project.

CEDEGE currently has 134 employees. As currently all government bodies are undergoing structural reorganization, CEDEGE is also under investigation for possible reorganization. At the time of the present investigation, interviews with directors and heads of personnel departments suggested that major organizational changes are not expected.

The day-to-day operation and maintenance of irrigation facilities had been handled by the contractor, Hidalgo & Hidalgo. However, operation and maintenance duties were transferred to CEDEGE starting in 2005, and after a two-year transition period, operation and maintenance is slated to be handled autonomously by an irrigation association.

(2) Irrigation Association

Ecuador's Ley de Agua Article 78 (Article 78 of Water Law) stipulates that for each irrigation project an irrigation association be formed. For this project the association itself has already been established, and bylaws for the Catarama Irrigation Project Association have already been decided on. The association's director and people responsible for each region have already been appointed. The organizational structure is such that the canals will be divided into 11 districts. Each district will have three representatives (one representative and two vice-representatives), so that the association will have 34 representatives in total. However, at the present time there is no real activity taking place. CEDEGE has plans under way to petition for cooperation through a farmers conference, judging from a group interview of farmers at the time of the on-site investigation, many voiced the notion that under the current conditions wherein there is no progress in outfitting outlying arable lands and people are not using the irrigation facilities, there is little intention in participating in operation and maintenance.

2.5.1.3 Financial status

(1) CEDEGE

CEDEGE has taken the form of a public corporation, and originally it had a self-supporting accounting system. However, the income from the large-scale irrigation projects that CEDEGE administers is being managed directly by the Ecuadorian Government, and in the budget it is handled separately. The way this revenue is spent is decided upon by the central government, and is limited to investment or the like for new projects. Table 5 compares requested and actual budgetary annual figures for all of CEDEGE. Looking at budget requests made to the central government for the past two years, expenditure came to 10% or less of the requested amount regardless of the year. Under the current circumstances, where, outside of personnel expenses for employees, allocations cover only a fraction of facilities costs, procuring the financing needed to operate and maintain the facilities is problematic. As the debt rate is 5.7%, current financial conditions are not a problem. For this reason, financial conditions have stabilized, but the fact remains that discretionary allocations made each year for CEDEGE continue to be low. For this project as well, money earmarked for land

acquisition has yet to be approved[27].

Table 5. CEDEGE's Annual Budget and Actual Figures

(Unit: US$1)

	2005	2006
Requested amt.	194,984	170,785
Actual amt.	13,377	17,663
Actual/ Requested	6.9%	10.3%

Source: CEDEGE

Table 6 Balance Sheet

(Unit: US$1,000)

		2004	2005
Assets	Current assets	179,620	176,306
	Fixed assets	1,753,532	1,739,378
	Other assets	229	70
	Total assets	**1,933,381**	**1,915,754**
Liabilities	Current liabilities	35,942	8,913
	Fixed liabilities	91,836	99,676
	Total liabilities	127,778	108,589
Capital	Capital stock	1,802,257	1,805,468
	Surplus	3,346	1,697
	Total capital	1,805,603	1,807,165
	Sum of liabilities and capital	**1,933,381**	**1,915,754**

Source: CEDEGE

(2) Irrigation association

At present, the contractor is in charge of operation and maintenance. Because they are not operating a pump station, irrigation fees are not being levied. The irrigation association estimates that the annual irrigation fees will come to US$80-US$110 per hectare[28]. Farmers who were interviewed expressed the opinion that that was too high.

[27] In the on-site study, regarding the budget for operation and maintenance of the irrigation facilities, estimated to be US$20 million annually (the personnel expenses corresponding to yearly operation and maintenance fees), there was some suggestion that it would be allocated.

[28] See footnote 19 in 2.3.1.

2.5.2 Operation and maintenance

CEDEGE has set up an office in neighboring Ventanas with six staff members permanently stationed to handle the project. The staff breaks down into three agricultural technology specialists and three other technical staff. They are responsible for supervising day-to-day operation and maintenance while providing instruction to farmers. When CEDEGE hands control of operation and maintenance to the irrigation association, major issues for the work are not expected because those in charge are looking at engaging the contractor that has been in charge of operation and maintenance until now.

At the time of the current study, when confirming the management conditions of irrigation facilities with the contractor in charge of operation and maintenance, some damage was noted. For instance, the measuring meter for the canal's sluice gate was stolen (this happens twice a month), part of the canal was damaged, and some vegetation has been growing in drainage canals. However, the overall response was that in terms of operation and maintenance no major problems exist.

3. Feedback

3.1 Lessons Learned

In terms of the failure to develop outlying arable lands or irrigation facilities, if the effects of the facilities were demonstrated by installing them for targeted farmers and information campaigns were properly done in order to draw out farmers' latent demands, a greater amount of agricultural land development would advance smoothly with the proactive involvement of the farmers. (Also, it is assumed by some influence of which past accumulated data and information had not been fully utilized by a change of the executing agency.)

3.2 Recommendations

A number of reasons can be pinpointed for the failure to develop outlying arable lands or use irrigation facilities. First, a solid understanding of the relationship between the benefits (increased agricultural production) and costs (land acquisition needed to develop outlying arable lands and irrigation fees) of carrying out irrigation projects is poorly understood. Moreover, a support system for intangible issues such as farming coaching to support the effective use of the irrigation work has not been provided. To resolve these issues, it is suggested that the following measures be taken.

(1) Dissemination of information on the advantages of using irrigation facilities

To promote the use of irrigation facilities in the future, farmers need to be coaxed into

taking the initiative by demonstrating the facilities' practical value through information campaigns and the like. In particular, one idea is to show farmers the efficacy of irrigation by taking a portion of the benefited farmers and supporting them through a pilot study.

(2) Provision of a comprehensive agricultural development plan

To advance the use of irrigation facilities, those in charge must decide on a standard for what constitutes suitable provision of facilities and then conduct the development of outlying canals and fields. Following that, these must be provided together with intangibles like agricultural technology and financing in such a way that the majority of farmers can participate in the project. It is hoped that the executing agency will help strengthen farmers' overall capabilities by reviewing the possibility of doing such things as providing an agricultural experiment station and providing better access to farm credits[29].

[29] The loan system at Ecuador's industry bank, Banco Nacional de Fomento, provides such options as small-scale loans (with 12% interest) with agricultural produce as collateral and financing targeting small scale producers (US$5000 limit at 8%). Interest rates run from 8%-13.43%. Repayment periods range from eight months for short-term financing to four years for long-term financing. The Catarama branch had 34 loans in the period from January to July 2005, with loans going to farmers, ranchers, and small-scale industry. Considering the number of benefited farm households in the Catarama region (537 in all), it cannot be said that the current level financing amounts to much, and certainly more financing needs to be provided in the future.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Scope of project		
1) Sibimbe plan	1) Benefited area 3,470ha	1)
a. Construction of head works	a. Max. flow rate 5.0m^3/s	a. Max. flow rate 4.85m^3/s (roughly as planned)
b. Irrigation canal	b. 54.0km	b. 42.1km (roughly as planned)
c. Drainage canal	c. 52.2km	c. 56.1km (roughly as planned)
d. Development of outlying arable lands	d. 2,250ha	d. 796ha
2) Catarama Plan	2) Benefited area 2,330ha	1) As planned
a. Construction of pump station	a. Max. flow rate 3.3m^3/s	a. Max flow rate 2.7m^3/s (roughly as planned)
b. Irrigation canal	b. 28.1km	b.26.7km (roughly as planned)
c. Drainage canal	c. 24.8km	c.15.2km (roughly as planned)
d. Development of outlying arable lands	d. 1,850ha	d.612ha
3) Procurement of farming machinery	3) Procurement of farming machinery 22 tractors, 6 combines, 52 other machines	2) Cancelled 3) Cancelled
4) Procurement of maintenance facilities and equipment	4) Procurement of maintenance facilities and equipment Project office, workshop, bulldozers, etc.	
5) Embankments in lower basin	5)	4) Total 13.7km Sibimbe 1 4.8km Sibimbe 2 7.6km Catarama 1.3km
(2) Project period	Feb 1988-Dec 1992 (59 months)	Feb 1988-Dec 2002 (179 months)
1) P/Q	1) Feb 1988-June 1988	1) Apr 1992
2) Tendering, tender evaluation	2) Jul 1988-Dec 1988	2) May 1994-Jul 1995
3) Contract	3) Jan 1989-March 1989	3) Aug 1995-Nov 1995
4) Establishment of L/C	4) Apr 1989-Jun 1989	4) Apr 1996
5) Construction work for facilities	5) Feb 1988-Dec 1991	5) Jun 1996-Dec 2002
6) Development of outlying arable land	6) Jul 1990-Dec 1992	6) Dec 1999-Dec 2002
7) Consulting service	7) Jul 1987-Dec 1992	7) Sep 1990-Dec 2002

(3) Project Cost Foreign currency Local currency Total ODA Loan Portion Exchange rate	 6,400 million yen 3,500 million yen (Actual currency used: sucre) 10,110 million yen 8,594 million yen 1 sucre = 1.06 yen (As of Aug 1986)	 7,320 million yen 3,560 million yen (Actual currency used: US dollars) 10,880 million yen 7,320 million yen US$1 = 119.7 yen (Avg. over 1990 - 2003)