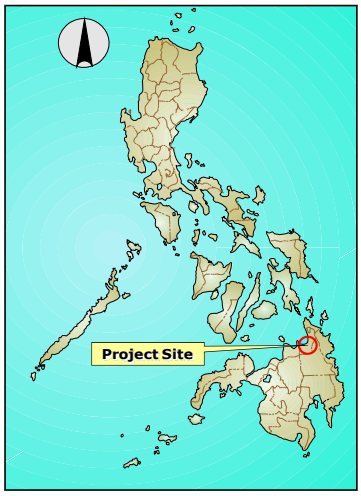
The Republic of the Philippines

Lower Agusan Development Project

External Evaluator: Haruko Awano, IC Net Limited[1]

1. Project Description



Project Site

Flood Sluice Gate constructed by the Flood Control Component

Main Irrigation Canal constructed by the Irrigation Component

1.1 Background

The Agusan River flows from south to north in the eastern part of Mindanao, leading to Butuan Bay. Its basin covers an area of 11,400 km² and is the third largest river basin in the Philippines. The lower Agusan River area is blessed with abundant rainfall and fertile plain and has a big potential for agricultural development. In its west bank is Butuan City, the center of economic activities of northern Mindanao. However, repeated flooding by overflowing of the Agusan River hindered economic activities, affected agricultural production, damaged properties, and endangered the population.

1.2 Project Outline

The objectives of the Project are: i) to mitigate flood damage by constructing an earth embankment levee along the banks of the Lower Agusan River, conducting dredging works, and improving urban drainage systems of Butuan City, and ii) to increase rice production by constructing irrigation facilities, thereby contributing to improvement of living standard and regional development.

The Project has two components, i.e., flood control and irrigation, and consists of the three-loan phases of Flood Control Phase I (FC I), Flood Control Phase II (FCII), and Irrigation.

Approved Amount / Disbursed Amount	▪ FC I: 3,372 million yen / 2,798 million yen ▪ FC II: 7,979 million yen / 7,317 million yen ▪ Irrigation: 4,040 million yen / 3,899 million yen

[1] This project was jointly evaluated with National Economic and Development Agency of the Philippines government.

Exchange of Notes Date / Loan Agreement Signing Date	▪ FC I: December 1987 / January 1988 ▪ FC II: March 1997/ March 1997 ▪ Irrigation: July 1995 / August 1995
Terms and Conditions	▪ FC I: Interest Rate: 3% Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied, Partial Untied (consulting service) ▪ FC II: Interest Rate: 2.5%, 2.1% (consulting service) Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied ▪ Irrigation: Interest Rate: 2.7%, 2.3% (consulting service) Repayment Period: 30 years (Grace Period: 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency(s)	Borrower: Government of the Republic of the Philippines Executing Agencies: ▪ F C I & II: Department of Public Works and Highway (DPWH) ▪ Irrigation: National Irrigation Administration (NIA)
Final Disbursement Date	▪ FC I: December 1999 ▪ FC II: February 2007 ▪ Irrigation: June 2006
Main Contractor (Over 1 billion yen)	▪ FC I: G.G. Reyes Const. / Universal Dockyard Ltd./ HOME Const./JPL Const.; (Philippines) (JV) ▪ FC II: Ciriaco Corporation (Philippines) F.F. Cruz & Co. (Philippines) Kajima Corporation (Japan) China International Water & Electric Corporation (China) ▪ Irrigation: C. M. Pancho Construction Inc. (Philippines) Kubota Corporation (Japan)
Main Consultant (Over 100 million yen)	▪ FC I: Nippon Koei Co., Ltd. (Japan) ▪ FC II: PKII Engineers (Philippines); TCGI Engineers (Philippines); Nippon Koei Co., Ltd. (Japan) ▪ Irrigation: Nippon Koei Co., Ltd. (Japan)
Feasibility Studies, etc.	F/S: 1981 DPWH
Related Projects (if any)	E/S (D/D): 1983 E/S loan

2. Outline of the Evaluation Study

2.1 External Evaluator

Haruko Awano, Senior Consultant, IC Net Limited

* Jointly evaluated with the National Economic Development Agency (NEDA) of the Philippines

2.2 Duration of Evaluation Study:

Duration of the Study: January 2010 – December 2010

Duration of the Field Study: March 7 – 31, 2010; May 25 – June 23, 2010;
September 7 – 11, 2010

2.3 Constraints during the Evaluation Study:

None in particular.

3. Results of the Evaluation (Overall Rating: Flood Control-C, Irrigation-D)

3. 1. Relevance (Rating: Flood Control - a; Irrigation - b)

3.1.1 Relevance with the Development Plans of the Philippines

(1) Flood Control

The Cotabato-Agusan River Basin Development Program (CARBDP) Office was established under DPWH in June 1978 through a Presidential Decree to develop the basin of the Cotabato River and the Agusan River, the two major rivers in Mindanao, and address the problems posed by frequent flooding. In the previous Medium-Term Philippine Development Plans (MTPDP 1987-1992 and 1993-1998), flood mitigation through flood control structures was identified as one of the priority programs. This involved the construction and improvement of flood control systems in the major river basins covering large fertile areas to increase agricultural productivity and minimize loss of lives and property. The Government of the Philippines (GOP) prioritized the implementation of flood control and drainage projects along the 12 major rivers in the country, including the Lower Agusan River Basin.

In the current Medium-Term Philippine Development Plan (2004-2010), the GOP expressed an intention to provide flood control and drainage facilities in all flood-prone areas, as well as to rehabilitate and improve existing facilities. Moreover, the Medium-Term Public Investment Program 2005-2010 of the DPWH included the Flood Control Project Phases I & II aiming for the protection of a total of 13,700 ha in the coverage area.

(2) Irrigation

In the MTPDP 1993–1998, the GOP prioritized promotion of food security through the provision of irrigation facilities and aimed to increase provision of irrigation facilities from 1.55 million ha to 1.93 million ha. Furthermore, the Agriculture and Fisheries Modernization Act (AFMA) of 1997 prioritized the self-sufficiency in rice and corn production and the promotion of food security. For this objective, the GOP aimed to promote the development of irrigation systems that are effective, affordable, appropriate and efficient.

The current MTPDP 2004-2010 also focused on self-sufficiency in rice production by increasing production efficiency and competitiveness. One strategy is to improve the access to irrigation services. In support of the MTPDP, the Rice Self-Sufficiency Plan envisioned a 100% self-sufficient rice production by 2010 through improved rice productivity and increased income of rice farmers. The focused interventions include the improvement of irrigation systems' effectiveness and efficiency through rehabilitation, repair and construction of new facilities

On the other hand, the Land Use Plan of Butuan City from 1973 to 1996 envisaged converting 2,000 ha of rice paddy, which is equivalent to one fourth of the target irrigated area (7,930 ha) of the Project, to residential and industrial areas. However, at the time of Detailed Design Study (D/D) in 1983, it was argued that the full development of this area will take longer time and therefore, this can still be included in the proposed irrigation area. The city officials are also

affirmative with this inclusion[2]. Although the Project was appraised in 1995, more than 10 years after D/E, the appraisal documents refer to neither this Land Use Plan of Butuan City nor the risks of land conversion. The following Land Use Plan of Butuan City from 1997-2010 expanded the area to be developed for industrial and residential areas. However, no information was obtained on how the NIA reviewed the land use plan of Butuan City at the time of project implementation. Butuan City is currently formulating a new land use plan from 2011 but no information on how the new plan will deal with the Firmed-Up Service Area (FUSA) under the Project was available.

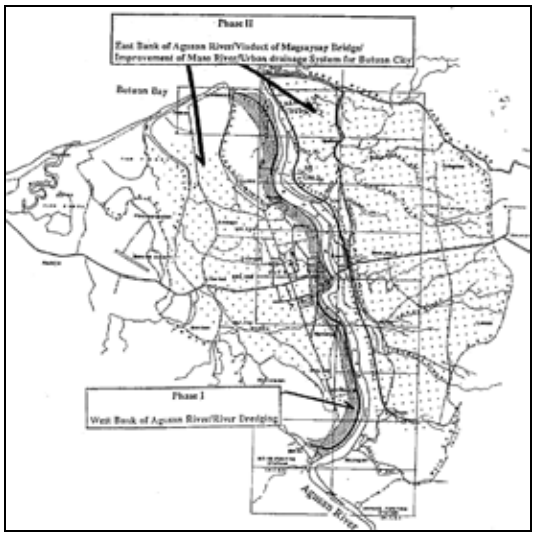


Figure 1: Project Area of Flood Control
(Butuan City in Northern Mindanao, Shading and dotted areas show the project area)

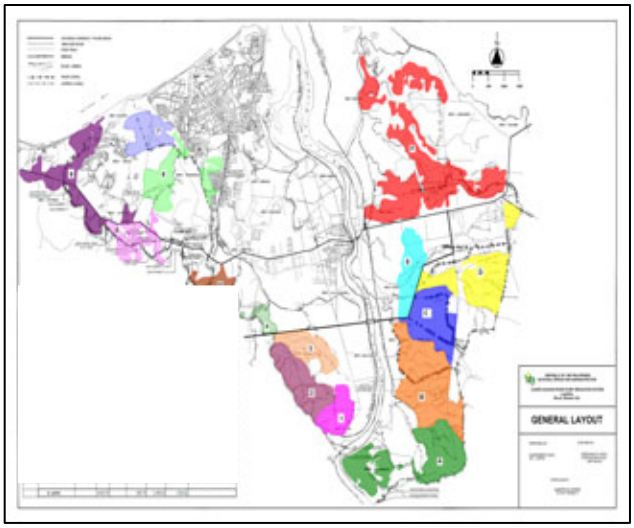


Figure 2: Project Area of Irrigation
(Butuan City in Northern Mindanao, Colored areas show the project area. Different colors indicate the areas categorized by Irrigation Associations.)

3.1.2 Relevance with the Development Needs of the Philippines

(1) Flood Control

Since the discharge capacity of the Agusan River was 1,800m³/sec, which equals the actual maximum flow every year (the maximum flow from 1990 to 1995 was in the range from 1,500 to 3,000 m^3 per second), flood occurred almost every year and continued for about two months. The damage by flood in 1981 included an inundated area of 8,000 ha, an inundation period of 60 days, 40 people killed, and 18,400 inundated houses, amounting to PhP 84.8 million in total. The damage caused delays in development and stagnant economic activities in the area.

As the center of economic and social activities in the Province, Butuan City's population has been steadily increasing over the last four decades and more than doubled from 131,000 in 1970 to 308,000 in 2009. As the population grows in the area, the need for flood prevention and mitigation becomes more imperative. In 1999, as the flood control project was yet to be

[2] In terms of the consultation with the city at the time of D/E, NIA explained that Agriculture Officers of Butuan City participated in the workshop. Other information was not provided.

completed, a major flood with the maximum flow of 4,500 m³/sec occurred, and caused significant damages as 8,700 ha was inundated.

(2) Irrigation

Although rice is a staple in the Philippines, the growth of its production had been sluggish due to the slow increase of yield and cropping areas. From 1985 to 1995, the yield per hectare increased by 8% from 2.6 ton to 2.8 ton, cropping areas increased by 11% from 3.4 million ha to 3.76 million ha, and the total production increased by 20% from 8.81 million ton to 10.54 million ton. (Refer to the charts below.) The major challenge was low productivity due to flooding, insufficient improvements in irrigation development, and high cost of agricultural inputs. It was necessary to improve irrigation facilities, develop and disseminate various agricultural technologies, and promote mechanization. From 1999 to 2007, the yield was increased and the total production of rice reached 16 million ton. However, the import of rice is increasing due to growing per capita consumption. The amount of rice import more than doubled from 0.83 million ton in 1999 to 1.8 million ton in 2006.

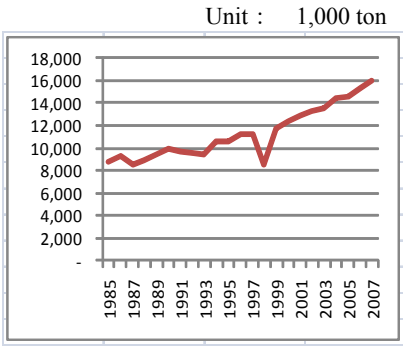


Figure 3: Philippine Rice Production

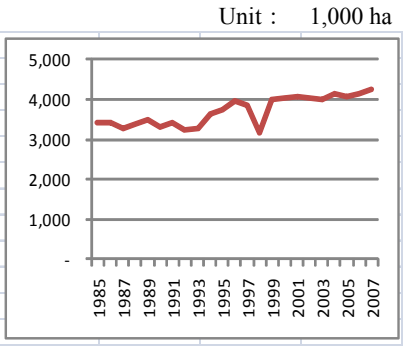


Figure 4: Rice Cropping Areas

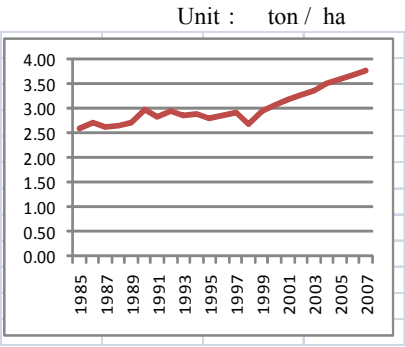


Figure 5: Rice Yields

Source : FAOSTAT Database, 2008. FAO, Rome. 22 Sep 2008

In Butuan City, promotion of agriculture had become important because its major industry of forestry had been stagnant. At the time of the appraisal, out of the total area of 15,881 ha which could be irrigated in the city, only 20% was irrigated. In addition, in 1990, the province of Agusan der Norte faced a rice shortage of 22,109 tons against the demand for 45,529 tons. Since then, the urbanization of Butuan City led to the decrease of farmland and the possible area for irrigation also decreased to 9,546 ha in 2008[3]. At the time of the ex-post evaluation, the conversion of a portion of the project area to a housing area was also observed.

The concept of the Project (both of Flood Control and Irrigation Components) originated from the Water Resource Development Plan by the CARBDP, which prioritized the development of the Lower Agusan River Basin. In 1980, the Feasibility Study (F/S) of the Project was conducted and the proposed project included a flood control component mainly consisting of levee embankment and a drainage system and an irrigation component covering 8,000 ha. The F/S put priority on the flood control component as a basis for the development project. Following the

[3] Out of the area, 4,967 ha was irrigated and 4,579 ha was yet to be irrigated.

F/S, a Detailed Design Study (D/D) was conducted in 1983, and it was proposed to implement the flood control component in two phases in view of the massive construction cost and difficulties in land acquisition and compensation. Considering the importance of protection of the most populated Butuan city center, the priority was given to the west bank area.

As for the irrigation, after the F/S in 1980 and D/D in 1983 were conducted, the Implementation Plan was made in 1995. Meanwhile, it was evaluated if a diversion dam or pumping irrigation was necessary and pumping irrigation was selected as the more appropriate method from both the technical and economic perspectives. However, there is no evidence that Butuan City was actively involved in determining the area to be irrigated when NIA was formulating the Implementation Plan.

3.1.3 Relevance with Japan's ODA Policy

"Overseas Economic Cooperation Policy" issued by JICA (former JBIC) in 1999 supported poverty reduction efforts of the GOP by providing assistance including environmental conservation and disaster prevention. In its Country Assistance Program 2000, the Government of Japan aimed to support the GOP's efforts towards alleviating poverty and redressing regional disparities and recognized the importance of providing assistance on rural infrastructure to achieve agricultural and rural development. The focus areas of assistance included disaster prevention.

Given the above, the flood control component of the project has been highly relevant with the Philippines' development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high. The irrigation component is also relevant to the country's development plan to and needs to increase rice production through the provision of irrigation facilities as well as Japan's ODA policy to focus on assistances for agriculture and rural development. While the Land Use Plan of Butuan City (1973-1996) envisaged that one quarter of the target area would be diverted to other purposes, at the time of D/D, the officials of Butuan City agreed the inclusion of the area in the project target and the relevance was confirmed. However, the following Land Use Plan of Butuan City (1997-2010) which was formulated after the appraisal in 1995, the planned industrial and housing areas were further expanded. Since the relevance with the city land use plan is critical to determining the target area and the implementation of the project and the reduction of agriculture area by urbanization was observed at the time of ex-post evaluation, the component's relevance is fair.

3.2 Efficiency (Rating: Flood Control – b; Irrigation – c)

3.2.1 Project Outputs

For both components, several modifications to the original scope at the time of appraisal were noted. In particular, for the two phases of the flood control, many changes of scope were done during the detailed design review and the construction period.

(1) Flood Control

Civil Works

Flood Control Component consists of Phase I which constructed levees and other facilities in West Bank and Phase II which included the construction of levees in East Bank, construction of Magsaysay Viaduct, rehabilitation of PIER E4 of existing Magsaysay Bridge and improvement of urban drainage system in West Bank. In Flood Control (FC) Phase I, most of the target project outputs were delivered except for utilities such as electricity and water facilities of the

resettlement area. Several changes in scope of work were noted such as reduction of embankment and dredging[4], and increase in length of concrete flood wall. These changes were due to right-of-way (ROW) problem on land acquisition and in consideration of actual situation of developed urban areas. A floodgate[5], which was not part of the original plan, was constructed to allow free flow of water from the Agusan River to Agusan Pequeño and vice versa. The changes were deemed appropriate and have no adverse effect on the project objective, except for the followings.

- The cancelled utilities at the resettlement area have delayed resettlement of affected residents.
- Expected flood control effects at the downstream end of the river were not fully achieved because of the cancellation of embankment in the area which was due to the objections from fishpond owners against land acquisition.

Table 1: Planned and Actual Project Outputs (Flood Control I)

Projects / Outputs	Plan	Actual
Embankment Levee	12.3 km; Height 4 m	10.3 km; Height 4 m
Concrete Floodwall	2.1 km; Height 4 m	5.4 km; Height 4 m
Dredging	900,000 m³	700,000 m³
Urban Drainage System	1,100 m	880 m
Floodgate	None	1 (addition)
Spoil Bank Yard Treatment	171 ha	20 ha

For FC Phase II, which consisted of four contract packages, several changes from the original scope were noted in the three packages as below. Major reasons were i) increase in cost of civil works brought about by economic crises; ii) objections from local residents against the land acquisition; and iii) to meet actual field conditions such as the needs for access by fisher folks, environment protection, and availability of existing roads. However, a few changes affected the intended project effects.

- Package 1 (Improvement of the East Bank): (a) intended spillways were not constructed due to negative reactions from the residents and sluice gates were introduced[6]; (b) levee was shortened due to lesser development status of downstream area and the consideration that adjacent spoil bank yard could already serve as a barrier to flooding backwater; (c) cut-off channel[7] was reduced because of the ROW problem and removal of the intended cut-off channel maintenance road.
- Package 2 (Construction of Magsaysay Viaduct): There were no major changes.
- Package 3 (Banza River Improvement): (a) reduction of land improvements for resettlements; (b) change from lease to purchase of the spoil bank yard; and (c) removal of

[4] Dredging is an excavation activity or operation usually carried out in shallow seas or fresh water areas with the purpose of gathering up bottom sediments and disposing of them at a different location. This technique is often used to keep waterways navigable.

[5] Floodgates are adjustable gates used to control water flow in reservoir, river, stream, or levee systems. In the project, the floodgates were constructed to control backwater flow from Agusan River during high water level.

[6] A spillway is a structure used to provide for the controlled release of flows from a dam or levee into a downstream area, A sluice gate is a wooden or metal plate which slides in grooves in the sides of the channel. Sluice gates are commonly used to control water levels and flow rates in rivers and canals.

[7] A cut-off channel is a channel made to straighten a stream.

the East Bank drainage interceptor canal. Primary reasons for the modifications include the urgency to provide immediate relocation site and insufficiency of funds. The cancellation of the East Bank drainage interceptor canal where the levee was constructed resulted in negative effects on flooding caused by heavy rains. For the resettlement area, the DPWH later purchased another land of about 70 ha and Butuan City developed part of the area for relocation of residents.

- Package 4 (Masao River and Urban Drainage System Improvement): (a) increased dredging (deepening) along the Masao River and deleting levee and embankment ; and (b) cancellation of some drainage system improvement due to ROW issues (i.e., Langihan-Agusan Pequeño creek) and because some drainage improvements were already undertaken by the DPWH regional office. The increased dredging activities and cancellation of the levee were deemed appropriate, while the cancellation of the Langihan-Agusan Pequeño drainage system resulted in continued flooding in adjacent areas. DPWH understood the importance and necessity of this drainage component but it was difficult to undertake due to serious ROW problem. Dialogue with the City resulted to an agreement to undertake other section (additional scope of work) which is the Sosompit channel while the City will implement Langihan – Agusan Pequino Drainage in the future.

Table 2: Planned and Actual Project Outputs (Flood Control II)

Projects / Outputs	Plan	Actual
Package 1: Agusan River Improvement		
Levee	Length 14.5 km; Height 4 m	Length 12 km; Height 4 m
Related structures	Spillway 300 m; irrigation canal crossing; drainage sluice and siphon	Mahay sluice; Banza navigational sluice; Maug sluice; 8 RCPC cross drains
Cut-off channel	5.7 km	5.5 km
Cut-off channel maintenance road	1.2 km	Cancelled
Dike	7.3 km	Cancelled
Dredging	300,000 m³	Cancelled
Excavation	740,000 m³	693,375 m³
Tumampi Bridge	Pedestrian bridge	Vehicular bridge, 3 spans and 48 m in length
Package 2: Construction of Magsaysay Viaduct		
Construction of Viaduct	628 m	628 m
Cut-off channel bridge	90 m	90 m
Approach road	135 m	135 m
Package 3: Banza River Improvement		
Dike (Left Bank only)	6.2 km	Deleted
Dredging	1,212,000m^3:	2,180,905 m^3:
Spoil bank yard	170 ha	90 ha
Land improvement	30 ha out of the spoil bank yard; provision of water, electricity, roads, and drainage facilities, construction of 415 housing	7.83 ha was purchased and developed, provision of water, electricity, roads, and drainage facilities, construction of 415 housing.
East bank drainage	15.3 km	Deleted

Projects / Outputs	Plan	Actual
Additional		Banza Pedestrian Bridge of 72 m (added)
Package 4: Masao River and Urban Drainage System Improvement		
Masao River Improvement:	Levee 11.7 km; excavation (193,000 m³); and dredging (185,000 m³)	Levee was cancelled, Excavation (408,700 m^3) and dredging (408,700 m³)
Improvement of Urban Drainage System	Total = 30km in 6 areas	a) Urban Creek Improvements: Total 19.1 km in 7 areas (including Sosompit Drainage Channel: Total 1.4 km (added)) b) Drainage Channel Sluices & Culverts (added)

(1) Irrigation

Civil Works

In the Project's Irrigation Component, most outputs were delivered but with the following changes in scope and specifications: (a) reduction of the target service area by 43 percent (from 7,930 ha to 4,492.76 ha); (b) construction of regulating ponds for both Bit-os and Aupagan; (c) reduction of lateral canals; (d) reduction/cancellation of sub-laterals; (e) reduction of drainage canals in Aupagan by 50 percent; (f) addition of concrete canal lining; and (g) addition of related facilities such as turnouts. Most of the adjustments were deemed appropriate, in consideration of O&M, topography and site requirements. However, some of the changes resulted in cost increases, particularly the addition of concrete canal lining and regulating ponds. Related structures such as turnouts were added, but in four out of 11 irrigated areas surveyed it was found that some facilities were not strategically located, for example, they were constructed in the low level paddy areas and did not deliver water efficiently[8]. For construction of these terminal facilities, NIA usually employed local farmers. However, some terminal facilities of the project were done by the farmers outside of the area, which resulted in the above problem[9]. This factor in the construction process has become one of the reasons for inefficient delivery of irrigation water.

Conversion of agricultural land into residential, commercial, and industrial areas was the primary reason for the significant reduction in service areas. The possible conversion of the planned service areas, although identified in Detail Design Study in 1983, was not indicated in the Appraisal Documents as a potential risk to the Project. The flood control and road improvement projects in the target area also facilitated the land conversion. Due to reduction in service areas, the constructed irrigation facilities such as main canals became too large and affected efficiency and sustainability of water provision. As indicated in the table below, the

[8] Based on the site observation, interviews with Irrigation Associations (IAs), and beneficiary study. FUSA is divided to 15 areas and 11 areas were functional due to the problems of irrigation facilities as explained later. The situation of all the turnouts of FUSA could not be checked at the ex-post evaluation, but it was found that there are the turn-outs with the problem in the four areas.

[9] According to NIA, since the local farmers were not available during the time, they had to hire the farmers outside of the area. Even when outsiders constructed the facilities, they could have done with consultation with local farmers to meet their needs. However, according to IAs, such consultation was not made. .

water discharge capacity and water depth of the constructed main canals are much greater than the values required by current FUSA. In addition, since actually irrigated and planted area was only one third of the current FUSA, the amount of irrigation water was much smaller than the required amount, leading to lower water level. However, it was hard to adjust the scope of civil works based on the reduced service areas since the land conversion began when 75% of the facilities were already built[10].

Table 3: Planned and Actual Project Outputs (Irrigation)

Irrigation Project	Plan	Actual
Service Area	7,930 ha	4,493 ha
Pump House	・ In Bit-Os and Aupagan, two-floor concrete buildings (254 m² and 266 m²);	・ Split level concrete building (327 m²); ・ Split level concrete building (396 m²).
Regulating Ponds and Intake Structures	Not part of original design	・ 2 regulating ponds (53,500 m² for each) ・ Intake structures each for Bit-Os and Aupagan.
Main Canal	Bit-Os: 19.48 km; Aupagan: 21.11 km	Bit-Os: 17.55 km; Aupagan: 21.85 km
(Discharge Capacity)	N/A*	Bit-Os 4,955 m^3, Aupagan 7,922m^3 *(Required by current FUSA:*** *Bit-Os 2,935 m^3, Aupagan 4,523 m^3)*
(Water Depth)	N/A	Bit-Os 1.32 m、Aupagan 1.64m *(Required by current FUSA:*** *Bit-Os 1.05m, Aupagan 1.26m)*
Laterals	Bit-Os: 21.84 km; Aupagan: 21.11 km	Bit-Os: 20.34 km; Aupagan: 16.97 km
Sub-laterals	Bit-Os: 2.91 km; Aupagan: 7.65 km	Bit-Os: 0.45 km; Aupagan: 0 km
Concrete canal lining	Not part of original design	Added 33.18 km of concrete canal lining
Road Network-Service Roads	Not part of original design	Constructed 60.22 km of service roads
Drainage Canals	Bit-Os: 33.00; Aupagan: 36.30	Bit-Os: 33.00; Aupagan: 17.04
Structures	Not part of original design	Added 30 units of structures
Related Structures	403 units	509 units

[10] The constructed canals were based on the original design to irrigate the original target of nearly 8,000 hectares hence the canal cross-sections (bottom and top width and depth) were too large for use in irrigating the current irrigated area which is only about 20% of the original target. NIA does not deliver the water required for the original FUSA but based on the current irrigated and planted area. However, the necessary irrigation water needs just for this reduced area is much smaller than the planned water amount, resulting to water depth in the canal that is too shallow to reach the turn-out levels to flow to the farm ditches (terminal facilities). Therefore, irrigation water cannot be delivered to the several areas, in particular along the lower stream of the river. In some irrigated and planted area, there are also the problem that the level of water is not sufficient. Therefore, illegal water tapping was rampant in the low stream areas. .

Project Facilities	13	14

Note:
* Since main canals were constructed based on the designed values of discharge capacity and water depth, the design values should be similar to the actual values.
** Based on calculation by the local expert.

Procurement of Equipment

Originally eight pumps were to be procured but the number was increased to ten to maintain additional two pumps as stand-by units when a pump would break down during normal operation or when a pump is shut down for maintenance. However, two pumps became unnecessary due to reduction of FUSA and are to be transferred to another project. 95 units of construction and maintenance equipments and tools and vehicles were also procured.

(1) Consulting Services for the Three Project

Under FC II, a study on watershed management was conducted but one on the flood forecast and warning system was cancelled. A Resettlement Plan was formulated as additional scope after the large flood occurred in 1999. As shown in the table below, a substantial increase of Man Months (M/M) for consulting services was seen in the flood control components from 1,573 M/M to 2,133 M/M, mainly due to prolonged implementation schedule, additional scope of civil works, and delayed resettlement program.

Table 4: Consulting Services (Man-Months)

Projects		Plan	Actual	% of Plan
FC I and II	Foreign	555	682	123%
	Local	1,018	1,451	143%
Irrigation	Foreign	130	126	97%
	Local	99	127	128%

3.2.2 Project Inputs

3.2.2.1 Project Period[11]

The flood control structures were to be constructed within 143 months in total. However, the actual duration was almost doubled to 268 months. The percentages of actual period against the plan were 203% for FC Phase I and 172% for FC Phase II. Here are the major reasons for the delay of FC I: (a) delay in the selection of the consultant and contractors (delayed by 22 months); (b) poor performance of contractors resulting in a three-year litigation and work suspension; and (c) ROW problems. In particular, the problem of contractors and subsequent litigation processes took three years. On the other hand, the delay of FCII was due to the following: (a) delay of pre-construction works because of upgrading of design and restructuring of Packages 1 and 3, and resettlement issues, in particular pre-construction works for Package 2 were delayed by 59 months; (b) changes in scope and additional dredging for Package 3 (21 months); (c) additional study and changes in scope for Package 4 (35 months); and (d) bad weather.

[11] Project period is calculated from the month of Loan Agreement to the completion month of civil works.

Table 5: Planned and Actual Project Implementation Schedule

Projects	Plan	Actual	% of Plan
FC I	Jan. 1988 to Dec. 1993 (72 months)	Jan. 1988 to Feb. 2000 (146 months)	203%
FC II	Jan. 1997 to Jan. 2003 (71 months)	Mar. 1997 to April 2007 (122 months)	172%
FC I and II	143 months	268 months	187%
Irrigation	Aug. 1995 to June 2002 (83 months)	Aug. 1995 to Aug. 2006 (133 months);	160%

On the other hand, the irrigation component was to be implemented for 83 months, but it lasted 133 months, i.e., 160% of the plan. Here are the major reasons for the delay: (a) delays in bidding out and awarding of a few major civil work contracts (by 6 months); and (b) delays in civil works (by 43 months) mainly due to the following: (i) problems of ROW including litigation (by 7-11 months), (ii) bad weather (by 8-19 months), and (iii) changes in design of irrigation canals (by 9 months).

3.2.2.3 Project Cost

While the total project cost for the flood control component was estimated at JPY 14,664 million at the time of the appraisal, the actual total project cost was JPY 14,524 million, or 99 percent of the estimated cost. The total disbursed amount of ODA Loan was JPY 10,115 million or 89 percent of the total approved amount. In peso terms, the actual project cost was PhP 5.553 billion or 172 percent of the PhP 3.237 billion estimated cost. The appreciation of the yen was a major cause of the cost increase[12]. Here are the other reasons for the cost increase in peso: (a) changes in scope such as additional flood wall for FCI, and addition of maintenance road, drainage canal, dredging, etc., for FCII Package 4 (by PhP 414 million); (b) inflation; (c) increase in the price of land acquired (by PhP 161 million for FCI and by PhP 667 million for FCII); (d) extension of consulting services (by PhP 73 million for FCI.

Table 6: Planned and Actual Project Cost

Component	Cost (Unit: Million Yen)		% of Plan	ODA Loans
	Plan	Actual		
FC I	4,026	3,696	91%	Approved – JPY3,372 M; Disbursed – JPY2,798 M
FC II	10,638	10,828	102%	Approved – JPY7,979 M; Disbursed – JPY7,317 M
FC I and II	14,664	14,524	99%	Approved– JPY11,351 M; Disbursed – JPY10,115 M
Irrigation	5,387	5,765	107%	Approved – JPY4,040 M; Disbursed – JPY3,899 M

For the irrigation component, the total funding requirement was estimated at JPY 5,387 million funded from a loan amounting to JPY 4,040 million. The actual expenditures amounted to JPY 5,765 million or 107 percent of the estimated cost with the total loan disbursement of JPY 3,899 million. In the peso equivalent, the actual project cost was PhP 2.3 billion or 176 percent of the PhP 1.304 billion estimated cost. The yen appreciation from JPY 4.13/PhP to JPY 2.47/PhP

[12] There were significant changes in the rates from JPY 7/PhP (for FCI) and JPY 4/PhP (for FCII) at the time of the appraisal to an average of JPY 3.2 and 2.46/PhP at project implementation, respectively.

during project implementation affected the increase of cost in peso. Here are the other reasons for the cost increase: (a) additional civil works such as concrete lining and realignment of the main canal (by PhP 416 million); (b) design changes of pump stations such as the additional regulating ponds and intake structures (by PhP 274 million); (c) increase in the cost of procured equipment such as increased number of pumps (by PhP 200 million); and (d) additional administrative cost due to extended implementation (by PhP 168 million).

As explained above, the flood control components' actual implementation period was significantly longer than planned but the actual project cost was lower than planned. Thus the Project's efficiency in the components is fair. For the irrigation component, the actual implementation period was much longer than planned and the actual cost was slightly more than planned. Thus the efficiency of the Project in the irrigation component is low.

3.3 Effectiveness (Rating: Flood Control -- a; Irrigation -- c)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

(1) Flood Control Components I & II

Flood Data

Butuan City is composed of 86 barangays[13] of which 27 are classified as urban. A substantial portion of this urban population resides along and adjacent to the banks of the river and was highly and directly affected by flooding at the pre-project period. The projects were designed to protect people, housings, agriculture and infrastructure from the major flood which would occur once in 30 years period by increasing the discharge capacity of the Agusan River from 1,800m³/sec to 6,000m³/sec. The table below shows the flood data from 1999 to 2009 in the city. During the 1999 flooding of the Agusan River, all the barangays of Butuan City were affected, which was before the Flood Control Project Phase I was fully completed. Flood Control II was completed in April 2007 and no major flood has occurred since then. In addition, neither Butuan City nor the DPWH maintains the data such as inundated area and time. Therefore, it is difficult to evaluate effects based on operation and effect indicators. It also should be noted that there are still 12 barangays with 4,500 households (including the households which were not included in the original resettlement plan) remaining within the floodway that are unprotected from flooding of the river. However, since there was no damage on agriculture and infrastructure in the floods after 2007, it is fair to say that this is the effect of the flood control components[14].

[13] A barangay is the smallest administrative division in the Philippines and is the native Filipino term for a village, district or ward.

[14] It could not be confirmed if the ten barangays affected by 2009 flood include those in the floodway.

Table 7: Flood Data of Butuan City from 1999 to 2009

No	Date of Occurrence	Type of Disaster	Maximum Flow (m^3/Sec.)	Annual Highest Water Level (m)	No. of Affected Barangays*	Affected Population*		Damaged Houses	Casualties	Total Cost of Damages (000 peso)		
						Families	Persons			Agriculture	Infra-structure	Total
1	1999 Feb.	Flashflood due to La Nina	4,500	3.97	86	57,451	288,477	0	14	53,130	79,540	114,670
2	2000 Feb	Flashflood	2,200	2.6	26	11,464	54,464	0	0	686	25,300	25,986
3	2001 Feb	Flood due to continuous heavy rains	1,500	1.96	15	3,780	17,875	0	0	4,355	8,000	12,355
4	2001 Dec-2002 Jan	Flashflood due to continuous heavy rains	1,600	2	50	12,064	54,453	7,425	0	33,820	29,240	63,060
5	2003 Oct.	Flashflood due to Continuous heavy rains	200	0.69	41	17,511	72,473	20	0	457	10	467
6	2004 Feb.	n.a	1,200	1.64	29	11,668	51,555	4	0	1,170	0	1,170
7	2006 Feb	Flooding due to Monsoon rains	3,300	3.2	31	13,250	68,347	0	5	17,016	50,960	67,976
8	2007 Jan	Flooding due to Monsoon rains	2,000	2.34	22	8,218	34,759	0	0	0	0	0
9	2009 Jan	Continuous heavy rains due to the tail-end of a cold front	1,500	1.95	2	n.a.	n.a.	0	0	0	0	0
10	2009 Nov	Continuous heavy rains for five (5) days	1,500	1.95	8	2,649	13,495	14	0	0	0	0

Source: CARBDP, Office of Civil Difence of Region XIII, CSWD of Butuan City

(2) Irrigation Component

Irrigated and Planted Area[15]

The irrigation component has an original target service area of 7,930 ha. 100% of the service area was to be irrigated and planted with rice in three years after the completion of the Project[16]. However, at the time of the ex-post evaluation, the actual irrigated and planted area is about 1,440 ha, representing only 18% of the target area at the time of appraisal and 38% of the current Firmed-Up Service Area (FUSA) of 4,493 ha. The Table 8 below shows the breakdown of these areas.

[15] The areas related irrigation are defined as follows. 1) Firmed up Service Area, FUSA: The service area to be covered by irrigation facilities, 2) Functional Area: The area where irrigation facilities operate. The area that irrigation is not functional due to the broken facilities is deducted from FUSA, 3) Irrigated and planted area: The area actually irrigated and planted with rice.

[16] Based on the calculation of EIRR at the time of appraisal.

Table 8: Firmed-Up Service / Functional / Irrigated Area (ha)[17]

Area	Plan	Actual				
	Irrigated/Planted Area	FUSA	Functional Area		Irrigated/Planted Area	
			Before brokages	After brokages	Before brokages	After brokages
Aupagan	4,760	2,725	2,725	1,681	n.a	**898**
Bit-Os	3,170	1,768	1,768	1,355	782	**542**
Total	7,930	4,493	4,493	3,036	n.a	**1,440**
Total / Plan	100%	57%	57%	38%	n.a	**18%**

Source: NIA

Note: Before/After brokages measn before/after brokages of siphone in Aupagan and the main canal in Bit-Os

The actual irrigated and planted area was much smaller than planned. Here are the major reasons.

1) Reduction of FUSA from 7,930 ha to 4,493ha due to land conversion to housings and others
2) Reduction of the functional area from 4,493ha of FUSA to 3,036ha (1,456ha reduction) due to the totally damaged siphon[18] in the Aupagan area and the incomplete canal lining and bench flume along Lateral D in the Bit-Os area. The NIA plans to rework these broken facilities and plans to complete the reworks by 2011.
3) Out of the 3,036 ha of the functional area, 1,440ha is actually irrigated and planted while 1,597 ha remains un-irrigated and not planted due to the following reasons.
   - The current facilities such as irrigation canals are too large for the current irrigated and planted area to be provided the required amount of water, resulting in a low water level for the turnout to draw water in some areas. Where related facilities such as turn-outs are not appropriately located, it is necessary to improve the structures to provide irrigation water.
   - Farmers do not have capital to develop their land.
   - There are absentee land owners or owners expecting the land development for other purposes.
   - Some areas such as along the Second Magsaysay Bridge and Bypass Road were already converted to residential areas[19].

[17] Based on NIA reports during the ex-post evaluation. Actual data of FUSA, irrigated / planted areas and functional areas after the collapse of the siphon and the main canal are as of Ex-Post Evaluation. The data of irrigated/planted area before the collapse of the main canal in Aupagan was not available because the problem started much earlier.

[18] A siphon is a tube, in an inverted U shape, which allows a liquid to flow over an obstacle and then discharge at a level lower than the surface of the original reservoir.

[19] The area is estimated about 200-250ha based on the map provided by NIA. The area along the bypass was planned for development for industrial and residential use in the Butuan City Land Use Plan 1973 and for institutional, commercial, and residential use in the city's Land Use Plan 1997. For land conversion of FUSA for other purpose other than agricultural, the land owner will request from the Department of Agriculture (DA) for a certification that his land is no longer suited for agricultural use and from NIA that it is not an irrigable area before he can apply for conversion from the Department of Agrarian Reform (DAR). In reality, the FUSA is being converted illegally by dumping gravel and other materials on the land to make it unsuitable for agriculture use before requesting from the DA and NIA for certifications hence naturally the land will no longer be suitable for agriculture. DA, NIA and DAR seem to have no appropriate countermeasures against the problem.

There are factors beyond the control of the NIA such as lack of capital by farmers, existence of absentee land owners, and conversion of FUSA or expectation for the conversion. Although the NIA submitted the rework plan to increase irrigated and planted areas, to implement the plan, the NIA needs to address several issues such as securing funds for the rework of irrigation facilities and linking with financial institutions for farmers to obtain funds for land improvement, some of which the NIA cannot resolve by itself. While the NIA plans that 100% of FUSA be irrigated and planted in five years, the rework plan includes areas which were already converted to residential areas. Therefore, further scrutiny of the plan is needed

Rice Production Yield

The Project was to provide irrigation facilities to the area most of which had not been irrigated. In the irrigated and planted area of the project, rice production increased steadily and achieved the target yield both in dry and wet seasons in 2009 as below.

Table 9: Yield of Rice in the Project Area (Unit: ton/ha)

At appraisal				Plan		Actual 2009	
Non-irrigated paddy		Irrigated paddy					
Rainy	Dry season	Rainy	Dry season	Rainy	Dry season	Rainy	Dry season
2.5	2.2	3.1	2.5	3.8	4	4.3	4.3

Source: Appraisal Documents and NIA

Water Charge Collection Rate, Rate of Project Income / O&M Cost[20]

The collection rate of the water charge was 57-65% in 2009, which is higher than the national average rate of 55% (based on the NIA document) but much lower than the target rate of 90% by the NIA to achieve financial sustainability of this project. In addition, the rate of water fee collected against the O&M expenses is very low at 18.5% and the NIA depended on the subsidy. While 12 Irrigators' Associations (IA) are formed, the data on the rate of water users joined in the IAs against the total water users was not obtained. According to the available information from the two IAs interviewed, 20-25% of the beneficiary farmers did not join the IAs. Reasons for not joining include lack of awareness on IAs and dissatisfaction with irrigation water delivery.

Table 10: Water Charge Collection Rate and Rate of Project Income / O&M Cost

Collection rate of water charge (%)				**Rate of Project Income / O&M Cost (%)**			
Year	2007	2008	2009	Year	2007	2008	2009
Rainy Season	16.1	71.1	56.6	Income / Expense	23.4	24.9	98.1
Dry Season	51.2	63.6	65.4	Water charge / Expenses	15.6	17.2	18.5

Source: NIA

[20] JICA uses the Sufficiency Rate of Operation and Maintenance Cost (O&M cost / Planned O&M cost) as the Operation and Effect Indicator. However, since the data for the indicator was not available, the alternative indicators which show how much of O&M costs were covered by the income from the project and by the collected water fees were used. This was because NIA adopted the policy to cover the O&M cost by the income from water fee collection.

3.3.1.2 Results of Calculations of Internal Rate of Return (IRR)

The Economic Internal Rate of Return (EIRR) was re-calculated for both the flood control component and the irrigation component using the same method at the appraisal[21]. Results are as follows.

Table 11: EIRR of Flood Control and Irrigation Projects

Project	At appraisal	At ex-post Evaluation
Flood Control Projects I & II	9.7% **	25.39%
Flood Control Projects I & II with Irrigation Project	16.5%	16.43%
Flood Control Projects I & II with Irrigation Project (Scenario 1)*		22.30%
Irrigation Project	11.6%	0.25%
Irrigation Project (Scenario 1)*		2.54%

Note: * Irrigation Project (Scenario 1) is based on the assumption that the current planted area will be increased by 5% annually to reach 80% of FUSA.

** EIRR 9.7% for Flood control projects was calculated at the appraisal time of phase 1.

The EIRR of the flood control components is 25% which substantially increased from 9.7% at the time of the appraisal of Phase 1. The benefit consists of reduction of damage on agriculture, livestock, fishponds, buildings, housing, and infrastructures. The increase of the EIRR is attributed to the increased protected area based on the renewed data by the CARBDP and the growth of the numbers of residences and buildings[22].

On the other hand, the EIRR of the irrigation component based on the current irrigated and planted area is very low at 0.25%[23]. The substantial decrease of the EIRR from the time of the appraisal is due to reduction in the planted area and cost increase.

The EIRR of the three components based on the current irrigated and planted area is 16% and almost the same as the rate at the time of the appraisal of Flood Control Phase II. Since the total investment cost (economic price) of the flood control components accounts for 71% of the total investment cost of the three components, the low EIRR of the irrigation component is largely compensated by the high EIRR of the flood control components.

3.3.2 Qualitative Effects

To measure the effect and impact of the flood control and irrigation components, a beneficiary survey was held with 100 sample Butuan City residents and 200 sample farmers in the irrigated area[24].

[21] For the flood control components, the area to be protected was calculated at the time of appraisal as 7,947 ha which was based on the affected area by the flooding in 1981. But the protected area was increased to 9,442ha based on the flood hazard hydraulic modeling for the 30-year flood frequency by CARBDP in 2004. The re-calculation at the ex-post evaluation used the same area as CARBDP in 2004.

[22] In the F/S, the ratio of benefit from buildings, residences and infrastructures at the 30-year flood frequency level was 77%. However, the ratio increased to 94% at the ex-post evaluation.

[23] Even if calculated based on the assumption that the FUSA will increase by 5% until 80% of the FUSA is irrigated and planted, the EIRR is 2.54%.

[24] 100 samples were taken randomly from the residents list of the barangays who reside 1) outside but adjacent to the embankment levees and floodwall and were directly affected by flooding from the river before (40 residents each from the

(1) Flood Control Components

1) Flood frequency, time, area and damage

Most of the respondents reported the effect of flood reduction by the project. After the completion of the flood control components, 81% of the city respondents declared that the flooding of their area from the Agusan River is gone and 84% said that the flooded area also decreased considerably. In terms of flooding time, 78% responded that flooding was gone. Moreover, 73% reported that damage to properties like house appliances, personal effects, and crops also decreased considerably. The Figures 3 and 4 below show the distribution of responses for these four parameters.

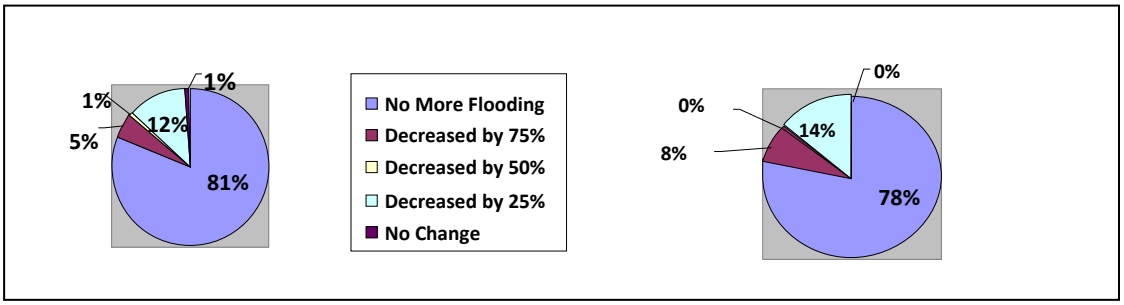


Figure 6: Annual Number of Flooding

Figure 7: Annual Flooding Time

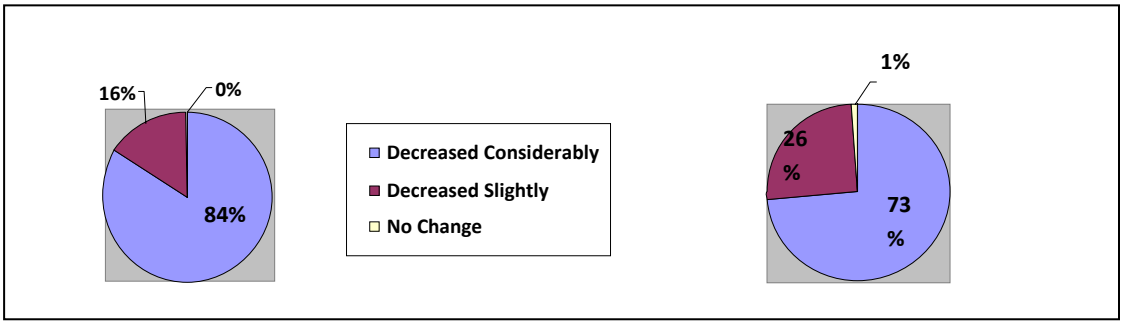


Figure 8: Flooded Area

Figure 9: Flood Damages

However, 44% of the respondents declared that they are still being flooded not from the Agusan River but due to heavy rains that could not be drained because city drainage was either clogged or insufficient or no drainage existed at all. A number of the respondents pointed out the overflowing of the East cut-off channel and city canals at the West as a cause of flooding by heavy rains. While the Project helped improve the urban drainage, it concentrated on the improvement of the Masao River and about 19.1km of existing and newly excavated channel, to serve as an outlet for the primary drainage channel in the city proper to drain local run-off water. However, not all the urban barangays benefitted from the outlet due to the cancellation

East and West Banks from 5 barangays each), and 2) at the western part of the city proper which is expected to have benefitted from the urban drainage system improvement (20 samples from 2 barangays). For the irrigation component, sample beneficiaries were selected randomly from the list of farmers who were billed by the NIA for the dry season of 2009/2010. 200 farmers in the currently irrigated area were covered by the survey, 100 in the West Bank and 100 in the East Bank. The areas where irrigation services were not provided due to broken siphon (downstream of the East Bank) and lateral canal (some area of the West Bank) were excluded from the samples.

of improvement of some drainage systems, and the rest of the existing insufficient city drainage facilities not being included in the improvement[25].

In the project, the synergy effects of two components of flood control and irrigation were expected. However, only 13% of beneficiaries of the irrigation component stated that their farm had been affected by flooding from the Agusan River before the flood control components. These areas are mostly at the upstream end of the service area and those nearest the Agusan River. Most of the farmers who experienced flood before responded that the flooding of their area from the Agusan River is gone and crop damage by flood has ceased after the projects and there is no crop damage.

No other service areas have been affected by Agusan River flooding even before the flood control components apparently due to either being too far from the river banks or located on a relatively high ground[26]. On the other hand, half the farmers interviewed are still affected by flood due to factors other than the Agusan River, such as overflowing of creeks and an insufficient drainage system. A negative effect of the Project was observed in Lower Tagabaka along the East Bank. The farmers reported that the embankment trapped rainwater in the absence of a drainage interceptor and caused flood. The reason for the flood is the removal of the planned drainage canal along the levee by the flood control components due to budget constraints.

The flood control components protected the irrigation facilities constructed and showed the flood control effects in some irrigated areas. However, synergy effects of the flood control and irrigation component are limited.

2) Effects of Technical Assistance

The technical assistance sub-components under the flood control component included the following: a) transferring technology to DPWH staff; b) O&M manual; and c) water resource management study. Transferred technical skills such as construction supervision and quality control were utilized in other flood control projects by DPWH staff members after the completion of the projects[27]. However, the O&M manual produced by the Project is not used by the PMO as designed due to budget constraints and the DPWH district office and Butuan City who are responsible for O&M do not know about the manual. Moreover, the utilization of the results of the water resource study was not observed and the latest Agusan River Basin Development Plan by the Department of Environment and Natural Resources (DENR) does not refer to the study. Therefore, it can be said that the effects of technical assistance are limited.

[25] The Asian Development Bank is reviewing the assistance to improve remaining drainage system in Butuan City and complementing effects with this project is expected.

[26] Had the original total target area at the West Bank been achieved, a substantial service area would have benefitted from the flood control projects, in particular those located on lower ground adjacent to Agusan River bank. However, these areas were deleted from FUSA due to conversion to other purposes. In addition, there could have been more samples from the downstream of the East Bank that were affected by flooding before but are not currently irrigated due to the damaged siphon. These areas were affected by flood but not included in the survey.

[27] The staff trained in the project was engaged in supervision of Pinatubo Hazard Urgent Mitigation Project (PHUMP) or Project for flood Disaster Mitigation in Camiguin Island. Laboratory Technicians who gained adequate knowledge in Quality Control was assigned in PHUMP, authorized to use nuclear density gauge acquired during the implementation of FC Phase II.

(2) Irrigation Component

1) Sufficiency of Irrigation Water Supply

The figures below show responses on sufficiency of irrigation water and indicate major improvements from before the Project. Before the Project, about half the respondents cited total water depletion in the dry season, and a similar number mentioned insufficient water supply. After the Project, the trend reversed with 51.5% in the dry season and 64.5% in the wet season reporting sufficient water supply. However, about one third of the farmers complained that water supply is still insufficient in the dry season[28]. On the other hand, 11.5 to 20 % of farmers stated that there was excessive water. The main reason for excessive water during the wet season is lack of drainage to address rainwater surface run-off, while the reason in the dry season is draining of excess irrigation waste water from adjacent farms.

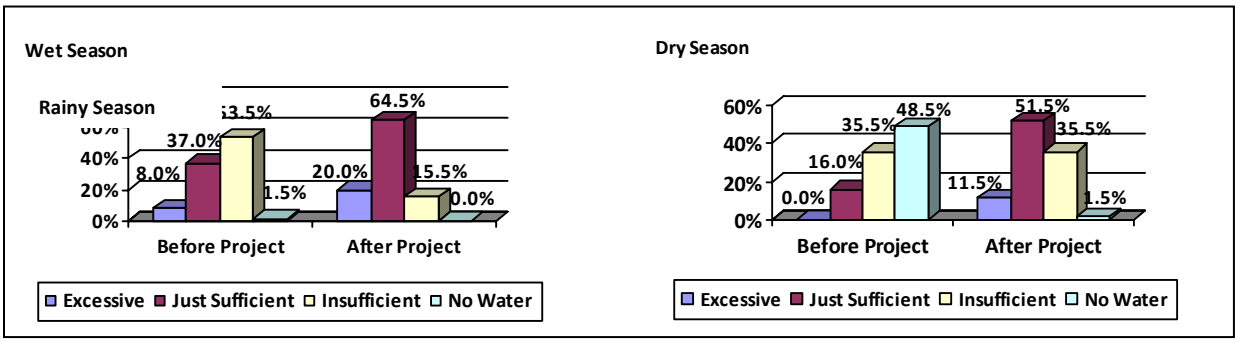


Figure 10:
Comparative Responses on Sufficiency of Irrigation Water at Before/After Project Period

Analyzing responses by location, i.e., Upstream, Midstream, and Downstream, the farmers in the Upstream and Midstream areas benefited the most especially in the dry season. More than half of them cited total depletion of water before but now they state that water is sufficient. On the other hand, 44% of the downstream farmers claimed that the water is still insufficient in the dry season.

[28] Here are the major reasons for this:
i) Only one pump is operating at each station to save the high power cost due to lack of O&M budget. Coupled with the larger canals compared to the FUSA, the water level is too low to deliver the water through turnouts. Therefore, water does not reach a few areas.
ii) The location of turnouts and farm facilities does not meet the actual needs of the farms.
iii) Rampant illegal water tapping is due to the insufficient depth of irrigation water in the canal.

Table 12: Water Sufficiency Rate by Stream (%)

Season	Stream	Before				After			
		Excessive	Just Sufficient	Insufficient	No Water	Excessive	Just Sufficient	Insufficient	No Water
Rainy	Up Stream	9	34.5	**53**	3.5	24	**58**	18	0
	Mid Stream	7.5	39	**53.5**	0	13	**73.5**	13.5	0
	Down Stream	8	36	**56**	0	24	**68**	8	0
Dry	Up Stream	0	16.5	29	**54.5**	13.5	**54**	30.5	2
	Mid Stream	0	10.5	32	**57.5**	11	**50**	38	1
	Down Stream	0	31	**69**	0	12	44	44	0

2) Cultivated Area and Production Yield of Rice

The Project aimed to assist farmers to increase the cultivated area through provision of irrigation facilities to the areas that had not been irrigated. 25 % (rainy season) and 31% (dry season) of farmers interviewed in both banks increased their cultivated area for rice. On average, these farmers increased the cultivated area by two to four times. The common reasons for farmers cannot expand their cultivated area are as follows: 1) lack of area for expansion; and 2) lack of capital to acquire land.

Table 13: Change in Rice Cultivated Area Before and After the Project

Area	Change	Rainy Season Average				Dry Season Average			
		% Resp.	Before (ha)	After (ha)	Change	% Resp.	Before (ha)	After (ha)	Change
West	Increase	23	0.91	1.9	209%	11	0.69	1.59	230%
	Decrease	11	1.19	0.77	65%	0	-	-	-
	No change	66	1.2		-	89	0.92		-
East	Increase	27	0.7	1.72	246%	51	0.49	1.9	388%
	Decrease	23	3.49	1.51	43%	7	1.86	0.71	38%
	No change	50	1.29		-	42	1.15		-

In terms of rice production yield, 69% and 72% of the farmers interviewed increased it by an average of 26% in the rainy season and by two to three times in the dry season. In addition to the availability of irrigation water, the change in farm practices helped increase production because 85% of the farmers introduced new farming practices such as mechanized farming, organic fertilizer, and improved product quality. Moreover, after the construction of a service road by the Project and embankment roads in the flood control components, government agricultural technicians visit the area more often to provide technical services, helping the farmers boost production. However, 15-19% of the farmers experienced a decrease in production.

Table 14: Change in Production Yield of Rice Before and After the Project

Area	Change	Rainy Season Average				Dry Season Average			
		% Resp.	Before (kg/ha)	After (kg/ha)	Change	% Resp.	Before (kg/ha)	After (kg/ha)	Change
West	Increase	82	3,556	4,452	125%	68	1,585	3,657	231%
	Decrease	15	3,814	2,993	78%	19	2,380	1,220	51%
	No Change	3	4,430		-	13	3,909		-
East	Increase	76	3,821	4,843	127%	89	1,491	4,392	295%
	Decrease	15	2,011	1,950	97%	0	-	-	-
	No Change	9	3,124		-	11	2,410		-

As explained in the above, for the flood control components, positive effects of flood control measures such as reduction of damage by flood as well as flood frequency were observed. With increasing population, households, and businesses in Butuan City, the expected benefit to residences and buildings increased, which resulted in the increase of the EIRR to 25%. The flood control components have thus largely achieved their objectives, and their effectiveness is high.

However, the irrigation component faced different outcomes. Although the component helped bring about substantial improvements such as increase in water sufficiency and rice production among the beneficiary farmers, the total irrigated and planted area was only 18% of the original plan and the effects were limited to a smaller number of farmers than expected. The EIRR is also very low at 0.25%. The Project has achieved its objectives at a very limited level. Therefore its effectiveness is low. The NIA is currently rehabilitating the facilities and the increase of irrigated and planted area is expected.

3.4 Impact

3.4.1 Intended Impacts

(1) Benefits of improving living standards by implementing flood control projects

In terms of gaining relief from the concerns of the Agusan River flooding, all the respondents of the beneficiary survey reported that they now feel assured that they will no longer be affected; with 60% highly assured. Their assessment of the risk of flooding hindering their livelihoods was high before the Project with 71% of the responses citing it as a significant hindrance. But, more than half (55%) of the residents responded that the said risks to their livelihoods were highly reduced after the Project. With regard to the increase of income after the Project, 77% said that the reduction of risks resulted in an increase in income. The reasons given for the increases in income are: 1) they are now able to continuously look for jobs and other means of support for their livelihood without interruptions; 2) they were able to diversify their economic activities into small businesses, like opening a sari-sari store (a small convenience store), or raising livestock for example. However, given the small scale of diversification, only two

percent said that there was an increase in employment that was generated from the flood control projects.

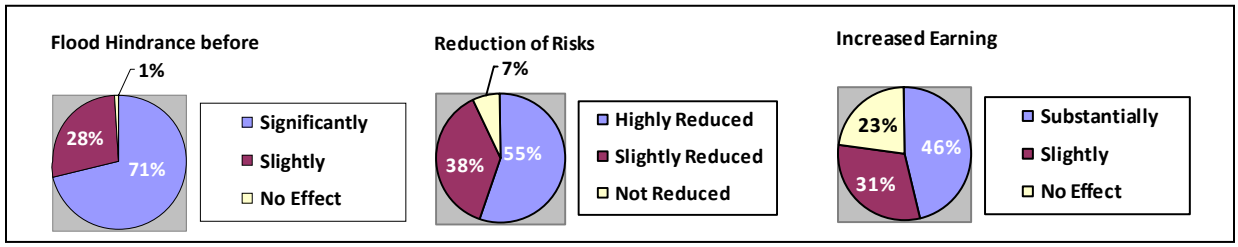


Figure 11: Flood Hindrance to economic activities before, Risk Reduction and Increased Income

For the health and sanitation, majority of respondents (86%) said that there was an improvement after the flood control projects were completed. They reasoned that water-borne illnesses like bilharzias were highly reduced. However, 14% of the respondents reported no improvement; especially those who live in areas where drainage systems were not improved said that they were still prone to diseases like dengue from mosquitoes breeding in stagnant water. 86% of the respondents reported that access to markets, farm inputs and basic services also improved due to the earth embankments, levee roads and bridges. In terms of the overall quality of life, 73% reported an improvement, such as better living conditions in newly built houses, better education for children, and opportunities to engage in backyard gardening.

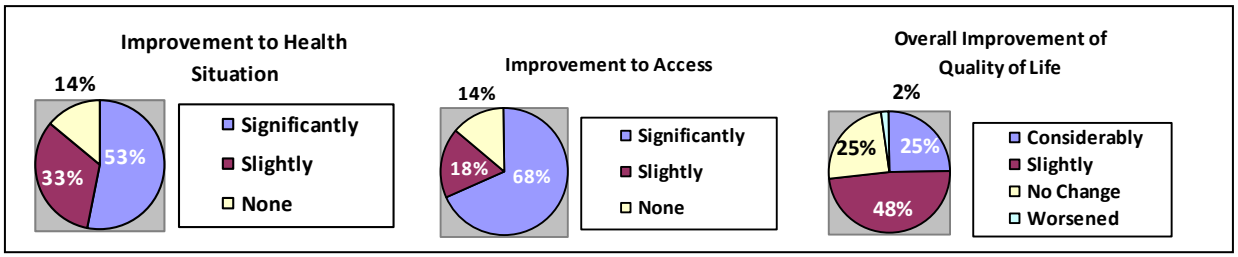


Figure 12: Improvement to Health Situation, Access and Quality of Life

Although the number of farmers who benefited from flood control is limited, they reported the same impact.

(2) Improvement of living standards as a result of the irrigation project

Almost all respondent farmers realized a significant increase in their annual farm income by more than three times, which was triggered by the introduction of the irrigation water supply resulting from the project. This gave farmers the opportunity to plant rice twice a year for double the crop even during the dry season. Annual production costs also doubled on average, but the increase was less than income growth, resulting in a big increase of the net income from rice production. The cost increase was due to hiring farm labor during the planting and harvesting of rice as well as the cost of fuel and oil for farm machinery, especially for those adopting mechanized farming. Another factor that contributed to better income for farmers was the presence of service roads (rural roads) constructed by the Project and, flood control embankment roads that triggered the entry of rice traders to the area, since farmers no longer have the difficulty of ferrying their harvest themselves.

There were also reports on the overall improvement in the quality of life with 26% of the farmers reported significant improvement. The positive impacts reported include: 1) improvements in housing, 2) purchases of appliances and motorcycles, 3) food security for the family, 4) better education for children, 5) purchases of prime commodities, and 6) access to credit from traders.

Table 15: Average Farm Income/Cost (Peso) and Improvements in Quality of Life for Irrigation Farmers

Area	Annual Income (peso)			Annual Cost (peso)			Improvement in Quality of Life		
	Before	After	Increase	Before	After	Increase	Considerably	Slightly	No Change
West	49,028	168,450	244%	13,000	31,072	139%	30%	63%	6%
East	63,980	204,007	219%	17,823	33,505	88%	23%	69%	8%

(3) Changes in Land Use Patterns and Land Prices

More than half (57%) of the city respondents observed a change in land use patterns after the completion of the flood control component. The common change was the conversion of agricultural land into housing, while some reported cultivation of idle land and fish pond development. As a consequence, almost half (46%) said that land prices increased by two to three times after the Project.

(4) Overall Impact on the Regional Economy

In Butuan City, the development of housing projects and increases in the establishment of businesses were observed. Because of the recent completion in 2007 of the flood control projects, it is difficult to evaluate the impact based on the available data. However, all the stakeholders interviewed including Butuan City government officials reported that these developments were apparently triggered by the flood control component and road improvements such as the Magsaysay Bypass Highway which was also assisted by JICA.

Table 16: Economic Indicators of Butuan City

Year	Population (1000)	# of Household	Business Establishment	No of farm families	Agriculture land havested		Agriculture production (MT)	Fishpond area developed	Livestock population (heads)	
					1st Cropping	2nd Cropping			Commercial	Backyard
2001	271	51,287	5,840						222,060	119,478
2002	275	52,159	5,892	20,899	14,406		43,464	944	159,100	282,102
2003	280	53,056	6,119		12,223		54,125	738	97,132	157,080
2004	285	53,948	7,244	23,160	19,194		97,964	1,333	200,701	128,195
2005	290	54,865	7,598	30,687	n.a		n.a	1,307	427,958	95,246
2006	295	55,798	6,540	21,556	n.a		n.a	1,307	110,185	212,335
2007	298	56,085	6,916	25,488	19,791		n.a	1,307	153,860	107,364
2008	303	60,755	7,411	32,756	16,218	14,425	205,124	1,171	283,068	102,448

Source: Butuan City Note: Decrease of business establishments in 2006 was due to a major fire

In terms of the regional economy, the GRDP of Region XIII was accelerated with the growth rate increasing from 0.9% in 2003 to 8.7% in 2007. Although it is difficult to directly link the growth to the results of the projects, there most likely was some contribution by the projects, since Butuan City is the largest city as well as a center of economic activity in the region.

3.4.2 Other Impacts

(1) Impacts on the natural environment

For flood control components, the Environmental Compliance Certificate (ECC) was approved in 1996 by the Department of the Environment and Natural Resources (DENR) and Environment Assessment Monitoring was conducted in 2001 and 2005. DENR regularly inspects the water quality of the Agusan River and the latest results were within the acceptable level. However, academics and other stakeholders showed concerns over mercury contamination in the river due to gold mining which takes place upstream. With regard to the perceptions of city residents, 39% noted environment changes, most of which are positive such as improved water quality resulting in an increase of fish and fish ponds, clear water from pumps, and more creeks with less garbage. However, negative impacts were also reported such as creeks drying and natural vegetation being cut. At the site inspection, it was observed that some drainage canals were clogged with garbage and smelled badly.

For the irrigation project, the ECC was approved in 1998. Conditions included the provision of a regulating pond, the development of mini forest, the establishment of the Environment Monitoring Fund, and the Environment Guarantee Fund, and planting activities by the NIA and the DENR. Environmental Assessment Monitoring was conducted from 1998 and the water quality of the Agusan River and the Masao River was monitored. The DENR has requested the report on the mercury levels in the regulating pond from the NIA. No environment problems were observed at the site except for some residents who were swimming in the regulating pond.

As for the perceptions of the beneficiary farmers, about 40% reported noting changes in the environment, including both positive and negative. Positive changes include increased flora cover where idle grasslands were converted to rice paddies, and improved water. On the other hand, the reported negative changes were 1) water in some creeks having dried up, 2) the swamps were drained, and 3) the decrease in brush land which affected some wild birds.

(2) Land Acquisition and Resettlement

With the implementation of the flood control components, a number of the city's residents were either directly or indirectly affected, hence the need to be relocated to appropriate resettlement sites. The former were those along the proposed embankment levee of both banks while the latter were those who were located within the floodway upon completion of both levees. To address the needs for relocation, the Project planned to acquire several sites for them and develop land and housing for the resettlement of the directly affected residents. However, after a large scale flood occurred in 1999, it became necessary for the Project to formulate the resettlement plan not only for those directly affected but for those indirectly affected as well.

Under Phase I, 51 ha of land were developed in Pagapatan and 785 households (HHs) were relocated. Under Phase II, 415 housings and utilities were provided on the site of 7.8 ha in Baan where 405 HHs relocated, and an additional 287 HHs moved to the resettlement site of Mahay which was acquired by the Project. In FCI, cancellation of the utilities for the resettlement area delayed the relocation of the affected residents[29].

Although 4,015 HHs had been planned to be resettled to the areas to be developed under the flood control projects, only 1,479 households (less than 40% of the plan) were actually relocated. The lack of a cohesive relocation plan, the reduction of the resettlement area and planned facilities, and the delayed development of the resettlement area affected the overall processes and resulted in the reduction of the number of households relocated. While compensation was paid to land owners, squatters who resettled are to make installment payments on the land and housing to the city but the payment has not yet started due to a delay in the transfer of ownership of the land from the DPWH to the city. As of the ex-post evaluation, there are still about 4,500 households including those who were not included in the original plan that are living within the floodway and are subject to floods more severe than before. However, Butuan City, which is responsible for their resettlement, explained that it would take about 7-10 years for them to complete the resettlement work due to funding constraints on the development of the land.

Table 17: Resettlement Plan, and Actual Implementation of Flood Control Projects[30]

Project Phase	Land Acquired			Households to Be Relocated		
	Plan	Actual	% of Plan	Plan	Actual	% of Plan
Flood Control I	201 ha	81 ha	40%	3,600	785	22%
Flood Control II	30+100 ha	78.7 ha	61%	415	694	167%
Total	331 ha	159.7ha	48%	4,015	1,479	37%

Source: CARBDP

[29] The facilities were later provided by Butuan City and an NGO.

[30] In FC II, the study on residents who lived in waterways was conducted after the large flood in 1999 and confirmed 3,509 households in the East Bank and 2,392 households in the West Bank. In the Resettlement Plan formulated after the study, it was planned to acquire additional 100ha (30ha will be purchased by Butuan City) for the residents in the floodway to be resettled. After 1999 flood, additional 100ha was to be acquired of which 30ha was to be acquired by the Butuan City.

Given this, the survey was conducted in three existing resettlement sites with 60 respondents. In terms of procedures in land acquisition and resettlement, 38% of the respondents assessed it as satisfactory, while 30% reported unsatisfactory. Reasons for unsatisfactory ratings include unaffordable housing units, a lack of assistance provided during transfers, and being forced to resettle. It was observed that residents in the areas that worked with the assistance of the city and NGOs showed more satisfaction with the procedures. In terms of the compensation package, 72% of the respondents said that there was none provided either for land or housing, because they were considered squatters or located on government property[31]. For those compensated, 54% said that the amount was low, while 46% were contented with the compensation amount. Although more than 60% of the respondents declared better living conditions, 68% reported encountering problems at the sites. The highest complaints on their list were fewer job opportunities, public disturbances like robbery and theft, and the greater distances from schools and places of work.

On the other hand, there were several problems on ROW land acquisitions during project implementation[32]. In FC I, some land affected by ROW was expropriated through the courts. In FC II, due to ROW problems, part of the drainage improvement plan was changed. During the construction of the Magsaysay Viaduct, landowners barricaded the site and the Project sought police assistance. These disturbances affected the overall schedule of the projects considerably. The lack of documents confirming land ownership, the delay of fund disbursement by the Department of Budget and Management (DBM), and the long legal process for expropriation were among the reasons for the delay.

For the irrigation component, only a few households were relocated in the pump station area in Bit-Os and no major relocation of residents occurred in the construction of irrigation canals and drainage systems. The NIA planned to complete its land acquisition and relocation of residents before it began the contract for civil works. However, the prolonged processes on land acquisition due to ROW delayed the schedule of canal construction.

(3) Unintended Positive/Negative Impacts

There were positive impacts observed for children such as better education and decreased water-borne diseases. No negative impacts were found.

As explained above, there was a substantial impact to the residents and farmers who were the direct beneficiaries of the Project which came from both the flood control and irrigation components of the Project. Major impacts included the elimination of concerns and risks from flooding, increased income due to reduced disturbances on economic activities by flooding, increased agriculture production, and improved living standards. Flood control projects are also contributing to the development of Butuan City. However, 4,500 HHs still remain in the flood zone. These residents are exposed to flooding more severely than before. Therefore, it is expected that the Butuan City

[31] However, some said that the swapping scheme was done instead (no compensation was provided but instead, the appraised value of their property was deducted from the cost of units in relocation sites).

[32] ROW is defined as a strip of land where public infrastructure is built for the beneficial use of the general public. If the land is a private property, it has to be acquired by the government by paying to the owner an amount based on the agreed compensation package. If the owner and government will not agree on the compensation package, the government can acquire the property through expropriation or legal means.

government will make further efforts to ensure their resettlement.

3.5 Sustainability (Rating: Flood Control – c; Irrigation – c)

3.5.1 Structural Aspects of Operation and Maintenance

(1) Flood Control Components

The organizations responsible for the O&M of the flood control systems and urban drainage facilities are the DPWH District Engineering Office (DEO) and the City Government of Butuan. A Memorandum of Agreement (MoA) was signed between the DPWH and the Butuan City Government in February 2008 defining the responsibilities of O&M as follows:

- The Butuan City Government will maintain the Sluices and other structures, Embankment Levees, Channels (Cut-off and Urban Drainage) and all other structures/works not along the national roads.
- The DPWH Butuan City DEO will maintain the Magsaysay Viaduct, Cut-off Channel Bridge, and Box Culverts along the national roads and highway.

However, as of this evaluation, the CARBDP's PMO in Butuan City is still undertaking periodic maintenance activities on a very limited scale since there are no clear responsibilities for O&M between the city government and the DPWH. It was internally agreed within the city government that the City Engineering Office (CEO) would do repair works on drainage and levee structures and the City Environment and Natural Resources Office (ENRO) would be in charge of vegetation control and the de-clogging of drainage facilities. Despite the agreement, the city expects O&M to be implemented by the PMO and does not make any plans, for example, to replace stolen facilities. The DEO of the DPWH was therefore obligated to undertake some maintenance activities of the related structures including some urban drainage facilities along the national highways, although these are supposed to be done by the city.

With regard to staffing, no major problems were observed. The Maintenance Section of the DEO of the DPWH employs 12 staff including 3 engineers and 30 laborers. The City government Engineering Office employs 49 staff members including 2 engineers, while the City ENRO employs 22 staff members (16 for drainage improvement and 6 for vegetation control). The CARBDP Office also maintains 18 staff members including a project director, a project manager, and 3 engineers.

(2) Irrigation Component

The field project offices of the NIA are responsible for the O&M activities of the irrigation system. The Irrigation Management Office (IMO) of Agusan del Norte Province of the NIA directly supervises the project offices while the NIA Regional Office XIII provides oversight to all irrigation systems in the region. The field offices have 23 staff members including 5 engineers and 4 operators and no major problems were observed for staffing.

While the NIA is responsible for the O&M of the main canals and pumping stations, the Irrigators' Associations (IAs) are to undertake O&M functions over lateral canals. Under the Irrigation Operation and Maintenance Transfer (IOMT) Program of the NIA, there are three types of O&M arrangements between the NIA and the IAs, which are:

1) Type I: IA undertakes routine maintenance of a certain length of the irrigation canal

system[33]

2) Type II: IA undertakes system operations and collection of ISF from its members
3) Type III: IA owns and assumes full management of O&M of system[34]

The type of contract between the NIA and the IA depends on the maturity and capability of the IA based on the NIA's organizational assessment. For this project, only 2 IAs out of 12 signed the contract for Type I. There are another 2 IAs that signed the contract for Type II to collect Irrigation Service Fees (ISF) from members. The transfer of O&M activities of lateral canals to IAs has been delayed due to the unsatisfactory delivery of irrigation water. Their concerns are also of the sustainability of the system given the high cost of power, and the insufficient capacity of the IAs. The delay of O&M responsibilities being turned over to IAs resulted in less involvement by IAs in facility maintenance, for example checking for illegal water tapping.

3.5.2 Technical Aspects of Operation and Maintenance

(1) Flood Control Components

Both the City government offices and the DEO of the DPWH employ the necessary technical staff, and no major problems were reported in terms of the technical capacity of O&M. However, the city is constructing a park facility within the floodway, which may pose an obstruction to the flood flow[35]. There is a need for the city to consult with the DPWH on O&M and the possible effects of the facilities over all. The O&M equipment procured by the projects has yet to be transferred from the DPWH to the City, while City ENRO claimed a shortage in the equipment necessary to clean the drainage system. The O&M plan and manual produced by the Project has to be reviewed and confirmed with DPWH DEO and the City, since these plans and manuals were not shared with them.

(2) Irrigation Component

The staff of the NIA field offices includes five engineers and the officer in the NIA Provincial IMO who oversees the O&M of the system was trained in Japan under the Project. They are using the O&M manual developed by the NIA and no major problems were observed in terms of the NIA's technical capacity on O&M. However, the lack of management and maintenance capacity of the IAs was observed. This resulted in unattended on-farm facilities, and the prevalence of illegal water tapping. IAs need further training to enhance their management capacity.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Flood Control Components

The DPWH Central Office Bureau of Maintenance (BOM) released the O&M budget of PhP4 million to the CARBDP PMO in 2007 but there were no funds released in 2008 and 2009. Under this situation, the PMO conducted remedial measures on minor works. The CARBDP PMO mentioned that there were no more funds allocated to provide for the specific maintenance of

[33] For the irrigated paddy of 50 ha, IA conducts O&M of the canals of average 1km.

[34] This is for an area of less than 1,000 hectares. IAs will amortize the investment and rehabilitation cost of the whole or part of the system not exceeding 50 years. In this case, both of the ownership and all the responsibility of O&M are transferred to IAs.

[35] This is the Millenium Development Goals (MDG) Park Development Project and Regional Development Committee of Region XIII asked for cancellation of the project. They requested the study on impact by the project to flood control and approval from DPWH. (Based on the letter from RDC to the mayor of Butuan City as of August 2010)

flood control facilities. The DEO of the DPWH also experienced a significant reduction of its budget as shown in the table below. From 2009 to 2010 there were no budget allocations from the Motor Vehicle Users' Charge (MVUC) to the DEO, which affected their overall budget.

Table 18: Budget for the DPWH District Office (unit: million peso)

Year	2005/06	2007	2008	2009	2010
Amount	16 m	8 m	16 m	7 m	6 m
Source	GAA	MVUC	MVUC	GAA	GAA

While the current budget allocations for the City Engineering Office and the ENRO are very limited, the city government plans to allocate funds for the O&M of the project facilities for 2011. Their financial status turned positive in 2007.

As above, both the DPWH and the City government are currently not allocating the sufficient funds for the O&M of the project facilities. This has lead to insufficient O&M. However, Butuan City plans to allocate the budget from 2011.

(2) Irrigation Component

Significant challenges facing the financial sustainability of the Project were observed, due to the high cost of power for pumping irrigation. The high cost of power was pointed out at the appraisal and introduction of off-peak electricity fee, efficient water delivery, and strict water fee collection were recommended[36]. The Rate of Project Income (including the subsidy) against the O&M Cost increased to 98% in 2009 but this was due to a national government subsidy which was 68% of the total expenses. It is anticipated that the 2010 sufficiency rate will decrease since the subsidy will stop in 2010. The NIA prepared the sustainability plan aiming to achieve financial sustainability by 2015 by raising the ISF and collection rate and expanding the current irrigated and planted area. But half of the farmers already consider the current ISF to be high. Therefore, to achieve the target, the NIA is required to exert further efforts to convince the farmers to pay a higher fee by improving their water delivery. The overall financial status of the NIA turned positive in 2008, but this was due to the increase of subsidies.

3.5.4 Current Status of Operation and Maintenance

(1) Flood Control Components

At the time of evaluation, several problems were observed. One issue was theft at the facilities such as the flood gate lifting device control mechanism at Agusan Pequeño, drainage outlet gates along the urban drainage channel, and so on, all of which have yet to be replaced. The PMO keeps all the drainage outlet gates to prevent from further stealing. Other problems include thick vegetation along the drainage channels, and the heavily silted east cut-off channel and drainage channel at San Vicente. There is also thick vegetation observed along the mid and downstream stretch of the embankment levees, and also the presence of potholes along the embankment levee service roads. These problems are all attributed to insufficient maintenance. They have already negatively affect the Project's efficacy leading to problems such as flooding due to trapped rain water run-off and, backwater flow to existing city drainage systems during high tides and floods.

[36] The lower cost of off-peak electricity fees could have been adopted by the NIA and recommended at the time of appraisal. But off-peak hours usually coincide with low tide when the NIA is not operating the pumps due to problems of siltation and low water levels at the pump stations. Therefore, NIA has yet to adopt the off-peak electricity fees.

(2) Irrigation Component

At evaluation, it was observed that the following problems are affecting the irrigated and planted area and operations. These are attributed to the reduction of the service area, the construction processes, and natural calamity.

- Of the total 10 pumps, only two pump units are operating on rotation for each pumping station (one pump at a time for each station) due to the efforts to save power costs, heavy siltation at pump stations from the Agusan River, and an insufficient level of river water during low tide, resulting in insufficient water delivery to farms[37].
- The part of lateral canal in the east bank of Bit-Os is not operational due to an eroded section along a soft soil formation which was not identified during investigation before the start of civil works. This resulted in non-irrigation of 413 ha. The NIA started concreting the section but stopped due to budget constraints; the NIA is in the process of bidding to complete the remaining works;
- In the west bank of Aupagan, the siphon and the adjacent box culvert along the main canal was totally damaged by a flood. This resulted in non-irrigation of 1,034 ha of functional areas. It was reported that the risk of a broken siphon and culvert was anticipated and noted by the residents at the time of construction but the design did not change[38]. The NIA is in the bidding process for rework ;
- Constructed canals are too large since these were based on the original target service area which was reduced to half, hence they could not attain the water depth they were designed for and many turn-outs cannot draw water from the canal. There are also the areas that high locations and the absence or inappropriate location of Main Turnouts (terminal facilities) resulted in inappropriate water delivery to paddies. These leading to rampant illegal water tapping, in particular by downstream users.
- In the west bank of Bit-Os area, there was the constant collapse of a 100 m stretch of the canal embankment slip due to continuous erosion by water run-off from the side hill along the canal and from the intermittent spring in that hill. NIA reworked the embankment but it needs a permanent solution or unexpected sudden collapse of this section especially during wet season will happen resulting to sudden cut-off of irrigation water supply. This was due to natural conditions and it is difficult for NIA to forecast the problem beforehand.
- Highly silted drainage canals flooding adjacent rice paddies due to insufficient maintenance;

As explained above, for the flood control components, the unclearly specified responsibilities between the CARBDP of DPWH and Butuan City resulted in insufficient budget allocations and O&M activities. For the irrigation component, the financial sustainability is very low due to the high burden of power costs of the pumps and limited revenue from water charge due to the reduced irrigated and planted area. The low management capacity of the Irrigators' Associations that results in delays in the transfer of O&M activities to them are also challenges. In light of the above, this Project has serious problems both structurally and financially for flood control. The irrigation component also faces serious problems with its finances, as well as challenges both technical and structural in nature.

[37] Two pumps out of ten are to be transferred to the other project.

[38] This is based on the interview with residents. The residents advised the possibilities of collapse of the siphon and the culvert to the contractor but the contractor explained they could not change the design which was already fixed. NIA did not review the issue because they were already in the construction phase.

Therefore, the sustainability is low for both the flood control and the irrigation components.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The flood control component has been highly relevant against a high demand for flood mitigation in Butuan City and it has achieved most of the planned effects such as eliminating flood damage and increased EIRR. There are already observed positive impacts such as reduced risk by flood and the economic development of the city. However, it took much longer to complete than the planned schedule and has incurred serious problems in the structural and financial aspects of O&M. In light of the above, this Project is evaluated to be fairly satisfactory (C).

On the other hand, addressing the Irrigation Component, there were discrepancies between the target area and the Land Use Plan of Butuan City, which has led to the reduction of FUSA. Although significant effects and impacts on the beneficiary farmers were reported, such as increased rice production and an improved living standard, the effects are very limited due to the significant reduction of irrigated and planted areas, which remains less than 20% of the target. The efficiency of the Project is low due to the prolonged implementation schedule and increased cost. In addition, the Project faces serious challenges in its financial sustainability. In light of the above, this Project is evaluated to be unsatisfactory (D).

4.2 Recommendations

(1) Recommendations for Implementing Agencies

< Flood Control >

- The DPWH should have a meeting without delay with the new administration of Butuan City to clarify the responsibilities of O&M for the project facilities and to proceed with the transfer of maintenance equipment to the city. Butuan City needs to allocate the necessary budget for O&M and establish the implementation system. Until the city can fully implement O&M, the DPWH needs to assist the city.
- It is recommended that Butuan City secure the necessary funds and proceed with the resettlement of total 4,500 HH who are still inside the flood way, including 2,000HH which were not included in the original design. The DPWH needs to accelerate the ownership transfer of the land for the resettlement area to the city and assist ongoing resettlement processes by Butuan City.
- Butuan City and barangays should consider introducing measures to prevent the stealing of FC facilities and parts, such as utilization of a neighborhood watch group.

< Irrigation>

- The NIA should secure the necessary budgetary funds and implement the rework of the irrigation facilities as planned in order to increase the irrigated and planted areas. Training sessions to IAs have to be implemented to facilitate understanding on the increase of water fees, to increase the collection rate of water fees and to transfer the O&M of lateral canals to them. The NIA is recommended to coordinate with financial institutions and the Department of Agriculture to facilitate loan provisions and agriculture extension services to farmers.
- The NIA will share the data on the past conversion of the FUSA to residences and other purposes with the new administration of Butuan City, the Department of Agrarian Reform (DAR), and the Department of Agriculture and Fishery (DAF) to discuss measures to prevent

further conversion of the FUSA[39]. It will be a more practical approach for NIA to discuss with these stakeholders and decide as to which part of the FUSA should no longer be converted, striking a balance between the area to be protected for irrigation and the area to be converted to other purposes, referring to the Land Use Plan of the city, actual development status, and the possible development effects by conversion of FUSA to other purposes. After this has been decided, these entities should take strong measures to prevent and not allow any conversion on the finalized FUSA.

(2) Recommendations for JICA

- JICA should hold discussions with the top management of the DPWH and Butuan City, and confirm and monitor the processes of transferring O&M responsibilities of FC Facilities from the CARBDP/PMO to the City.
- It is recommended that JICA assist the beneficiary farmers and IAs with training and guidance for the improvement of their capacity in O&M and to increase water fee collection rate.
- The financial sustainability plan produced by the NIA is based on the assumption that 100% of current FUSA is to be irrigated and planted. However, the feasibility of the plan needs to be scrutinized. Therefore, it is recommended for JICA to monitor the financial plan by NIA including on how to secure the necessary O&M budget.

4.3 Lessons Learned

- The O&M responsibilities of the flood control facilities remained unclear despite the agreement between the DPWH and Butuan City, which resulted in inappropriate budget allocations and insufficient O&M. When the facilities and O&M responsibilities are to be transferred to local government after the completion of projects, JICA should include in its project design a system where the transfer processes of documents, ownership, the necessary O&M equipment and know-how will be completed during the project period or monitor the processes as a follow-up measure. More binding instruments or documents to ensure continuous commitment by the local governments will also be required.
- The effect and impact of the irrigation component was significantly reduced due to the conversion of the FUSA to other purposes. For irrigation projects in urban areas or areas where further development is anticipated, and when there is a long lag time between FS preparation and commencement of implementation, the target area should be critically reviewed and determined with the participation of the recipient local governments, referring to their land use development plan and policies. In the project plan, it was assumed that 100% of the FUSA would be irrigated and planted in three years after completion, but this was unrealistic. Risks and other factors leading to the inability to actually irrigate 100% of the FUSA, such as conversion of the FUSA to other purposes and the existence of absentee landowners as experienced in this project, should be considered and practical plan and targets should be set and appraised[40].

[39] This was proposed at the interim report meeting of this ex-post evaluation held in Butuan City in June 2010.

[40] According to the study by JICA in 2009, the national average ratio of irrigated areas out of the FUSA was 72% in the wet season and 63% in the dry season for 1995, indicating that the actual planted area may have been smaller than the irrigated areas. EIRR calculation and project appraisal should be done based on this kind of actual data. According to the local expert, it is generally planned that a target irrigated and planted area will be achieved five years after completion of a large scale irrigation facility like this project.

- With regard to financial sustainability, concerns regarding the high power cost for pump irrigation and the low collection rate of water fees by the NIA were already raised at the appraisal but there were no explanations for how to cover the necessary O&M costs. For future irrigation projects, the appraisal process should include a thorough economic analysis, financial sustainability assessment and take into account the possible provision of subsidies. In particular for pumping irrigation, the challenges of O&M resulting from high power costs should be fully scrutinized.
- Weak commitments by the recipient local governments were observed in both the flood control and irrigation components. There were also problems with the facilities that could have been prevented if the opinions of residents and farmers were taken into consideration. It is recommended that local governments and beneficiary residents be actively consulted and involved from the design stages of projects through pre-study meetings and workshops. These processes will promote the ownership of the facilities to be constructed, prevent conversion of target areas to other purposes, and incorporate adequate project designs based on the actual situation, and ensure O&M of facilities, thereby increasing the project's effects.
- When substantial numbers of residents are to be relocated such as in flood control projects, resettlement plans and necessary budget allotments should be included in the project design and be implemented from the early stages of the project. In the flood control projects, the resettlement plan was designed during the implementation phase which resulted in the delay of the resettlement processes and other civil works. Involvement and cooperation by the local government and NGOs would contribute to smooth implementation.
- Problems related to ROW significantly delayed the construction schedules of both projects. Efforts should be made for ROW issues to be resolved prior to the project's implementation, such as starting preparatory works related to land acquisition (ie. survey, documentation, budgeting, legal issues) after F/S and actual activities after D/D; obtaining formal agreements from land owners before signing of L/A, before loan disbursement, or before issuance of Notice to Proceed by BOP; or to disburse the funds upon resolving the issues[41].
- One of the objectives of the flood control component was to protect the facilities and FUSA developed by the irrigation components. At appraisal, EIRR was calculated based on the assumption that all the FUSA to be protected by the flood control component and the synergy effects of the both components were expected. However, after the project completion, a large portion of the FUSA which is near to the river bank and prone to flood has been converted to other purposes and the synergy effects were very limited. This is largely attributed to the fact that the flood control project reduced a flood risk and promoted the development of the area to residential and commercial zones and negatively affected the irrigation component. On the other hand, a significant portion of the remained FUSA is not prone to flood. In a program consisting of multiple projects, not only positive effects but a risk of negative effects should be reviewed, and then target areas should be clearly identified and the expected synergy effects should be set with target indicators. In the project, there was an observed negative effect from the design change of the flood control component to the irrigation beneficiaries,

[41] In this project, the reasons for delayed processes include a lack of documents for land title and the delay of fund disbursement by GOP. Such delays could have been reduced, if preparatory works had started at earlier stage. For example, the bridge construction project(Bridge Construction Project for Expanded Agrarian Reform Communities Development (Umiray Bridge)、Grand Aid, Basic Study was done in 2008) in Philippines assisted by JICA included the resolution of ROW as a condition for project implementation. The land owners and local governments also signed a "Deed of Donation." Upon the signature of the document, D/D started.

i.e., the cancellation of a drainage interceptor canal which caused rainwater run-off flooding to the farmers. Therefore, it is important that changes in the design should be reviewed to promote synergy and to avoid adverse effects to other components. Active and full coordination among component implementers is critical.

Comparison of the Original and Actual Scope of the Project

Flood Control Project, Phase I			
Item		**Original**	**Actual**
1. Project Output			
1). Civil Works	Embankment Levee (km)	12.3	10.3
	Concrete Floodwall (km)	2.1	5.4
	Dredging (m^3)	900,000	700,000
	Urban Drainage System (m)	1,100	880
	Floodgate	none	1
	Spoi Bank Yard Treatment (ha)	171	20
2) Consulting Services	Foreign Currency Portion (MM)	301	373
	Local Currency Portion (MM)	420	811
2. Project Period		Jan 1988 - Dec 1993 (72 months)	Jan 1988 - Feb 2000 (146 months)
3. Project Cost	Amount paid in Foreign currency (in ¥M)	2,640	2,400
	Amount paid in Local currency (in ¥M)	1,386	1,296
	TOTAL (in ¥M)	4,026	3,696
	Japanese ODA loan portion (in ¥M)	3,372	2,798
	Exchange Rate	¥7/peso	¥3.2/peso

Flood Control Project, Phase II			
Item		**Original**	**Actual**
1. Project Output			
1). Civil Works			
Package 1	1. Levee (km)	14.5	12
	2. Related structures	- spillway (300 m)	Mahay sluice (1.4 m)
		- irrigation canal crossing	Banza sluice (5 m)
		- drainage sluice	Maug sluice (1.4 m)
		- siphon	8 RCPC cross drains
	3. Cut-off channel (km)	7.3	5.5
	4. Tumampi Bridge	Pedestrian	Vehicular (3 spans, 48 m)
Package 2	Construction of viaduct (m)	628	628
	Cut-off channel bridge (m)	90	90
	Approach road (m)	135	135
Package 3	1. Dike (Left Bank) (km)	6.2	Cancelled
	2. Dredging (m^3)	1,212,000	2,180,905
	3. Spoil bankyard (ha)	170	90
	4. Land Improvement (ha)	30 (415 housing units)	7.83 (415 housing units)
	5. East Bank Drainage (km)	15.3	Cancelled
Package 4			
A. Masao River Improvement	1. Levee (km)	11.7	Cancelled
	2. Excavation (m^3)	193,000	408,700
	3. Dredging (m3)	185,000	408,700
B. Improvement of Urban Drainage System		Total 20 km in 6 areas	Total 19.1 km in 7 areas
	Drainage Channel	-	1.4 km
	Drainage Channel Sluices	-	45
	Box culverts	-	12
2) Consulting Services	Foreign Currency Portion (MM)	254	309
	Local Currency Portion (MM)	598	583
2. Project Period		March 1997 - January 2003 (71 months)	March 1997 - April 2007 (122 months)
3. Project Cost	Amount paid in Foreign currency (in ¥M)	5,571	5,959
	Amount paid in Local currency (in ¥M)	5,067	4,869
	TOTAL (in ¥M)	10,638	10,828
	Japanese ODA loan portion (in ¥M)	7,979	7,317
	Exchange Rate	¥4/peso	¥2.46/peso

Irrigation Project			
	Item	**Original**	**Actual**
1.Project Outputs			
(1) Civil Works	Service Area (ha)	7,930	4,493
	Pumping Stations	2	2
	Regulating Ponds	-	2
	Intake Structures	-	2
	Main Canal (km)	40.59	39.4
	Laterals (km)	42.95	37.31
	Sub-laterals (km)	10.56	0.45
	Concrete canal lining (km)	-	33.18
	Road Network-Service Roads (km)	-	60.22
	Drainage canals (km)	69.3	50.04
	Structures (units)	-	30
	Related Structures (units)	403	509
	Project Facilities	13 (Total 2,750m^2)	14 (Total 2,330 m^2)
2) Procurement of Equipment	Motor pumps	8 (Vertical shaft two flow	10 (Submersible motor
	Construction Equipment and Vehicles	55	46
	O&M Equipment	41	49
3) Consulting Services	Foreign Currency Portion (MM)	130	126
	Local Currency Portion (MM)	99	127
2.Project Period		August 1995 – June 2002 (83 months)	August 1995 – August 2006 (133 months)
3.Project Cost	Amount paid in Foreign currency (in ¥M)	3,559	3,899
	Amount paid in Local currency (in ¥M)	1, 828	1,866
	TOTAL (in ¥M)	5,387	5,765
	Japanese ODA loan portion (in ¥M)	4,040	3,899
	Exchange Rate	¥4.13/Peso	¥2.47/Peso

Third Party Opinion
Lower Agusan Development Project

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Introduction

The Lower Agusan Development Project (LADP), which has flood control and irrigation components, is a warranted undertaking of government. Given positive externalities of flood control and irrigation, the government has seen it fit to undertake the LADP. Given the large financial requirements of the project, the Government of the Philippines (GOP) tapped official capital assistance from the Government of Japan (GOJ).

It should be established at the outset that the project is a development priority of the GOP as enunciated in the Medium-Term Philippine Development Plan (MTPDP). On the part of GOJ, the project is consistent with JICA's "Overseas Economic Cooperation Policy". In view of this, both the GOP and GOJ share ownership of the project and should feel jointly accountable for all project outcomes, whether good or bad, or a mixture.

LADP is an appropriate and relevant project in view of the need to raise agricultural productivity and real incomes of project beneficiaries. Considering the large contribution of agricultural output to the regional GDP, the project is consistent with the goal in the aggregate of sustained economic growth and poverty alleviation.

The evaluation has been based on project completion reports, interviews with key informants, small ex-post project surveys, and on-site inspections. The data generated is useful for assessing projects outcomes based on the inputs. However, for generating ultimate impacts on targeted beneficiaries, a long-term consideration, baseline data on socio-economic characteristics at the household level are essential. Follow-on surveys are also needed to determine impacts, after completing the project and allowing it to operate for a sufficiently long time. The GOP may put such impact analysis as part of its project evaluation agenda for the long term.

Main Findings

Overall, the LADP gets a grade, rightly so, C (flood control) and D (irrigation), on a scale of A to D, where A is the highest rating possible and D, the lowest. The key factors that pulled down the LADP's overall rating are: time and peso cost overruns, delays in the implementation of the agreement between the national government agency in charge of flood control and the city engineering office on cost sharing, and the significant reduction in the service areas of the irrigation component due to rapid land conversion. Pulling up the rating in the overall is the respectable ex-post economic rate of return from the flood control component. Unfortunately, that cannot be said of the irrigation component, which received a D rating. Unanticipated developments like rapid urbanization led to significant deviations from the existing land use plan of the city, causing targets for irrigation areas to fall short.

Recommendations

The external evaluation of the LADP jointly undertaken with the National Economic and Development Authority (NEDA) underscores the great importance that should be attached to:

- Resolving right-of-way (ROW) issues prior to implementation: The GOP is the lead in securing ROW. The GOJ should not give the signal to proceed with implementation unless the GOP has fully secured ROW and guarantees no delay due to ROW issues during implementation

- Formulating rules on cost sharing between the national government (NG) and the local government unit (LGU). The NG should look for the legal instrument that would make the cost-sharing agreement with the LGU binding across political administration: The memorandum of agreement between the NG and the LGU should be backed by a city government resolution with a provision for reopening it and resolving any dispute within the NEDA Investment Coordination Committee.

- GOP and GOJ should agree on securing market-based hedging instruments for foreign-exchange risk: This is essential since huge cost overruns in pesos can delay project completion unduly if a government budget cover has to be obtained for the added project cost.