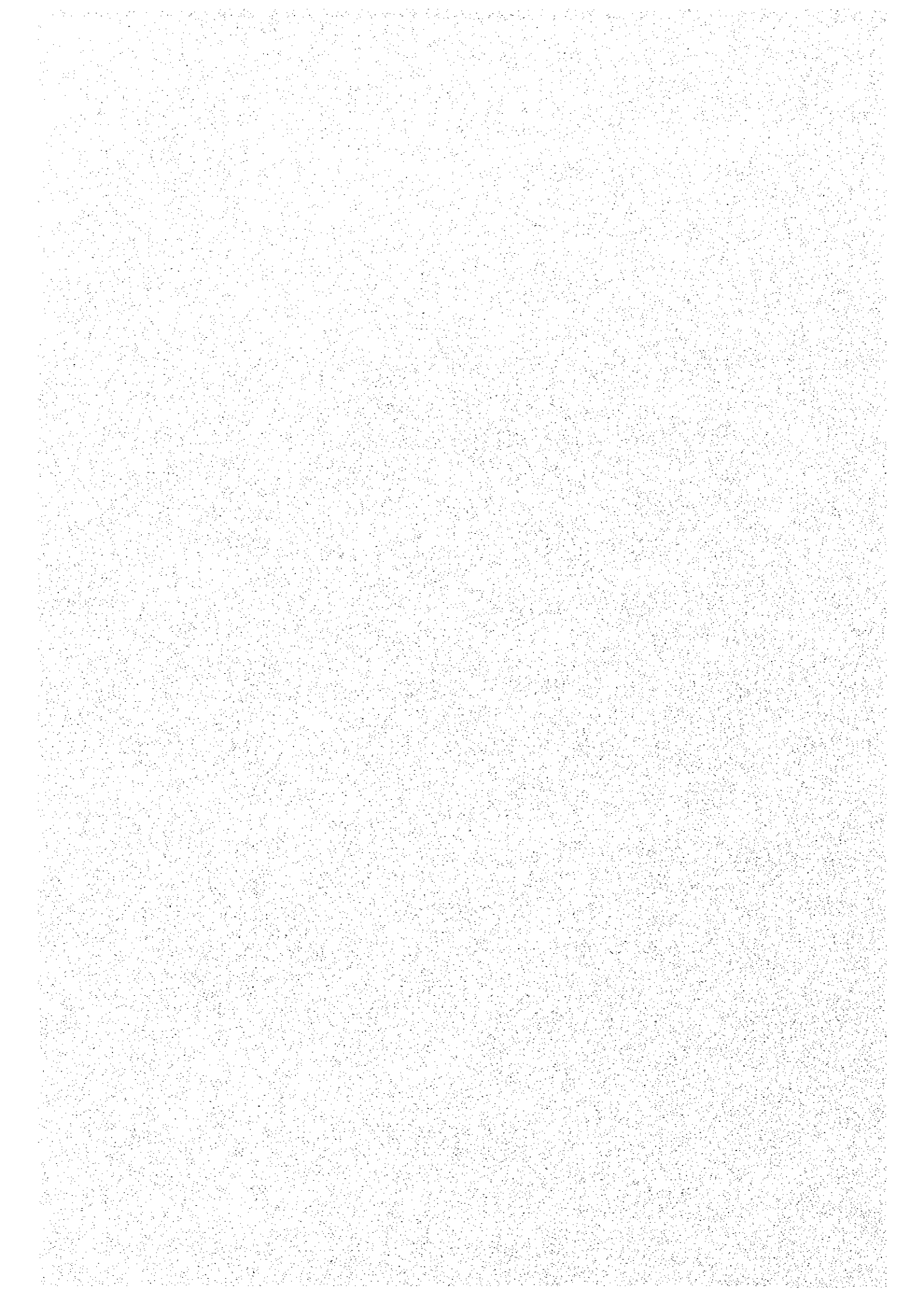


## **Chapter 3: Evaluation Results**

### **(Thailand)**



## **Chapter 3: Study Results (Thailand)**

### **3-1 Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin (F/S)**

#### **3-1-1 An overview and background of the study project**

##### **(1) An overview of the development study**

The development study under evaluation covers the irrigation area of 17,200ha in the Mae Klong River Basin with the objective of developing farm fields on the outskirts. The following is an overview of the development study.

- 1. Study implementation period: January 1979 – October 1979**
- 2. Compilation of the final report: March 1980**
- 3. Counterparts: Royal Irrigation Department (RID), Ministry of Agriculture and Cooperatives (MOAC)**
- 4. Consultant for the development study: Sanyu Consultants Inc.**

##### **(2) Background of development study implementation: Development history of the Mae Klong River Basin and details of the development study**

###### **1) Irrigated agriculture development projects of RID and the World Bank assistance**

In 1903, RID embarked on a series of development projects in this basin for the purposes of irrigation, flood prevention, and power generation (the "Irrigated Agriculture Development Project"; performed on a small-scale from 1903 to 1960).

After the Second World War, the Thai government intended to make the country a major food supplier in Southeast Asia, and started an irrigated agriculture development project for the basin in 1964 with the assistance of the World Bank. The project initiated by the World Bank started with construction of the Vajiralongkorn Diversion Dam (1964), including the Mae Klong irrigation project area at Tha Muang (first-stage area: 1,075,000 rai; major canals completed in 1972), followed by construction of a first-stage regional water system on the left bank (started in 1975), a farm field development pilot project on the outskirts initiated by JICA in 1978 (400ha), construction of a second-stage water system on the right bank (completed in 1982), and F/S in the Malaiman region for which the study was completed in 1980. In the Malaiman region (175,000ha) on the left bank, an irrigation facility covering 12,000ha (1986 - 1995) and an irrigation facility for rice cultivation (canal construction, completed in 1987) were completed, along with a pilot project for sugar cane (1981). For the Khwae Yai River (covered in the second stage, 1,443,000 rai), irrigation facilities (Pa Chee Project and Lam Topern River Plain North of Kanchababuri) and dams (Khwae Noi River in Pa Chee & Khao Project, Khwae Yai River & Wang Maseng Reservoir) were constructed, resulting in a 25% increase in food production as of 1968.

The irrigated agriculture development project conducted by RID/World Bank in the Mae Klong River Basin covered a combined area of 490,000ha, encompassing i) the Mae Klong irrigation project area and ii) the drainage project area, as mentioned above.

## 2) Cooperation policies of the World Bank

The cooperation provided by the World Bank for the basins of both the Chao Phya River and the Mae Klong River was planned to proceed along the following four stages, in accordance with three reports issued by the Bank ("Thailand Chao Phya Irrigation Implementation Project 1, 1972," "Thailand Chao Phya Irrigation Implementation Project 2, 1972," and "WB Staff Project Report, 1975").

In addition, the "Greater Mae Klong Multi-purpose Project, WB 1968" (F/S report for stage II) states that development activity in the Mae Klong River Basin should be divided into two areas, i) the Tha Muang area (stage I) and ii) the Kwaeyai River area (stage II); that an intensive irrigation development project ought to be implemented for the Tha Muang area (stage I); and that canals should be constructed in a five-year plan for Ban Tham at Petchabli.

Areas to be evaluated in the "Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin (F/S)" are the Tha Muang district (Stage I) and East Malaiman on the left bank of the Mae Klong River.

## 3) Japan - Thailand technical assistance (Japan-Thailand cooperation for irrigated agriculture development projects)

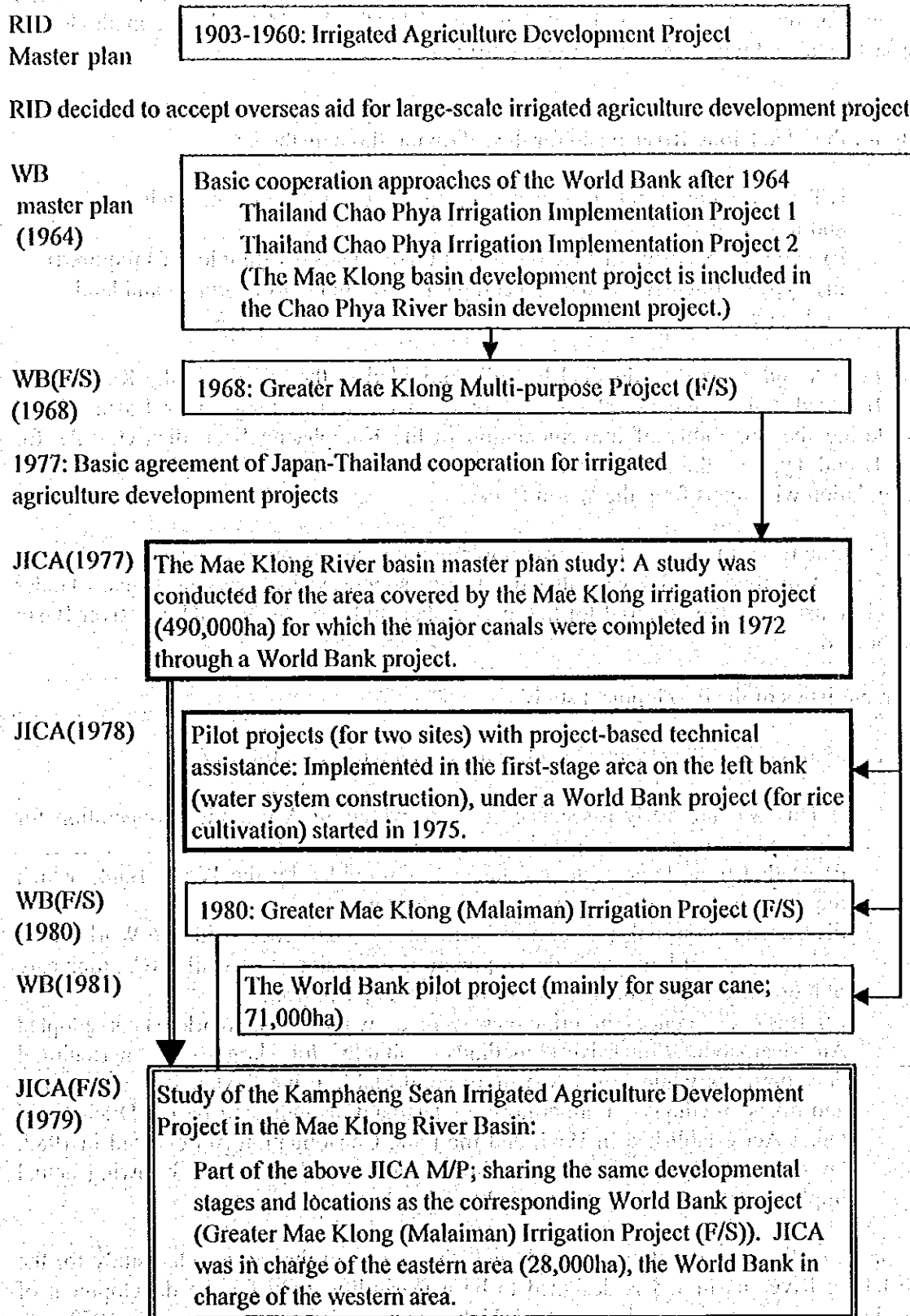
In April 1977, a basic agreement was signed between the Japanese and the Thai governments on irrigated agriculture development in the Mae Klong River and the lower reaches of the Chao Phya River.

Following this basic agreement, JICA implemented the following:

- i) A study of irrigated agriculture development project on the west bank of Chao Phya in the lower reaches of the Chao Phya River (F/S, 1976-1977)
- ii) A study of the master plan for the Mae Klong River Basin (M/P, 1977-1979)
- iii) Initiation of pilot projects (project-type technical cooperation, 1977-1985) in one location of the Chao Phya River and two locations of the Mae Klong River

"Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin (F/S)" under evaluation in this document is part of the master plan study for the Mae Klong River specified in "ii)" above. The master plan study was initiated at the stage where Part B of the World Bank cooperative project was underway.

**Fig. 3-1: Historical development of irrigated agriculture development in the Mae Klong River basin and operational assignments**



#### 4) Differences in developmental methods between the World Bank and JICA

Although the study on the master plan for the Mae Klong River basin started at the same time and for the same areas as the plan proposed by the World Bank, the methods and approaches taken by the two are somewhat different.

The JICA study team reviewed the irrigation development policies in the master plan study for the Mae Klong River Basin for the following three methods:

- i) Type A; Ditches and Dikes method (limited to construction of ditches, dikes and farm roads)
- ii) Type B; Extensive method (construction of canals dividing lots, as required)
- iii) Type C; Intensive method (accompanied by land rearrangement and land exchange)

For Type A and Type B, a detailed F/S was provided in the "Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin (F/S)," considering the possibility of implementation in the Kamphaeng Saen district. As for Type B and Type C, the study team recommended that RID should implement the land consolidation with loans from the World Bank.

At the same time, the World Bank was implementing an irrigation project using Type C ("intensive") methods. RID was also financially supported by overseas loans. Under these circumstances, the proposal for the master plan study for the Mae Klong River Basin was shelved.

#### (3) Characteristics of the development study

Characteristics of this development study can be summarized as follows:

- i) This was an "early assistance" case in which JICA provided cooperation for Thailand in the area of irrigated agriculture development.
- ii) At that time, large-scale assistance was provided by the World Bank, which required JICA to coordinate with the World Bank.
- iii) Coordination took the form of harmonious coexistence, with the World Bank taking charge of large-scale development of the major areas while JICA took care of more detailed segments derived from the major projects.
- iv) Basic differences in principles were at work. The World Bank adopted American-style "intensive" methods suitable for large-scale agricultural developments while Japan was more comfortable using "extensive" or "ditches and dikes" methods. Furthermore, in Thailand, as indicated by the Ditches and Dikes Act established in 1964, and the Land Consolidation Act enacted in 1982, laws concerning development methods were formulated as if following actual implementations of irrigated agriculture development projects.

As stated earlier, this development study constitutes part of the master plan study for the Mae Klong River basin and is designed to be a feasibility study for the development of farm fields at the outskirts of the area for which major canals were completed in 1972 with the assistance of the World Bank.

The development project at Kamphaeng Saen, which corresponds to Part D of the

cooperation policy of the World Bank, is subdivided into two projects, for the west and east districts. The project for the west district was proceeded with assistance from the World Bank. The east district was subject to the development study. According to an explanation from the director of Regional Office 10 provided to the evaluation study team during the survey, the development for the east district was supported by both overseas loans from the World Bank and national funds.

#### (4) Conclusions derived from the evaluation study

The following conclusions can be obtained from comprehensive evaluations of the World Bank reports, time-line accounts and geographical descriptions of development projects at Kamphaeng Saen in the Mae Klong River basin, project-site surveys, and collected questionnaire answer sheets from Regional Office 10.

i) From the time-line accounts and geographical descriptions of development projects in the Mae Klong River basin, based on reports of the World Bank, the areas covered by JICA development studies for both the "Master Plan Study for the Mae Klong River Basin" and the "Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin (F/S)" belong to the Tha Muang district (Stage I) and East Malaiman on the left bank of the Mae Klong River.

ii) There is a canal that can be regarded as a major ditch in the eastern region of Kamphaeng Saen surveyed by the evaluation study team. However, this canal was constructed in the 1990s, in accordance with Type B (Extensive method + overseas loans from the World Bank) action proposed by the "Master Plan Study for the Mae Klong River Basin." There was no confirmation of any "Type A" activity, as suggested by the "Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin."

#### (5) Others

In 1997, RID conducted the "Performance Evaluation of Kamphaeng Saen Irrigation Project, 1997" for the Kamphaeng Saen district. Regrettably, however, because this report does not distinguish the western and eastern regions, it cannot be utilized for measuring the effects of the "Study of the Kamphaeng Saen Irrigated Agriculture Development Project in the Mae Klong River Basin."

#### 3-1-2 Evaluation results by the five evaluation criteria

During the study period, accurate information has not been acquired from interviews and questionnaires because two decades have passed since the FIS was executed.

## 3-2 Study of the Mae Kuang Irrigated Agriculture Development Project (F/S)

### 3-2-1 An overview and background of the study project

#### (1) An overview of the development study

The development study under evaluation covers an area of 20,000ha encompassing both Chiang Mai and Lamphun Provinces and designated for dam construction and irrigation development projects. The following is an overview of the development study.

1. Study implementation period: February 1981 – February 1982 (S/W signed in December 1980)
2. Compilation of the final report: March 1982
3. Counterparts: Royal Irrigation Department (RID), Ministry of Agriculture and Cooperatives (MOAC)
4. Consultant for the development study: Sanyu Consultants Inc.; Taiyo Consultants Co., Ltd.

#### (2) Background of development study implementation:

Development of the Mae Kuang River basin started in 1957 with the construction of a weir covering an area of 9,600ha. However, this project was not sufficient to counter water shortages in dry seasons and floods in wet seasons. In 1975, RID embarked on construction of a dam on the left bank, but was unable to solve certain construction-related difficulties and requested assistance from JICA, which led to implementation of this development study.

This development study covers an area of 20,000ha encompassing both Chiang Mai and Lamphun Provinces, and seeks to formulate an irrigation development project effective for both the wet and dry seasons by constructing a total of three dams (the main one and another on the right bank, and a third on the left that was attempted by RID), utilizing the reserved water in these dams, and providing water supply/drainage through newly constructed main and branch canals.

#### (3) Characteristics of the development study

This development study is characterized by the fact that immediately after the completion of a JICA development study in February 1982, the "Mae Kuang Irrigated Agriculture Development Project (MKAIDP)" proceeded to next-stage study (July 1982) with an overseas loan from OECF. Construction started in 1984. The process can be summarized as follows.

1. JICA development study: February 1981 – February 1982
2. OECF loan; the next-stage study: July 1982
3. OECF loan; the first-term construction: September 1984 (construction of the dam on the left bank)
4. OECF loan; the second-term construction: October 1985 (construction of the dam on the right bank)
5. OECF loan; the third-term construction: September 1987 (construction of the main canal on the left bank (68.6km), the branch canal on the left bank (99.0km), and 32



administration offices)

## 6. Completion of all construction: 1993

For the irrigation development project, after 1992, RID took responsibility for planning and implementing construction of the facilities using the "ditches and dikes" method (land consolidation methods were not adopted). Utilization of the irrigated land for other purposes has been restricted.

Compared with the area covered by JICA development study (20,000ha), actual irrigation area available for urbanization, reforestation, and inland fish cultivation, etc. was 13,613ha as of 1999.

### (4) Conclusions derived from the evaluation study

The development study covered slightly less than 70% of the irrigated land that was initially planned, but project operations proposed in the development study were successfully implemented without delay. Subsequent operations involving RID projects (as part of accompanying projects) have been continuously performed.

Based on comments obtained at hearings with the individual experts currently dispatched as JICA senior volunteers, it was found that the total storage capacity of dams is insufficient for absolute demand levels.

### 3-2-2 Evaluation results by the five evaluation criteria

#### (1) Efficiency

- 1) This development study offers a very clear scope, i.e., construction of dams and formulation of irrigation development plans for the areas under evaluation. The final report clearly indicates that the development study was conducted for these objectives.
- 2) It is impossible to evaluate detailed study activities (Thai and Japanese inputs, including human input, communication, and data collection, etc.) due to the absence of members of the study.

#### (2) Effectiveness

- 1) Judging from the OECF reports and RID activities that will be touched on later, the content, scale, implementation conditions, and technologies of the projects proposed through the development study all seem to have been thoroughly reviewed.
- 2) The report sufficiently reviews the basic project plans (including construction of dams) and formulation of irrigation development plans. Although it gives careful consideration in terms of technical analyses, those who read it later may find it difficult to derive an overall picture of irrigated agriculture development policies and water resources policies at that time, or of perspectives in agro-economics and socioeconomic impacts on communities.

#### (3) Impact

- 1) The development study proposals are supplemented with more detailed analyses in the subsequent next-stage study, and modified to be utilized in applications for OECF loans.
- 2) The development study proposals and the analyses done for them have the following impacts on the areas covered by the study after project operations:
  - i) Increased irrigation area: The irrigated land area has steadily increased through urban development, reforestation, inland fish cultivation, etc. to slightly less than 70% of the originally planned area.
  - ii) Flood prevention: The dams and weirs constructed can control a volume of water equal to 24% of total rainfall. This figure can be translated into 27,200,000 Baht in flood damage at 1998 price levels, indicating that this amount of economic loss was prevented.
  - iii) Land category: The land in the project area has become increasingly urbanized over the years. After irrigation development, traditional rice cultivation has been replaced by cultivation of red pepper, vegetables, and fruits, and by inland fisheries.
  - iv) Amounts of harvested crops: In Chiang Mai Province, a comparison of the 1992/93 and 1996/97 harvests shows no fluctuation for wet seasons. However, for dry seasons, harvests in planted area increased by 45.3%. Similarly, in Lamphun Province, harvests in wet seasons increased by 29.2%, and in dry seasons by 78.6% (in planted area).
  - v) Inland fisheries: Fish catch increased by 120 tons at weirs and 150 tons at fish farms.
  - vi) Water User's Groups (WUGs), Water User's Association (WUA): In terms of

water management organizations, there were 130 WUGs and 12 WUAs as of the end of 1999.

vii) Others: Reserved water in dams is provided not only for irrigation purposes. It is also supplied to the Doi Saket District in Chiang Mai Province at 11,500 cum./d = 0.13 cum/s; to Stage 1 in Chiang Mai Province at 52,800 cum./d = 0.61 cum/s; and to the Northern Industrial Estate in Lamphun Province at 15,000 cum./d = 0.17 cum/s.

#### (4) Relevance

- 1) As stated in the background of this development study, the study is considered to be valid in Thailand.
- 2) In the development study, coordination with the existing area in Mae Kuang Irrigated Agriculture Development Project (MKIADP) is not necessarily considered, which, however, does not negate the study's relevance.
- 3) Regional offices of RID in charge of the areas perform activities related to irrigation development, including organizing farmers.

#### (5) Sustainability

- 1) Sustainability is supported primarily by RID, but in practice, managed by regional offices of RID as activities of Mae Kuang Operation and Management Project (MKOMP).
- 2) As for WUGs and WUA, refer to the comments given at "impact." The roles of WUGs and enhancement of their responsibility are activities of MKIADP Office. MKIADP is organized as follows:

- i) Administrative Division
- ii) Engineering Division
- iii) Water Management Division
- iv) Mechanical Division
- v) Four O&M Sections

As of 1995, MKIADP was composed of 124 staff members, among whom there were 66 O&M staff members, 22 of whom were in charge of water management, controlling an area of 1,300ha and 31.3km of canals.

- 3) To sum up, after implementation of this development study, this region has steadily been making efforts for sustainable development of projects by establishing offices, under the guidance of MKIADP and MKOMP.

### 3-3 Study of the Sakae Krang River Basin Irrigation Project (F/S)

#### 3-3-1 An overview and background of the study project

##### (1) An overview of the development study

The development study under evaluation covers an area of 6,300 km<sup>2</sup>, encompassing the Sakae Krang River basin located in the northwest of the central Chao Phraya plain, intended to review the water resource development plan for the Sakae Krang River Basin, to select dams that should be operated in projects, and to formulate irrigation development plans (pre-F/S and F/S). This basin is located about 250km to the north of Bangkok. The following is an overview of the development study.

1. Study implementation period: September 1984 – March 1986
2. Compilation of the final report: March 1986
3. Counterparts: Royal Irrigation Department (RID), Ministry of Agriculture and Cooperatives (MOAC)
4. Consultant for the development study: Nippon Koei Co., Ltd., Kyowa Engineering Consultants Co., Ltd., and Nippon Giken Co., Ltd.

##### (2) Background of development study implementation:

This study can be divided into two parts: a first-stage study for preliminary feasibility study (selection of possible project candidates; Pre-F/S) and a second-stage study for feasibility studies of the top-priority projects derived from Pre-F/S and for formulation of irrigation development projects. Both groups of studies were implemented in accordance with the national objectives of 1) enhancing major production categories, including agriculture; 2) developing underdeveloped regions and eliminating absolute poverty; and 3) improving living standards in farm villages and equitable distribution of incomes, as stipulated in the Fifth National Economic and Social Development Plan (1982 - 1986). Emphasis is placed on enhancing productivity in agriculture through new water resources and irrigated agriculture developments so that the target for agricultural development (annual development rate of 4.5%) can be attained.

##### (3) Characteristics of the development study

This development study focuses on development and the environment. This is because solving environment-related problems is crucial to project operations as proposed in the development study. Unless this requirement is met, no projects can be implemented.

The relationship between this development study and The environment should therefore be considered from the following perspectives:

- 1) Are environmental assessments included in the scope of this development study in the first place?
- 2) How should the environmental studies be allotted?
- 3) What kind of factors (conditions) should be satisfied relative to environmental problems (for possible project operations), and what kind of efforts have been made to solve these problems?

1) Are environmental assessments included in the scope of this development study in the first place?

As stipulated by the S/W of this development study, three environmental specialists participate in the study team. As for RID, our counterpart, a document stipulates that RID should invite "environmental specialists" from relevant organizations at the expense of RID.

The gist of the implementation plan for environmental study (work allotments) subsequently submitted by the JICA study team to RID is as follows:

i) The environmental study covered by the development study is targeted at the top-priority dam project and the environmental impacts of irrigation developments.

ii) The environmental impact standards should be based on the General Guideline of the National Environmental Board (NEB).

iii) As for the study approaches required by NEB, three points need to be noted: I) for those approaches that have already been included in S/W, additional data should be collected and provided by the JICA study team; and II) for those that have not yet been included in S/W, additional data should be collected and provided by RID; and III) the JICA study team should provide assistance to studies of some areas.

iv) The deadline for RID's environmental study and its work plan (i.e., the portions already performed by the study team and those to be performed by RID) should be clarified.

From these accounts in the final report, it is apparent that environmental issues had been a study theme from the very beginning of this development study.

2) How should the environmental studies be allotted?

The overview of the environmental-study implementation plan provides a breakdown of the environmental-study items to be performed by JICA study team and RID. The "Ecological Resource (= Forests)" study is assigned to the JICA study team; RID is supposed to be in charge of resident transfers in the target areas and impacts on residents.

Subsequently, RID independently requested the Chiang Mai University to conduct environmental studies in January 1991 (the "Environmental Impact Assessment Study") and in February 1994 ("Environmental Impact Mitigation Plan"). These were preparations for the following request for a 20th OECF loan. Upon request from the Thai government, OECF conducted a SAPROF study in 1995.

3) What kind of factors (conditions) should be satisfied relative to environmental problems (for possible project operations), and what kind of efforts have been made to solve the problems?

i) Environmental Guidelines

(a) During the implementation of the development study, the target was

defined as satisfaction of the environmental guidelines specified by NEB (Environmental Impact Assessment: EIA) (refer "1) – (ii)" above).

(b) After the development study and until project implementation, the EIA became quite strict, which required further studies (refer to "2" above).

ii) Public hearings and investigations on residents' awareness

(a) Simultaneously, as stipulated by the law, public hearings (by the Ministry of Agriculture and Cooperatives under the direction of NEB, directly supervised by the Office of the Prime Minister) and investigations on residents' awareness are conducted for project operations. RID compiles materials for, and submits them to, these public hearings.

iii) Approvals for project applications

Projects can be officially approved for implementation by satisfying EIA and obtaining an NEB's approval (decision).

(4) Conclusions derived from evaluation study

As stated above, projects proposed in the development study still face the dual challenge of "development vs. environment." Although, as evidenced in the implementation of the SAPROF study by OECF, fund-providing partners used to be relatively easy to find at the early stages, no project has yet been implemented despite the earnest efforts of RID to solve environmental problems. According to a staff member of a former counterpart still engaged in this case, the Mae Wong Project was the first instance in which environmental concerns have appeared at the forefront in Thailand.

3-3-2 Evaluation results by the five evaluation criteria

Evaluation by five evaluation criteria cannot be discussed at this stage. Because the EIA became quite strict and required further studies; thus proposed projects have still been under preparation.

### **3-4 Study of the Water Management System and Monitoring Program in the Chao Phya River Basin (M/P)**

#### **3-4-1 Overview and background of study projects**

##### **(1) An overview of the development study**

The development study under evaluation is aimed at formulating long-, medium-, and short-term project implementation plans for effective and appropriate management of water resources in the entire basin of the Chao Phya River. The following is an overview of the development study.

1. Study implementation period: January 1987 – March 1989 (S/W signed in May 1986)
2. Compilation of the final report: March 1989
3. Counterparts: Royal Irrigation Department (RID), Ministry of Agriculture and Cooperatives (MOAC)
4. Consultant for the development study: Sanyu Consultants Inc.; Taiyo Consultants Co., Ltd.

##### **(2) Background of development study implementation: Water resource management in Thailand**

###### **1) Water resource and agricultural development policies in Thailand**

This development study under evaluation was conducted in accordance with the following principles stipulated in the Sixth National Economic and Social Development Plan (1987 - 1991).

- i) Internal measures for water management (utilization plan and operational techniques)
- ii) External measures for water management (improved productivity of water resources and appropriate management of local environment and social capital)

Water resource policies in Thailand were changed drastically in the preceding Fifth National Economic and Social Development Plan (1982 - 1986), shifting from the traditional emphasis on expansion of cultivated areas to agricultural development through improved productivity, i.e., enhancement of irrigation facilities based on the assumption that land area is limited. Specifically, the Chao Phya River Basin requires effective utilization of farmland through improved production processes, i.e., through formulation of an effective water distribution system for the area. This concept was inherited in the Sixth National Economic and Social Development Plan and in subsequent plans.

These changes in water resource policies have been prompted by urgent social and economic requirements, such as increased demand for industrial and domestic water supplies. At the same time, some response is needed to the depletion of national resources caused by large-scale irrigated agriculture development. In other words, water resources have evolved from a free good to an economic one, making their effective utilization an important item on the political agenda. At the same time, increases in agricultural production have become less profitable from a national policy perspective because international supply-and-demand relationships have become more balanced. Under these

circumstances, it becomes possible to move away from policies based on large-scale irrigated agriculture development intended to increase the food supply (promoted until the Fourth National Economic and Social Development Plan) and toward support for small-scale irrigation projects.

2) Water resource management and JICA cooperation (pioneering examples of intellectual-assistance-types of development study and promotion of collaboration)

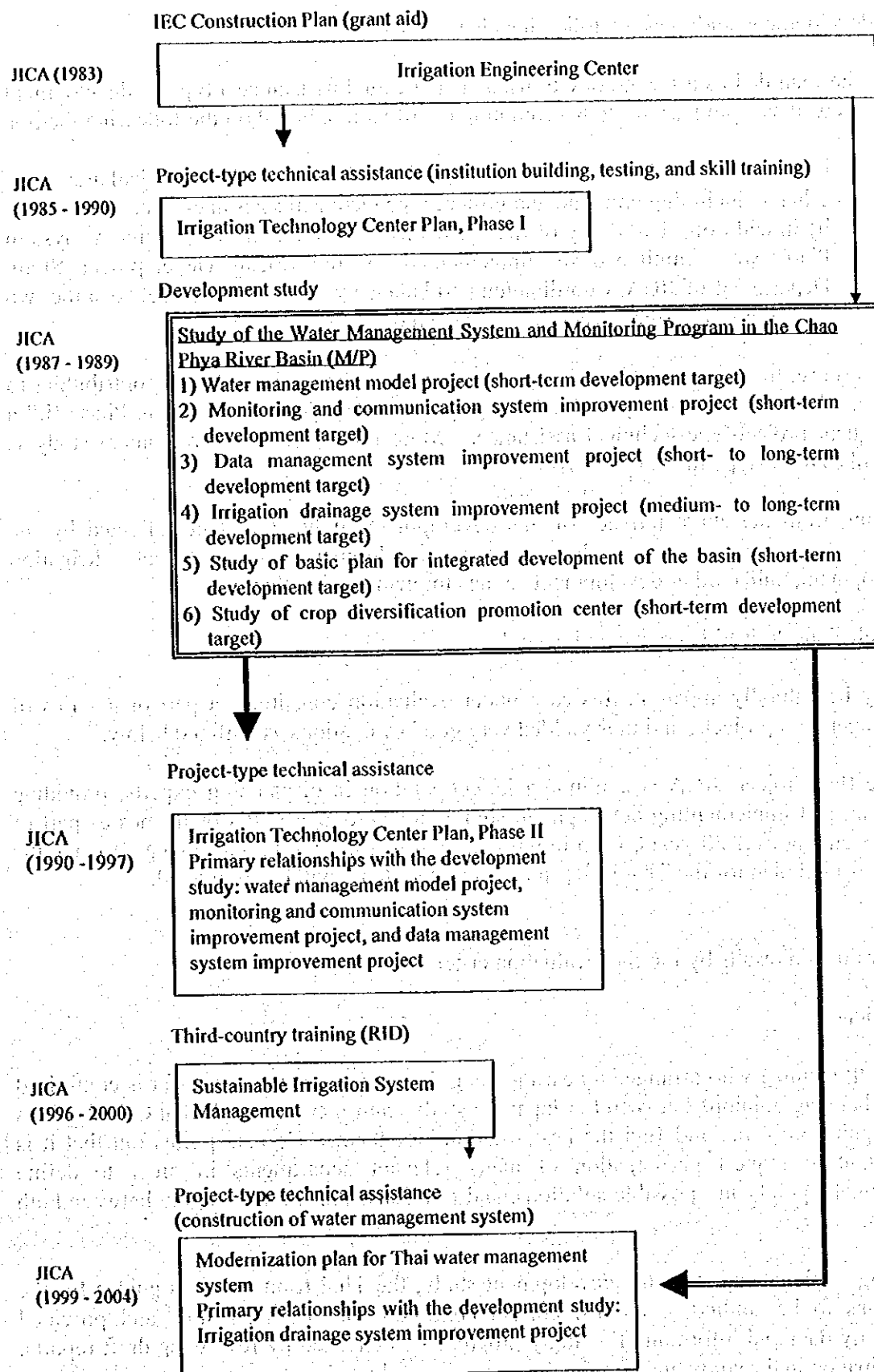
JICA cooperation on water resource management was initiated prior to implementation of this development study. As indicated in the following chart, "The Irrigation Engineering Center (IEC) Project and This Development Study," JICA provided cooperation for IEC construction, through grant aid to RID, as early as 1983 (the second year of the Fifth National Economic and Social Development Plan). This cooperation was intended to help cultivate ties between irrigated agriculture development and water resource management. Upon completion of IEC construction, JICA began training RID staff for institutional construction, testing, and skill improvements through project-type technical assistance cooperation (the "Irrigation Technology Center Plan"), in order to improve staff ability levels. Based on these improvements, which were a prerequisite for support for the IEC project, this development study has been implemented.

This development study is the only M/P-type development study among the four cases covered by the current type of evaluation studies; more specifically, it can be classified as a technology transfer- (intellectual assistance-) type of development study. Furthermore, while this development study was implemented, the "Study of the Chao Phya River Basin Flood Forecast System Plan" was also implemented by the Social Development Study Department. It should be pointed out that coordination and balance were maintained between the two efforts.

In 1990, after implementation of this development study, the "Irrigation Technology Center Plan, Phase II" was introduced as a way of implementing the "water management model projects," etc. proposed in the development study. A monitoring system was experimentally introduced, which connected the four unsteady-flow monitoring stations at the northern region, Bang Sai, Bang Pakong, and the Memorial Bridge to the IEC headquarters by telephone line. In addition, based on implementation experiences with an improvement project of this monitoring system, RID has undertaken JICA's third-country training, "Sustainable Irrigation System Management" since 1996.



**Fig. 3-2: Irrigation Engineering Center (IEC) Project and this development study**



### (3) Characteristics of the development study

This development study has the following characteristics:

- 1) It can be regarded as a technology transfer- (intellectual assistance-) type of development study, as well as a pioneering study promoting coordination, based on the following factors:
  - i) It was an M/P development study coordinated using JICA's technical assistance scheme, including grant aid and project-type technical assistance, etc.
  - ii) In addition, the "Study of the Chao Phya River Basin Flood Forecast System Plan" was simultaneously implemented by the Social Development Study Department of JICA. Coordination and balance were maintained between the two operations, and some synergies were even detected.
- 2) In this sense, the report of this development study can also be regarded as contributing to the compilation of a project plan for the "Irrigation Technology Center Plan, Phase II," a subsequent project-type technical assistance. More precisely, this development study is more like an F/S-type than an M/P-type.
- 3) Judging from the characteristics of this development study, it was not affected by the policy change from large-scale irrigation development to small-scale irrigation development, unlike other development studies implemented at that time.

### (4) Conclusions derived from evaluation study

As may be naturally apparent, this case under evaluation constitutes a part of a series of JICA cooperation projects, and thus yielded very good evaluations as outlined below.

For the IEC Project, JICA is continuing its cooperation in dispatching experts, providing equipment, and implementing development studies for particular C/P's or themes as part of efforts extending over 20 years, from initial grant aid in 1983 until 2004 (planned) when the "Modernization plan for the Thai water management system" will be completed.

#### 3-4-2 Evaluation results by the five evaluation criteria

##### (1) Efficiency

- 1) The C/P member who arranged a hearing recognizes that technology transfer is comprised of exchanging opinions between the Japanese study team members and Thai C/P members to pinpoint problems and find the best solutions for them. He also points out that it is important to request participation of many relevant departments in order to define problematic points and possible solutions, and to discuss matters thoroughly between both parties.
- 2) During implementation of the development study, the Thai team acted as guides for the locations to be studied, explained current conditions on the Thai side, and provided necessary data and information. Study progress was checked by reviewing draft reports. Participation in the study and communication were evaluated as "moderate."

- 3) Through implementation of the development study, the Thai team was able to acquire knowledge and skills about operations (water balance and water release), uses of irrigation water (in both wet and dry seasons), and conditions of irrigation/drainage facilities (design criteria for facilities maintenance) through meetings and discussions.
- 4) As stated earlier, this development study was coordinated with JICA technical assistance schemes, including past grant aid and ongoing project-type technical assistance.

## (2) Effectiveness

- 1) As will be indicated later, all proposals from the development study have been implemented. It is thus possible to surmise that project content, scale, implementation conditions, skills, etc. have been sufficiently reviewed. JICA also provided equipment. Some comment that certain aspects that would not have been realized single-handedly due to lack of budgeted funds and human resources, have actually been implemented.
- 2) The report indicates that the development study is a technology transfer- (intellectual assistance-) type and M/P-style development study. The following characteristics can be noted:
  - i) First of all, "formulation of IEC project contents" is targeted.
  - ii) After IEC policy targets are reviewed, actual projects have been formulated together with short-, medium-, and long-term plan targets.
  - iii) In addition, for some projects, including "water management model projects," the contents are currently reviewed.
  - iv) One big feature is the technology transfer in the development study performed in collaboration with counterparts.

## (3) Impact

- 1) Some questionnaire answer sheets indicate, specifically, that impacts were palpable in water management and river development in the Pitsamulok district, along the middle reaches of the Chao Phya River; and in surveillance of rainfall, water volume in the river and in irrigated districts, and drainage improvements in the lower delta regions.
- 2) For the six projects proposed in the development study, the following replies were obtained through questionnaires and interviews:
  - i) For the water management model project, project-type technical assistance was provided through the "Irrigation Technology Center Plan, Phase II," as stated above. (C/P was the Office of Hydrology and Water Management.)
  - ii) For monitoring and communication system improvement projects, results included new management of RID facilities (i.e., the four observation stations for which JICA provided equipment), reduction of mechanical failures, and adequate responses to communications systems (the Water Management Division).
  - iii) For the irrigation drainage system improvement project, construction work is ongoing in Kampling as a flood prevention measure (Kampling Project, "Drainage in the lower delta area," Water Management Division; supported by World Bank loans).
  - iv) The data management system improvement project is included in "i)" above.
  - v) The basic plan for comprehensive development of the basin was implemented under the title "Water Management Study in Chao Phraya Basin" (the Project

Planning Division), which had an impact on drought countermeasures for the irrigated areas (i.e., development of new water resources and environmental management).

vi) For the study of the Crop Diversification Promotion Center, the program has already been completed as an extension project (planning to expand the cultivation areas that can allow cultivation of crops other than rice in dry seasons by  $200,000 \text{ rai/year} \times 5 \text{ years} = 1 \text{ million rai}$ ) (the Crop Diversification Program, Department of Agricultural Extension).

#### (4) Relevance

- 1) The relationships between the development study policies and the National Economic and Social Development Plans are as stated at the outset. There is no inconsistency between them, since no policy change took place between the Fifth and Sixth National Economic and Social Development Plans.
- 2) This development study overlaps to some degree with the "Study of the Chao Phya River Basin Flood Forecast System Plan" implemented by the Social Development Study Department, in terms of implementation schedule and areas to be studied. To support data and information collection, coordination and balance were maintained with the study team, an approach leading to harmonious project operations.
- 3) The project-type technical assistance cooperation, "Irrigation Technology Center Plan," designed for IEC and this development study relate to each other as indicated in the above figure; each constitutes part of the entire IEC project.
- 4) Implementation of proposals from the development study has been outlined above. Some replies indicate that both irrigation development and water resource development are important issues, and that efforts are made to shift maintenance and management responsibilities for small-scale irrigation systems to the relevant local authorities. Furthermore, judging from the fact that JICA's project-type technical assistance, "Modernization Plan for the Thai Water Management System," and similar efforts have been implemented, the framework proposed by this development study can be regarded as satisfying current needs.

#### (5) Sustainability

- 1) Some comment that continuous collaboration from JICA has enabled RID to develop accumulated knowledge for understanding water management as a whole.
- 2) RID has become capable of studying an irrigation drainage system improvement project (Kamplang Project) independently.
- 3) On the other hand, some comment that more knowledge and know-how should be accumulated concerning new themes such as the environment, development methods in which residents can participate, and how to organize local communities, etc.
- 4) In JICA's third-country training (entitled "Sustainable Irrigation System Management"), not only Thai professors but also RID staff members have been capable of giving lectures.
- 5) As stated above, irrigation development and water resource development are still important

issues for RID, and efforts are being made to shift maintenance and management responsibilities for small-scale irrigation systems to the relevant local authorities.

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## **Chapter 4: Study Results (Philippines)**

### **4-1 Ilocos Norte Irrigation Project (F/S)**

#### **4-1-1 An overview and background of the study project**

##### **(1) An overview of the development study**

This feasibility study covers the irrigation area of Ilocos Norte (22,600ha), and is intended to formulate irrigation facility and riverhead development projects. The following is an overview of the development study.

1. Study implementation period: August 1978 – December 1980  
(Field study)  
    First stage (August – November 1978)  
    Second stage (January – March 1980)
2. Compilation of the final report: December 1980
3. Counterparts: National Irrigation Administration (NIA)
4. Consultant for the development study: Sanyu Consultants Inc.

##### **(2) Background of development study implementation**

Subsequent to the “green revolution,” the Philippines attained self-sufficiency in rice by 1977 with the introduction of a high-yielding strain of rice and the promotion of irrigation cultivation, both of which improved financial conditions in farming villages. During the 1970s, however, the challenge the country had to tackle was to improve agricultural productivity and rectify regional income differentials. Steps for meeting the challenge included efforts to improve and diffuse agricultural technologies and to enhance agricultural infrastructure.

Under these circumstances, this feasibility study was conducted in an area of 22,600ha in Ilocos Norte Province (administrative region #1), which was regarded as lagging behind in development work. The study’s primary objective was to develop irrigation facilities and water sources.

##### **1) National Development Plan**

This case overlaps with the Long-term Development Plan (1978 - 2000) and the Mid-term Development Plan (1978 - 1982) formulated by the Philippine government. For the agricultural sector, the Long-term Development Plan emphasizes improving productivity and income, while the Mid-term Development Plan gives priority to enhancing employment and income in farming villages in the long run and to improving domestic productivity in cereals and stable food supplies in the short run.

As for irrigation, these plans emphasize the expansion of irrigation facilities to increase rice production to respond to increasing demand for rice, and a strategy of implementing land allotments in line with crop qualities. In addition to the expansion of irrigation facilities, repairs to existing facilities and improved irrigation management were also regarded as important.

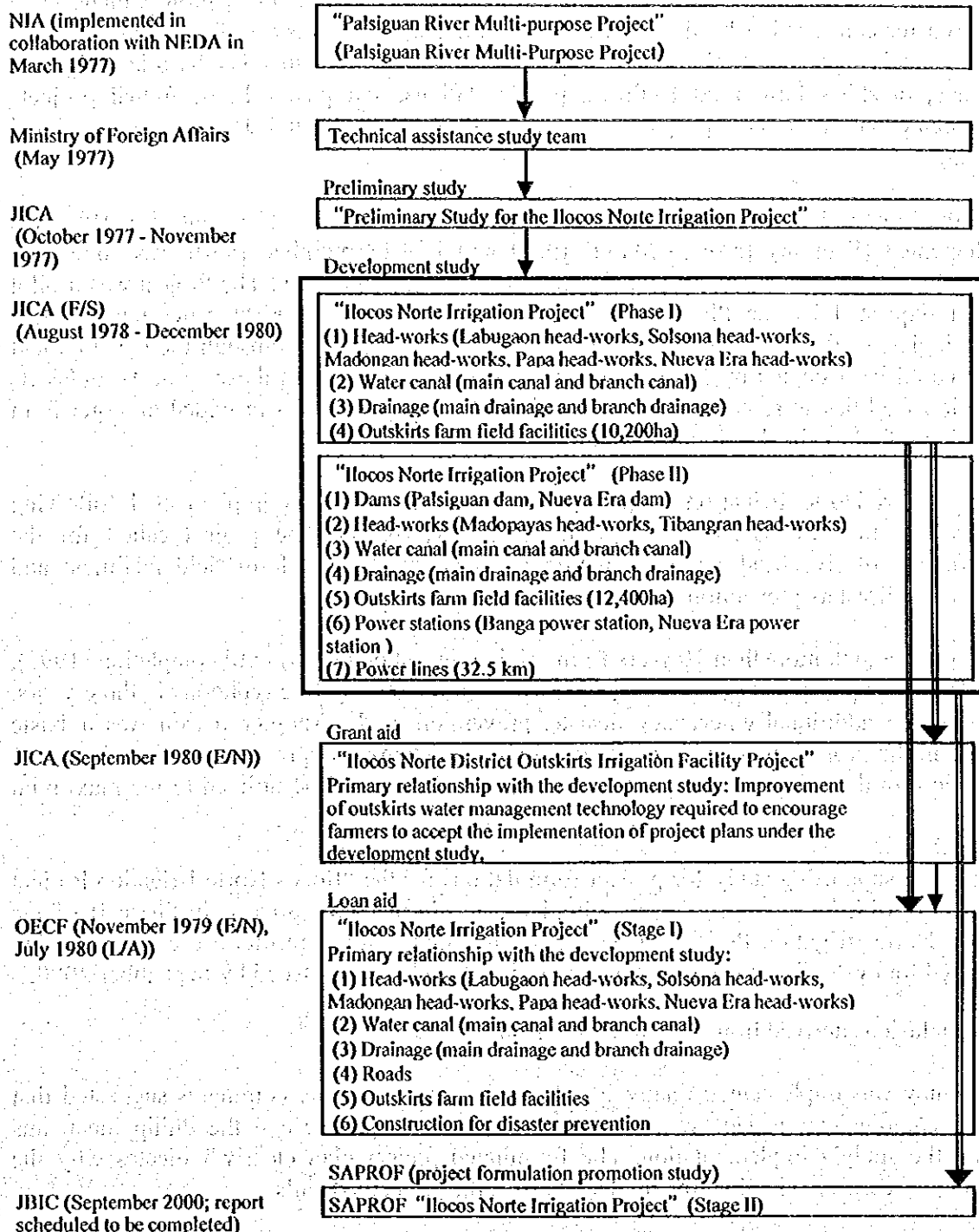
## 2) Historical background to implementation of the development study

Against this backdrop of efforts to formulate development plans by the Philippine government, in 1975, the National Irrigation Administration (NIA) embarked on a complete irrigation plan for Ilocos Norte Province. The plan grew to be a comprehensive regional development endeavor, and proceeded under direct supervision by the national government starting in 1976. In 1977, NIA formulated the "Palsiguan River Multi-purpose Project" in collaboration with NEDA.

In response to this move, in May 1977, a technical assistance study team was dispatched by the Ministry of Foreign Affairs of Japan. The Philippine government requested the Japanese government to conduct studies for the plan. Subsequently, following an official request from the Philippine government received through the embassy, JICA dispatched the "Preliminary Study Team for the Ilocos Norte Irrigation Project" in November 1977. The team conducted studies in two separate stages: a first stage involving formulation of a general plan and implementation of feasibility studies for regions in which data could be collected as well as favorable results were expected; and a second stage involving plans in areas such as dams and power generation.



**Fig. 4-1: Historical development of Ilocos Norte Irrigation Project**



### 3) Project implementation

This study was implemented in two separate stages. In the first stage, project plans were proposed for constructing head-works, irrigation drainage, and outskirts farm field facilities; in the second stage, project plans were proposed for constructing dams, head-works, irrigation drainage, outskirts farm field facilities, power stations, and power lines. Actual projects implemented based on these proposals were partially financed through Japanese grant aid and loan aid.

For the "Ilocos Norte District Outskirts Irrigation Facility Project" (grant aid), B/D was implemented (February through March 1980) and E/N (September 1980) was concluded while Phase II of the "Ilocos Norte Irrigation Project" was underway. The Project was a pilot project requested by the Philippine government to improve outskirts water management technologies, so that the irrigation improvement projects proposed through the development study could be accepted by farmers and implemented smoothly. In these projects, outskirts irrigation facilities were constructed and agricultural equipment was provided to target farm fields identified by the development study.

The "Ilocos Norte Irrigation Project (Stage I)" (loan aid) was implemented following proposal of the "Ilocos Norte Irrigation Project" (Phase I). The project called for the construction of five head-works; irrigation drainage, roads, and farm field facilities; and emergency disaster- prevention facilities.

This project took more than 10 years from original inception (1983) until completion (1995). The delay was partly because the target area was hit directly by five typhoons in three years, necessitating additional emergency disaster-prevention work. Another reason was a basic change in the project planning, from a top-down to bottom-up approach, to reflect the needs of Zanjera in the canal designs, so that existing facilities could be utilized to the maximum extent.

SAPROF (supporting study for project formulation) for the "Ilocos Norte Irrigation Project (Stage II)" with loan cooperation was implemented in the same area as in Phase II of the "Ilocos Norte Irrigation Project," covered by this study. Study results are currently being compiled for evaluation purposes, and a report is scheduled to be issued by September 2000.

#### (3) Conclusions derived from the evaluation results

The study was implemented relatively efficiently, although some comments suggested that certain communication gaps were present between the Japanese and the Philippine teams during the study's implementation. The formulated project plan clearly indicates why the project is necessary. The final report also clarifies the project's details.

At the same time, this study could be regarded as the one (of the five studied for the Philippines) in which the study proposals were most clearly implemented. The project plans proposed by this feasibility study (Phase I) proceeded almost exactly as planned in the study, except for certain modifications introduced as part of the shift toward an approach encouraging farmers' participation. It usually takes quite a while between the formulation of project plans (i.e., after the completion of feasibility studies) and project implementation due to administrative procedures in the recipient country. In the meanwhile, needs identified in the original studies may sometimes have changed, resulting in the need to review the contents of OECF (present JBIC) projects prior to implementation.

One factor contributing to the near-complete implementation of the F/S was the prompt pace of project implementation, with all study schedules from Phase I to Phase II completed by December 1980, and the L/A signed by July 1980. According to the parties concerned, the study received national-level priority, which ensured optimal conditions for project implementation.

#### 4-1-2 Evaluation results by the five evaluation criteria

##### (1) Efficiency

1) We received opinions from former counterparts about the context in which the development study was implemented. They state that the Philippine side actively participated in the study in collaboration with the Japanese team. Informal meetings were held almost every day to confirm achievements thus far. One negative aspect might have been communication, which was somewhat hampered by insufficient linguistic capabilities on the Japanese side during the study's implementation phase.

2) As for technology transfer, the Philippine side states that they have obtained additional knowledge, besides what was already known to participants in their respective specialized fields, through implementation of the feasibility study and the irrigation projects.

3) As for the adequacy of the data required for implementation of the study, the final report indicates that sufficient qualitative and quantitative data were obtained. However, the section about farmers' organizations in the final report does not mention "Zanjera", a traditional irrigation organization that has existed in the region for over 350 years. This organization should have been studied. This omission may have been due to the fact that the study team had no specialist in farmers' organizations or their maintenance or management.

4) As for the consistency between this feasibility study and other projects, no information has been obtained that can lead to confirmation of the statements made in the study. However, the following findings concerning areas covered by the feasibility study and surrounding areas have been obtained:

- i) Repairing irrigation facilities in the area under study and the surrounding areas under NISIP (National Irrigation System Improvement Plan) I of the World Bank (7,242ha)
- ii) Improvement and planning for irrigation facilities in the area under study and the surrounding areas by FSDC (Farm System Development Corporation) (690ha).
- iii) Repairs and constructions of roads by the Ministry of Public Highway (MPH) (135.2 km within the area under study)
- iv) Implementation of feasibility study for flood prevention projects for the Labugaon River and the Solsona River by the Ministry of Public Wealth (MPW)
- v) Tree-planting plan by the Forest Management Bureau (the "Marcos Tree-planting Plan" in the Nueva Era District, in the area under study, covers 11,000ha)

<sup>1</sup> A "zanjera" is a traditional irrigation organization dating back to the 1630s. These organizations are still in operation in the Ilocos region and the Cagayan Valley. Community members can raise funds for irrigation facilities construction, as well as procure materials and labor, allocate water, and manage irrigation facilities in a democratic manner.

## (2) Effectiveness

1) The final report is basically structured around several key themes: economic background at the national and provincial levels; current conditions in the planned areas; project plans, implementation, maintenance, and management; and project evaluation. The descriptions are clear and easy to understand. As for content, although it seemed to be difficult to collect information due to lack of essential data, the report provides sufficient information on the latest conditions in the areas under study. Furthermore, the project plans clearly indicate why the implementation is necessary, which gives enough details. The attached materials also provide economic comparisons for alternative plans, suggesting that the project plans have been thoroughly reviewed. However, the descriptions about farmers' organizations involved in maintenance and management of projects are not sufficient. This may be due to lack of study that covers these farmers' organizations.

2) After Phase I of this feasibility study was completed in November 1978 and before Phase II started in January 1980, the E/N for the "Ilocos Norte Irrigation Project (Stage I)" that reflects Phase I was concluded (November 1979); the L/S was concluded in July 1980. Judging from this sequence, the Philippine government seems to have expected that the proposals linked to implementation of the F/S would be implemented in the form of projects through yen loans. In this sense, the Philippine side was sufficiently capable of implementing the project, despite its large scale (encompassing an area of 10,200ha).

However, hearing findings from NIA suggest that, although the project plans indicated in the report of the feasibility study have been actually implemented, this plan (including Phase II) may be too large in scale for a new irrigation project (about 21,400ha, including Phase II), in terms of the general fund-raising capabilities of the Philippines.

## (3) Impact

1) As stated earlier, based on this feasibility study, the "Ilocos Norte District Outskirts Irrigation Facility Project" (grant aid) and the "Ilocos Norte Irrigation Project (Stage I)" (loan aid) were implemented as projects. Both projects primarily derived from proposals in Phase I of this feasibility study, and had already been suggested as possible even while the study was underway. The "Ilocos Norte District Outskirts Irrigation Facility Project" (grant aid, 1980 (E/N)) was implemented as a pilot project intended to aid the smooth implementation of this feasibility study, and the "Ilocos Norte Irrigation Project (Stage I)" (loan aid, 1980 (I/A)) was implemented to help realize project plans through Phase I of this feasibility study.

2) Implementation of the "Ilocos Norte Irrigation Project (Stage I)" produced several key results, including productivity improvements, income increases, satisfactory production for demands (self-sufficiency in rice), and more systematic operations of the water management organizations in the area under study.

For example, productivity (as indicated by rice yield per hectare) in the area under study increased from 2.51 tons/ha/year (average from 1983 to 1986) to 4.42 tons/ha/year (average from 1997 to 1999) in dry seasons; and from 2.22 tons/ha/year (average from 1983 to 1986) to 4.06 tons/ha/year (average from 1997 to 1999) in wet seasons. The average annual income of a farming household increased from 8,075 pesos before project completion (1982) to 66,381 pesos (1996). Production of rice relative to demand in project areas also increased from four times demand to six times (with demand calculated at 184kg/person/year).

In addition, projects were designed to satisfy the needs of the Zanjera, the traditional farmers' organizations, thus contributing to active participation of farmers in project maintenance and management. The number of farmers' organizations registered with NIA has also increased from four as of 1980 to 28 in 1999. At present, the irrigation facilities are managed under more systematized Zanjera organizations with the assistance of NIA. In general, local maintenance and management for the entire region is now more systematic and efficient than before. Irrigation plans are successful, and are based on participation from farmers, thus attracting the attention of both domestic and overseas experts in the field.

3) At present, SAPROF is being implemented for the "Ilocos Norte Irrigation Project (Stage II)" (loan aid) corresponding to this feasibility study (Phase II). Once these projects are implemented, almost all of the proposals of this F/S will have been applied.

#### (4) Relevance

1) This feasibility study (on the implementation stage of the development study) seemed to be consistent with the "Mid-term Development Plan (1978 - 1982)" in effect at that time, which aimed primarily at improving employment opportunities in farming villages and incomes in farming households, and at enhancing domestic productivity of cereals. The study identifies the following objectives:

- i) Increasing agricultural production
- ii) Creating employment opportunities for residents of local communities
- iii) Improving livelihoods in farming villages by modernizing canal/drainage facilities and roads, disseminating and systematizing agricultural techniques, and providing comprehensive electrification.

Furthermore, for irrigation, priority was given to expanding irrigation facilities so as to increase production in response to growing demand for rice. Another goal was to further expand irrigation facilities for the Ilocos district (the first administrative district).

Although the final report of this feasibility study does not give any account of its relationship with the "Mid-term Development Plan (1978 - 1982)," study-plan coordination seems to have been maintained during the implementation stage in line with project objectives.

2) This feasibility study did not take into account irrigation facilities management utilizing traditional farmers' organizations. The project plans proposed by this feasibility study thus do not reflect farmers' needs sufficiently; and in this sense, their relevance is a little low. However, at the project implementation stage, when loan aid was provided, Zanjera organizations became involved in the formulation of the designs, and thus farmers' needs were reflected in the end.

3) The "Ilocos Norte Irrigation Project (Stage I)" (OECF), a project based on this feasibility study, is a large-scale irrigation project and inconsistent with the government policy for the first half of the 1980s, which gave priority to new medium-to-small scale irrigation projects.

However, the development plan of NIA for 1990-2000 (CORPLAN) states, "Priority should be given to small-to-medium scale irrigation projects from financial perspectives. It is also desirable to maintain a balance between large-scale and small-to-medium scale irrigation

projects.”<sup>2</sup> Although government policies on irrigation projects changed after implementation of the development study, the implementation of those two projects was not necessarily inconsistent, considering the directions suggested by NIA.

In addition, the NIA regional office said that because the “Ilocos Norte Irrigation Project (Stage I)” turned out successful with farmers’ participation, at the time SAPROF was implemented for the “Ilocos Norte Irrigation Project (Stage II),” the project was highly evaluated by the local farmers, and their expectations were quite high. From the perspective of local needs which are considerable, the project plans derived from this F/S are relevant, even as of this evaluation.

#### (5) Sustainability

1) Two projects were implemented: the “Ilocos Norte District Outskirts Irrigation Facility Project” (grant aid) and the “Ilocos Norte Irrigation Project (Stage I)” (loan aid). As for sustainability, the latter should be discussed, as the former was a pilot project implemented in the early 1980s.

2) The entity managing the irrigation facilities constructed under the “Ilocos Norte Irrigation Project (Stage I)” was a Zanjera-based farmers’ organization. As stated earlier, the area under study had long had a Zanjera group [a firmly integrated unit promoting various activities led by an elected leader, in accordance with its own unique rules handling irrigation-related matters.

After the implementation of the “Ilocos Norte Irrigation Project (Stage I),” a national irrigation system was properly established in the target area, leading to more systematic management of irrigation based on Zanjera. In 1994, arrangements were made for the gate manager of NIA to manage the head-works, while the management of irrigation canals and all accompanying facilities was turned over to Zanjera. Furthermore, Zanjera reached an official agreement with NIA to pay an annual 1.5 Cavan<sup>3</sup> per one hectare for 50 years as a contribution to development costs.

As a result, Zanjera has been reported to take a more active management role in irrigation facilities since project implementation. More regular meetings are held than before, with specific agenda. Decisions are also made in a more democratic manner, unlike the old way of simply following the leader’s decisions. In this respect, the study proves its sustainability.

<sup>2</sup> NIA, Corporate Plan: 1990-2000, May 1990, p35

<sup>3</sup> One Cavan is about 50kg of Palay rice.

## 4-2 Mabini Agricultural Development Project (F/S)

### 4-2-1 An overview and background of the study project

#### (1) An overview of the development study

This feasibility study covers the Mabini irrigation district of 11,500ha, and is intended to formulate project plans for riverhead development and irrigation facility improvements, etc. The following is an overview of the development study.

1. Study implementation period: September 1981 – March 1982
2. Compilation of the final report: March 1982
3. Counterparts: National Irrigation Administration (NIA)
4. Consultant for the development study: Japan Engineering Consultants Co., Ltd.;  
Nippon Suiko Consultants, Co., Ltd.

#### (2) Background of development study implementation

This feasibility study covers an area of 11,500ha in the Mabini irrigation area of the Pangasinan Province. Most of the beneficiary land comprises rain-fed paddy fields. The study is intended to formulate project plans for riverhead development and irrigation facility improvement to ensure increased agricultural production, stable expansion of rice (primary produce) cultivation, improved farmers' incomes, and further creation of employment opportunities, etc.

##### 1) National and regional development plans

As with the "Ilocos Norte Irrigation Project" introduced in the previous section, this feasibility study was introduced while the Philippines' Mid-term Development Plan (1978 - 1982) was being formulated. The Development Plan sought to enhance employment and income in farming villages in the long run, and to improve domestic productivity in cereals and maintain stable food supplies in the short run. For irrigation, the Plan emphasized irrigation facilities expansion to increase rice production in response to increasing demand for rice. To this end, it employed two strategies: 1) implementing land allotments suited to crop qualities; and 2) expanding irrigation facilities, as well as repairing existing facilities and improving irrigation management.

Improving domestic productivity in cereals and ensuring food-supply stability, as stipulated in the Plan, requires enhanced agricultural productivity in the region, which in turn requires introduction of high-yielding crop strains. Thus, the improvement of irrigation facilities is indispensable. The Development Plan thus emphasizes the expansion of irrigation facilities to increase rice production in response to intensifying demand for rice. These circumstances contributed to the growing need for this feasibility study.

##### 2) Historical background to implementation of the development study

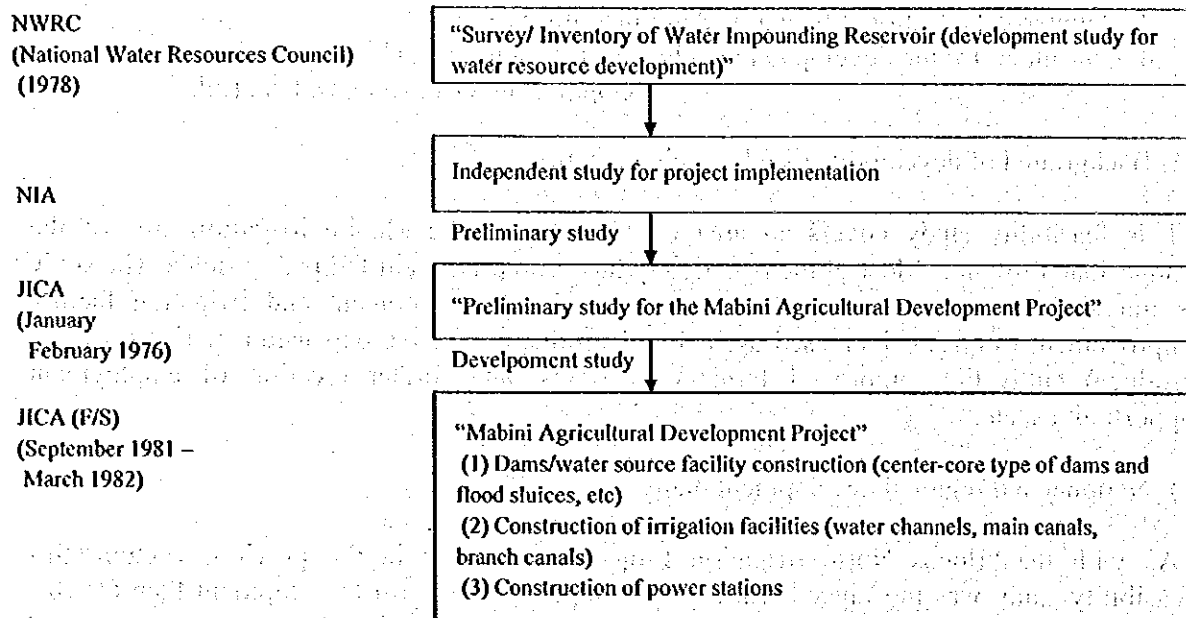
This feasibility study has its origins in the "Survey/ Inventory of Water Impounding Reservoirs," a development study on water resources conducted by the Ministry of Public Wealth and the Ministry of Transportation and Communication, following a Presidential Order in 1976. In 1979, the Small Water Impounding Management Committee was established to put the development study's results to practical use in a well-coordinated

manner.

The National Irrigation Administration (NIA) was one of the agencies available to chair this Committee. Subsequently, NIA became the implementation body for the five districts including Mabini, and secured the agreement of the Committee for project support.

In April 1980, the Philippine government made an official request. In January 1980, the preliminary study team was dispatched to implement this feasibility study.

**Fig. 4-2: Historical development of the Mabini Agricultural Development Project**



### 3) Project implementation

Although this feasibility study, so far, has not been implemented in a project form, it has attracted the attention of the China Chen South American Construction Contractor Co., Ltd. A next-stage study has just been implemented. According to NIA, when it receives the study report, checks the contents, and confirms that standards are met, the projects proposed through the report will receive priority status. And then, NIA will submit the report to the National Economic and Development Authority (NEDA). If it is approved by ICC (Investment Coordination Committee), the project will be started with loans from China.

### (3) Conclusions derived from the evaluation results

In terms of the implementation stage of the study, conditions for the technology transfer were not adequate. Specifically, it has been pointed out that lack of communication due to insufficient linguistic capabilities on the Japanese side hampered the progress of technology transfer, and that both sides failed to implement studies for the purpose of technology transfers.

Even after implementation, proposals from this F/S were not put to practical use. This was primarily due to a policy change in irrigation development projects in the early 1980s, under which emphasis shifted from construction of new irrigation facilities to repair of existing



facilities. Still, the possibility of new loans from China has emerged so that projects that have lost their relevance are likely to be implemented in the future.

#### 4-2-2 Evaluation results by the five evaluation criteria

Evaluation by the five criteria cannot be discussed at this stage since proposed projects have been under preparation.

## 4-3 Improvement Project for the Operation & Maintenance of National Irrigation Systems (AMRIS, 18 Districts) (F/S)

### 4-3-1 An overview and background of the study project

#### (1) An overview of the development study

This feasibility study covers the AMRIS irrigation district (35,000ha), and is intended to improve existing irrigation facilities and formulate project plans for maintenance and management of irrigation systems. The following is an overview of the development study.

1. Study implementation period: September 1982 – February 1984
2. Compilation of the final report: February 1984
3. Counterparts: National Irrigation Administration (NIA)
4. Consultant for the development study: Sanyu Consultants Inc.;  
Kyowa Engineering Consultants Co., Ltd.

#### (2) Background of development study implementation

The AMRIS irrigation district (35,000ha), the target area of this feasibility study, covers the Bulacan and Pampanga Provinces. About 80% of the district is in the Bulacan Province. In both provinces, agriculture is the primary industry, constituting part of the granary in the Middle Luzon Plain. Irrigation projects in the Middle Luzon Plain have long been introduced by NIA. In the 1960s and 1970s, active project efforts focused on large-scale reservoirs and irrigation facility improvements increased the irrigation ratio from 36% in the 1960s to about 50% in the 1980s. <sup>4</sup> As of 1980, the irrigation ratio in the paddy fields of the Bulacan Province, part of the target area of this feasibility study, stood at 70%; and that in Pampanga Province at 71%. Both figures are higher than those for other areas in the country.

This feasibility study was conducted to formulate project plans for improving existing irrigation facilities and enhancing maintenance and management systems for irrigation, rather than for constructing new irrigation facilities in the AMRIS irrigation district<sup>5</sup>. The district itself contains a relatively broad irrigation area with a long history of irrigation facility improvements.

#### 1) National Development Plan

This feasibility study was conducted during the Mid-term Development Plan (1983 – 1987: established in May 1982). This Mid-term Development Plan established the following primary goals for the agricultural sector:

- i) Increasing food production to respond to the Philippines' increasing population and improving nutrition-intake levels.

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<sup>4</sup> The figure is for five provinces in the Middle Luzon Plain; Kenzo Horii, Takashi Shinoda, Hirokazu Tada, "Irrigation Systems in Asia," Shinhyoron 1996, p.85.

<sup>5</sup> Irrigation areas equipped with large reservoirs are the Upper Pampanga Irrigation District (UPRIIS), the Angat-Masim Irrigation District (AMRIS), and the Magat Irrigation District (MARIS). This feasibility study covers the Angat-Masim Irrigation District.

- ii) Increasing incomes of farming households.
- iii) Increasing agricultural production to obtain more foreign currency.

However, due to the sluggish international price levels for agricultural produce and natural disasters such as typhoons and droughts, the Philippines, which depends on agricultural exports for much of its foreign currency, suffered an unfavorable balance of trade. In 1984, it even needed to import rice from abroad. Under these circumstances, a Revised Mid-term Development Plan (1984 - 1987) was issued. Goals in the agricultural sector remained largely unchanged, but the Revised Plan introduced a new emphasis: how improved productivity in the agricultural sector could contribute to overall economic recovery. In terms of irrigation infrastructure projects, the following points were emphasized:

- i) Repairing existing irrigation facilities (instead of new development projects) and improving water and irrigation facility management to reduce project costs, as a means of increasing rice production.
- ii) Promoting implementation of regional irrigation development plans, to rectify regional differences in supply and demand of rice.
- iii) Promoting production of agricultural produce other than rice.

## 2) Historical background to implementation of the development study

The irrigation systems in the Angat and Masim River basins covered by this feasibility study are among the oldest irrigation facilities in the Philippines. Prior to implementation of this feasibility study, irrigation facilities were already been in place, and projects to improve existing facilities and water management had been implemented using ADB loans.

The ADB project, "Angat-Magat Integrated Agricultural Development Project (AMIADP)" started in 1973, following a 1968 request for technical assistance by the Philippine government. ADB decided to provide loans for irrigation facilities in the Angat District (26,400ha) and the Magat District (34,185ha), which were the largest and most modern at the time. The objectives were to expand irrigated areas both for the wet and dry seasons, by improving the existing facilities and water management systems.

This initiative increased the total beneficiary area in the Angat District under this feasibility study from 26,400ha before the project to 35,000ha after its implementation.

## 3) From the request for this feasibility study by the Philippine government to its implementation

When the Philippine government requested that this feasibility study be implemented in June 1981, repair projects had already been conducted at 76 national irrigation systems out of 117 districts, using loans from IBRD, etc. The Philippine government requested the Japanese government to provide assistance for 22 of the 41 districts requiring repair work, and other assistance. To respond to this request, the preliminary study team was dispatched in February 1982 to implement the "Preliminary Study for the Improvement Project for the Operation & Maintenance of National Irrigation Systems."

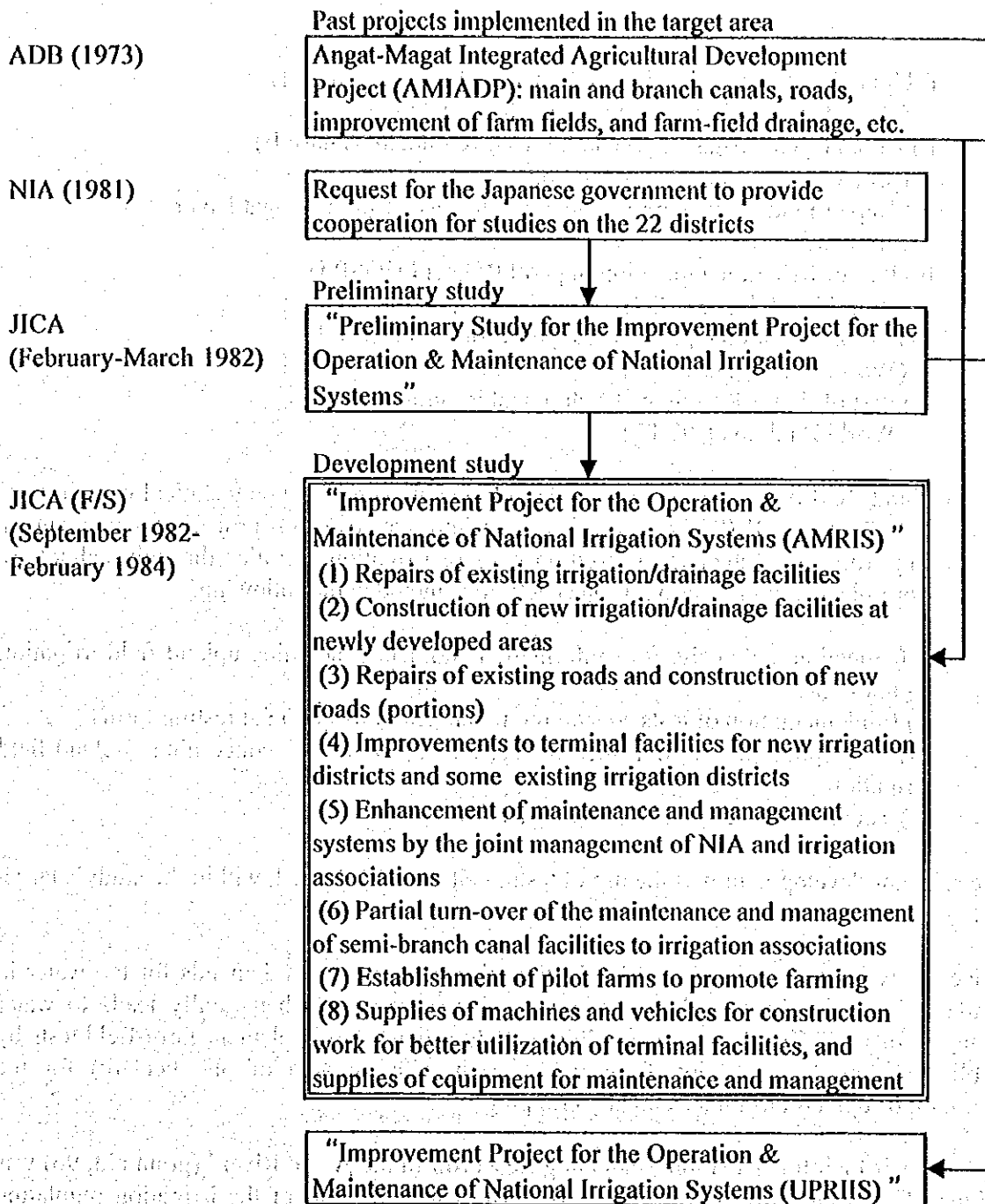
The Japanese team found it difficult to cover the 22 districts in the study. Accordingly, based on priorities outlined by the Philippine side, JICA study cooperation was focused on the Upper Pampanga Irrigation District (UPRIIS) and the Angat-Masim Irrigation District (AMRIS). For the remaining 20 districts, NIA was supposed to perform studies on 18 of them

in collaboration with JICA.

This feasibility study was performed in accordance with the above preliminary study, primarily designed for AMRIS district. It was also intended to assist the Philippine side to implement studies on the 18 districts.

For reference, we note that the "Improvement Project for the Operation & Maintenance of National Irrigation Systems (UPRIIS)" was also implemented in accordance with the "Preliminary Study for the Improvement Project for the Operation & Maintenance of National Irrigation Systems," as was the case for this feasibility study.

**Fig. 4-3: Historical development of the Improvement Project for the Operation & Maintenance of National Irrigation Systems (AMRIS)**



#### 4) Related plans implemented in the target area

This evaluation study failed to confirm whether proposals made under this feasibility study went directly into operation. Projects implemented after the study in the area covered by this feasibility study are as follows:

- i) Upland-field Irrigation Technology Development (Phase I)  
(project-type technical cooperation, 87-92)
- ii) Upland-field Irrigation Technology Development (Phase II)  
(project-type technical cooperation, 93-98)
- iii) Repair Plan for Irrigation Regulating Reservoir in the Angat River  
(grant aid, 96)
- iv) Part of Irrigation Operation Support Project I (IOSP I)  
(World Bank loan, 88-92)
- v) Part of Irrigation Operation Support Project II (IOSP II)  
(World Bank loan, 93-00)
- vi) Part of Water Resource Development Program (WRDP)  
(World Bank loan, 97-02)

The "Upland-field Irrigation Technology Development" (project-type technical cooperation, Phase I (87-92); Phase II (93-98)) aimed to help improve irrigation project management by diversifying crops and enhancing utilization rates of irrigation facilities through technology transfers for upland-field irrigation. Project activities included the following:

- i) Collection and analyses of information and data concerning upland-field irrigation technologies
- ii) Implementation of tests concerning upland-field irrigation at testing farms
- iii) Compilation of documented technical standards concerning upland-field irrigation
- iv) Technical training for NIA staff members

The relevant development was the use of testing sites in San Rafael, within the study's target area.

Since the water source for AMRIS irrigation districts also serves demands for tap water in Manila, priority is given to domestic uses in dry seasons, which naturally leads to water shortages for irrigation. Thus, this feasibility study proposes to implement farm-field tests by establishing ten demonstration farm fields (each with an area of one hectare) for the promotion of upland farming/secondary cropping.

The "Repair Plan for Irrigation Regulating Reservoir in the Angat River" (grant aid, 96) was designed for repair work on the Bustos dam (head-works), part of the irrigation regulating reservoir in the AMRIS irrigation district. Improvement work on the Bustos dam (head-works) is included in the proposals of this feasibility study. This plan was implemented as emergency work on the damaged iron sector gate, caused by typhoon-related flooding.

The "Irrigation Operation Support Project I (IOSP I)" (World Bank) (1988-1992) was a project implemented by NIA with loans from the World Bank to cover the entire country. The project aimed at i) enhancing the organizational and technical capabilities of NIA and irrigation associations (IA) for more effective irrigation facility management, and ii)

improving NIA's project performance through repair of irrigation facilities, etc. This project and the feasibility study are related in that the former was responsible for part of the repairs on irrigation facilities in the target area.

The "Irrigation Operation Support Project II (IOSP II)" (World Bank) (1993-2000) covers the target areas outside of the Manila metropolitan area.

It is aimed at improvement of irrigation facilities, emergency improvement works, water damage prevention, silt prevention, supplementary O&M, and IA assistance, among other items. The IOSP II-related project implemented in the target area of this feasibility study was the construction of an emergency weir to repair the damaged Bustos dam (head-works) in 1999.

The "Water Resource Development Program (WRDP)" (World Bank) (1997-2002) covers the entire country and is aimed at assisting the Philippine government in the following areas:

- i) Establishment of water resource plans and frameworks to improve water resource management
- ii) Management of riverhead areas
- iii) Efficient utilization of irrigation water and improvement of agricultural produce, specifically rice
- iv) Alleviation of poverty
- v) Promotion of the transfer of irrigation-systems management to farmers
- vi) Improvement of the environment in irrigated areas

These targets are linked to the feasibility study since the Program conducted studies on riverhead development in the target area. The study proposes to establish separate water sources for irrigation to secure water for the AMRIS irrigation area, since the reservoir water in the upper Angat River, which is the water source for the AMRIS irrigation area, is primarily applied for domestic use in the Manila metropolitan area.

### (3) Conclusions derived from the evaluation results

Due to lack of available information, efficiency concerning the collaboration between the Philippine and Japanese teams and the technology transfers cannot be assessed. A review of the report for this feasibility study indicates that the originally intended scope specified in the S/W is properly covered. In addition, the study can be regarded as sufficient as it provides explanations about adequate data and required information.

In terms of the study's target areas, activity includes Japanese project-type technical cooperation, grant aids, and certain World Bank project efforts. Although this activity is not a direct result of the study's proposals, project sites and/or target areas do partially overlap with the study's target areas.

In addition, subsequent to the implementation of this feasibility study, the policy of the Philippine government changed from an emphasis on irrigation projects in new development areas to improvement projects for existing facilities. This feasibility study also includes a small-scale expansion plan for new irrigation facilities (3,500ha).

#### 4-3-2 Evaluation results by the five evaluation criteria

**Evaluation by the five criteria cannot be discussed at this stage since no project directly related has been implemented after the development study.**