4.2 PROJECT ACTIVITIES AND ACCOMPLISHMENT

4.2.1 PLANNING AND DESIGN CRITERIA

(1) At time of discussion for the Project Implementation

1) Initial Purpose

To up-grade Engineers qualifications, to be enough to maintain engineering by themselves continuously, with adopting / modifying irrigation and drainage planning methodology and introducing rational analysis method of hydrology through technical transfer for the aspects as followed :

a. Verification trials for upland irrigation manual in pilot areas
b. Improvement of the manuals
c. Up-grading analysis method of hydrology and conducting case studies at model NIS.
d. Carrying out training to NIA staffs on aspects related with Planning and Design Criteria

2) Criteria of Project Purpose Effectiveness

a. Definitions of irrigation efficiency for implementation
b. Design of field irrigation systems
c. Introduction of water saving irrigation system
d. Researching newly and effective irrigation technology
e. Study on manual revisions
f. Provision of irrigation pamphlets for farmers
g. Up-grading hydrological analysis technology
h. Carrying out of case studies
i. Planning for training, provision of training materials and instructions

3) Preconditions

a. Supplying equipment to be donated as scheduled
b. Satisfying quantity and accuracy of required data for verification tests and discharge analysis
c. Available to quite any troubles on discharge and rainfall observation and on interchangability among computer systems

(2) At time of Interim Evaluation

1) Initial Purpose

Same as the time of discussion for the Project Commencement

2) Criteria of Project Purpose Effectiveness

Same as the time of discussion for the Project Commencement

3) Preconditions

It was discussed to solve the condition of holding two assignments of an expert to be a single

assignment for this subject.

(3) At time of Final Evaluation

1) Condition of the Project Purpose Efficiency

a. Results of researching irrigation amount, wetted area, required costs were observed at experimental plots and summarized as introduction of water saving irrigation system.

b. Researching results of dynamics of soil moisture content due to revision of manual were concluded as academic experience of counterparts because analysis of collected data with tensiometers were rather scientific for them and difficult to generalize for the common field.

c. Revision of manual includes definition of reference year for irrigation planning, introduction of water saving implements and commonly used estimation method of water requirement such as Penman Method. Also revising the contents from research and plan to plan and design of irrigation.

d. Irrigation pamphlets for farmers were provided as extension material with introducing water saving implements such as micro-sprinkler system.

e. Characteristics of river discharge were studied with examining hydrological circulation elements, such as precipitation, evapotranspiration, coefficients of tank-model, observed river discharges and others for appurtenant basins. Observed data adapted above study were collected from installed observation gauges for said aspects, such as rainfall and water level of river discharge. Potential water resources of each basin was estimated and summarized into potential map with tank-model discharge simulation adapting model coefficients obtained from 1995 analysis, updating and adding results caused from hydrologic characteristic analysis.

f. A series of training to NIA staffs was continued for three years cooperating with counterparts and none of constraints and troubles was noticed. Training materials were updated while conducting the activities considering responses from training attendants.

g. Demonstration of micro-irrigation implements were held at 25 locations over the country with assistance of NIA engineering staffs and farmers, which events were planned as a support cooperation to DCPP scheme.

2) Existence of Precondition Alteration

Same as the previous interim evaluation stage.

(4) Reasons for Concluded Project Purpose Efficiency

1) Accomplishment

a. 6 short term experts were dispatched and they contributed to boost efficiency.
b. Counterpart(s) for this subject have been assigned for long term (5-year) and getting familiar with any related aspects.

2) Non-Accomplishment

a. Nothing in particular.

4.2.2 WATER MANAGEMENT

(1) At time of discussion for the Project Implementation

1) Initial Purpose

To up-grade Engineers qualifications, to be enough to maintain engineering by themselves continuously, with adopting / modifying water management methodology and introducing rational and updated methods of the subject through technical transfer for the aspects as followed :

a. Verification and other necessary trials in pilot areas
b. Improvements of the manual, basing on the trials.
c. Rationalizing water distribution planning methods and improvement, conducting case studies.
d. Carrying out training to NIA staffs and leading farmers on aspects related with water management planning.

2) Criteria of Project Purpose Effectiveness

a. Study on water consumption at field level
b. Water distribution planning at TSA level
c. Developing decision making method on irrigation starting time.
d. Revision of IEDC Manual
e. Collection and analysis on water management originated data
f. Developing analysis methods of roll of irrigation systems
g. Developing water distribution planning on canal level
h. Conducting case study(s) on water distribution planning
i. Planning for training, provision of training materials and instructions

3) Preconditions

a. Appointing and continuous assignment of qualified counterparts and supporting staffs to ensure smooth research, planning and methods development.
b. Supplying equipment to be donated to be set up on schedule

(2) At time of Interim Evaluation

1) Initial Purpose

Same as the time of discussion for the Project Commencement

2) Criteria of Project Purpose Effectiveness

Same as the time of discussion for the Project Commencement

3) Preconditions

Same as the time of discussion for the Project Commencement

(3) At time of Final Evaluation

1) Condition of the Project Purpose Efficiency

a. Applicability of the manual was studied through comparison between actual water consumption at any farms and estimated water consumption of crops provided at Plan and Design Criteria Section.
b. Water balance trials and water management evaluations were carried out for laterals and sub-laterals.
c. Simple method to judge irrigation starting time (TIN-CAN method) was developed basing on evapotranspiration ratio.
d. Non-uniform flow simulation(s) was carried out for main canals and it caused to be available to understand flow conditions, water levels for water control and discharge volume.
e. Water distribution planning of main canals for drought term was developed for the basin including the canals.
f. Rotational irrigation trials were conducted as case study for lateral and sub-lateral fields.
g. A series of training was carried out for NIA staffs and leading farmers from 1994 to 1996 for the subjects related with water management planning.

2) Existence of Precondition Alteration

Nothing in particular.

(4) Reasons for Concluded Project Purpose Efficiency

1) Accomplishment

a. Guidance of development of water distribution planning method, implementation of case study and others have been conducted during last five years by Japanese experts.
b. Short term expert(s) contributed to make depth of progresses for water distribution planning method.

2) Non-Accomplishment

a. It became impossible to implement rotational irrigation method study in lateral level due to El Ninō phenomenon for both year of 1997 and 1998.

4.2.3 MAINTENANCE AND REHABILITATION

(1) At time of discussion for the Project Implementation

1) Initial Purpose

a. To upgrade technical capability of the NIA Engineers
b. To introduce economical maintenance and rehabilitation technology and To carry out test construction and case study
c. Conduct of training related to maintenance and rehabilitation aspect

2) Criteria of Project Purpose Effectiveness

a. Provision of engineering manual for low cost maintenance and rehabilitation technology for irrigation systems.
b. Conduct of case study
c. Conduct of training course

3) Preconditions

a. Sufficient budget for experimental canal lining works should be allocated for the implementation of case study.
b. Required experimental equipment and apparatus should be sufficient and in good operating conditions

(2) At time of Interim Evaluation

1) Initial Purpose

Same at the time of discussion for the Project Commencement

2) Criteria of Project Purpose Effectiveness

Same at the time of discussion for the Project Commencement

3) Preconditions

Same at the time of discussion for the Project Commencement

(3) At time of Final Evaluation

1) Condition of the Project Purpose Efficiency

1)-1 Regarding to the introduction of maintenance and rehabilitation technology

a. Reconfirmation on concerned documents:

Collected and summarized 23 books / manuals during the initial period of activities. Some materials were used as reference for the test construction such as cement, steel bar as reinforcement, bamboo, coconut fiber, river gravel, river sand, volcanic ash (Lahar). Books referred were listed in

the manual.

b. Preparation of manual on low cost maintenance and rehabilitation technology :

The contents of the manual includes major subjects such as Investigation, Facility design, Cost estimate, Construction method and Construction management, relating with canal rehabilitation works which share most part of irrigation systems, considering that NIA staffs could carry out required works by themselves in future. This manual will be completed within scheduled period, by May 1998.

1)-2 Regarding to Carrying out test construction

a. Provision of Activity Plan

" Activity framework for the trial works implementation " was prepared at initial stage and all of the activities had been carried out based on the framework as stated.

b. Testing / Selection of indigenous materials:

Physical / Dynamic tests on various indigenous materials were carried out, such as cement, Reinforcement steel bar, bamboo, coconut fiber, river gravel, river sand and volcanic ash.

c. Testing / Selection of materials design mixture :

i). Trial mixing with the volcanic ash (Lahar) as replacement of fine aggregates was conducted and could cause confirmation that the said material was applicable to use under sufficient water control. But optimum mixing proportion was not able to complete in order to attain the required compressive strength.

ii). The ideas to use the volcanic ash replacement of cement or as admixture for concrete, was suspended with reasons that sufficient quantity with required fineness could be hardly found in nature and necessity to give some processing to obtain required quality.

iii). Related equation for unconfined compressive strength and water cement ratio was provided based on the results of concrete tests applying various water cement ratio from 50% to 75% to find appropriate concrete design mix and compressive strength for canal lining.

iv). Short term experts transferred / demonstrated the technology on how to conduct laboratory tests and how to decide mixing proportion for concrete and soil cement.

d. Selection of Canal Lining Methods

Test construction project # 1 and # 2 on Canal Lining Methods was carried out at Lateral-B, North Main Canal, Bulacan in Model NIS on 1995 and on 1996, utilizing indigenous materials under the local cost expenditures for the construction of model infrastructure. Those trials are stated in " Activity framework for the trial works implementation ", excluding lining with plastic or polyethylene film.

Table 4.2.3-1 Test Construction Project # 1 and 2

Experimental Construction 1995	Experimental Construction 1996
210 kg/cm^2 (ordinary sand + RSB*)	180 kg/cm^2 (+ RSB*)
210 kg/cm^2 (ordinary sand + Bamboo)	180 kg/cm^2 (non-RSB*)
210 kg/cm^2 (ordinary sand + C.F*)	160 kg/cm^2 (+ RSB*)
210 kg/cm^2 (V. ash* + Bamboo)	160 kg/cm^2 (non-RSB*)
210 kg/cm^2 (V. ash* + C.F*)	Concrete hollow blocks
	Concrete tiles
	Grouted Riprap
	Rubble Masonry
	Soil Cement (10% cement mixing)
	Earth canal (+ concrete stakes at slope edges)

* Note : RSB* : Reinforcement steel bar C.F* : Coconut fibers V. ash* : Volcanic Lahar

1)-3 Implementation of case study for low cost maintenance and rehabilitation in model NIS

a. Preparation of activity framework

" Activity framework for the trial works implementation " was issued at initial stage and all of the activities had been carried out.

b. Field investigation and selection of sites

Lateral-B, North Main Canal, in Model NIS was selected for the test construction site through confirmation with Irrigation Superintendents among others and canal cross-section survey and soil investigation were conducted.

c. Preparation of structural plans and POW.

Required design documents and contract documents were prepared for the test constructions.

d. Test construction of canal lining

Five (5) combination canal lining methods in 1995 and ten (10) in 1996 were conducted respectively.

e. Selection of lining methods from test constructions

Cost comparisons, stability aspects and conditions after completion had been monitored for all results listed in the previous Table 4.2.3-1 and the results will be evaluated with specialized comments by the end of cooperation period.

f. Monitoring of completed structures performance.

Monitoring activities had been carried out from the final construction completed on April 1997 and no damage was occurred such as cracks, seepage loss and deterioration, except construction of illegal intake pipes along the canal lining.

1)-4 Regarding Training of NIA staffs

a. Preparation of course design

The training was conducted 4 times with respective titles and time allocations.

b. Preparation of training materials

Training materials required for this subject were prepared as follows:

1. 2 video tapes for material and dynamic tests for concrete and for concrete lining implementation
2. Training materials for practices
3. Physical / Dynamic test
4. Lectured material on Concrete mixing design by weight.

c. Guidance for training courses

Training course were conducted by both of counterparts and experts. Counterparts provided their lectures more than twice, and also experts provided lectures at least once. All of activities during the training course were assisted by the section.

2) Existence of Precondition Alteration

a. The former counterpart who had been assigned to the section since the project commencement was transferred to the Project management staff on the same project on January 16, 1997.

b. Supplying of electricity and water to the laboratory where installed equipment for tests were cut by March 1997 and the stoppage affected smooth laboratory management.

4) Reasons for Concluded Project Purpose Efficiency

1) Accomplishment

a. Dispatch of two experts continuously.
b. Provision of sufficient equipment and apparatus in materials testing laboratory.
c. Two test construction projects were funded.

2) Non-Accomplishment

a. Reasons for not applying the trial use of volcanic ash as substitute of cement or as admixture for concrete is beyond from the aimed theme, to introduce economical technology for systems of maintenance and rehabilitation. Because required fineness should be over 2,500 cm^2/g (Blaine Specific Surface) and necessity to find quarry site with quantified potential near volcanic crater or to crash the ash to obtain the required fineness with bowl mill.

b. Regarding the production of reinforced concrete utilizing synthetic fibers, there are two major reasons. One is rather difficult to find sufficient material in Philippines and the other reason is commonly used bagger mixer here is not available to keep required quality, which was confirmed through the trial concrete mixing tests using coconut fiber instead.

4.2.4 INFORMATION ANALYSIS AND MANAGEMENT

(1) At time of discussion for the Project Implementation

1) Initial Purpose

Initial purpose is that the technologies to be established through the Project activities will be maintained and developed continuously by Philippine side, with up-grading qualification of engineers for aiming rapid, accurate and efficient availability of database for irrigation planning and management.

a. Improvement of database on irrigation planning and management
b. Implementation of training to NIA technical staff concerning information analysis and management

2) Criteria of Project Purpose Effectiveness

a. To be available to maintain and develop technology and development methodology by Philippine side while issuing engineering criteria and establishing required manuals
b. Carrying out of training for aspects related with Information Analysis and Management

3) Preconditions

a. Surety of dispatching concerned experts from the initial stage.
b. Surety of installation and setting up new computers without delay
c. Surety to be introduced new computer software.

(2) At time of Interim Evaluation

1) Initial Purpose

Same as the time of discussion for the Project Commencement

2) Criteria of Project Purpose Effectiveness

Same as the time of discussion for the Project Commencement

3) Preconditions

a. Progress for the concerned subject was doubted because of delaying the proceeding expert.
b. Same as the at time of discussion for the Project Implementation for the computers

(3) At time of Final Evaluation

1) Condition of the Project Purpose Efficiency

1)-1 Improvement of Database on Irrigation Planning and Management

a Establishment of Database Management System (DBMS) for Irrigation System Operation

a-1. Database Development

i). 5-year action plan was provided

ii). Designing of DBMS:

a-2. Data Collection and Inputting.

i). Service area data

i)-1. Irrigation facility data : Data on canal (as designed), Concrete gate in North Main Canal, Concrete canal of Lateral-B canal (obtained from Maintenance and Rehabilitation Section), with photo-pictures and explanation of site situations, was collected and compiled. Contents of compiled data is summarized as followed table.

1. Canal	location, discharge, velocity, water depth, slope, width, sectional area, roughness coefficient and others
2. Concrete gate	photopictures, location map, gate dimensions, elevations
3. Concrete canal	photopictures, width and others.

Data of main canals and gates as Irrigation Facility Inventory are to be utilized for facility renovation. Irrigation canal network was based on collected main and lateral canals data with assistance of Water Management Section.

i)-2. Map Information : Map information of Bulacan Area and others were compiled with Map-Info software.

ii). Environmental Data

ii)-1. Alteration of Data collection and Data compilation.

The procedure was changed from copying of data to purchase of floppy disk from concerned agency and transfer it into the computer system directly.

ii)-2. Software for climate data analysis

One meteorological data analysis software was developed automatically after compiling data from copied floppy disks, because it will not function as database if the data collected is just compiled. That software consists of such as [daily rainfall province], [successive rain days province], [temperature province], [wind province], [evapotranspiration province], [meteorological summary province] and [EL NINO province] and so on..

ii)-3. Both of users' manual for meteorological analyzing software and users' guide were provided.

ii)-4. Meteorological data of Bulacan, Iloilo, Munoz and Davao were compiled and analyzed.

ii)-5. Analysis of El Ninō phenomenon.:
Software titled [EL NINO] was developed, to analyze meteorological characteristics for potential El Ninō year and year without the potential. Even though those El Ninō analysis

were out of the scope, the analysis was on the same line of meteorological analysis and the phenomena affected to water shortage or stoppage of irrigation water supply to Bulacan actually. The results seemed to have occupied their attention and intensify their understanding and willingness for the analyzing works. While doing those analyzing works counterparts made efforts to collect necessary information through Internet.

ii)-6. Rainfall data collected during Phase I Stage:

Rainfall data collected during Phase I Stage were transcribed into new software and analyzed as stated as above.

iii). Farm Data

Information originated farmers such as name of farmers, addresses, and others were compiled through ACCESS.

iv). Irrigators' Association (IA) Data

As information related with name of association, number of members and others were compiled.

b. Development of Data-sharing and Technical Calculation System for Irrigation Technology

b-1. Introduction of LAN system for DBMS

i). Design of LAN system

i)-1 The installed LAN system covered DCIEP II office, Administrator's office and other NIA departments and realized to exchange information through the center offices. Training for how to use software and for engineering calculation of irrigation technology were carried out.

i)-2 Introduction of Internet and Collecting Information.

1. Internet was introduced and installed as part of DBMS.
2. E-mail was installed and it became available to exchange information between the center and region offices.

b-2. Development of Technical Calculation Library

Collected computer programs from books, colleges and universities, international organizations and Internet. Developed meteorological software to calculate probability of rainfall, return period, evapotranspiration using Penman method and so on. These programs were shared to users as commercialization activity.

1)-2 Implementation of training to NIA technical staff concerning information analysis and management

3 training seminars for irrigation related information analysis and 17 seminars for computer utilization were carried out during the assignment.

2) Existence of Precondition Alteration

Although the appointment of expert had been delayed for this field (joined in the 4th year) scheduled activities were completed under the busy conditions.

(4) Reasons for Concluded Project Purpose Efficiency

1) Accomplishment

a. The long term experts conducted and completed the technical transfer.
b. Short term expert(s) contributed to make depth of progresses for the given tasks.

2) Non-Accomplishment

Nothing in particular

4.2.5 AGRONOMY

(1) At time of discussion for the Project Implementation

1) Initial Objectives

Initial objective is that the technologies to be established through the Project activities will be maintained and developed continuously by Philippine side, while upgrading the qualifications of NIA staffs in the sector.

a. Implementation of crop cultivation trial in a trial farm, taking of soil characteristics
b. Improvement of the Manual
c. Implementation of training for NIA staff and key farmers concerning diversified crop cultivation in irrigated areas.

2) Criteria of Project realization

a. To carry out field test
b. To carry out soil survey
c. To improve technical manual
d. To develop a cropping guideline
e. To prepare a training plan and teaching material, and to carry out training.

3) Preconditions

a. Confirmation of appointing sufficient counterpart for the investigation and the survey
b. Confirmation of availability of experimental farm during project implementation
c. Confirmation of budgetary allocation for training
d. Confirmation for keeping security at experimental farm

(2) At time of Interim Evaluation

1) Initial Purpose

Same as the time of discussion for the Project Commencement

2) Criteria of Project Realization

Same as the time of discussion for the Project Commencement

3) Preconditions

Same as the time of discussion for the Project Commencement

(3) At time of Final Evaluation

1) Condition of the Project realization

a. Implementation of crop cultivation trial in the trial farm taking into account of soil characteristics

a-1 Field trial

According to the cropping calendar test (6 sets of tests), November cropping was found the best. Similarly according to the crop adaptability test (18 crops tested), eleven crops were found recommendable. Crop improvement test for cropping cultivation method (3 sets of tests) showed the effectiveness of mulch. Under the farm cultivation test (6 crops) which were performed on the existing farm, the upgrading of cropping technical level were confirmed. However improvement test for soil porosity (3 sets of tests) which were carried out by the smoked chaff did not show any effects.

a-2 Soil survey

Through the test pits survey at the pilot farm and at DCPP and other areas, the conditions of the three textures of the soil profile, structure and fertility of soil, PH, and EC were clarified. The survey showed unsuitability of crop variety on heavy clay soil, sandy soil and gravel soil area.

The field survey and soil survey were performed and results were presented. Some parts of the results were reflected to improve the manual. Moreover, the counterparts acquired the ability to plan, design and execute the cultivation under the survey performance. When the expert leave the Project, the personnel performed the crop selection, cropping pattern determination at DCPP and MIS area.

b. Improvement of Manual

The manual, titled " VEGETABLE PRODUCTION MANUAL IN AN IRRIGATED ECOSYSTEM ", for farmers and extension staff were prepared in 1996 as a separate version and were distributed to the related organizations because the technique of crop cultivation was far from the irrigation technical manual. This manual was arranged practically and main items included were fertilizer and profits management, cultivation method, existing conditions of the Philippines agricultural production and environmental influence to crops. "GUIDE FOR DIVERSIFIED FARMING" (20 sets of English and 20 Tagalog versions with 500 copies each) which described the cultivation method of twenty items for significant crops for farmers was prepared. As regard to preparation of Manuals and cultivation

guideline, the purpose of "Revision of Manual" was concluded.

c. Training for NIA Staff and the key farmers

The educational training for DCPP key farmers was provided for five times from 1994 to 1996 and 165 members joined the training programs. The pamphlet for soil cultivation guideline and slide and video were prepared as teaching materials. In calendar year 1997 DCIEP II and MRIIS office which is located in the north of Isabela Province prepare and conducted training course for non-rice crops production attended by key farmers (32 trainees). The counterpart was responsible for four classes. As preparation of suitable teaching materials and execution of periodic training, the objective of training was achieved.

2) Alteration of Previous Conditions

a. Two-counterpart as stated in the R/D was reduced to one-counterpart from January, 1997.
b. Insufficient budget affected to the project implementation such as official tour and the conditions in 1997 was same as previous conditions, disbursed only a part of annual budget plan.

(4) Effectiveness of Project Accomplishment

1) Accomplishment

a. The long term experts conducted the technical transfer for a period of three years.
b. The sufficient counterparts (number of staffs and their qualification) were appointed during three years.
c. The budgetary for experimental plots and training were allocated during three years.

2) Non-Accomplishment

a. Because of the lack of budgetary in 1997, some of the on-site field investigations, official trips and training programs were canceled.

5. RESULTS OF THE EVALUATION

5.1 EFFECTIVENESS OF TARGET ACHIEVEMENT

Effectiveness of Project Outputs of each cooperation field is studied and summarized in the previous chapter while understanding detail activities. This section reports of effectiveness of the Project Purpose of each cooperation field.

5.1.1 Effectiveness of Project Purpose

Initial Purpose is to enhance technical capability of the engineers' of NIA in irrigation technology. The Purpose can be concluded that the initial purpose had been completed in general.

In general, with the cooperative relationship between the Japanese experts and Philippine counterparts by the efforts from both sides, most of the activities of the Project have been completed. By the end of the cooperation period on May 27, 1998, the Project are expected to obtain some more accomplishments, as there still be some activities remained to be achieved.

(1) Planning and Design Criteria

While it can be concluded that most of the scheduled activities has been carried out hence the initial purpose had been completed in general, continuous sound maintenance and development of obtained technology.

(2) Water Management

It can be concluded that most of the scheduled activities stated in the TSI has been carried out hence the initial purpose will be completed at the project termination. No particular constraints or restrictive aspects were noticed against the expanding effectiveness.

(3) Maintenance and Rehabilitation

It can be concluded that most of the scheduled activities stated in the TSI has been carried out for the captioned field under the cooperation of long and short term experts.

Trials had not been carried out to use volcanic ash as substitute for cement or as admixture for concrete and to make reinforced concrete utilizing synthetic fibers.

(4) Information Analysis and Management

a. Establish Database Management System for Irrigation System Operation
b. Establish Local Area Networks (LAN) combined with Internet among DCIEP II offices and main divisions in NIA, completing connection with some of region offices through e-mail system.

NIA staffs can use new soft wares with installed computer system with some scheduled training. Hence it can be concluded that the scheduled activities stated in the TSI has been carried out.

(5) Agronomy

Most of the Project Purpose were completed sufficiently in general through technology guidance and transfer by the long term experts, provision of manuals and conducting some scheduled training.

5.2 PROJECT IMPACT

5.2.1 IMPACT

(1) Technical impact

The manuals and pamphlets which were prepared in this Project are available for the NIA staff and farmers. The technical transfer which was carried out through on-the-job training was expanded to cover overall irrigation technology such as runoff analysis by tank model method, drought season water management methods, rotation irrigation on farm level, low-cost concrete lining method for canal and computerized data management. Moreover, NIA staffs and farmers received the technical transfer through various kinds of training.

(2) Institutional impact

Standardized design criteria, construction supervising method, material test equipment which are provided under DCIEP II and installed computer data management enhanced the capability of NIA.,

(3) Economic impact

The effectiveness of crop diversification is expected to have a positive impact on the development of market activities. The irrigation technology which was transferred through the Project activities influenced the overall planning, design, construction and O/M activities carried out by NIA. The transferred technology could ensure project management potential in effective and economical way.

(4) Social and cultural impact

The irrigated service area which is under the jurisdiction of NIA is about 662,400 ha. It accounted for 50 % of total area provided with irrigation facilities in the Philippines. As the area of influence of NIA is big, the effectiveness of the technology transfer will influence the social and cultural conditions of farmers and the rural societies.

(5) Environmental impact

No mention particularly .

5.2.2 EXTENT OF IMPACT

(1) Project level

The counterparts of NIA have improved their irrigation technology through the Project. And the IEC has carried out the kinds of training on the-job-training for the NIA staffs, and key farmers. It is expected that these training courses will be continued.

(2) Sector level

The LAN system which was structured and set up by the information analysis & management section had an effect on NIA's head office. This action influenced on the decision to establish a WAN (Wide Area Network) system among the DCIEP II, NIA and NIA's regional offices.

(3) Regional level

The establishment of DCPP had positive impacts on the beneficiary farmers as well as on the surrounding rural communities. Even when the MIS was at its demonstration stage, many farmers expressed their wish to join it. These activities are expected to contribute to the promotion of the diversified crops irrigation.

(4) Macro level

The establishment of the DCPP and MIS demonstration farm and farmer's training program were part of the contribution towards the development of the crops diversification program.

5.3 EFFICIENCY

Japanese inputs (experts dispatch, training, equipment) have basically been carried out according to plan, leading to the smooth implementation of the Project. The inputs of the Japanese side include experimental canal improvement, irrigation trials, improvement of manuals, experimental crop cultivation, establishing database of irrigation originated information, execution of the middle level training and key farmers training program under the cooperation with counterparts and assistance of related office personnel.

The fact that Philippine side made adequate arrangements in terms of facilities, buildings, staff and budget also contributed to the facilitation of the Project activities.

While most of the inputs from both sides are expected to yield proper results, regarding the assignment of the counterparts, it is pointed out that recent transfer of staff from the Project seem to make less potential of the counterpart team later, hence, it is suggested to take more effective personnel arrangement with view of expanding the Project effects.

5.4 RATIONALE

(1) Philippines Agricultural Development Plan

Philippines agriculture contributes about one fifth of the national GDP (Gross Domestic Products),

shares one-third of export, provides about half of the job opportunities, while two third of the national population live in rural areas and the people depends on the sector either directly or indirectly.

The Government of Philippines issued the policy on crop diversification to attain rice sufficiency and appointed NIA to commence the Project through carrying out technical transfer of irrigation engineering of diversification crops aiming at the following :

- Diversification of crops by introducing secondary crops to paddy fields
- Contributing for raising the workability of irrigation facilities

Hence Super Goal, Project Target and Project Purpose are summarized as follows;

Super Goal : " *To narrow the income gap between people living in urban areas and people living in rural areas* " with increasing farmers' income.

Project Target : " *To increase cropping intensity by means of adapting rational technologies to be generated in NIA for the aspects of water management, facility operation and maintenance and sound irrigation for secondary crop season* "

Project Purpose : " *To upgrade engineering potentials of NIA staffs through conducting scheduled activities such as verification trials of the manuals and improvements if required, on-the job training and engineers' skills to raise workability of irrigation facilities by boosting utilization of newly obtained irrigation technologies at National Irrigation Systems (NIS) under NIA, which are developed and verified under implementation of this JICA Project Type Technical Cooperation Scheme* ".

At time of discussion for the Project Implementation, irrigation for secondary crop production has been adopted only in small scale for self consumption or at vicinities of markets. With this it is hard to conclude that the technology of secondary crop was accepted and utilized by farmers as their own measures systematically. Also because of concentrating to paddy development there were rather rare experiences in the aspect.

At the occasion of the advisory study (1995), Administrator of NIA issued instruction to Regional Irrigation Managers, Provincial Irrigation Engineers and Irrigation Superintendents of all NIS to realize Diversified Crops Promotion Project (DCPP) urgently this Project will be center for promoting diversifying crops over the nation.

By all means it can be said there is sufficient adjustment between this Project and the Super Goal.

Adding to the cooperation and guidance for establishment and management of DCPP, the Project Team assisted in the introduction of Micro Irrigation System (MIS), consisting of micro sprinkler or micro drips.

The marketing and distribution of secondary crops still remained as constraints for developing crop diversification.

5.5 PROSPECTS FOR SUSTAINABILITY

5.5.1 PROSPECTS FOR INSTITUTIONAL SUSTAINABILITY

Based on the technology and equipment and facilities provided with JICA's assistance, NIA intends to establish an Irrigation Engineering Center (IEC) under Systems Management Department (SMD) of the Systems Operations and Equipment Management (SOEM) Sector, NIA after the Project termination. Above said IEC will be the newly organized IEC under SMD by 1999 at the latest. It is not present so called IEC which is acting as DCIEP II, and the new IEC will be established at present IEC building. The main purposes are to accelerate the modernization of irrigation facilities; to optimize the utilization of the irrigated farmlands; to promote crop diversification; to establish LWIS (Land and Water Information System); to improve irrigation service fee collection and to upgrade construction operation and management techniques. The further sustainability plan for the implementation agency is already confirmed as enclosed in ANNEX of this report.

In addition, NIA has another plan to transfer temporally some of DCIEP II staffs and donated equipment to Casecnan Multi-Purpose Irrigation and Power Project (CMIPP), which is under implementation by NIA. Casecnan Multi-purpose Irrigation and Power Project is one of highest prioritized national projects. The results of DCIEP II, which JICA has been assisting for more than a decade, can be expected to be applied and utilized to CMIPP. Required staff for IEC are scheduled for transfer from DCIEP II mainly, also from SMD and Project Development Department (PDD), NIA substantially.

5.5.2 PROSPECTS FOR FINANCIAL SUSTAINABILITY

(1) Prospects for Financial Provision

There is no particular cost estimate for the establishment of IEC because IEC would be established using the present Research and Development Division (RDD) of SMD as core with its existing personnel. Also DCIEP II office is available for IEC activities.

(2) Prospect for Official Support and its Continuity

The Agriculture and Fisheries Modernization Act of 1997 which aims for agricultural development and modernization, scheduled to be effective from 1998, has budget provisions for irrigation research and development. Thus it is ensured IEC will have no budget problems in the coming years.

(3) Cost Recovery

IEC will have functions of irrigation research and laboratory services including expert's advice for a fee, hence self revenue generation will be encouraged.

5.5.3 PROSPECTS FOR PHYSICAL AND TECHNOLOGICAL SUSTAINABILITY

(1) Conditions for Technical Transfer and Required Technical Level

Six long term experts were working full time during the period of implementation of the technical cooperation program. There were no complaints or criticism about the technical transfer program from NIA and DCIEP II; therefore, it may be safely assumed that the result of this program was satisfactory.

In general terms, the technical skills of the counterparts are high. Generally ability of counterparts are high. Concerning the project implementation, the counterparts worked quite actively; the Philippines side managed most of the equipment.

(2) Condition of Staff Distribution

Project Manager		1
Administration	Account & Others	7
	Driver	5
Planning and Design Section		4
Information Analysis and Management Section		4
Maintenance and Rehabilitation Section		1
Water Management Section		1
Agronomy Section		2
DCPP		2
Field Officer		1
Total		28

During the first three years from the commencement of the Project, every section had at least two persons who could become counterparts but, by the end of the Project, many of the potential personnel who could be counterparts were frequently mobilized.

(3) Technical and Availability Conditions for the Counterparts

All counterparts have graduated from a university. Therefore, it could be assumed that they had enough technical skills to act as counterparts.

(4) Training Plan for Successor

In the past there was no systematic technical transfer made from trained staff to untrained staff. However through the training program technical transfer was carried out as part of the Project activities.

5.5.4 CONSTRAINTS FOR MANAGEMENT

Nothing in particular.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY OF EVALUATION

(1) Effectiveness of Purpose Achievement

The Project has been preparing various manuals for rationalizing and upgrading accuracy of irrigation engineering originated with secondary crop cultivation, while conducting activities planned in the TSI as reported in Chapter 4 of this report. It can be concluded that the Project Purpose, that is to raise up Engineers' qualification of each cooperation field and the technologies to be established through the Project activities will be maintained and developed continuously, has been completed in general. It should be expected to Philippine side for efforts to accomplish and fulfill the Project Target with the said results and to approach the Super Goal, which might take certain period to realize the complete effects.

Thus the said Project, which was commenced in 1987 and continuing one year follow-up activities and this second phase by present, has completed given tasks adequately not only upland cropping but also general irrigation technology during the 11 years.

(2) Impact

1) Technical and Institutional Impact

Most of necessary engineering requirements with written manuals and nucleus human resources, consisting NIA staffs and key farmers, are provided to sustain the Project, which has sufficient potential to boost not only the secondary crop development scheme but also almost overall irrigation engineering. Those developed technology is quite sufficient as national technical basis for newly setting up institutional system such as the Irrigation Engineering Center (IEC) as under planning.

2) Economic and Social and cultural impact

It is obvious that the newly developed technology under this Project can be applied for expanding secondary crop cultivation over the nation, which is available to modify present cropping field of farmland and be expected to increase ruralists' income.

(3) Extent of Impact

Counterparts have received technical transfer cooperation field by field during those 5 years (Total cooperation period was 11 years). Besides, some key farmers could joined to training seminars. Those are the extent of impact on the Project and sector level. Regarding regional level, both of DCPP and MIS are expected to take tasks to extend the impact. The establishment of the DCPP and MIS demonstration farm and farmer's training program were part of the contribution towards the development of the crops diversification program.

(4) Efficiency

While most of the inputs from both sides are expected to yield proper results, regarding the assignment of the counterparts, it is pointed out that recent transfer from the Project seem to make less potential of the counterpart team later, hence it is suggested to take more effective personnel arrangement with view of expanding the Project effects.

Besides Japanese experts were dispatched on time both of long term and short term experts. Procurement of some equipment by JICA delayed to send the project site, but it was not hindered from doing project activities.

(5) Rationale

The Project was commenced with clear background to promote secondary crop cultivation scheme to narrow down the income gap between people living in urban areas and people in rural areas. Besides the Project Purpose is to realize sufficient engineering and institutional potentials to contribute the scheme, expanding the results to nation wide is the Project Target. Therefore it can be said there is sufficient rationale between the Project and the Super Goal.

(6) Sustainability

1) Institutional Sustainability

Newly planned Irrigation Engineering Center (IEC) is going to take and expand all of the Project results and develop them as succeeding organization, instead of the present project team.

2) Financial Sustainability

The said newly planned IEC will be established as a regular unit of NIA, whose budget also to be provided by the Philippine Government. Additionally, the said IEC will contribute to improve the budgetary conditions of NIA through the study of irrigation service fee collection for diversified cropping.

3) Physical and Technological Sustainability

Generally ability of counterparts are high. Concerning the Project implementation, the counterparts worked quite actively; the Philippines side managed most of the equipment. This fact showed they can sustain both of physical and technological aspects by themselves. It should be considered to find ways to let conduct systematic technical transfer from trained staff to untrained staff for further expansion of human resources.

6.2 RECOMMENDATIONS

In order to make the Project sustain and extend its effects and impact to contribute in the attainment of the Project Purpose, Project Target and Super Goals as stated in the Record of Discussions, the Team recommends that Philippine side will take necessary measures as follows.

1) To secure sufficient budget and continuous arrangement of required staffs to enhance the results of DCIEP II.

2) To enhance the results of the Project and extend them widely and effectively through activities of the IEC scheme and Casecnan Multi-Purpose Irrigation & Power Project.

3) To maintain and utilize the donated facilities and equipment properly.

4) To realize the newly planned IEC as early as possible, which is scheduled to set up in Systems Management Department, NIA.

5) To conduct detailed study on marketing and distribution of secondary crops to ensure the extension of crop diversification scheme, cooperating with related agencies.

MINUTES OF MEETING

A meeting was held between Mr. ORLANDO C. HONDRADE, Officer-In-Charge, Office of the Assistant Administrator for Systems Operation and Equipment Management (SOEM), National Irrigation Administration and the JICA Evaluation Team, headed by Mr. JUN KUROSAWA, dispatched for the Diversified Crops Irrigation Engineering Project Phase II (hereinafter referred as "the DCIEP II") undermentioned subjects were discussed and confirmed further development and expansion of the results generated under the DCIEP II.

1. Irrigation Engineering Center (IEC) which is planned to be established under the Systems Management Department (SMD), NIA, will continue enhancing all activities developed through the DCIEP II.

2. Casecnan Multi-Purpose Irrigation and Power Project (CMIPP) will continuously apply and utilize the irrigation technology developed by the DCIEP II.

3. During the transition period of DCIEP II to IEC, all irrigation techniques and knowledge developed under the DCIEP II will be transferred to SMD .

4. Philippine side will allocate sufficient budget and provide qualified engineers to accomplish the above mentioned activities.

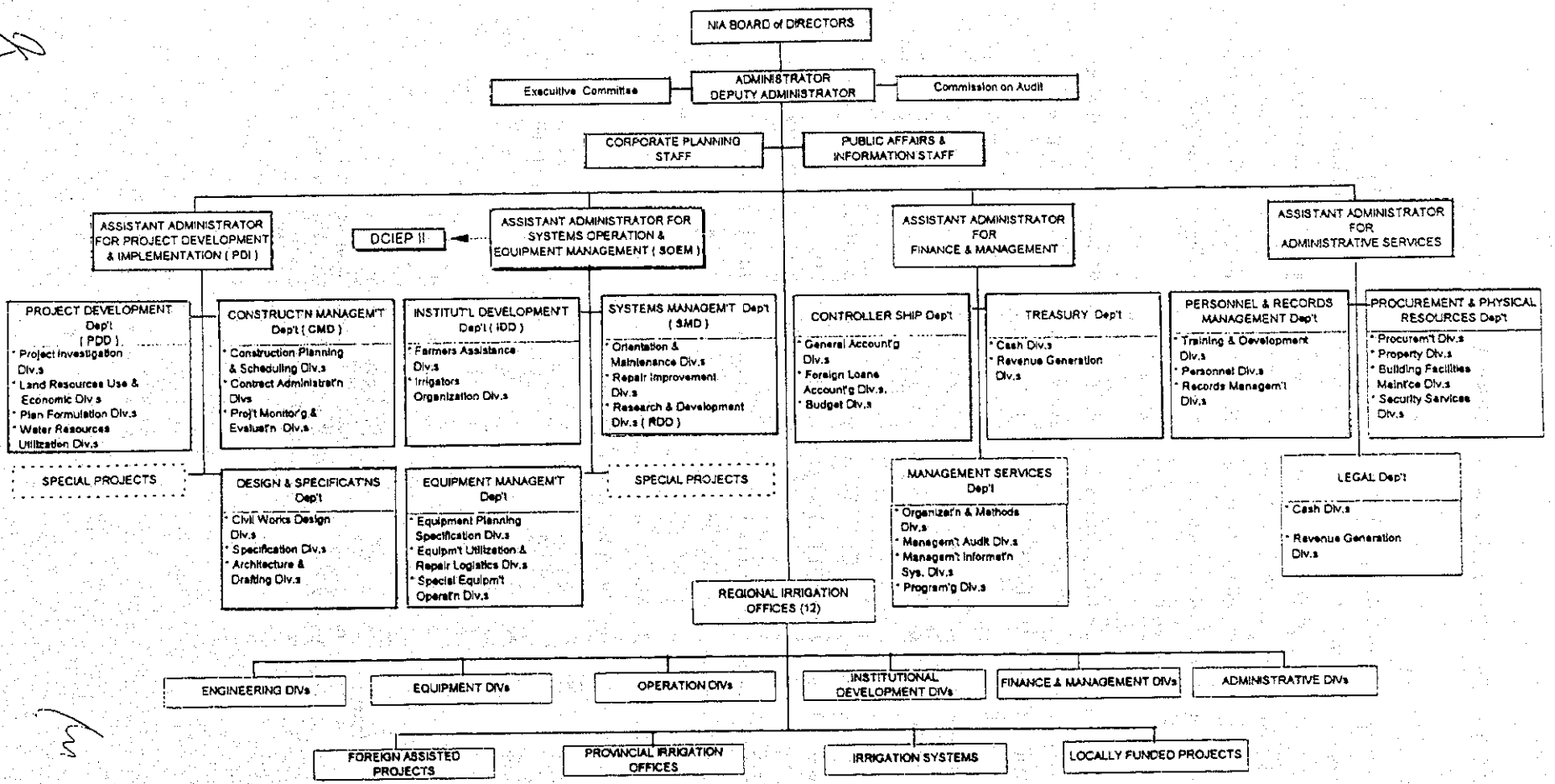
5. From April 1998, both of Philippine and Japanese sides will formulate Post-DCIEPII action plans before the termination of the DCIEP II.

Manila, March 11, 1998

Jun Kurosawa

Mr. JUN KUROSAWA
Leader of Japanese Evaluation Team
Japan International Cooperation Agency
Japan

Mr. ORLANDO C. HONDRADE
OIC, Office of the Asst. Administrator for
SOEM, National Irrigation Administration
Republic of the Philippines



Organization Chart of National Irrigation Administration

(as of March 1998)

Forms.xls Organization chart NIA2

ANNEX 2

LIST OF TECHNICAL COOPERATION EQUIPMENT(UNIT VALUE) =¥1,600,000)

J FY	ITEM No.	ITEM (MAKER - MODEL)	PRICE(¥)	QUANTITY	LOCATION	FREQUENY OF USE	CONDITION	REMARKS	PROCURED PLACE	DATE OF PROCURE MENT
93	1	MULTI-FOLD METER:DIK-3420	1,608,000	1	SL	B	A		JPN	Mar. 1994
93	2	TOYOTA LAND CRUISER DIESEL STATION WAGON:MODEL HZJ80L-GCMRS	2,761,000	2	HO	A	A		JPN	Aug. 1994
93	3	MITSUBISHI CARGO TRUCK 5MT 3298 DIOESEL: MODEL FE304BAEL	1,590,000	1	AMRIS	A	A		JPN	Aug. 1994
93	4	CO2 ENVIRONMENTAL CHAMBAR	3,810,000	1	ML	E	A	Termination of testing	JPN	Aug. 1994
94	5	MOTOR DRIVEN COMPRESSION TESTING MACHINE: TC-611a	4,445,000	1	ML	B	A		JPN	Aug.. 1994
95	6	YOUNG'S MODULUS RIGIDITY METER	2,288,000	1	HO/MR	E	A	Termination of testing	JPN	Aug.. 1995

FREQUENY OF USE A: DAILY
B: WEEKLY, MONTHLY
C: USE IN SPECIFIC PERIOD
D: 3~11 TIMES USE/YEAR
E: IDLE

CONDITION A: GOOD CONDITION
B: OPERATIONAL IN USE
C: CONDITION FOR REPAIR
D: UNENABLE TO USE

LOCATION HO: HEAD OFFICE OF DCIEP
SL: SOIL & WATER LABORATORY AT IEC BIDG.
FO: FIELD OFFICE
ML: MATERIAL TESTING LABORATORY
AMRIS: MODEL NATIONAL IRRIGATION SYSTEM

LIST OF TECHNICAL COOPERATION EQUIPMENT(¥1,600,000) = UNIT VALUE) ≒¥100,000)

J FY	ITEM No.	ITEM	SPEC	MAKER	PROCURED Nos.	DISPOSAL	EXISTING Nos.	FREQUENCY OF USE	CONDITION	REMARKS	LOCATION	PROCURED PLACE	DATE OF PROCUREMENT
93	100	TENSIO METER HM Type	10, 20, 30, 40, 50, 60	DIK-3420	2	0	2	C	A	Use in training	FO/WM	JPN	May.1994
93	101	AUTOMATIC LEVEL		SOKKISHA-B-2	1	0	1	C	A	Use in cross section survey	FO/WM	PHILI	Mar.1994
93	102	BOAT		SEVYLOR HUNTIN & FISHING BOAT	1	1	0	E		Rubbr given big damaged by rats.	FO/WM	PHILI	Mar.1994
93	103	COPIER(L)	COLORED PRINT	XEROX V400	1	0	1	A	A		HO	PHILI	Mar.1994
93	104	COPIER(S)		XEROX FX5039	1	0	1	A	A		HO	PHILI	Mar.1994
93	105	MORTOR CYCLE		SUZUKI X-3	2	0	2	A	A		AMRIS	PHILI	Mar.1994
93	106	MICRO SPLINKLER SET		DAN MARKO, TYPOON DRIP LINE	1	0	1	B	A		Tanawan DCPP	PHILI	Mar.1994
93	107	PERSONAL COMPUTER		ACER POWER 433e	3	0	3	A	A		HO/INF,PL,MR	PHILI	Mar.1994
93	108	COLOR MONITOR		ACER VIEW 761	3	0	3	A	A		HO/INF,PL,MR	PHILI	Mar.1994
93	109	PERSONAL COMPUTER		MITAC 4060G/U.003-4G1	4	0	4	A	A		AMRIS NIA/SPS IDD SMD	PHILI	Mar.1994
93	110	COLOR MONITOR		MITAC M1564PD	4	0	4	A	A		-ditto-	PHILI	Mar.1994
93	111	PERSONAL COMPUTER (NOTE TYPE)		NOTESTAR	1	0	1	A	A		HO/PM	PHILI	Mar.1994
93	112	PRINTER		CANON BJ230	3	0	3	A	A		HO/INF, NIA/IDD,AD	PHILI	Mar.1994
93	113	PRINTER	LASER JET,4SI	HEWLETT PACKARD DESKJET 500C	1	0	1	A	A		HO/INF	PHILI	Mar.1994
93	114	UPS		OMNI 2000/230LAN	3	0	3	A	1:A 2:E		HO/INF 2:out of order	PHILI	Mar.1994

93	115	UPS	PEOPLE POWER 8C int 900LAN	1	0	1	A	A		HO/INF	PHILI	Mar.1994
93	116	SOFTWARE	WindowsNT,MS Office Word Perfect,MS-Video MS-Access,Photoshop Par adox,SPSS 1set Visual Basics,BorlandC Pagemake,etc.	1	0	1	A	A		HO/INF	PHILI	Mar.1994
93	117	NETWORK INTERFACE	ETHERNET 1set	1	0	1	A	A		HO/INF	PHILI	Mar.1994
93	118	DIGITIZAR	KURATA XLC3648	1	0	1	A	A		HO/INF	PHILI	Mar.1994
93	119	AIR METER	C13-XT	1	0	1	C	A	Termination of testing based on TSI	ML	JPN	Jul.1994
93	120	SALT TESTER	AG-100	2	0	2	D	A	-ditto-	ML	JPN	Jul.1994
93	121	CONCRETE TEST HAMMER	NR	3	0	3	D	A	-ditto-	ML	JPN	Jul.1994
93	122	UNIVERSAL TESTING MACHINE	CT-100	1	0	1	C	A	-ditto-	ML	JPN	Jul.1994
93	123	MORTAR MIXER	ACM-20/10L	1	0	1	C	A	-ditto-	ML	JPN	Jul.1994
93	124	BLAINE AIR-PERMEABILITY APPARATUS	BP-650	1	0	1	C	A	-ditto-	ML	JPN	Jul.1994
93	125	SIEVES	SET	2	0	2	C	A	-ditto-	ML	JPN	Jul.1994
93	126	CONCRETE MOISTURE METER	COCO-HI-500	2	0	2	D	A	-ditto-	ML	JPN	Jul.1994
93	127	LABORATORY MILL WILEY	WM-3	1	0	1	E	A	-ditto-	ML	JPN	Jul.1994
93	128	WATER CURRENT METER	J771	1	0	1	E		Repairing in Japan	HO/WM	JPN	Jul.1994
93	129	EVAPORATION PAN	3-1530-03	1	0	1	C	A	Use in training	FO/WM	JPN	Jul.1994
93	130	WATER LEVEL SENSOR	NHS-T04	2	0	2	A	A		HO/PL	JPN	Jul.1994
93	131	WATER MEMORY SYSTEM	Water memory, Water level sensor NH-WP	2	0	2	E	A	Reserve	HO/PL	JPN	Jul.1994
93	132	RAIN MEMORY SYSEM	Rain memory Rain gauge IC-card	1	0	1	A	A		Bustos/PL	JPN	Jul.1994

94	133	SPECIFIC GRAVITY MEASURING SET		SS-C-468	1	0	1	A	A		ML	JPN	Sept.1994
94	134	PERSONAL COMPUTER (SERVER)	Mini Power PENTIUM/90MHz Monitor etc.	IBM	1	0	1	A	A		HO/INF	PHILI	Mar.1995
94	135	PERSONAL COMPUTER (WORK STATION)	486DX4, wiz Monitor etc.	IBM	2	0	2	A	A		FO HO/WM	PHILI	Mar.1995
94	136	PERSONAL COMPUTER (WORK STATION)	486DX2, wiz Monitor etc.	IBM	4	0	4	A	A		HO/MR NIA/IDD SMD,SPS	PHILI	Mar.1995
94	137	PERSONAL COMPUTER (WORK STATION)	486DX2, wiz Monitor etc.	COMPAC	1	0	1	A	A		AGANAN RIS	PHILI	Mar.1995
94	138	Uninterruptible Power Supply		AMERICAN POWER CONS.	4	0	4	A	A		HO/INF	PHILI	Mar.1995
94	139	PRINTER	Laser Jet	Hewlett Packard	1	0	1	A	A		HO/INF	PHILI	Mar.1995
94	140	TAPE BACK-UP SYSTEM	2GB	Hewlett Packard	1	0	1	A	A		HO/INF	PHILI	Mar.1995
94	141	VIDEO PROJECTOR	LC5000	HYMEX	1	0	1	A	A		HO	PHILI	Mar.1995
94	142	WATER LEVEL RECORDER	1 Month drum		8	0	8	A	A		NMC/WM	PHILI	Mar.1995
94	143	WATER LEVEL RECORDER	TTC1	OSK-15208	1	0	1	E	A	Reserve	FO/WM	PHILI	Mar.1995
94	144	GPS DATA RECEIVER	SPECTRUM	SOKKIA	1	0	1	C	A		HO/PL	PHILI	Mar.1995
94	145	FILM SCANNER	SCAN MAKER 35T	MICRO TEC	1	0	1	A	A		HO/INF	PHILI	Mar.1995
94	146	MORTOR CYCLE	LX125	HONDA	2	0	2	A	A		AGANAN RIS	PHILI	Mar.1995
94	147	PICKUP TRUCK	HILUX LN85L-TRKS	TOYOTA	1	0	1	A	A		HO	JPN	Apr.1995
94	148	MORTOR CYCLE	MT50	HONDA	1	0	1	A	A		HO	JPN	Apr.1995
94	149	MAGNETIC OPTICAL DRIVE	230MB,MK230AE		2	0	2	A	A		HO/INF	JPN	Apr.1995
94	150	WATER LEVEL RECORDER	KWH-200		10	0	10	E	A	Reserve	FO/WM	JPN	Apr.1995
94	151	MIXER	SS-C-500		1	0	1	D	A	Termination of testing based on TSI	ML	JPN	Apr.1995
94	152	CURING BOX	TC-533		1	0	1	D	A	-ditto-	ML	JPN	Apr.1995
94	153	DRYING OVEN	ESF-114S		1	0	1	D	A	-ditto-	ML	JPN	Apr.1995
94	154	BALANCE	EP-12KA		1	0	1	D	A	-ditto-	ML	JPN	Apr.1995
94	155	MORTAR FLOW TESTING APPARATUS	TC-526		1	0	1	D	A	-ditto-	ML	JPN	Apr.1995

94	156	RAINFALL RECORDING SYSTEM	DIGITAL	NAIGAI NHS-R	3	0	3	A	A		2-AMRIS 1:RESERVE	JPN	Apr.1995
94	157	WATER LEVEL RECORDING SYSTEM	DIGITAL	NAIGAI NHS-WP04	2	0	2	A	A		NMC/PL SMC/PL	JPN	Apr.1995
95	158	LOS ANGELES ABRASION TEST MACHINE	TC-520		1	0	1	D	A	Termination of testing based on TSI	ML	JPN	Jan.,1996
95	159	MORTOR CYCLE	XL 125 SD	HONDA	4	0	4	A	A		1::FO 1:AMRIS 2:HO	PHILI	Feb.1996
95	160	WATER LEVEL METER	OSK-1S201LP 7days drum rotation Measuring range 0 to 2m 96001-96008	OGAWASEIKI	8	0	8	E	A	Reserve	FO/WM	PHILI	Mar.1996
95	161	SELF PRIMING TURBINE ENGINE PUMP ACCESSORIES(5SET)	TVS-406X3S-2.2E	KAWAMOTO	5	0	5	A	A	For MIS use	1:PAMPANGA 1:SAN JOSE 1:LAOAG 1:CAUAYAN 1:FO	JPN	Aug.1996
95	162	CURRENT METER	P TYPE 1		1	0	1	A	A		FO/PL	JPN	Aug.1996
95	163	CURRENT METER	P TYPE 2		1	0	1	A	A		FO/PL	JPN	Aug.1996
95	164	DATA COLLECTOR	TD-105 CMP		1	0	1	E	A		FO/PL	JPN	Aug.1996
95	165	COMPACT VHF/UHF SYNTHCSIZED FM PORTABLE RADIOS (TRANSCEIVER)	TK-250	KENWOOD	2	0	2	B	A		HO	JPN	Aug.1996
95	166	WATER BATH CIRCULATOR	TC320-B		1	0	1	E	A	Termination of testing based on TSI	ML	JPN	Aug.1996
95	167	PERSONAL COMPUTER (SERVER) SOFT: NETWARE386 4.1(E) IOUSERS	PROSIGNIA5/9 0-2100A 16MB RAM 2,000MB	COMPAQ	1	0	1	A	A		HO/INF	JPN	Aug.1996
95	168	PERSONAL COMPUTER (WORK STATION) SOFT: MS-OFFICE PRO (E)	OPTIPLEX GX5100 16MB RAM 1,200MB	DEL	5	0	5	A	A		HO/TM PL MR WM INF	JPN	Aug.1996
95	169	ELECTRIC TOTAL STATION SYSTEM SUPR PUBLIC WORK(DOBOKU) Jr	SET4C-1173		1	0	1	E	A	Termination of testing based on TSI	ML	JPN	Aug.1996

96	169	BOAT	Fiberglass 8 ft.	ALS MARINE CENTER	1	0	1	A	A		FO/PL	PHILI	Dec.1997
96	170	PERSONAL COMPUTER (NOTE TYPE)	TI Extensa 510 Intel Pentium 100, 8MB RAM	TEXAS INSTRUMENTS	2	0	2	A	A		HO/INF PL	PHILI	Dec.1997
96	171	DIESEL PUMP (CENTRIFUGAL SELF PRIMING WATER PUMP TYPE)	3x3 suction and discharge dia Engine: 4.8HP		8	0	8	E	A	For MIS use	1:BICOL 1:AGANAN 1:ALTA 1:AURORA 1:VALENCIA 1:BUCAO 2:FO/PL	PHILI	Dec.1997
96	172	GOULDS PUMP	Engine: 4.5HP 60Hz single 220V		1	0	1	A	A		BAO MIS	PHILI	Dec.1997
96	175	PERSONAL COMPUTER	Acer Aspire 2000T RAM:24MB HDD:1.2GB	ACER	3	0	3	A	A		HO/PM INF AG	PHILI	Jan. 1998
96	176	PERSONAL COMPUTER	Acer Altos 7000 RAM:32MB HDD:2.0GB	ACER	1	0	1	A	A		HO/INF	PHILI	Jan. 1998
96	177	RAIN GAUGE		OTA	5	0	5	E	A	Plan to use	1:MRIIS 4:hO/PL	PHILI	Feb. 1998
96	178	WATER LEVELMETER	KWH-200 OSK-15201LP Drum:7days	IKEDA	4	0	4	E	A	Plan to deliver	FO/WM	PHILI	Mar. 1998
96	179	FLOW MEASURING APPARATUS	PFR-6 OSK-15216	IKEDA	2	0	2	E	A	Plan to use	FO/WM	PHILI	Mar. 1998
96	180	WATER LEVEL RECORDER	NHS-WP04	NAIGAI	1	0	1	E	A	Plan to use	hO/PL	JPN	May. 1998
96	181	ANEMOMETER			1	0	1	E	A	Plan to use	HO/PL	JPN	May. 1998
96	182	AUTOMATIC MECHANICAL SIOL	CS-310		1	0	1	C	A		SL/MR	JPN	May. 1998
96	183	DIRECT SHEAR APPARATUS	CS-310		1	0	1	C	A		SL/MR	JPN	May. 1998

ANNEX 4

NIA DCIEP JICA

DIVERSIFIED CROPS IRRIGATION ENGINEERING PROJECT PHASE 2

03 November 1997

For : The Administrator

Through: The Assistant Administrator for SOEM
The Assistant Administrator for PDI

From : The Project Manager, DCIEP 2

Subject: Proposal for the Creation of An Irrigation Engineering Center (IEC)

In line with NIA's management desire to provide the farmers maximum benefit from the irrigation systems, increase collection efficiency of irrigation fee, implement corrective measures in the construction and rehabilitation of irrigation facilities and effectively use existing facilities available at the Head Office as well as in the various field offices, we are pleased to submit a proposal for the creation of an IRRIGATION ENGINEERING CENTER to cater to the following for your consideration:

1. Development and establishment of a Land and Water Information System (LWIS) to all national irrigation systems. The proposed LWIS is a Geographical Information System (GIS) based technology which is used in acquiring, processing, storing and distributing information about land and water. It will facilitate the preparation and timely transmittal of accurate systems data on irrigated land, prompt billing, evaluation and water scheduling/delivery.

2. Modernization of irrigation facilities and promotion of crop diversification in suitable NIS. The proposed IEC will develop design schemes on automated regulatory works along main canal for improved water use. It will also prepare programs for the computerization of design procedures for irrigation facilities and drafting with the use of computer aided drafting (CAD). The IEC will also serve as a center to promote crop diversification and pressurized irrigation systems. Included as Annex 1 is an action plan for a sustainable diversified cropping program in marginal service areas during dry season nationwide.

3. Establishment of quality assurance/control group and laboratory. The IEC will allow NIA to enhance the technical capability of its staff in irrigation engineering. It will provide immeasurable impact on the design, rehabilitation and construction management of irrigation facilities.

The proposed IEC will have three divisions headed by a Department Manager with 23 highly technical staff. Initially the present staff of DCIEP 2 is available to manned the

IEC BUILDING, NIA COMPOUND, E. DELOS SANTOS AVENUE, QUEZON CITY, PHILIPPINES
TELEPHONES: 96-72-84 / 96-15-93 • TELEFAX NO. 96-72-70

staff requirement of IEC. Other staff required will be recruited from the head office and field offices. It is hereby proposed that the some of the excess positions which are to be abolished as a result of streamlining shall be retitled for the staffing requirement of IEC.

Likewise, majority of the equipment and apparatus required to start the operation of IEC are already available at DCIEP. Only computers softwares which are upgraded or outmodelled will be obtained later.

We look forward for your favorable action.

SERAFIN A. PALTENG
Project Manager, DCIEP 2

Recommended by:

ORLANDO C. HONRADE
OIC, Office of the AssistantAdministrator
for SOEM

ANTONIO A. GALVEZ
OIC, Office of the Assistant
Administrator for PDI

APPROVED/DISAPPROVED:

ORLANDO V. SORIANO
Administrator

PROPOSAL FOR THE CREATION OF AN IRRIGATION ENGINEERING CENTER

I. INTRODUCTION

The NIA is primarily responsible for the development and management of water resources for irrigation and provision of necessary services on a sustainable basis consistent with the agricultural development program of the government. Its thrusts and strategies relevant to this proposal among others are: (1) sustained operation and maintenance of the irrigation systems to deliver satisfactory level of service to the farmers; (2) rehabilitation and upgrading of existing systems; (3) improved farm level water management and crop production; (4) promotion of diversified crops irrigation in all suitable systems nationwide; and (5) intensification of Irrigation Service Fee collection and revenue generation from other sources.

At present, there are more than 160 national irrigation systems with an aggregate service area of about 650,000 ha under the responsibility of 127 operations center. The national average cropping intensity is 130 percent, 80 percent in the wet season and 50 percent in the dry season. With this situation, it is apparent that only 32 percent of the service area are satisfactorily provided with irrigation water. Moreover, environmental degradation resulting to deterioration of water supply in both quantity and quality is creating a big gap between agricultural production and the demand of rapidly increasing population.

More than 20 foreign assisted and national projects are on-going construction. Likewise, a huge number of communal irrigation projects are under implementation all over the country with foreign and local support fund. In addition, the government is pursuing a massive irrigation program to support the demand of increasing population and to minimize the effects of unforeseen climatological changes and the entry of other crops as result of the GATT or WTO. In effect more irrigation projects are to be implemented.

With this projection in mind, a reliable NIA Technical Group, not the Contractor's engineers, be created to oversee the quality of all on-going projects to attain durability of constructed facilities and further decrease the annual budget intended for repair works.

Recently, the NIA management recognized the need to modernize the existing management information system through the use of electronic mail to be able fast track on-going project implementation and properly monitor fund utilization. However, some other components have yet to be improved to attain more sustainable irrigation system.

Hence, this proposal to establish an Irrigation Engineering Center at NIA.

II. RATIONALE

With the government decision to stop/minimize national subsidy in 1982, the NIA top management advised every irrigation office to be viable by promptly collecting irrigation service fees (ISF) and other legal sources of income. NIA piloted and adopted various collection schemes and periodically refined them to strengthen irrigation fee collection. Land ownership/parcellary maps of all irrigation system service areas were updated with support from the NISIP and IOSP funds. An Irrigation Management Information System (IMIS) was also developed and piloted in a number of irrigation systems during the last five years. The IMIS was designed in such a way that prior to the start of the irrigation season, a water delivery plan is

members

- development and operation of a Wide Area Netework (WAN) which will make connection between regional, system, provincial offices and NIA head office to make available LWIS data on line

- establishing a group of trained manpower to operate LWIS

2. establish a quality assurance/control group and laboratory at head office responsible to undertake the following:

   - overseeing the monitoring activities to maintain the quality control/assurance of works in various on-going construction and rehabilitation project of NIA.

   - ensuring that all materials utilized in the construction pass the requirements of standard specifications and strictly comply with schedule of minimum testing requirement

   - improving the construction management techniques/methods of NIA field personnel to attain an optimum quality of workmanship in all NIA Projects nationwide

   - developing a system in the preparation of reports on testing and quality control available anytime for appraisal, inspection and quality assurance audit

   - conducting of trainings for NIA field personnel to fully acquaint them with the standard procedures on sampling, testing, quality control of materials, monitoring quality workmanship and the proper way of operating various materials testing equipment and apparatus

3. develop modernization scheme for irrigation facilities and promote crop diversification in selected NIS through:

   - development of design scheme on automated regulatory works along major canals for a more improved water use

   - promotion of pressurized irrigation facilities by establishing demonstration units MIS in actual farmers field

   - establishment of Diversified Cropping Promotion Projects (DCPPs) in the existing service areas of NIS and CIS

   - computerization of design procedures for irrigation facilities using high languages and promotion of computer aided design (CAD) and drafting

   - organization of trained DCIEP and NIA staff to handle the promotion of diversified cropping program in the regional and field offices.

service to farmers need to be properly attended/acted upon through a combined strategy of physical improvement, technology advancement and institutional development.

Similarly, NIA has to minimize its expenses on the repairs and rehabilitation of its existing irrigation facilities to save more funds for the operation and maintenance of all irrigation systems and to further generate more new areas which may contribute to the attainment of viability of the agency. The defects in the construction of irrigation canals and related structures oftentimes cause a long suspension of irrigation water supply thereby ensuing serious social problems in the concerned areas. To avoid these situations, it is very important to secure the required quality assurance in the construction of NIA Projects through intensive quality field check works and laboratory tests.

NIA, however, cannot implement any quality control/assurance program in all its on-going projects due to the lack of an organization to spearhead the required activities. But with the available sophisticated and modern materials testing equipment and apparatus donated by JICA to NIA as part of its technical assistance to DCIEP, the Agency can make use of all these equipment presently located at DCIEP Laboratory in San Rafael, Bulacan by establishing its own Materials Testing Laboratory in Quezon City. The Laboratory, if provided with enough spaces in the ground floor of IEC, will also be considered as an extension of the Center.

III. OBJECTIVE

In general the primary goal of IEC are to establish an organization that will enhance the modernization of irrigation facilities, maximize the use of areas provided with irrigation facilities through crop diversification, develop and establish of a LWIS in all irrigation systems to improve irrigation services and ISF collection and to improve quality control of construction and rehabilitation works.

Specifically the IEC shall:

1. develop and establish a LWIS in all irrigation systems for:

   - preparing updated maps with layers of information on land use, crops, soil, contour, irrigation and drainage networks, rivers and creeks, etc.
   - graphical presentation of actual irrigation versus scheduled irrigation on each irrigation boundary covered by each WRFT
   - time history mapping of the systems as operation progresses in time in connection to the irrigators/landowners database to facilitate the operation planning, water delivery schedule, implementation and evaluation process
   - prompt billing, recording and evaluation of benefitted areas
   - assessing as well as programming of periodic maintenance and rehabilitation prior to the next cropping season
   - development of a feedback system to systems operation managers as well as to the irrigators association leaders for dissemination to all

evolved based on the agreed cropping and schedule with the irrigator's association. Areas provided with irrigation water during land preparation and crop maintenance and area harvested are all considered as basic data for preparing irrigation bills.

Despite the above approaches, collection of ISF has consistently lagged behind targeted amount each year. Back accounts have accumulated much that the liquidity of NIA as a corporation badly affected. The national average for collection of current accounts for the last five years stood at about fifty percent, way below the level of achieving self-Sustainability. This situation is also aggravated by the none remittance of huge accumulated collected amounts by NIA designated agents. In some occasions the collection for 5 to 10 years were not remitted to the head office. These cases surfaced only after thorough investigations were conducted by a group of head office staff. If the collection of ISF remains poor, O&M will deteriorate and collection of ISF will further go down.

To resolve these situations and to effectively use the available resources, a Land and Water Information System (LWIS) will be developed and established in all irrigation systems. The proposed LWIS is a Geographical Information System (GIS) based technology which is used in acquiring, processing, storing and distributing information about land and water. The LWIS would facilitate the preparation and timely transmittal of accurate information to concern decision makers. It will result to tremendous improvement of linkages between parameters of database, e.g. irrigators with ISF payment status, a bottle neck in ISF collection efficiency.

The LWIS will allow a time history mapping of the status of service areas relative to the irrigators/landowners database for proper planning and implementation process as well as prompt billing, recording and performance evaluation. Expected revenues can be determined in due time thus the need assessment for periodic maintenance can be done prior to the next cropping season. At the end of each cropping season, the areas eligible for exemption from ISF could easily be verified both from the system level and at the head office. The timely transmittal of such information would eliminate the present dilemma of NIA.

Furthermore, the LWIS which deals with space, spatial features and feature attribute can be used to determine agro-based activity accurately and can facilitate in establishing spatial links between various data wherein spatial analysis is possible. The number of farmers/tenants can be linked to the lot they cultivate and the expected ISF. The areas irrigated, harvested and paid ISF per unit area billed could be compared between adjacent lots thereby minimizing discrepancies. Updated maps would be readily available for recording the historical events such as change in ownership, irrigated area during a specific cropping season, etc. that have occurred including previous years that the system was in operation.

Another issue that needs to be addressed is the extent of environmental degradation in more than 80 percent of watersheds of irrigation systems nationwide. Irrigation water supply is observed to be decreasing annually. This is further aggravated with the frequent occurrence of the el nino phenomenom. NIA's option is to increase the area of land that can be irrigated out of the available resources by proper water management and introduction of other crops that require less water. The traditionally water-deprived, uncultivated portions of irrigation service areas during dry spells summing up to roughly 40 percent of the total area provided with irrigation facilities are the primary targets for improving cropping intensity through the introduction of better irrigation technology than the commonly used border irrigation. Other factors affecting irrigation system operational performance such as sedimentation, damages on facilities and insufficient technical capability of O&M personnel to deliver appropriate irrigation

putting up of a medium scale pilot project that shall test and adopt improved irrigation technology.

IV. MANPOWER AND EQUIPMENT REQUIREMENT

As shown in the organizational structure (see Figure 1), the proposed IEC will have three divisions and headed by a highly qualified department manager. It is proposed that the IEC will have 23 well qualified trained technical staff and one support staff especially that center will deal advance technology in computer and in irrigation engineering. As much as possible the proposed staff will come from the core of trained DCIEP staff and from other units in NIA head office.

The required equipment to establish the IEC will come from the existing facilities of DCIEP. The bulk of equipment and apparatus needed to perform materials testing are available at the San Rafael Laboratory. What has to be done is to construct a laboratory at the IEC ground floor and transfer all the equipment and apparatus to NIA head office.

On the development and establishment of a LWIS , most of the existing computers at DCIEP are fitted for setting up the GIS. Survey instruments such as the GPS and Total Station, etc. are available at DCIEP. Only the latest softwares for mapping and design are to be acquired once the IEC will start operation.

V, CONCLUSION AND RECOMMENDATION

Considering the desire of NIA top manegement to provide efficient services to our client farmers and effectively use the deminishing water resource as well as limited arable land, the establishment of IEC should be given high priority. In essence, the creation of IEC will utilize the technology developed by DCIEP in diversified cropping. Manuals and phamplets have already been prepared by DCIEP and distributed to various field offices. More than 300 field staff have already undergone training in diversified cropping. These field staff are ready to adopt the technology as demonstrated by them during the establishment of the 14 DCPPs and 25 Micro Irrigation Sytems.

The problem of setting up the actual irrigable area and available water resource will likewise be minimize with the establishment of LWIS in all the irrigation systems. Timely information about the expected revenues, updated list of farmers and other matters pertaining to the operation of the system will be easily available. Water distribution schedule will also be planned properly and delivery of such requirement will on time. Untimely irrigation flows in the canal will be eliminated.

The establishment of the materials testing laboratory therefore , would allow NIA to enhance the technical capability of its staff in irrigation engineering particularly in construction aspects. Likewise, the laboratory will provide immeasurable impact on the design and construction managment of different irrigation facilities especially those projects being undertaken by contracts because they could be in a better position to closely monitor the quality of materials based on testing results and to attain the required durability of constructed concrte facilities based on quality workmanship.

FIGURE 1

PROPOSED IRRIGATION ENGINEERING CENTER

ORGANIZATIONAL STRUCTURE AND STAFFING