

Proposal for a
Project-Type Technical Cooperation on
ENVIRONMENTAL AND PRODUCTIVITY MANAGEMENT
OF MARGINAL SOILS

Submitted to the
GOVERNMENT OF JAPAN
through the
NATIONAL ECONOMIC DEVELOPMENT AUTHORITY
and the
DEPARTMENT OF FOREIGN AFFAIRS
Government of the Philippines

Proponent
BUREAU OF SOILS AND WATER MANAGEMENT
Department of Agriculture

April 1998

I. Official Title of the Project

Environmental and Productivity Management of Marginal Soils

II. Implementing Organization

1. Name of Implementing Organization

Bureau of Soils and Water Management (BSWM)
Department of Agriculture
Republic of the Philippines

2. Project Site

The project shall have its official address at the BSWM, SRDC Building, Elliptical Road, Diliman, Quezon City, Philippines. Project activities will be carried out at the bureau's field research centers located in Tanay, Bulacan and Bukidnon and at selected regional pilot sites.

3. Related Government Department

Department of Environment and Natural Resources (DENR)

4. Outline of the Implementing Organization

The Bureau of Soils and Water Management (hereinafter referred to as "the Bureau") is one of the four bureaus that comprise the production group under the Department of Agriculture (E.O. No. 116, January 30, 1987). Its mission is to generate soil and water technologies to make farming more productive, profitable and ecologically sustainable.

5. Organizational Set-Up

The Bureau is headed by a Director and consists of seven (7) divisions and two (2) research centers (Annex 1). The office of the Director is supported by a team of administrative services staff. The Office of the National Artificial Rain Stimulation is also under the office of the Director.

6. Outline of the BSWM Activities

The Bureau is mandated to:

- a. advise and render assistance on matters relative to the utilization and management of soils and water as vital agricultural resources.

- b. formulate measures and guidelines for effective soil, land and water resource utilization, as well as soil conservation in croplands and other agricultural areas.
- c. undertake soil research programs
- d. coordinate with the relevant government agencies in resettlement areas and prepare the necessary plans for the provisions of technical assistance in solving soil related problems, prevention of soil erosion, fertility preservation, and other related matters.
- e. engage in rain-making projects for agricultural areas and watersheds to solve the problems of prolonged droughts and minimize their effects on standing agricultural crops.
- f. recommends plans, programs, policies, rules and regulations to the Secretary of the Department of Agriculture on soil and water conservation and provide technical assistance in the implementation of the same.

7. Annual Budget

The Bureau's activities are sustained by an annual budget sourced out from the local fund of the Department of Agriculture. A five-year budget (1995-1999) is reflected in Table 1.

Table 1. Annual Budget of the BSWM from 1995-1999 ('000 Pesos)

Particulars	1995	1996	1997	1998	1999
Personal Services	25,135	33,238	36,438	55,317	66,364
Maintenance and Other Operating Expenses	38,857	55,907	38,857	39,656	49,860
Capital Outlay		500			
Total	63,992	89,645	75,295	94,973	116,224

III. Project Proposal

1. Background Information

In most Asian countries land scarcity is becoming acute each year as populations continue to increase and economic development makes new demands on land use. Since the lowlands are already densely settled, it is the uplands that the demand for new agricultural land is being directed.

Uplands are a fragile environment and are unfavorable for agriculture. However, pressures have forced the marginal farmers to cultivate the upland marginal areas without serious regard to environment. The marginal areas of the country include those agricultural lands with physical limitations, chemically degraded and polluted soils; the inaccessible and less productive areas owing to lack of basic infrastructure and services, and those areas characterized by the predominance of marginal farming communities surviving on subsistence level. About 9.3 million hectares of marginal croplands have been identified throughout the country. These marginal agricultural areas lack the necessary support in terms of technology, infrastructure, utilities, extension and others.

The Department of Agriculture through the Bureau of Soils and Water Management has a mandate to formulate and implement measures for effective soil, land and water resource utilization, as well as soil conservation in croplands and other agricultural areas. Towards this end, the Soils Research and Development Center Project was established through a bilateral agreement between the Government of the Republic of the Philippines and the Government of Japan. The Grant Aid component (1989-1991) provided the necessary physical and support facilities for advanced research and development in the field of soil and soil-related sciences in the Philippines. Corollary to this, the Technical Cooperation Project Phase I (1989-1994) was initiated to increase agricultural productivity by way of sound soil management practices. This was followed by SRDC Phase II (1995-1999) which focused on the development of technologies for acid upland soils. The successful implementation of the two Technical Cooperation Programs was made possible through the effective utilization of the SRDC facilities and the technical assistance from the Japanese Experts.

To advance the gains achieved during Phase I and Phase II of the Technical Cooperation Project, and to maximize the use of the Center facilities, a new project is hereby proposed: Environmental and Productivity Management of Marginal Soils. The primary emphasis of this project will be on the improvement of soil and water management for marginal and degraded soils. Research and development efforts shall focus on these two vital agricultural resources with special attention on the environmental and productivity aspects. The proposed project contents include research and development on soil and water management, technology adaptation and promotion, and development of soil environment information systems.

The expected outputs from this project will provide direct benefits to the small farmers in the countryside. In addition, the implementation of the project is also envisioned to enable the policymakers and stakeholder communities in marginal areas base their decisions about resource management on scientifically sound information and technologies.

2. Objective of the Project

General: To improve and sustain the strategic value of marginal and degraded soils for food security.

Specific:

- a. To develop appropriate and sustainable soil and water management technologies for marginal and degraded soils
- b. To formulate and implement an integrated nutrient management for marginal and degraded soils
- c. To create awareness on the capacity of improved marginal soils to sustain long-term food security
- d. To develop environmental and productivity information and monitoring systems
- e. To upgrade laboratory facilities in the regions according to specific requirements of marginal soils

3. Project Content and Activities

3.1 Soil and Water Management

Environmental and productivity issues confronting the agricultural sector are rife. These issues underscore the fact that soil and water resources must be managed effectively to sustain the productivity of the country's marginal agricultural lands. The focus of research and development activities along this main concern include:

- a. Analysis of indigenous technologies and development of improved soil and water management systems
- b. Analysis of balanced fertilization within the nutrient recycling capacity of marginal soils
- c. Improvement of productivity of marginal soils through (i) biological/organic amelioration, (ii) erosion control, and (iii) crop rotation system

- d. Research on water harvesting and impoundment including shallow groundwater utilization and management
- e. Assessment of the impact of conservation systems on soil productivity and environmental quality

3.2 Technology Adaptation and Promotion

This component will focus on the operational aspects of mature and tested technologies. Appropriate “technology packages” will be disseminated through different forms of media. This will be preceded/ reinforced with the following activities:

- a. Establishment of “techno demo” farms to showcase soil and water technologies that will improve productivity and at the same time sustain the development of marginal lands through farmer participation.
- b. Promotion of technologies that enhance biodiversity and preserve the environment
- c. Development of farmers manual on suitability, management and utilization of marginal lands

3.3 Soil Environment Information Systems

Information technology resources will be examined to develop and improve comprehensive and flexible relational databases for the storage and processing of data needed in the environmental and productivity management of marginal areas. Focus will be on:

- a. Soil, water and land resources inventory and data banking of marginal areas in the country.
- b. Development of softwares necessary for database management and soil/land evaluation
- c. Development of computer-assisted soil/land evaluation systems

4. Expected Beneficiaries

- 4.1 The DA and BSWM policy makers who will be given the opportunity to advocate correction of certain policies which heretofore worked against agriculture. Of particular importance are the policy statements on resource use and management

- 4.2 The management staff of the BSWM whose planning capability will be enhanced from the viewpoint of integrated resource management
- 4.3 The researchers and project implementors who will be given a chance to work in a holistic and multidisciplinary manner
- 4.4 The local government units, other government agencies and non-government organizations who will share the progress and results of the coordinated endeavor
- 4.5 More importantly, the marginal farmers who will reap the benefits of increased productivity and sustained development through their active participation in project planning and implementation.

5. Expected JICA Experts and Fields of Activities

5.1 Long-term JICA Experts

- a. Team Leader
- b. Coordinator
- c. Soil Survey and Management
- d. Soil Biology
- e. Soil and Water Conservation
- f. Watershed Resources Management

5.2 Short-term JICA Experts

- a. Geographic Soil Information System
- b. Environmental Biology
- c. Soil Morphology and Genesis
- d. Soil Fertility
- e. Land Use Planning
- f. Soil Chemistry
- g. Soil Microbiology
- h. Soil Physics and Mineralogy
- i. Biometrics
- j. Agrometeorology
- k. Plant Physiology
- l. Others

6. Requested Number of Counterpart Training and Fields

The implementing agency shall request for counterpart training of about 4 to 5 staff per year on the following fields:

- a. Environmental Management
- b. Rural Development Planning and Management

- c. Database Information Systems
- d. Soil Conservation and Farming Systems
- e. Environmental Impact Assessment
- f. Production of Audio-Visual Communication Media
- g. Soil Physics and Mineralogy
- h. Soil Chemistry
- i. Soil Microbiology
- j. Soil Morphology and Genesis
- k. Environmental Biology
- l. Biometrics
- m. Groundwater Utilization and Management
- n. Watershed Management
- o. Agricultural Land and Water Resources Development

7. Required Equipment

Equipment necessary for the effective implementation of the project will be required on the following activities:

- a. Field experimentation - lysimeters, tractors, tensiometers, moisture meters, groundwater water table elevation indicator, sand density apparatus, water analysis kit, pumps and engines, neutron probe, rain gauges, vehicles, etc.
- b. Laboratory analysis - atomic absorption spectrometer, distilling apparatus, pH meter, drying oven, agate mortar and pestle, ion chromatograph, etc.
- c. Surveying - global positioning systems, distance meter, altimeter, compass, binoculars, camera, Abney hand level, planimeter, etc.
- d. Data processing – Information technology system application package, etc.
- e. Technology promotion - video camera and accessories, cameras, audio system, digitizer, scanner printer, conference microphone system, wireless microphones, *etc.*
- f. Miscellaneous - cell phones, photocopiers, etc.

IV. Situation of Project Facilities

1. Existing Building and Equipment

The SRDC Building constructed during the Grant Aid, Phase I and II is still in tiptop condition and can accommodate project personnel including experts. Most of the equipment provided during Phase I and Phase II are still functional and can be used for this project.

However, the buildings and facilities in the research centers in Tanay and Bulacan need improvement and upgrading. Likewise, the research center in Bukidnon needs to be rehabilitated. Equipment in the regional laboratory stations need to be upgraded.

2. Counterpart Personnel and Project Budget

Counterpart personnel and other necessary support staff for the project are available. However, it may be necessary to hire contractual staff to assist in field experimentation and technology promotion.

The budget allocation for the project is estimated as follows (000s):

	REQUESTED FOREIGN ASSISTANCE	GOP COUNTERPART
Personnel Services		
Expert Services	400 manmonths	-
Counterpart Services		4,000
Improvement of Infrastructure and Facilities for Development of Farm Equipment	20,000	3,000
Machinery and Equipment	60,000	2,000
Training Expenses	25 trainees	1,000
Maintenance and other Operating Expenses	7,500	25,000

V. Specific Plan of Action (To ensure project sustainability after Japanese assistance term)

1. Institutional Aspect

The effective utilization and management of soils and water as vital agricultural resources is one of the primary functions of the Bureau. As in the past technical cooperation, the experience gained and technology developed shall become part of institutional strategies in formulating measures and guidelines for soil, land and water utilization and conservation.

2. Financial Aspect

The Bureau has the potential to access funds from the national government to sustain the efforts initiated through the technical cooperation. A strong proposal shall therefore be made for allocation of appropriate funding.

3. Technical Aspect

Environmental and productivity management technologies for marginal soils shall be incorporated in the recommended measures for rational utilization of soil and water resources. Additionally, capability building shall be continuously pursued. Retooling the agricultural technicians shall be undertaken for the effective transfer of matured technologies to farmers. This activity shall be closely coordinated with the Agricultural Training Institute.

VI. Other Pertinent Information

The proposed technical cooperation project will complement other projects which the BSWM-SRDC is collaborating with, as follows:

1. Improvement of Efficiency and Environmental Impact of N Fertilizer in Irrigated Rice Systems in Southeast Asia (1995-1998) FAO

The project is designed to assess the efficiency and environmental impacts of N fertilizer in rice-based cropping system in various agro-ecological conditions in Asia.

2. Integrated Management of Salt Affected Soils in the Philippines (1998-1999) FAO

The project aims to improve soil productivity of salt affected soils in the Philippines.

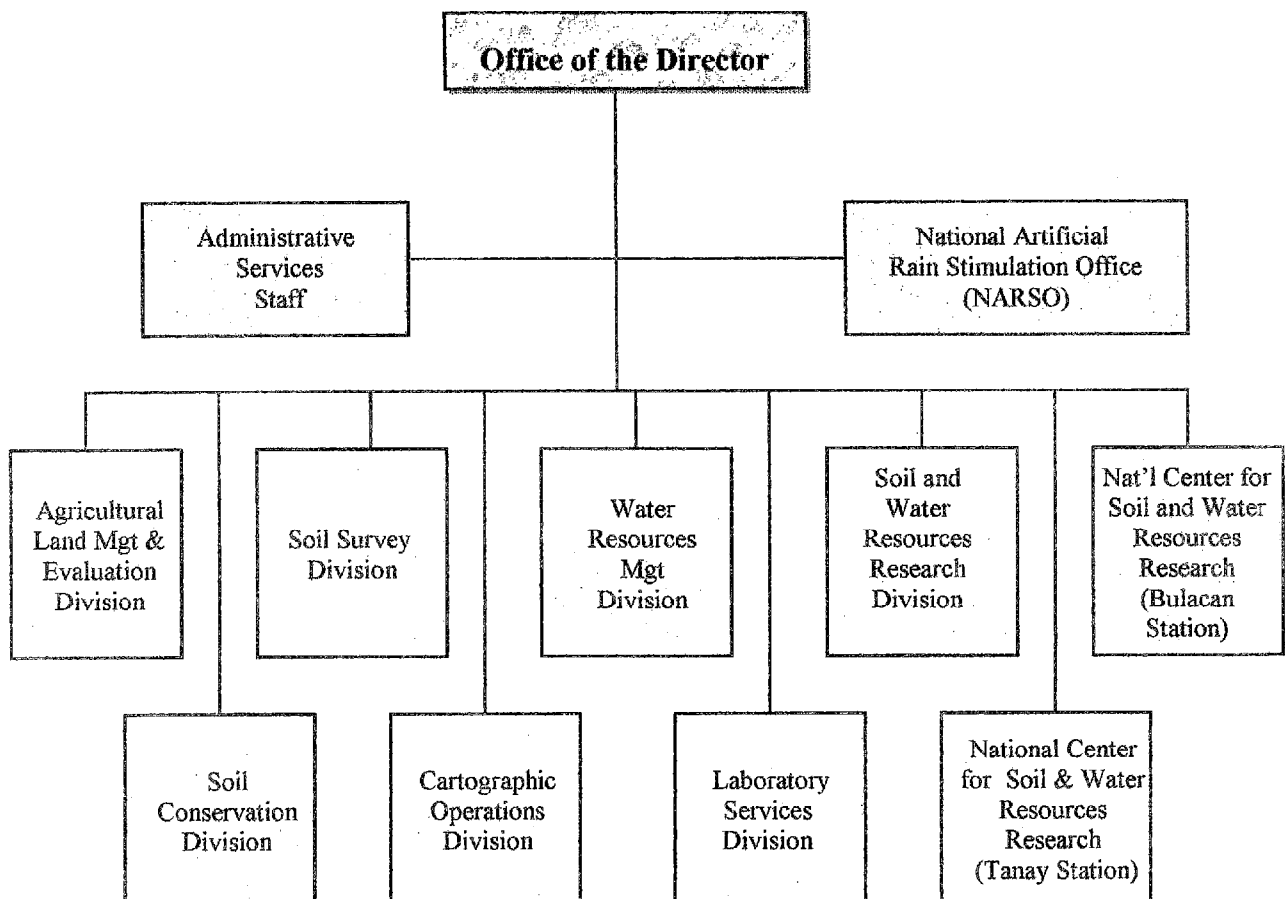
3. Management of Phosphorus for Sustainable Food Crop Production on Acid Upland Soils in Australia, Philippines and Vietnam (1996-1999) ACIAR

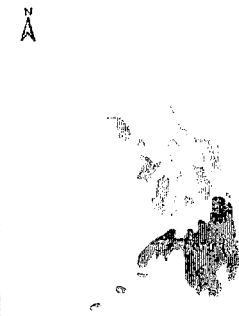

The project aims to identify sustainable and farmer-accepted technology for improved production of groundnut, maize and soybean on upland acid soils by the more efficient utilization of applied P.

4. Management and Rehabilitation of Degraded Hillylands in the Philippines (1998-2001) IBSRAM

The project shall extend and sustain the acceptance of conservation farming technology in degraded hillylands.

Annex 1. BSWM Organizational Set-Up





Environmental and Productivity Management of Marginal Soils in the Philippines (EPMMA)





Goal:

To improve and sustain the strategic value of marginal and degraded soils for food security.

Objectives:

1. To develop appropriate and sustainable soil and water management technologies for marginal and degraded soils
2. To formulate and implement an integrated nutrient management for marginal and degraded soils
3. To create awareness on the capacity of improved marginal soils to sustain long-term food security
4. To develop environmental and productivity information and monitoring systems
5. To upgrade laboratory capabilities/facilities in the regions/stations according to specific requirements of marginal soils



Project Content

- 1. Development of soil environment information systems**
- 2. Development of soil and water management technologies**
- 3. Technology demonstration and promotion**

Outline of Present Situation of Marginal Soils in the Philippines and the Proposed Countermeasures

1. Soil Environment Information Systems

Present Situation	Countermeasures
1. Natural resources (soil, water, climate, vegetative, <i>etc</i>) are not determined accurately.	1. Inventory and data banking of natural resources for environment and agricultural productivity evaluation.
2. Softwares for soil land evaluation are not fully developed.	2. Development of softwares for soil and land evaluation.
3. Wide evaluation of the country's natural resources has not been done.	3. Development of computed-assisted soil and land evaluation systems.

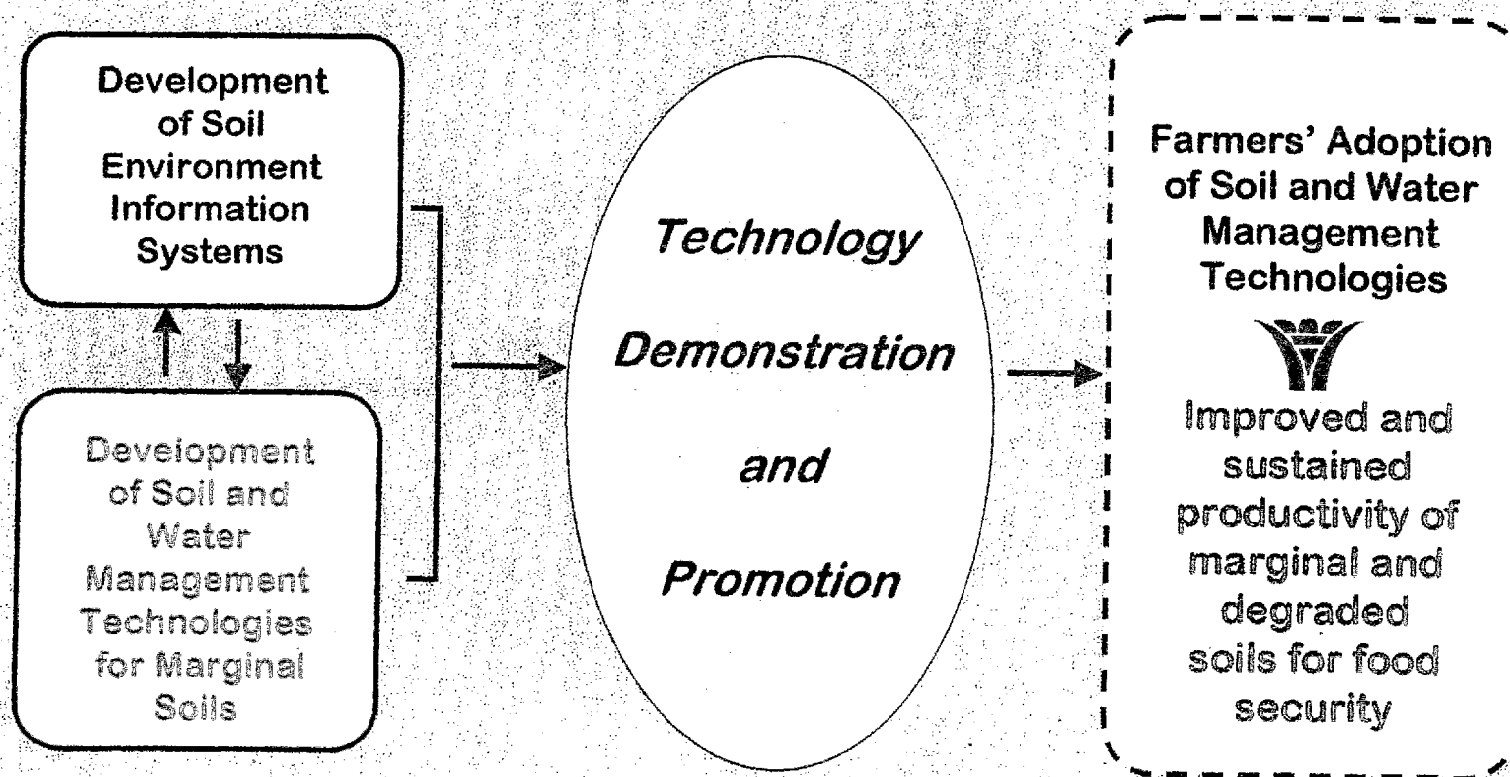
2 Soil and Water Management Technologies

Present Situation	Countermeasures
<p>1. Problems on environmental deterioration</p> <ul style="list-style-type: none"> ❖ water shortage and deterioration of water quality ❖ deterioration of soil structures (soil hardness, erosion, runoff, and shallow plow layer) 	<p>1. Development of appropriate technologies</p> <ul style="list-style-type: none"> ❖ utilization of organic matter ❖ application of living mulch, contour farming, deep tillage and organic matter application
<p>2. Decline of biological diversity</p> <ul style="list-style-type: none"> ❖ reduction of vegetation ❖ decline of soil organisms 	<p>2. Diversification in crop production</p> <ul style="list-style-type: none"> ❖ improvement of crop rotation systems ❖ application of organic matter
<p>3. Decline of soil productivity</p> <ul style="list-style-type: none"> ❖ decline and imbalance of soil nutrients ❖ insufficient and inefficient water utilization ❖ reduced activity of soil organisms 	<p>3. Adoption of appropriate technologies</p> <ul style="list-style-type: none"> ❖ Balanced fertilization ❖ utilization of shallow ground water, residual moisture, mulching, increasing thickness of the plow layer ❖ utilization of mycorrhizal fungi and nitrogen fixing bacteria, organic matter application

3. Technology Demonstration and Promotion

Present Situation	Countermeasures
<p>1. Lack of packaged technologies on soil and water management for marginal soils</p> <ul style="list-style-type: none"> ❖ lack of technical information on farming practices appropriate for sloping marginal lands ❖ insufficient information on how to improve productivity of marginal lands affected by water shortage ❖ lack of packaged technologies on fertilization and management of low fertility soils <p>2. Low level of adoption of soil and water management technologies in marginal areas</p> <ul style="list-style-type: none"> ❖ lack of farmers training ❖ lack of farmers manual ❖ lack of technology dissemination 	<p>1. Packaging of appropriate soil and water management technologies</p> <ul style="list-style-type: none"> ❖ contour farming, high value crops, living mulch, useful microorganisms, deep tillage, organic matter, agro-forestry ❖ organic matter application, utilization of VAM and rhizobia to counteract low P and N; use of tolerant crops, improvement of physical property and balanced fertilization ❖ utilization of drought resistant crops, shallow groundwater, living mulch, organic matter, trenching and deep tillage <p>2. Technology demonstration of soil and water management technologies in marginal areas</p> <ul style="list-style-type: none"> ❖ farmers training and seminars ❖ development of farmers manual ❖ multi-media releases

FLOWCHART OF PROPOSED PROJECT ACTIVITIES



Proposed Techno Demo Sites

1. Upland / lowland
Bulusukan,
San Ildefonso,
Bulacan



2. Hillyland
Sampaloc,
Tanay, Rizal



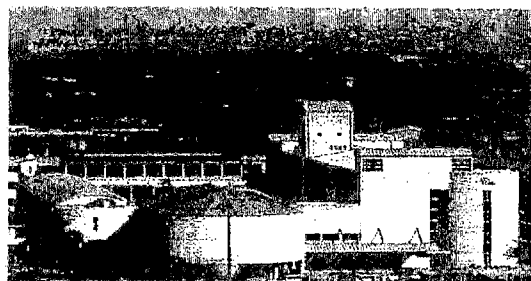
3. Highland
Intavas,
Impasug-ong,
Bukidnon



BSWM Soilsearch Center & Research Stations



Bulacan Station



BSWM-SRDC



Luzon

PHILIPPINES



Rizal Station

Visayas

Mindanao



Bukidnon Station

Preliminary Information on the Proposed Techno-Demo Sites

Criteria	Proposed Techno-Demo Sites		
	Bulacan	Rizal	Bukidnon
Location	Bulusukan, San Ildefonso, Bulacan (Central Luzon)	Cabagsang, Sampalok, Tanay, Rizal (Southern Luzon)	Intavas, Impasug-ong, Bukidnon (Northern Mindanao)
Distance/ Transportation/ Travel Time	BSWM (Quezon City) → Res Sta 70 km 2 hrs by car Res Sta → Site 11 km 15 min by car	BSWM (Quezon City) → Research Station 53 km 1.5 hrs by car Res Sta → Site 11 km 20 min by car	Manila → Cag de Oro 1.5 hrs by plane Cag de Oro → Res Sta 83 km 1.5 hrs by car Res Sta → Site 22 km 30 min by car
Total Land Area (ha)	788	540	7886
Agricultural Land (ha)	720	395	
Population	1315	1115	1850
Average Annual Income (Pesos)	On-Farm: 11,514 Non-Farm: 24,000	30,000 25,000	
Climate	Tropical (6 mos wet, 6 mos dry)	Tropical (6 mos wet, 6 mos dry)	Tropical (no pronounced wet and dry season)
Rainfall (mm/yr)	2,000	2,350	2,400
Soil Type	Vertisols, Ultisols	Ultisols	Ultisols
Topography	Rolling	Rolling to hilly	Undulating
Elevation (amsl)	50 - 150 m	390 m	1,250 m
Crops	Lowland and upland crops (rice, corn, mungbean, sweet potato, cassava)	Upland crops (sweet potato, corn, peanut, mango, jackfruit)	Cool season crops (potato, cabbage, chinese cabbage, tomato, corn)
Farmers' attitude	Aggressive	Aggressive	Aggressive
Farmers' Organization	ARC (DAR)	ARC (DAR)	Agri-Coop (DA)
Water Source	Well, pond	River	Spring
Electricity	Yes	Yes	Yes
Peace and Order	Relatively good	Relatively good	Relatively good
Disease (Malaria)	None	None	None
Distribution of Farmers' House	In cluster along the road	Randomly scattered	Concentrated in the community center

Techno-Demo Strategy

Selection of Pilot Sites

- 3 pilot sites near research stations (2-3 ha per site)
- marginal productivity (sloping, water shortage, low fertility)
- farmers eager and cooperative
- preferably an agrarian reform community

Memorandum of Agreement

- DA/BSWM-JICA
- farmers' cooperative
- local government units (regional, provincial, municipal, barangay)
- other government agencies (agrarian reform, environment and natural resources, agricultural training, plant industry, *etc.*)
- non-government organization, local state college, agro-industrial companies

Joint Planning

- project staff
- farmer leaders
- local government units
- other concerned agencies

Implementation

- bio-physical and socio-economic survey of the project sites
- close coordination and consultation with concerned units
- demonstration of technologies with farmers' active participation
- training and seminars

Monitoring and Evaluation

- annual review and planning
- periodic assessment by a joint group

Technology Promotion

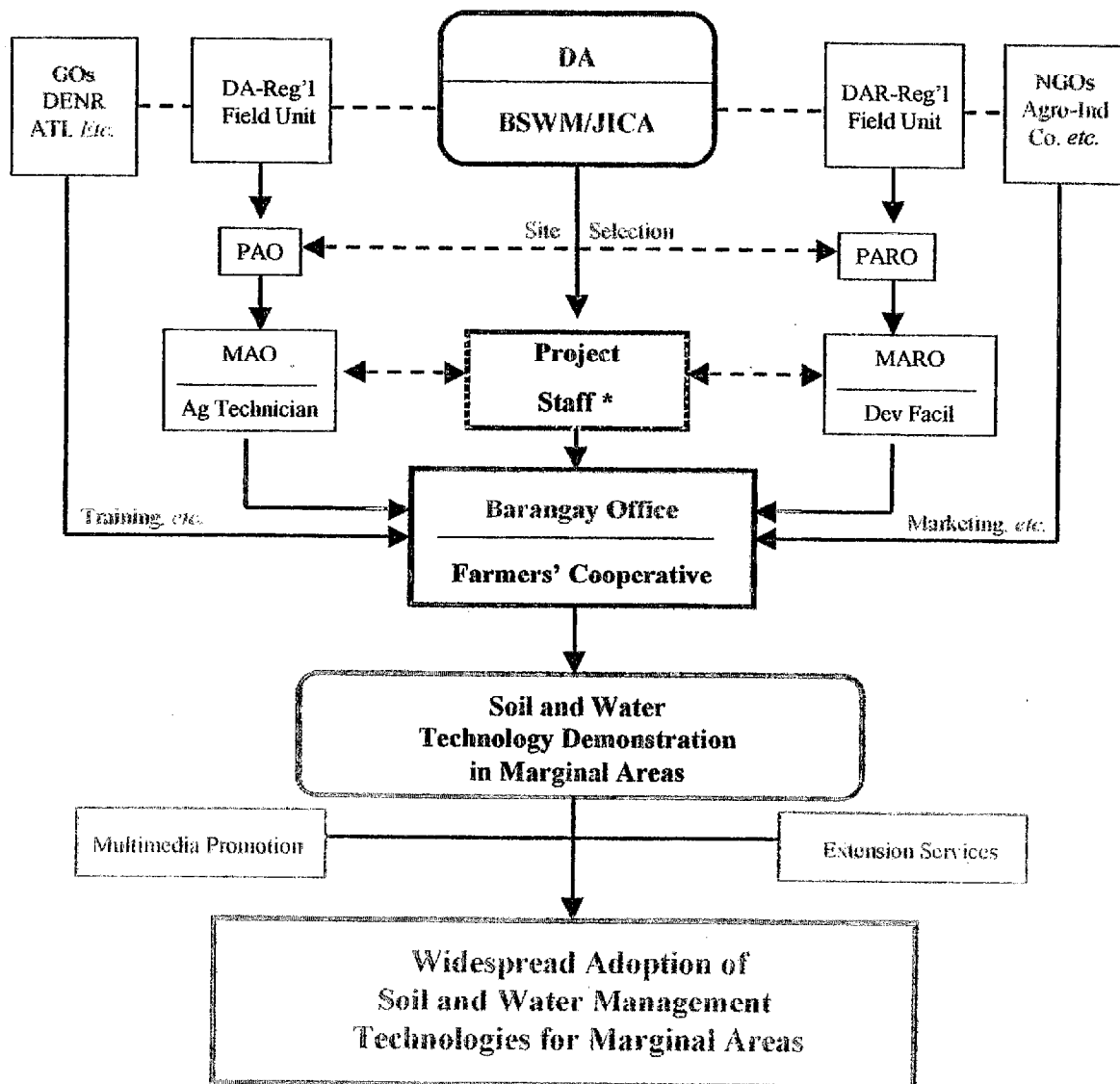
- packaging of technologies
- dissemination through various media

Expansion of Techno Demo Sites

- one for each region within the 5-year period

Year	1	2	3	4	5
Number of Sites	3	6	6		

FLOWCHART FOR TECHNO DEMO ESTABLISHMENT AND PROMOTION



* Project staff include the Regional SWAT Coordinator,
Research Station Chief and possibly JOCVs

Efforts of the Philippine Side

Creation of a Technical Working Group for the EPMMA T/C Project

Mr Alejandrino R. Baloloy	- Asst Director
Dr Lauro G. Hernandez	- Project Manager, SRDC II
Mr Wilfredo E. Cabezon	- Agricultural Land Management
Mr Alejandro G. Micoso	- Soil Survey
Dr Jode D. Rondal	- Soil Conservation
Dr Perfecto P. Evangelitsa	- Research
Engr Rodolfo M. Lucas	- Water Management
Mr Crisostomo B. Alcalde	- Research Center Chief
Engr Reynaldo Bajar	- Cartography
Ms Elsie Balagtas	- Budget and Finance
Dr Nora B. Inciong	- Laboratory
Mr Bayani Villanueva	- Regional SWAT Coordinator
Mr Nestor Ticzon	- Land Evaluation
Ms Clarita Bacatio	- Soil Survey
Engr Samuel Contreras	- Water Management
Engr Arnulfo Gesite	- Soil Conservation
Ms Gina Nilo	- Land Management
Ms Edna Samar	- Environmental Management
Ms Constanca Mangao	- Laboratory
Ms Esperanza Dacanay	- Research
Mr Rodelio B. Carating	- Soil Information Systems
Ms Georgina Carmelle Siena	- Information Dissemination

Draft of Project Content and Activities

Environmental and Productivity Management of Marginal Soils in the Philippines (EPMMA)

1. Soil Environment Information Systems

1. Soil, water, and land resources inventory and data banking of marginal areas in the country

- (a) Detailed pedological survey and laboratory analysis
- (b) Enhancement/integration of soil and land information system
- (c) Map digitization and soil environment information encoding

2. Development of soil, water, land resources information technology and analysis

- (a) Soil and land resources evaluation using conventional and GIS/Remote Sensing technologies
- (b) Data sharing and networking of information systems
- (c) Data simulation/modeling using GIS/Remote Sensing technologies and other mathematical techniques
- (d) Project impact analysis

3. Management of soil, water, and land resources

- (a) Development of standardized method of environmentally sustainable agricultural landscape planning
- (b) Information dissemination for technology adoption

II Soil and Water Management Research

1. *Analysis of indigenous technologies and development of improved soil and water management systems.*

- (a) Evaluation of indigenous technologies for the improvement of soil and water management system.**

2. *Development of balanced fertilization schemes for marginal lands based on the nutrient recycling capacity of the soils.*

- (a) Analysis of constraints to crop productivity in marginal soils**
- (b) Utilization of combined organic and inorganic materials for marginal soils**

3. *Improvement of productivity of marginal soils*

- (a) Utilization of biofertilizers for the improvement of productivity of marginal soils.**
- (b) Assessment of erosion control measures to improve the productivity of marginal soils.**
- (c) Promotion of high value crops in the crop rotation system.**

4. *Research on water harvesting and impounding including shallow groundwater utilization and management.*

- (a) Assessment of water yield and groundwater recharge in marginal upland areas.**
- (b) Analysis of long term water balance for the development of groundwater recharge techniques.**
- (c) Assessment and validation of existing small water system design and approaches.**
- (d) Analysis of climate and soil physical properties to determine soil moisture deficits in marginal upland areas.**
- (e) Introduction of non-conventional energy to drive/pump water from surface or underground source.**

5. *Assessment of the impact of conservation systems on soil productivity and environmental quality.*

- (a) Development of soil-based indicators to assess the impact of conservation farming.**
- (b) Assessment of the impact of agro-forestry on soil and water quality.**
- (c) Assessment of the impact of cover cropping (live mulch) on soil and water quality.**
- (d) Assessment of the impact of contour farming on soil and water quality.**

III Technology Demonstration and Promotion

1. Establishment of "techno demo" projects to showcase soil and water technologies that will improve productivity and at the same time sustain the development of marginal lands through farmer participation.

- (a) Characterization of micro watershed for techno-demo sites.
- (b) Establishment of participative and collaborative techno-demo projects on soil and water management in marginal areas.
 - ♦ Lowland/upland
 - ♦ Hillyland
 - ♦ Highland
- (c) Demonstration of soil and water management technologies for marginal areas.
- (d) Monitoring and evaluation of the impact of technology demonstration.

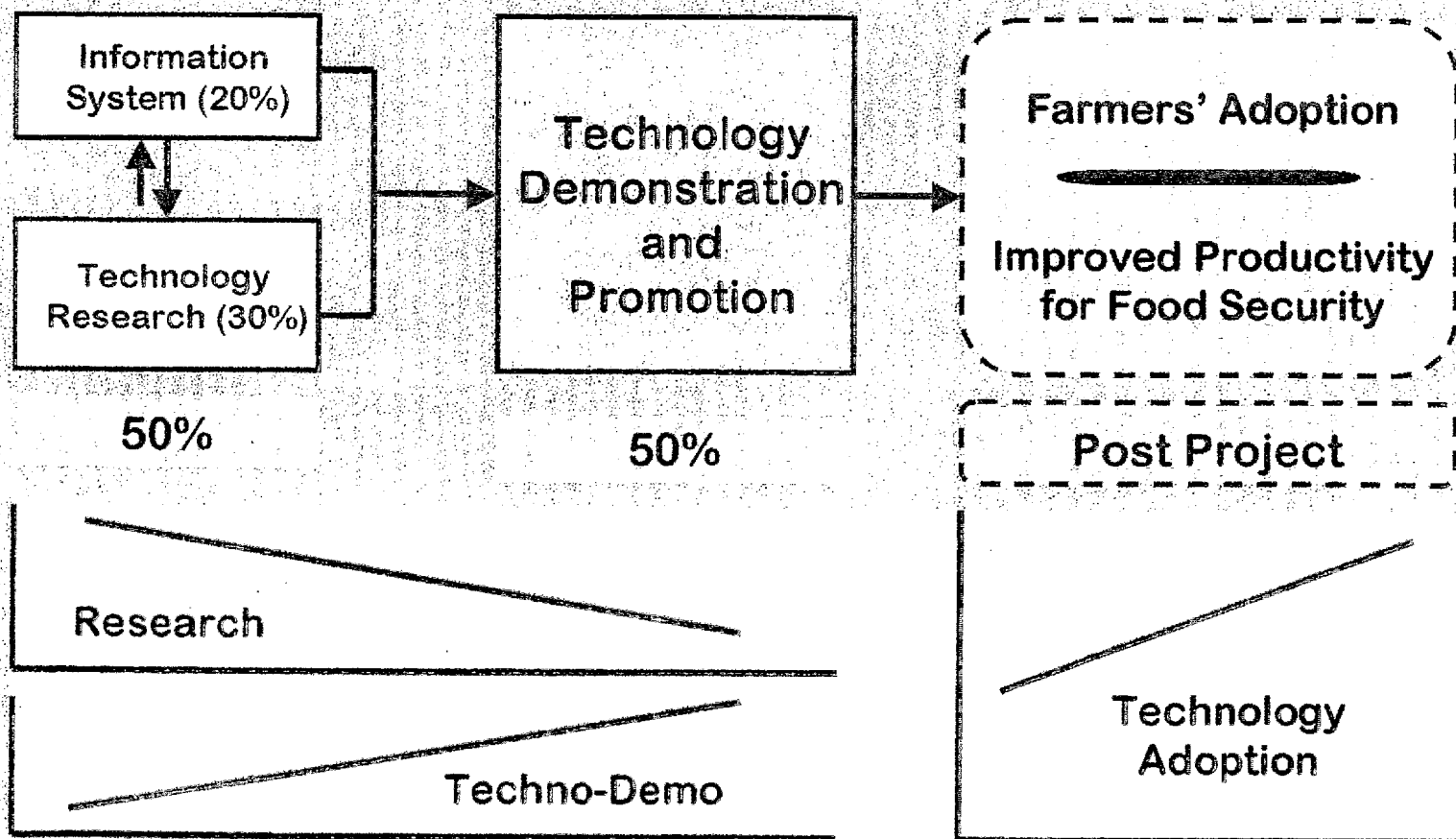
2. Promotion of technologies that enhance soil biodiversity and preserve the environment.

- (a) Establishment of outreach techno demo projects
- (b) Extension and education through media.
- (c) Establishment of nursery

3. Development of farmers manual on suitability, management and utilization of marginal lands.

- (a) Preparation of soil conservation primer in different dialects.
- (b) Coordination with SCUs and LGUs in the dissemination of educational materials.

STRATEGY OF PROJECT IMPLEMENTATION



Role of BSWM vis-à-vis Agriculture and Fisheries Modernization Act (AFMA)

- Strategic agricultural and fisheries development zones (SAPDZ)
- Protection of watershed areas
- Food security, poverty alleviation, social equity and income enhancement
- Global climate change
- Irrigation
- National information network
- Farm-to-market roads
- Research, development and extension

