A-32

FEASIBILITY STUDY ON

MARINE FISHERY DEVELOPMENT SUB-CENTER (SIBOLGA)*

1. BACKGROUND

1.1. Project Area

The Project will cover whole western water of Sumatra, having its development base in Sibolga.

The fishery is a leading economic sector in Sibolga, contributing about 30 % of GDP. As well as Padang, Sibolga plays an important role as a major fishing base in the west coast of Sumatra. The fishery in Sibolga are supported by 5,871 fishermen with 888 units of fishing fleets of which over 60% are equipped with a inboard engine.

1.2. Project's Role

The fishing activities in the northern part of Sumatra have historically been concentrated in the east coast (Malacca Straits) taking advantage of close access to the market, rich fishery resources and sufficient manpower. Due to the intensive fishing, however, the current catch level almost reaches to its maximum sustainable yield (MSY) as recognized from a recent stagnation of fish catch. On the other hand, the fishery resources in the western water of Sumatra are under-exploited (As of 1987, about 67% or 127,000 MT/year of coastal water are exploited, but almost untouched to offshore resources of 238,700 MT/year). Under the circumstance that it is difficult to expect remarkable increase of fish catch from the east coast, it is essential to fully utilize the under-exploited fishery resources of west coast in order to meet the increasing domestic demand for fish as well as for export. For keeping the current per capita annual fish consumption in the Region (23-25 kg) and annual increase rate of fish export volume (10%) it is required to increase the regional fish production to about 560 - 610,000 MT in 1993 and about 900 - 960,000 MT in 2008. The achievement of this target may largely depend on degree of exploitation of fishery resources of west coast. Basic strategy is to exploit the coastal fishery resources up to MSY level by 1993 and those of offshore fishery by 2008, as well as also supported by a constant increase of aquaculture and inland fishery production.

Most of fishermen in the west coast, however, are small-scale whose the motorization rate of fishing boats is 25% (while 45% in east coast) and per fisherman fish catch is also lower (1.18 MT/year) than east coast (1.78 MT/year). Owing to some projects implemented in the west coast of Sumatra in recent years, i.e. Sumatra Fisheries Development Project (ADB loan), Small-Scale Fisherfolk Communities of the Bay of Bengal (FAO T/A), fish production in the west coast has steadily increased from 80,408 MT in 1982 to 127,965 MT in 1987. Currently, about 90 purse seiners of east coast are operated in the west coast having a landing base in Sibolga (from Jan. to June). However, it will be necessary to further upgrade fishing efficiency of

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small-scale fishermen through a comprehensive approach, and more strong incentives should also be given in order to make a love call to the east coast's fishermen for fishing in the west coast of Sumatra.

The DGF established the Marine Fisheries Development Center (BPPI) in Semarang for the purpose of upgrading of small-scale fishermen through development of fishing gear and method and training in collaboration with provincial-level marine fisheries development units (UPPI). However, it is not enough capacity for BPPI to cover whole Indonesia and the extension of technology seems to be not efficient because of limited facilities in each UPPI.

In these context, it is indispensable to establish the Marine Fisheries Development Sub-Center for providing more efficient services to small-scale fishermen in the west coast of Sumatra.

2. THE PROJECT

2.1. Objectives

The objectives of the Project is to establish the Marine Fisheries Development Sub-Center in Sibolga, North Sumatra, and thereby to improve coastal fishing technology in order to catch fishes more efficiently and to promote development of off-shore fishing particularly tuna resources in the western water of Sumatra. The technologies to be developed therein must be suitable and applicable for regional small-scale fishermen. The Sub-Center will be organized under the existing Marine Fisheries Development Center (BPPI) in Semarang.

2.2. Proposed Site

The Sub-Center will be established in Sibolga.

2.3. Major Components

The project will be implemented in 2 phases: Phase I; Establishment of sub-center and Phase II; Technical cooperation.

Phase I: Establishment of the Sub-Center

The Sub-Center will include the following:

(1) Administrative facilities

Office

Staff room

Design room

Lecture room

Training room (navigation, fishing gear, etc.)

Dormitory for trainees

(2) Workshops and Training Facilities

Engine maintenance shop

Small wooden-boat yard

Fishing gear maintenance shop

Artificial reef mfg. shop

(3) Equipment

Workshop equipment (machinery and tools for maintenance)

Training equipment

Vehicles

(4) 50 GT multi-purpose fishery training and research vessel (for development of offshore fishing)

Phase II. Technical Cooperation

Technical cooperation will be required in the form of recruitment of 3 foreign specialists: fishing gear and method specialist (team leader), fishing boat design engineer, and artificial reef specialist. They will be stationed at the planned Sub-Center in Sibolga, North Sumatra, and will develop appropriate fishing technologies suitable for small-scale fishermen in the west coast of Sumatra. In particular, the following items are emphasized to be developed:

(1) Small-scale tuna long-liners (about 20 GT) to be operated in Nias and Mentawai Island region for exploitation of offshore tuna.

(2) Artificial reefs particularly fish aggregating device (FAD) suitable for purse seine, lift net and other fishing.

(3) Appropriate fishing gear for coastal fishing e.g. lobster cage, bottom long-line, vertical long-line, etc.)

3. SCOPE OF WORK

The scope of work to be performed are as follows:

Phase I: Establishment of the Sub-Center

(1) to examine and analyze the requirement for the sub-center, and to justify and determine the optimum scale of facilities.

(2) based on the existing data on natural environment of the portyard, to evaluate suitability as construction site and make additional site survey if necessary.

(3) to prepare a detailed design of the facilities including building, equipment and vessel (Building work will be done locally but equipment and vessel will be procured from foreign country.)

(4) to make spot-supervision the construction and procurement activities.

Phase II: Technical Cooperation

1. Fishing Gear and Method Specialist (Team Leader)

(1) to prepare a development programs to be carried out in the sub-center. Programs shall include objectives, scope of activity, program area and scale, schedule and required manpower and cost, etc.

(2) to review and evaluate the previous marine fishery research and development work especially on fishing gear and method, carried out not only in BPPI Semarang but also in AARD-CRIF and international organizations.

(3) to investigate and analyze the existing various types of fishing gear used in the project area.

(4) to design the improved fishing gear for small-scale fishermen, and to manufacture them on trial basis.

(5) to test the new fishing gear and to demonstrate fishermen.

(6) to select some number of fishermen as model fishermen for trial operation of the newly developed fishing gear, and to monitor the record regularly.

(7) to execute training programs for fishery extension officers, and also to recommend counterpart training in overseas countries.

2. Fishing Boat Design Engineer

(1) to investigate and analyze the currently-used fishing boats of various types and scales, and to recommend the possible improvement taking into account the capability of local shipyard, fishermen's skill and required cost and materials.

(2) to make a design of prototype tuna long line fishing boat (approx. 20 GT) and purse seine fishing boat (approx. 15-20 GT) which will be able to extend to small-scale fishermen in the project area.

(3) to supervise at shipyard on spot basis during shipbuilding of the prototype fishing boats.

(4) to test the efficiency of prototype fishing vessels and to provide selected model fishermen with technical guidance during initial period.

3. Artificial Reef Specialist

(1) to review the past records of artificial reef programs especially FAD in the western water of Sumatra.

(2) to design the most appropriate scale, number and shape of artificial reef in the project area taking full consideration of utilization of local materials.

(3) to select priority areas for installation of various types of artificial reefs by type of fishing gear.

(4) to train local fishermen/cooperatives how to manufacture, install and manage the artificial reefs.

(5) to monitor the effects of artificial reefs and to modify the design, location etc.

4. EXECUTION OF THE STUDY

4.1. Executing Agency

The executing agency of Indonesian side will be Directorate General of Fisheries (DGF), Ministry of Agriculture for entire project components and period.

4.2. Expertise and Man-Months

The Project will require the consulting services of total 15 man-months for Phase I and of total 72 man-months (3 experts) for Phase II.

4.3. Time Schedule

The Project will be implemented in a total period of 54 months comprising phase I: 18 months and phase II: 36 months.

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FEASIBILITY STUDY ON SMALL-SCALE FISHERY DEVELOPMENT (SOUTH TAPANULI)*

1. BACKGROUND

1.1. Project Area

The Project will cover coastal water of South Tapanuli. Main fishing in South Tapanuli is a lift net fishing in the southern coast (Batahan - Natal) while gill nets are dominated in other areas (Natal to northward). Present catch level is about 6,000 MT of which 60% are landed at Batahan and Natal areas. About 75% of fish catch are sold to Sibolga (fresh fish plus dried anchovy) and Air Bangis (dried anchovy). Anchovy is typical species caught by lift net fishing boats (35 units). Their fishing grounds are shifted by season; P. Telo & Pini area during Sep.-Mar. and Batahan-Natal coastal water during Mar.-Aug.. Fishes are mainly boiled/salted and dried at Batahan and Natal. As well as West Aceh, the coastal water of Tapanuli area is suitable for purse seine fishing. At present, however, purse seine fishing boats can be observed only in the areas between Tapaktuan and Sibolga, and coastal area of West Sumatra. As for fish marketing, some fresh fish may be possible to directly sold to P.S.P. (180 km or 8 hrs. by car) but not via Sibolga if ice supply is enough. In addition, ice are needed by lift net fishing bots for keeping fish in fresh even a case of more than 4 hours/trip.

1.2. Project's Role

Fish catch in the west coast of Sumatra has favorably increased from 80,408 MT in 1982 to 127,965 MT in 1987, while the catch of Malacca Straits has been stagnating at the level of 330,000 MT per annum, the same level as the estimated MSY (maximum sustainable yield). In order to meet the increasing local and export demands, it is indispensable to further develop the fisheries resources including those of offshore of the western water of Sumatra. The project area, as aforementioned, is facing to a good purse seine fishing ground within its 12-mile territorial water. The development of purse seine fishing is prospective, upon improvement of the following constraints.

a) Far access to market because of the lack of sufficient transportation and communication network.

b) Lack of appropriate fisheries infrastructural facilities, i.e. fish landing place, ice plant, marketing equipment.

c) Low technical level of fishermen and limited manpower availability.

d) Weak organization, particularly cooperatives society.

2. THE PROJECT

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2.1. Objectives

The objectives of the Project is to upgrade small-scale fishermen and to strengthen fishermen's association/cooperatives through provision of governmental support on fish marketing and fishing ground preparation. Furthermore, it is aimed at expansion of coastal fishing capacity with supply of fishing fleet and gears to fishermen.

2.2. Project Components

The Project will include Part A: Government support to Fishermen's Association/Cooperatives and Part B: Credit Component.

Part A: Government Support to Fishermen's Association/Cooperatives

Component 1. Artificial Reef Installation

The Project will include installation of artificial reefs which model will be designed at the proposed Sibolga Marine Fisheries Development Sub-Center. The number, scale and locations of reefs will be determined in discussion with the Sub-Center, cooperatives and the Project consultants. In the initial years, the floating reefs, so called fish aggregating device (FAD) mainly for purse seine and lift net fishing will be emphasized in this component. The artificial reefs including nearby fishing ground are expected to be managed by the respective fishermen's association/cooperatives.

Component 2. Small-Scale on-shore Facilities

The Project will include improvement of small-scale on-shore facilities by which fish marketing capacity is expected to expand. The areas where required with these facilities are mostly isolated from markets due to inconvenient road and sea transportation. In order to expand the existing fish marketing scale, the fishermen's association/cooperatives will be strengthened so as to involve in fish marketing.

a) Fish landing jetty/wharf with fish auction shed

Rehabilitation of the existing jetty/wharf including dredging of navigation channel will be required in Meulaboh, so that 20 GT class purse seiners can utilize the facilities. The slipway with small workshop for fishing boat up to 20 GT will be also constructed in Batahan.

b) Ice plant and fish/ice storage

Small-scale ice plant (1-2 tons/day block ice) will be installed at Batahan. The ice will used only for long-distance transportation of fresh fish, mainly to P.S.P. and Medan. About 15m^3 ice/fish storage (-0 C) will be also facilitated for temporary stock of fish for 1 or 2 days. In addition, for fish transport purpose, each one 1-ton insulated truck and about 100 pieces of plastic fish container (60 liter) will be supplied.

Component 3. Staff Training of Fishermen's Association/Cooperatives

The fishermen's association/cooperatives in Batahan and Natal will be improved, with provision of intensive on-the-job training of cooperatives activities (fish marketing, credit and fishing ground

management). For this purpose, one local government staff who will act as manager of project cooperatives will be intensively trained in overseas country for 6 months and in private fish trading company in Indonesia for another 6 months.

Part B: Credit Component

The Project will include credit to small-scale fishermen or group of fishermen who will be selected and provided with cooperatives collateral for credit.

The project area is suitable for purse seine fishing development. About 15-20 GT wooden-hull purse seiners will be introduced and operated in the coastal water of South Tapanuli. The vessels will be provided to the selected fishermen or fishermen's group by credit.

Assuming that one vessel can catch 200 ton/year (1 ton/trip x 200 trips) and about 25% or 10,000 MT of the remaining potential pelagic fish stock can be exploited in this region, 50 units of purse seiners can be operated in the region.

3. SCOPE OF WORK

3.1. General

The Study will include:

a) Review and assessment of the existing status of fishing, fish marketing, fisheries-related infrastructure, organization/institution, and credit activities;

b) Justification of appropriate scale of each project component, including number of sub-borrowers for fishing fleets & gear, capacity and location of on-shore facilities;

c) natural environmental survey, i.e. boring test, depth survey, site measurement, bench mark survey, which will be necessary for determining design of project facilities;

d) basic design of project components reflecting some design developed at the proposed Sibolga Sub-Center;

e) Preparation of detailed implementation plan including time schedule., financing plan and necessary institutional arrangements;

f) Estimation of required cost and manpower for project implementation; and,

g) Feasibility evaluation of the entire project in technical, financial, socio-economic, manpower, and institutional aspects.

3.2. Specific

(a) Fisheries Resources Aspect

The western water of Sumatra has a rich fish stock, which are not fully exploited in general, but in specific, catches of shrimps and skipjack have already exceeded the estimated MSY levels. The skipjack resource should be carefully analyzed in connection with purse seine fishing development.

(b) Fishing Technological Aspect

Due to a strong wave action action and fast current, fish aggregating device (FAD) is easy to be moved away as experienced in West Sumatra in 1987-88. The design not for a large-scale but small scale for shallow water use should be developed at initial stage. The Consultant will review all past experiences of FAD and/or artificial reefs not only in Indonesia but also in neighboring countries, including, those to be developed in the proposed Sibolga Marine Fisheries Development Sub-Center, and will analyze its feasibility, paying a specific consideration on the oceanographic and conditions.

In addition, the Consultant will evaluate suitability of the proposed fishing gear and method to be applied to each project area, based on the past performance made by the related institution

(c) Fisheries Infrastructure Aspect

Most of the existing provincial fish landing centers (PPIs), which are located in the river mouth, are suffered from heavy siltation causing difficulty if timely call of fishing boats. Onshore facilities such as ice plant, fish auction shed and forwarding equipment are lack in the project areas. In addition to the limited access to the market, these insufficient fisheries infrastructure makes fishing village isolate even though there is a large potential fisheries resources. In relation with fish marketing aspect, the Consultant will review the existing fisheries infrastructure, and will prepare an appropriate improvement plan on feasible scale.

(d) Fish Marketing Aspect

Ice supply in the project are is very limited, almost all fishes for regional market are dealt without ice. Local people in west coast of Sumatra historically seems not to prefer iced-fish. Ice is used only for long-distance transportation, but no iced-fish are seen at local markets. As well, fishing boats do not use ice because of s short trip and iced-fish price seems not to differ with non-iced-fish if not perished. Although it is recommended to use ice from sanitary aspect, ice demand should be carefully analyzed taking into consideration of local food habit and the cost added by ice.

(e) Institutional Aspect

In the project areas, where are generally remoted from major domestic markets and fish marketing system in not well established or not well functioned, it is important to establish a due organization like cooperatives, which will activate marketing. The existing cooperatives are weak both in managerial and financial points of view. The Consultant will examine the possibility to enroll cooperatives as a core operational body in the Project including how to improve and strengthen their activities and institution. The possible government support may be indispensable for doing so. The institution and organization concerning to fish marketing i.e. auction system to be adopted, differ by each province. The Consultant should recommend appropriate measure and possible government support taking into consideration of provincial own ideas.

(f) Socio-economic Aspect

The main objective of the Project is to upgrade small-scale fishermen. The Consultant will assess fishermen's socio-economic

status by type, scale and location, identify the underlying constraints, and recommend a measure to be taken for step-by-step upgrading.

(g) Manpower Aspect

It is expected that fishermen of east coast may change their fishing ground to west coast gradually. The Consultant will assess the difference between fishermen of east and west coast, and will recommend how to promote conversion of fishing activity from east to west. At time when main fishing ground moves to west cost, some local fishermen will have a chance to be employed. It is necessary to upgrade their technical status beforehand not only for generation of skilled manpower but also for improving their own living standard. The Consultant will analyze necessary manpower including method and scale of manpower improvement.

(h) Credit Aspect

Some of government banks are reluctant to provide loans to artisanal fishermen who can not submit appropriate collaterals. On correspondence may be a crucial point. In the similar fisheries project in West Sumatra, a loan was released to a group of fishermen, in order to reduce a individual debt amount to the level which the bank does not require any collateral. This system, however may not be applicable to all cases, because some fishermen does not prefer to joint and some are not willing to get any loan. The Consultant will recommend an adequate method of approach for promoting credit activity, in consideration of credit amount, number of sub-borrowers and cooperatives involvement.

4. EXECUTION OF THE STUDY

4.1. Executing Agency

The executing agency of the Study at Indonesian side will be the Directorate General of Fisheries (DGF), Ministry of Agriculture (MOF).

4.2. Expertise and Man-Months

Total of 12 man-months covering fisheries economics, fishing technology, fish marketing, infrastructure, credit/finance and institution will be needed for formulating the detailed scope of the Project and making a feasibility study analysis.

4.3. Time Schedule

The Study will be completed within 4 months after commencement of field services.

C-4

RECONNAISSANCE SURVEY ON SOUTH NATAL COAL RESOURCES*

1. BACKGROUND

1.1. Location

The site is situated in an area between Natal (North Sumatra Province) and Air Bangis (West Sumatra Province) with a land area of 800 km^2 (40 km x 20 km).

1.2. Project's Role

The site is in Kabupaten South Tapanuli, which is located in the southern part of North Sumatra Province and covers an area of about 21,000 km^2, with a population of 1.16 million. The kabupaten is strategically situated at a middle point between the two major urban centers of Medan and Padang. Recently, outcrops of coal have been discovered in the southeast of Natal. This new coal bed is of very good bituminous quality similar to Ombilin coal. Since the kabupaten has a great deal of development potential in agriculture, home industries and tourism, the newly found coal reserves will play a very important role in the future development of the nearby areas as a major energy source. The coal would also help develop the Nias Island if enough coal is produced from the coal field to be shipped to the island.

2. OBJECTIVE OF THE SURVEY

The successfull implementation of the West Coast Tapanuli Integrated Development Program will depend much on the development of energy resources in the area. Hydro electric and mini-hydro electric energy will be exploited for the program. Coal resources also represent an important energy source for the future energy demand. Since it usually takes a long time, sometime almost a decade, to open a coal mine, reconnaissance survey should be started as early as possible targeting the future energy demand. The potentiality of the coal outcrops in question is not certain yet, but reconnaissance survey should be initiated as the first stage, followed by detailed survey, feasibility study and exploitation planning if the potentiality proves high.

3. SCOPE OF WORK

3.1. General

The new coal outcrops occur at seven locations, scattering in an area of about 9 km^2 (3 km x 3 km). Previous survey reports do no identify the Tertiary basin where the coal is embedded, but observe that the following should be done to develop the coal:

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(1) to unravel the distribution of coal in the area by defining the distribution of Tertiary and Sedimentary basin, and to select promising areas of coal resources

(2) to determine quality of the coal resources

(3) to infer the amount of coal resources

A feasibility study shall be continued, taking into consideration the result of the reconnaissance survey, to make a plan for exploitation.

3.2. Plan of the Survey

(1) Preparation of the survey

Photo geological interpretation is conducted to obtain aspects of geology and geological structure in the survey area. A topographic map of adequate scale for geological survey is prepared. The reconnaissance area shall be defined through the photogeological interpretation.

(2) Execution of geological and geograhical structure survey

Geological survey shall be executed in a Tertiary basin which is defined on the basis of results from the photogeological interpretation in order to unravel the coal area.

(3) Execution of drilling for geological structure investigation

Investigation of geological structure and coal emplacement shall be followed by drilling in the coal area.

(4) Estimation of inferred coal resources

Coal samples collected by the geological and drilling investigation shall be chemically analyzed to determine their quality. Potential shall be measured by estimating the volume of the coal reserves.

(5) Selection of promising areas

By synthesizing the reconnaissance survey, promissing areas shall be selected for future survey on exploitation.

(6) Assessment study on environmental disturbances

In this survey, assessment study shall be conducted on environmental impact of the mining operation anticipated in the future.

4. EXECUTION OF THE SURVEY

4.1. Executing Agency

The Directorate of Coal (DB) of the Directorate General of Mines, and the Directorate of Mineral Resources (SDM) of the Directorate General of Geology and Mineral Resources are in charge of the coal project. Both agencies belong to the Ministry of Mines and Energy. SDM is in charge of reconnaissance survey to unravel geology, geological structure of coal resources and first stage of exploration

work to confirm the embedded condition and amount of coal deposits, whereas DB is responsible for feasibility study. The Regional Office (Medan) of the Ministry of Mines and Energy will cooperate with these Directorates.

4.2. Expertise and Man-Months

The survey will require 60 man-months of engineering service of photo geological interpretation, geological and drilling surveys and synthesizing the survey results.

4.3. Time Schedule

This survey shall be executed in two years.

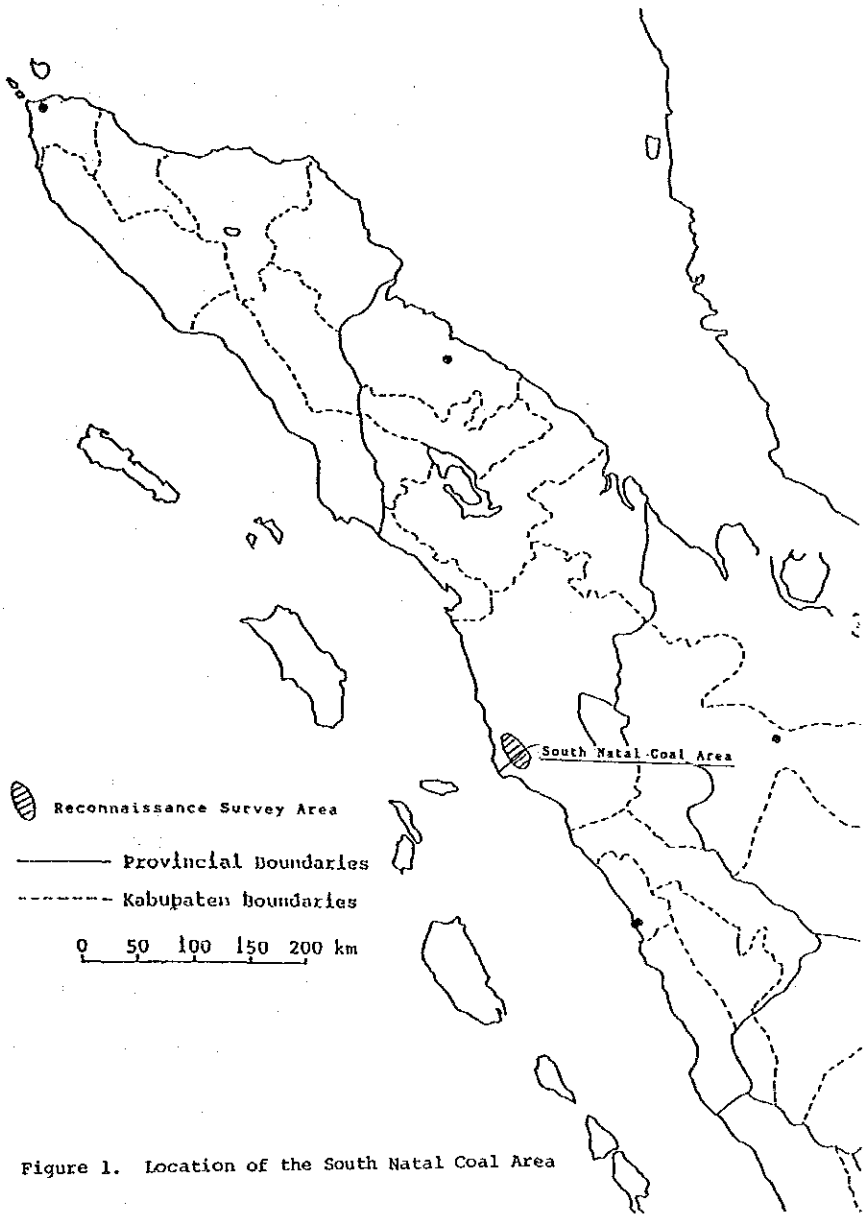

Figure 1. Location of the South Natal Coal Area

F-27

FEASIBILITY STUDY ON WEST COAST TAPANULI ROAD DEVELOPMENT*

1. BACKGROUND

The Government of Indonesia is determined to implement local road (Kabupaten road) improvement for the balanced development of the rural areas in Indonesia. With this objective a local road development program was introduced in Repelita III (1979/80 - 1983/84), as one of the important policies of the Government.

Several international lending agencies, notably the Overseas Economic Cooperation Fund (OECF), the International Bank for Reconstruction and Development (IBRD) and the Asian Development Bank (ADB), have assisted the Government in financing the above program for many Kabupatens in Indonesia since Repelita III.

The West Coast Tapanuli IDEP area, which consists of two Kabupatens, Tapanuli Tengah and Tapanuli Selatan, and one Kotamadya, Sibolga, is an area relatively lagging behind the eastern part of North Sumatra province, even though the area has a great deal of development potential, especially in the agricultural sector.

The Trans-Sumatra Highway passes through the area and has contributed to the regional development. The route change of the Trans-Sumatra Highway has given adverse effects on the area, especially on Sibolga in terms of economic activities. Padangsidempuan, which is a fast growing urban center in the area, is located at strategic crossroads on the Trans-Sumatra Highway, a halfway junction between Medan and Bukittinggi/Padang connecting to Sibolga westward and Rantauprapat eastward.

Locational advantages of the area should be utilized to full extent for the development in the future. However, to utilize the high potential in the area, one of the constraints for further development is the insufficient feeder and local road network. Therefore, the road network development is prerequisite to the area.

In the "Study on the Integrated Regional Development Plan for the Northern Part of Sumatra (LTA-78)" by JICA in 1989, the "West Coast Tapanuli Integrated Development Program (IDEP)" is proposed as a new integrated development approach. In the IDEP, the necessity and urgency of road network development including trunk, feeder and local roads are pointed out.

Under such circumstances, it is recommended to carry out the feasibility study on West Coast Tapanuli Road Network Development Project to confirm technical and economic viability of the project.

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2. OBJECTIVES OF THE STUDY

2.1. Objectives

The objective of the study is to carry out a feasibility study on the road network development covering trunk, feeder and local roads in the West Coast Tapanuli area of North Sumatra Province, including the following items:

(1) To carry out a feasibility study by using a simplified economic feasibility evaluation methodology,

(2) To establish a simplified implementation program methodology and to prepare an implementation program, and

(3) To perform technology transfer to Bina Marga in the course of the study.

2.2. Proposed Roads

In the feasibility study, the following road links shall be especially studied:

(1) *Trunk road: Tarutung - Sibolga - Padangsidempuan*

(2) Feeder road: in the central valley area

(3) Local road: Siabu - Sibuan, west coast road

3. SCOPE OF WORK

In order to achieve the objectives mentioned above, the feasibility study shall include the following activities:

(1) Collection and review of all relevant existing data and development plans in the study area

(2) Supplementary investigations to clarify conditions of transportation in the study area

(3) Study of socio-economic framework including land use plans in the study area

(4) Forecasting of future transportation demands in the study area

(5) Alternative study on road networks in the study area

(6) Conducting of traffic assignments and identification of road link characteristics

(7) Estimate of each link function based on indices of transportation efficiency and development effect

(8) Engineering study and preliminary cost estimate on road development schedule

(9) Establishment of priority of road links

(10) Field surveys for soil and materials investigations and analysis, hydrological surveys and analysis, and topographic surveys for high priority road links

(11) Determination of design policy, design criteria and standard

(12) Preliminary engineering designs for high priority road links

(13) Cost estimates including construction costs, right-of-way acquisition costs, maintenance costs, etc.

(14) Economic evaluation and socio-economic impact study

(15) Preparation of implementation program taking stage construction into account

4. EXECUTION OF THE STUDY

4.1. Organization

The executing agency is the Directorate General of Highways (Bina Marga), the Ministry of Public Works of Indonesia.

4.2. Expertise and Man-Months

It is estimated that about 75 man-months of foreign expatriates will be required to assist the executing agency for this study. The experts for this study are as follows:

(1) Project Manager
(2) Transport Planner
(3) Regional Planner
(4) Transport Economist
(5) Traffic Engineer
(6) System Engineer
(7) Cost Estimator
(8) Highway Engineer
(9) Structural Engineer
(10) Soil/Material Engineer
(11) Surveyor

4.3 Time Schedule

The study is to be completed within twelve (12) months after the commencement of the study.

5. Nias Island IDEP

A-19

STUDY ON WETLAND FOOD CROP INTENSIFICATION AND DIVERSIFICATION*

1. BACKGROUND

1.1. Location

The project will be implemented in Kabupaten Nias, North Sumatra.

1.2. Project's Role

Nias Regency is a group of islands located 135 km west of Mainland Sumatra. Primarily because of the geographical isolation, Nias is one of the lowest-income regencies in North Sumatra Province and in Indonesia as a whole. The past growth performance of the island economy has been far from encouraging, while the population has increased nearly 3% per annum to the present level of a little over 560,000.

The mainstay of economic activity in Nias is agriculture, which consists of food crops (chiefly rice and root crops), livestock (chiefly local pigs), and traditional smallholder tree crops (chiefly coconut and rubber). In order to contribute to the future development of the islands, the agricultural sector has two goals to address to; namely, to attain food security for rapidly growing population, and to increase its income-earning capacity.

With regard to the first issue of food security, Nias needs not only to increase the output of rice in order to reduce the sizable deficit, but also to diversify food production and thereby to improve the nutritional standards.

2. THE PROJECT

The project mainly consists of five supporting activities as follows:

(1) Development of rainfed wetland, particularly with provision of small-scale irrigation/drainage improvement

(2) Introduction of secondary food crops with better market prospects (such as soybean, maize and peanut) and vegetables into the cropping pattern on wetland

(3) Improvement of harvest and post-harvest operations and market-ing arrangements

(4) Strengthening or establishment of a rural extension center (or centers) with appropriate equipment and facilities for demonstration and manpower training

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3. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are (i) to critically analyze the existing cropping patterns on wetland, (ii) to identify effective measures to increase the wetland cropping intensity through diversification, and (iii) to suggest a range of institutional supports necessary to disseminate improved farming operations on wetland.

4. SCOPE OF WORK

Major items to be studied are as follows:

- Review of the present cropping intensity on wetland
- Identification of technical constraints in the local production techniques and physical characteristics of paddy fields
- Identification of social and economic constraints to more intensive utilization of available wetland, such as availability of labor and draft animal or mechanical power, marketing arrangements and access to institutional supports
- Suggestions on feasible measures for promoting diversification on the existing wetland

5. EXECUTION OF THE STUDY

Executing agency is the agricultural bureau (Dinas Pertanian) with close coordination/consultation with the provincial and kabupaten BAPPEDAs.

Fields of expertise and man-months necessary are as follows.

Crop Science Specialist (Team Leader)	6	m/m
Irrigation specialist	4	m/m
Post-harvest specialist	3	m/m
Agricultural machinery specialist	3	m/m
Agricultural economist	6	m/m

Time schedule is tentatively set for 6 months.

A-21

STUDY ON PADDY POST-HARVEST TECHNOLOGY DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be implemented in Kabupaten Nias, North Sumatra Province.

1.2. Project's Role

Nias Regency is a group of islands located 135 km west of Mainland Sumatra. Primarily because of the geographical isolation, Nias is one of the lowest-income regencies in North Sumatra Province and in Indonesia as a whole. The past growth performance of the island economy has been far from encouraging, while the population has increased nearly 3% per annum to the present level of 560,000.

In order to contribute to the future development of the islands, the agricultural sector has two goals to address to; namely, to attain food security for rapidly growing population, and to increase its income-earning capacity. With regard to the issue of food security, Nias has about 22,000 ha of wetland, which however does not produce enough rice to feed the present population. It is estimated that the output of rice from both wetland and dryland falls short of the demand by about 10,000 tons.

Therefore, together with irrigation development to increase the cropping intensity and productivity of wetland and the implementation of intensification programs to improve farming practices, the reduction of losses during harvest and post-harvest operations can contribute significantly to food security in Nias.

The project aims (i) to identify effective measures for reducing wastage of paddy during various stages of harvest and post-harvest operations, and (ii) to disseminate the improved harvest and post-harvest technology packages.

2. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study is (i) to identify an appropriate package of improved post-harvest technology, and (ii) to formulate a pilot program, including institutional development.

3. SCOPE OF WORK

Major items to be studied are as follows:

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(1) Evaluation of local harvest and post-harvest operations

- Reaping and threshing practices and implements used
- Pre-milling (drying and winnowing) and milling practices and implements/facilities used
- On-farm and off-farm storage and transportation conditions
- Socio-economic characteristics of work force
- Available institutional supports and bottlenecks

(2) Formulation of a pilot program

- Identification of an improved technology package suitable to local socio-economic characteristics
- Identification of appropriate scale of capital costs (building and equipment) and sequence of implementation
- Identification of training requirements for local institutional support personnel

4. EXECUTION OF THE STUDY

The executing agency is the bureau of agriculture (Dinas Pertanian), in close consultation/coordination with the provincial and regency BAPPEDAs.

Fields of expertise and man-months are tentatively as follows:

Rice production specialist	4 m/m
Post-harvest technology specialist	4 m/m

Time schedule is tentatively set for 4 months.

A-26

STUDY ON SMALLHOLDER COCONUT DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be implemented in Kabupaten Nias, North Sumatra Province.

1.2. Project's Role

Largely because of the geographical isolation from Mainland Sumatra, Nias Islands is one of the lowest-income regencies in North Sumatra Province and in Indonesia as a whole. The past growth performance of the island economy has been far from encouraging, while the population has increased nearly 3% per annum to the present level of 560,000.

In order to contribute to the future development of the island economy, the agricultural sector has two goals to address to; namely, to attain food security for rapidly growing population, and to increase its income-earning capacity. With regard to the second issue, two tree crops have long been the major sources of cash income. In view of the presence of the oil mill on the islands, the increased production of coconut can be considered as having greater socio-economic impacts.

The project aims (i) to improve the productivity of, and income from, smallholder coconut, (ii) to increase the output of edible oil and copra meal for local consumption and for outside markets, and thereby (iii) to contribute to the growth of the less-developed islands.

2. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are (i) to critically evaluate the present conditions of smallholder coconut production, (ii) to select suitable locations for replanting or planting coconut in more or less contiguous units totalling about 3,000 ha, and to evaluate the economic and financial feasibility of such development.

3. SCOPE OF WORK

In Indonesia, a variety of programs have been, and are being, implemented for smallholder growers of estate crops, such as PIR programs, project management units, partial programs and self-reliant (swadaya) programs, to name only major standardized programs. However, some of these programs appear to have mixed results, depending on such factors as crops and locations selected for program operation. In view

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of the special characteristics of Nias Islands, the study is expected to evaluate the relative merits of alternative programs as well.

Major items to be studied are as follows:

(1) Analysis of the present status of smallholder coconut production

- Technical aspects (planting materials, operation and maintenance, harvest and post-harvest practices, etc.)
- Socio-economic aspects (land use, size of holding, organization of work force, production costs and income)
- Available institutional supports

(2) Analysis of local marketing system and bottlenecks, and market prospects

(3) Project formulation

- Identification of basic components for appropriate technology packaging
- Comparative feasibility analysis of alternative programs
- Identification of the appropriate management system and technical assistance requirements

4. EXECUTION OF THE STUDY

The executing agency is the estate crop bureau (Dinas Perkebunan) in close consultation/coordination with the provincial and regency BAPPEDAs.

Fields of expertise and man-months are tentatively as follows:

Agronomist (Team leader)	6 m/m
Pest control specialist	4 m/m
Post-harvest technology specialist	4 m/m
Economist	4 m/m

Time schedule is tentatively set for 6 months.

A-34

FEASIBILITY STUDY ON SMALL-SCALE FISHERY DEVELOPMENT (NIAS)*

1. BACKGROUND

1.1. Project Area

Although Nias is surrounded with rich fisheries resources, original fishermen in Nias are mostly artisanal with non-powered canoes (about 95% of boats or 4,500 fishermen). Main fish landing places are P. Telo and P. Pini (anchovy), Gunungsitoli and Telukdalam (tuna, skipjack, etc.), representing over 50% of total marine fish catch. About 5 MT per week of fresh fish (mainly raw materials for canned tuna) are transported from Gunungsitoli to Medan via Sibolga, while dried anchovy produced at P. Telo and P. Pini is sold to Padang and Medan. The fish landing facilities in Nias are not sufficient except a modern fishing port established as a forward base for offshore fishery in P. Telo.

1.2. Project's Role

Fish catch in the west coast of Sumatra has favorably increased from 80,408 MT in 1982 to 127,965 MT in 1987, while the catch of Malacca Straits has been stagnating at the level of 330,000 MT per annum, the same level as the estimated MSY. In order to meet the increasing local and export demands, it is indispensable to further develop the fisheries resources including those of offshore of the western water of Sumatra. The project area, as aforementioned, is surrounded with a rich fisheries resources, particularly it is very close to tuna fishing ground. The development of tuna long line fishing is prospective, upon improvement of the following constraints.

1) Far access to market because of the lack of sufficient transportation and communication network.

2) Lack of appropriate fisheries infrastructural facilities, i.e. fish landing place, ice plant, marketing equipment.

3) Low technical level of fishermen and limited manpower availability.

4) Weak organization, particularly cooperatives society.

2. THE PROJECT

2.1. Objectives

The objectives of the Project is to upgrade small-scale fishermen and to strengthen fishermen's association/cooperatives through provision of governmental support on fish marketing and fishing ground preparation. Furthermore, it is aimed at expansion of coastal fishing capacity with supply of fishing fleet and gears to fishermen, as well as pilot-scale operation of offshore tuna fishing.

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2.2. Project Components

The Project will include Part A: Government Support to Fishermen's Association/Cooperatives and Part B: Credit Component.

Part A: Government Support to Fishermen's Association/Cooperatives

Component 1. Small-Scale On-Shore Facilities

The Project will include improvement of small-scale on-shore facilities by which fish marketing capacity is expected to expand. The areas where required with these facilities are mostly isolated from markets due to inconvenient road and sea transportation. In order to expand the existing fish marketing scale, the fishermen's association/cooperatives will be strengthened so as to involve in fish marketing.

(1) Fish landing jetty/wharf with fish auction shed

Rehabilitation of the existing jetty/wharf including dredging of navigation channel will be required in Gunungsitoli, while a new fish landing facilities will be needed at Telukdalam, so that 20 G/T class fishing vessel can utilize the facilities. The slipway with small workshop for fishing boats up to 20 GT will be also constructed in Gunungsitoli.

(2) Ice Plant and Fish/Ice Storage

Small-scale ice plant (1-2 tons/day block ice) will be installed at both Gunungsitoli and Telukdalam. The ice will be used only for long-distance transportation of fresh fish, mainly tuna to cold storage in Medan. About 15 m^3 ice/fish storage (-0 C) will be also facilitated for temporary stock of fish for 1 or 2 days in each location. In addition, for fish transport purpose, each one 1-ton insulated truck and about 100 pieces of plastic fish container (60 liter) will be supplied. In Gunungsitoli where fresh tuna marketing is expected, fish packing room and a styrofoam box manufacturing plan will be necessary.

Component 2. Staff Training of Fishermen's Association/Cooperatives

The fishermen's association/cooperatives in Gunungsitoli will be improved, with provision of intensive on-the-job training of cooperatives activities (fish marketing, credit and fishing ground management). For this purpose, one local government staff who will act as manager of project cooperatives will be intensively trained in overseas country for 6 months and in private fish trading company in Indonesia for another 6 months.

Part B: Credit Component

The project will include credit to small-scale fishermen or group of fishermen who will be selected and provided with cooperatives collateral for credit.

Component 1. Tuna Fishing Development

About 20 GT wooden-hull tuna long line fishing boats which will be introduced and operated in the offshore of Nias and Mentawai Islands region. Some foreign professional fishermen could be recruited

(preferably Japanese or Korean is better from the viewpoint of tuna fishing technology) for operation and on-the-job training of the selected local fishermen.

It is expected that some of catch will be exported as fresh tuna by air from Gunungsitoli to Japan via Medan and Singapore, while the remaining will be transported to Sumatra Main Island or P. Telo for frozen tuna. Assuming that one tuna long liner can catch about 1 ton per 3-day trip and about 50% or 6,000 MT of the potential tuna stock in the region will be exploited under the Project, about 60 units of this type of tuna long liner can be operated in the Region.

Component 2. Motorization of Canoes

Out of non-motorized fishing canoes in Nias (about 4,500 units), only those of over 7 m length will be provided with outboard engines of 8-25 hp and improved gear consisting of vertical long-lines, drift gill net and vertical hook and line.

3. SCOPE OF WORK

3.1. General

The Study will include: 1) review and assessment of the existing status of fishing, fish marketing, fisheries-related infrastructure, organization/institution, and credit activities; 2) justification of appropriate scale of each project component, including number of sub-borrowers for fishing fleets and gear, capacity and location of on-shore facilities; 3) natural environmental survey, i.e. boring test, depth survey, site measurement, bench mark survey, which will be necessary for determining design of project facilities; 4) basic design of project components reflecting some designs developed at the proposed Sibolga Sub-Center; 5) preparation of detailed implementation plan including time schedule, financing plan and necessary institutional arrangements; 6) estimation of required cost and manpower for project implementation; and, 7) feasibility evaluation of the entire project in technical, financial, socio-economic, manpower, and institutional aspects.

3.2. Specific

(1) Fisheries Resources Aspect

The western water of Sumatra has a rich fish stock, which are not fully exploited in general, but in specific, catches of shrimps and skipjack have already exceeded the estimated MSY levels. The skipjack resource should be carefully analyzed in connection with purse seine fishing development.

Tuna stock in the area is estimated at 12,800 MT/year, and of which about 5,000 MT are annually caught, mostly coastal tuna in shallow water (less than 150m deep). As for deep sea tuna, only few trial was made after the catch record of P.T. Perikanan Sumatra Besar (PSB) was not satisfactory, although it is said that there is enormous volume of migratory deep-sea tuna in the Region. The Consultant will carefully assess tuna resource and justify the proposed tuna fishery development.

(2) Fishing Technological Aspect

Due to a strong wave action and fast current, fish aggregating device (FAD) is easy to be moved away as experienced in West Sumatra in

1987-88. The design not for a large-scale but small-scale FAD for shallow water use should be developed at initial stage. The Consultant will review all past experiences of FAD and/or artificial reefs not only in Indonesia but also in neighboring countries, including, those to be developed in the proposed Sibolga Marine Fisheries Development Sub-Center, and will analyze its feasibility, paying a specific consideration on the oceanographic and geographic conditions.

In addition, the Consultant will evaluate suitability of the proposed fishing gear and method to be applied to each project area, based on the past performance made by the related institutions.

(3) Fisheries Infrastructure Aspect

Most of the existing provincial fish landing centers (PPIs), which are located in the river mouth, are suffered from heavy siltation causing difficulty of timely call of fishing boats. On shore facilities such as ice plant, fish auction shed and forwarding equipment are lack in the project areas. In addition to the limited access to the market, these insufficient fisheries infrastructure makes fishing village isolate even though there is a large potential fisheries resources. In relation with fish marketing aspect, the Consultant will review the existing fisheries infrastructure, and will prepare an appropriate improvement plan on feasible scale.

(4) Fish Marketing Aspect

Ice supply in the project area is very limited, almost all fishes for regional market are dealt without ice. Local people in west coast of Sumatra historically seems not to prefer iced-fish. Ice is used only for long-distance transportation, but no iced-fish are seen at local markets. As well, fishing boats do not use ice because of short trip and iced-fish price seems not to differ with non-iced-fish if not perished. Although it is recommended to use ice from sanitary aspect, ice demand should be carefully analyzed taking into consideration of local food habit and the cost added by ice.

Tuna is an Indonesia's major export item as well as shrimps. Indonesia exports about 35,000 MT of tuna-like fish annually, mostly to Thailand (17,500 MT) and Japan (16,000 MT). Considering a locational merit of Sumatra, if tuna fishery is largely developed, the project areas may be one of supply bases of frozen tuna-like fish for Thailand's canned tuna industry. Since supply of frozen tuna from U.S.A. and Japan to Thailand are recently not stable, Sumatra will be in a position to supplement a shortage. In addition, with development of air transportation services, Japanese fresh tuna market will be emphasized. The Consultant will assess the current status of international tuna markets and will recommend most appropriate tuna marketing plan.

(5) Institutional Aspect

In the project areas, which are generally remote from major domestic markets and fish marketing system is not well established or not well functioned, it is important to establish a due organization like cooperatives, which will activate marketing. The existing cooperatives are weak both in managerial and financial points of view. The consultant will examine the possibility to enroll cooperatives as a core operational body in the Project including how to improve and strengthen their activities and institution. The possible government support may be indispensable for doing so. The institution and organization concerning to fish marketing i.e. auction system to be

adopted, differ by each province. The Consultant should recommend appropriate measure and possible government support taking into consideration of provincial own ideas.

(6) Socio-economic Aspect

The main objective of the Project is to upgrade small-scale fishermen. The Consultant will assess fishermen's socio-economic status by type, scale and location, identify the underlying constraints, and recommend a measure to be taken for step-by-step upgrading.

(7) Manpower Aspect

It is expected that fishermen of east coast may change their fishing ground to west coast gradually. The Consultant will assess the difference between fishermen of east and west coast, and will recommend how to promote conversion of fishing activity from east to west. At time when main fishing ground moves to west coast, some local fishermen will have a chance to be employed. It is necessary to upgrade their technical status beforehand not only for generation of skilled manpower but also for improving their own living standard. The Consultant will analyze necessary manpower including method and scale of manpower improvement.

(8) Credit Aspect

Some of government banks are reluctant to provide loans to artisanal fishermen who cannot submit appropriate collaterals. On the way to develop small-scale fishermen, however, this correspondence may be a crucial point. In the similar fisheries project in West Sumatra, a loan was released to a group of fishermen, in order to reduce a individual debt amount to the level which the bank does not require any collateral. This system, however, may not be applicable to all cases, because some fishermen does not prefer fo joint and some are not willing to get any loan. The Consultant will recommend an adequate method of approach for promoting credit activity, in consideration of credit amount, number of sub-borrowers and cooperatives involvement.

4. EXECUTION OF THE STUDY

4.1. Executing Agency

The executing agency of the study at Indonesian side will be the Directorate General of Fisheries (DGF), Ministry of Agriculture (MOF).

4.2. Expertise and Man-Months

Total of 12 man-months covering fisheries economics, fishing technology, fish marketing, infrastructure, credit/finance and institution will be needed for formulating the detailed scope of the Project and making a feasibility study analysis.

4.3. Time Schedule

The study will be completed within 4 months after commencement of field services.

F-28

CONSULTING SERVICES FOR DETAILED DESIGN AND CONSTRUCTION OF NIAS ISLAND RING ROAD*

1. BACKGROUND

In the "Study on the Integrated Regional Development Plan for the Northern Part of Sumatra (LTA-78)" by JICA in 1989, the "Nias Island Integrated Development Program (IDEP)" is proposed as one of the regions to be concentrated for regional development. The study area for the "Nias Island IDEP" is Kabupaten Nias, whose capital is Gunung Sitoli. The area is 5,450 km^2 in size with a population of 561,000 in 1987.

In the "Nias Island IDEP", it is pointed out that transportation systems such as roads and port are inevitable for the shipment of increased agricultural products and import of commodities for daily life from the standpoint of civil minimum. As for the road development in the area, road networks have yet to be developed. About 30% of provincial roads and 96% of kabupaten roads are still unpaved.

Some parts (about 35 km) of the road link between Gunung Sitoli and Teluk Dalam at the south end of the island will be improved as a part of road rehabilitation project assisted by OECF, Japan, starting in 1990. However, most part of provincial roads such as the ring road and the cross road are in fair or poor condition. To support productive sectors, especially agriculture, and tourism development, road network development in Nias island is essential during the period of Repelita V.

Under such circumstances, it is recommended to execute the detailed design and construction of the Nias Island Ring Road Project.

2. PROPOSED PROJECT

The project will cover the following road construction:

(1) Road betterment of about 350 km Nias island ring road along the coast,

(2) Road betterment of about 55 km island cross road from Miga to Lolowau, and

(3) Construction of feeder roads to be connected with the above roads.

3. OBJECTIVES OF THE PROJECT

The objectives of the project are to support agricultural and tourism development in the "Nias Island IDEP" and to promote the realization of balanced socio-economic development among the regions.

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4. SCOPE OF WORK

The scope of work for consulting services of the project shall cover the following items:

(1) The engineering services for the detailed design, including:

a) Review of existing data and studies
b) Additional survey and investigations required for the detailed design
c) Preparation of the detailed design and cost estimate
d) Preparation of tender documents and tender drawings
e) Preparation of maintenance program for the project road

(2) The engineering services for construction supervision, including:

a) Pre-construction engineering services
b) Supervision of the construction of betterment of road structures
c) Guidance and monitoring of maintenance operations

5. IMPLEMENTATION OF THE PROJECT

5.1. Organization

The executing agency is the Directorate General of Highways (Bina Marga), the Ministry of Public Works of Indonesia. The Consultant for the project shall fully cooperate with all concerned Government agencies such as Central Bina Marga, Dinas Bina Marge (DBM) and Regional Public Works (Kanwil PU) in the province.

5.2. Expertise and Man-Months

It is estimated that about 250 man-months of consulting engineers of foreign domestic consultants will be required to assist the executing agency for the implementation of the project. The consulting engineers shall be as follows:

(1) Project Manager
(2) Highway Engineer
(3) Quantity Surveyor
(4) Structural Engineer
(5) Soil/Material Engineer
(6) Construction Engineer
(7) Mechanical Engineer
(8) Cost Estimator
(9) Document Specialist
(10) Topographic Surveyor
(11) Inspection Engineer

5.3 Time Schedule

The project is to be completed within thirty-six (36) months after the commencement of the project.

H-8

FEASIBILITY STUDY ON RE/AFFORESTATION DEVELOPMENT (NIAS) *

1. BACKGROUND

1.1. Location

This project will be implemented in Nias Island, North Sumatra.

1.2. Project's Role

Nias Island is isolated in the Indian Ocean, 135km west from Sumatra Island. The island is about 37km wide and 115km long and total area is 545,000 ha. As for topographic features, the island has a mountain range of about 500m high above sea level with S.E. direction, and the highest mountain is Mt. Lolomatua, 886m above sea level. Most areas are hilly, and alluvial plains are limited to the coastal areas around river mouths. Population was 560,632 in 1987, population density being 103 persons per km^2. Farmers account for 80% of the total population.

According to the Concensus Forest Land Use by the Government of Indonesia, 153,650 ha of Protection Forest is defined as Land Status, but according to a present land use map, the area of Protection Forest is defined as mixed conditions of bush, scrub, normally regrowth following cultivation and shifting cultivation, and forest no longer exists. This results from forest destruction caused by expanding shifting cultivation induced by high population growth in this island.

The disforestation reduces water-holding capacity of the ground, causes soil erosion and decreases productivity of land. The Nias island is largely covered with hills and riverbed slope is larger than 1%, so water flow is quite fast. Therefore, it is necessary to execute re/afforestation for soil and water conservation. Unfortunately, there is no execution of re/afforestation in the Nias island. This project is to produce Protection Forest and Production Forest through re/afforestation and simultaneously to increase land rehabilitation and forest resources in traditional land rights (adat) areas which are outside of Forest Area. It is also aimed at for local people to increase the self-sufficiency ratio of wood resources by providing construction materials, firewood,and so forth.

2. THE PROJECT (including possible alternatives)

The Consensus Forest Land Use by the Indonesian Government plans to establish man-made forest of a total of 40,000 ha annually, consisting of 20,000 ha of Protection Forest Area and 20,000 ha of Production Forest Area, as defined by the land status. Also, a 3,000 ha of afforestation shall be made in traditional land right areas which are excluded from the jurisdiction of the Ministry of Forestry. The Protection Forest shall be established as forest and reserved without

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any harvesting or utilization, whereas the Production Forest shall be cut and utilized after sufficient growth. As for afforestation at traditional land right areas, the rovincial government and the Ministry of Forestry shall provide seedling and fertilizer and perform guidance and extension, while local, traditional land right owners shall execute land preparation, planting, tending and shall harvest at the time of maturity.

3. OBJECTIVES OF THE STUDY

The objectives of the study are: i) to investigate natural conditions such as climate, soils and vegetations, ii) to study social conditions, iii) to select appropriate project area(s), iv) to prepare a reforestation plan, a seedling procurement plan, and a forest road route plan, etc., and v) to estimate the project costs.

4. SCOPE OF WORK

4.1. General

Although this project is to execute afforestation of 20,000 ha in the Protection Forest Area, 20,000 ha in the Forest Area, and 3,000 ha in non-Forest area, specific sites and areas have yet to be specified. To identify high potential sites appropriate for this project, a ground survey should be conducted. After exact sites are selected, maps should be prepared for the specific plots in accordance with the Land Status. The maps should be of a scale of 1:20,000, incorporating land shape and vegetation maps made with a minimum scale of 1:100,000 by interpreting aerial photographs.

Upon the selection of appropriate sites and the preparation of working maps as well as the study of the following items, the project scheme shall be established, and necessary costs of the project shall be calculated specifically. Also, a balance sheet calculation shall be presented for the Production Forest.

4.2. Major Items to Be Studied

-Land Availability:	Nias land area
	Land use
	Land availability for this project
	Topography
	Existing vegetation and land use
-Location:	Project area
-Climate	
-Hydrology	
-Soils:	Geology
	Soils
-Population:	Population and labour supply
-History	
-Accessibility:	Existing access road and port
	Loading requirements
-Species selection aspect	
-Seedling procurement plan:	Annual requirement
	Nursery construction plan
	Nursery facilities & equipments
	Nursery practice system
	Cost of Seedling
-Recommendation method of land preparation	
-Planting plan	
-Tending plan	
-Stand improvement plan	

-Forest protection plan: Fire control pest and disease control
-Forest road route plan
-Boundary setting plan
-Plan for procurement of working facilities, equipment and machinery
-Plan for maintenance of working facilities, equipment and machinery
-Plan for forestry
extension work: Social forestry
-Harvesting aspects
-Plan for logging
-Plan for utilization of forest products
-Plan for processing of forest products
-Marketing of the forest products
-Plan for costing
-Plan for revenues
-Cash-flow analysis
-Socio-cultural aspects: Employment/Income distribution
-Institutional aspects
-Training aspects
-Environmental aspects
-Research and development aspects

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The executing agency will be the Directorate General of Reforestation and Land Rehabilitation, Ministry of Forestry and the North Sumatra Provincial Government.

5.2. Expertise and Man-Months

The expertise required to carry out the feasibility study will be as follows:

Siliviculturist

Forest soil specialist

Nursery specialist

Logging specialist

Forest road specialist

Economist

Sociologist

Legal expert specialized in local land tenure system

About 55 man-months will be required in total.

5.3. Time Schedule

Feasibility Study	12 months
Implementation	10 years

7. South Sijunjung IDEP

A-39

STUDY ON DRYLAND FARMING DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be implemented in the southern part (Kecamatans Tanjung Gadang, Pulan Punjung and Kota Baru) of Kabupaten Sawahlunto/Sijunjung, West Sumatra.

1.2. Project's Role

One of the major agricultural policies of the current five-year plan is to improve and sustain national food self-sufficiency. This policy objective consists, among others, of the consolidation of the past achievement in rice production, and the diversification of food crop production to meet the growing domestic demand and increase the income-earning opportunities for small farmers.

Sawahlunto/Sijunjung Regency, especially its southern half, is one of the sparsely populated and underdeveloped areas of West Sumatra Province. Coupled with the completion of Trans-Sumatra Highway, the implementation of officially sponsored transmigration projects, and active private-sector interests in large-scale estate development, the area's potential capacity to produce agricultural commodities for both domestic and international markets has been and will be greatly enhanced.

Partly reflecting the past development projects, the southern part of Sawahlunto/Sijunjung Regency is emerging as a major production center of secondary food crops in the province. In line with the national objectives mentioned above, the project aims to strengthen this emerging tendency and increase the income-earning opportunities of dryland farming for rural communities.

2. THE PROJECT

The basic activities of the project are (i) to develop effective area-specific cropping systems on dryland, (ii) to incorporate feasible soil conservation techniques and appropriate mechanization, (iii) to develop and/or introduce improved harvest and post-harvest operations, and (iv) to organize effective training/extension programs. These activities will be implemented by strengthening, and/or establishing, a rural extension center (or centers) with appropriate equipment and facilities for demonstration and manpower training.

3. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are

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(i) to critically analyze the existing systems of land use and cropping patterns in dominantly dryland farming areas, (ii) to identify a selective range of environmentally sustainable and economically viable alternatives of dryland farming, and (iii) to formulate an appropriate mix of major activities to be pursued at the selected center(s).

4. SCOPE OF WORK

Major items to be studied are as follows:

- Characteristics of prevailing land use and land tenure systems of dryland by major edaphic classification
- Technical and economic evaluation of the existing production, harvest and post-harvest operations on dryland
- Preliminary assessment of soil capability and suggestions on suitable crops, cropping patterns and soil conservation techniques
- Analysis of the present marketing arrangements and the prospects of major markets and of local processing
- Available institutional supports (provincial and Regency levels) and their limitations

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The executing agency is the agricultural bureau (Dinas Pertanian) in close coordination/consultation with provincial and kabupaten BAPPEDAs and the regional research institute.

5.2. Expertise and Man-Months

Fields of expertise and man-months required for the study are tentatively as follows:

Agronomist (Team leader)	8	m/m
Agricultural economist	8	m/m
Ground-water specialist	4	m/m
Agricultural machinery specialist	4	m/m
Dryland farming specialist	8	m/m

Time schedule will be tentatively for 8 months.

A-43

FEASIBILITY STUDY ON LIVESTOCK DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be established in Kabupaten Sawahlunto/Sijunjung, West Sumatra.

1.2. Project's Role

One of the major agricultural policies of the current five-year plan is to sustain and/or improve national food self-sufficiency in a broad sense. With regard to rice production, Indonesia has been remarkably successful in achieving self-sufficiency, but for livestock and secondary food crops, a great deal still remains to be done for the provision of effective institutional supports in order to strengthen the national and regional capacity of supplying to the growing domestic market.

Sawahlunto/Sijunjung Regency, especially its southern half designated as South Sijunjung IDEP Area, is one of the sparsely populated and underdeveloped areas of West Sumatra Province. In line with the national objective mentioned above, the extensive availability of unused or underutilized dryland in South Sijunjung suggests the possibility of developing semi-extensive types of animal husbandry for supplying meat for the growing provincial and regional demand.

2. THE PROJECT

The basic activities of the project are (i) to improve natural pasture management for rotational grazing, possibly in combination with silvicultural development for conserving top soils and vegetation, (ii) to develop improved systems of livestock management, with emphasis on animal nutrition and disease control, and (iii) to organize effective training programs and extension services. These activities can be implemented by strengthening, and/or establishing, a rural livestock extension center (or centers) with appropriate equipment and facilities for demonstration and manpower training.

3. OBJECTIVES OF THE STUDY

The objectives of the study are (i) to critically analyze the existing system of animal husbandry, (ii) to identify locally suitable measures for improving livestock and grassland management, and (ii) to suggest appropriate institutional supports (training and extension programs) necessary to introduce improved livestock farming.

4. SCOPE OF WORK

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Major items to be studied are as follows:

- Analysis of the existing animal husbandry practices, and assess-ment of technical and socio-economic constraints for introducing improved livestock and natural pasture management

- Identification of suitable areas for grassland improvement and/or silvi-pasture development

- Suggestions on suitable breeds and grazing operations, training and extension programs on animal nutrition, animal health, and forage/fodder crops, and the required facilities and equipment

5. EXECUTION OF THE STUDY

The executing agency is the livestock bureau (Dinas Peternakan) in close coordination/consultation with the provincial and kabupaten BAPPEDAs.

Fields of expertise and man-months are tentatively set as follows:

Animal husbandry specialist (Team leader)	6	m/m
Animal health service specialist	4	m/m
Grassland improvement specialist	4	m/m
Agricultural economist	6	m/m
Construction engineer	4	m/m

Time schedule is tentatively set for 6 months.

8. Mentawai Islands IDEP

G-38

FEASIBILITY STUDY ON INTRODUCTION OF RURAL TELECOMMUNICATIONS (MENTAWAI)*

1. BACKGROUND

1.1. Location

This project will be implemented in Mentawai Islands, West Sumatra.

1.2. Project's Role

Mentawai islands are said to be the Achilles tendon of West Sumatra Province, as these islands have long been isolated from the mainland. Full-fledged modernization programs for the islands only begun in the middle of the twentieth century when the nation became independent.

The islands are vast with an area of 5,746 km2. The four major islands, namely Siberut, Sipora, North Pagai and South Pagai are shown in Figure 1.

Neither of the four major islands in Mentawai are inter-connectable by ferry or by airplane. The socio-economic conditions of the islands are still backwards and the inhabitants still live in a self-sufficient manner which has not yet been subjected to a modern economic system.

However, there would be potential for further development in the islands if the points of bottleneck for development are eliminated or alleviated. The island residents are demanding transportation, telecommunication and power supply, all of which are necessary to induce more economic activity. The vitalized inter-connection or socio-economic interdependence and exchange of information, at least with the mainland, would give way for socio-economic development of the islands.

With regard to telecommunication facilities in these islands, there is a small satellite station (SBK) at Muara Siberut in Siberut islands. There are only 19 subscribers. On the other islands, the only means of communication is the telegram. However, there are very few roads and the conditions are poor, therefore making access to the telegram office very difficult. And thus, the installation of even basic telecommunication infrastructures is necessary.

With regard to the accomplishments of the Feasibility Study on the introduction of rural telecommunication, the study should be based on JICA Report concerning the guidelines for the feasibility study to be carried out for rural telecommunication network improvement and expansion in each area issued in October 1985.

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2. OBJECTIVES OF THE STUDY

The objectives are to study the feasibility of introduction of rural telecommunication projects.

3. SCOPE OF WORK

3.1. General

This work studies the rural telecommunication development plan and its feasibility in the development area as shown in Figure 1 for six months. PERUMTEL is requested to implement rural telecommunication project during Repelita V based on this feasibility study.

3.2. Major Items to be studied

"The Plan" will cover the following items:

(1) Background of the project

(2) Social and economic conditions

(3) Existing telecommunication facilities and services

(4) Present state of rural areas and telecommunication facilities and services

(5) Demand and traffic forecast

(6) Kind of telecommunication service

(7) Rural telecommunication development plan

(8) Operation and maintenance

(9) Estimate of project cost

(10) Tariff and estimate of revenue

(11) Economic and financial analysis

(12) Implementation schedule and priority

4. EXECUTION OF THE STUDY

4.1. Executing Agency

The executing agency will be the Directorate General of Posts and Telecommunications, Ministry of Tourism, Post and Telecommunications.

4.2. Expertise and Man-Months

Composition of the Field Survey Team will be as follows:

(1) Foreign Consultant

-Team leader

-Outside plant engineer

-Traffic forecasting engineer

-Radio engineer

-Switching engineer

-Construction engineer

-Economist

(2) Requested Counterparts

-Team leader

-Switching engineer

-Radio engineer

-Outside plant engineer

-Economist

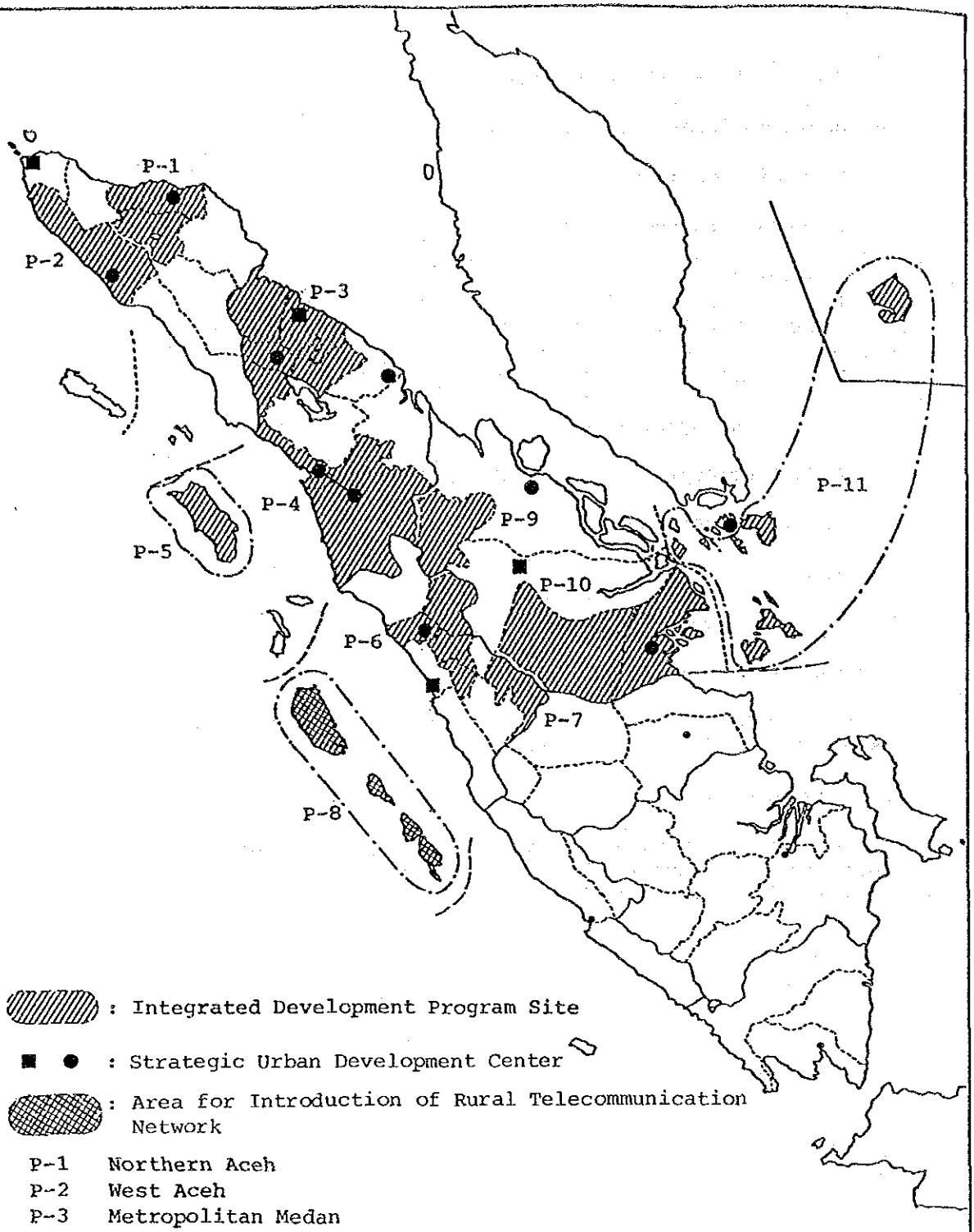
-Technician

(3) Man-Month Estimate

The estimated total man-months are 38 m/m for foreign consultants and 8 m/m for national consultants.

4.3. Time Schedule

The study should be conducted by foreign consultants in cooperation with counterparts from POSTEL/PERUMTEL. The duration of the study will be 6 months



P-1 Northern Aceh
P-2 West Aceh
P-3 Metropolitan Medan
P-4 West Coast Tapanuli
P-5 Nias Island
P-6 Minang Highlands
P-7 South Sijunjung
(P-8) Mentawai Islands
P-9 Rokan Basin
P-10 Indragiri River
P-11 Riau Islands

Figure 1. Introduction of Rural Telecommunication Network Areas

10. Indragiri River IDEP

A-53

STUDY ON DRYLAND FARMING DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be implemented in Kabupaten Indragiri Hulu, Riau.

1.2. Project's Role

One of the major agricultural policies of the current five-year plan is to improve and sustain national food self-sufficiency. This policy objective consists of the consolidation of the past achievement in rice production, on the one hand, and the promotion of agricultural diversification partly to meet the growing domestic demand and partly to increase the income-earning opportunities for small farmers, on the other.

Except for the rapidly growing large-scale estates of oil palm and rubber, the capacity of the agricultural sector in Riau Province is yet weakly developed. The province heavily relies on the external supply of rice and many other basic food items. The proposed project is in line with the above national policy and aims to increase the income-earning opportunities mainly in transmigration areas where dryland farming is the dominant form of agriculture.

2. THE PROJECT

The basic activities of the project are (i) to develop effective area-specific dryland cropping systems mainly in transmigration areas, (ii) to incorporate feasible soil conservation techniques and appropriate mechanization, (iii) to develop and/or introduce improved post-harvest operations, and (iv) to organize effective training/extension services. These activities will be implemented by strengthening, and/or establishing, a rural extension center (or centers) with appropriate equipment and facilities for demonstration and manpower training.

3. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are (i) to critically analyze the existing systems of land use and cropping patterns in dominantly dryland farming areas (chiefly transmigration areas), (ii) to identify a selective range of environmentally sustainable and economically viable alternatives of dryland farming, and (iii) to formulate an appropriate mix of major activities to be pursued at the selected center(s).

4. SCOPE OF WORK

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Major items to be studied are as follows:

- Characteristics of prevailing land use and land tenure systems on dryland by major edaphic classification
- Technical and economic evaluation of the existing production, harvest and post-harvest operations on dryland
- Preliminary assessment of soil capability and groundwater resources and suggestions on suitable crops, cropping patterns and soil conservation techniques
- Analysis of the present marketing arrangements and the prospects of major markets and of local processing
- Available institutional supports and their limitations

5. EXECUTION OF THE STUDY

The executing agency is the agricultural bureau (Dinas Pertanian) in close coordination with the provincial and kabupaten BAPPEDA.

Fields of expertise and man-months are tentatively as follows:

Agronomist (Team Leader)	8 m/m
Agricultural economist	8 m/m
Groundwater specialist	4 m/m
Agricultural machinery specialist	4 m/m
Dryland farming specialist	8 m/m

Time schedule will be tentatively for 8 months.

A-54

STUDY ON PADDY POST-HARVEST TECHNOLOGY DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be implemented in Kabupaten Indragiri Hilir, Riau Province.

1.2. Project's Role

Riau Province presently has an estimated deficit of about 150,000 tons in milled rice. Indragiri Hilir accounts for 37% of the total provincial rice production, and is the only regency with a rice surplus, roughly estimated at 20,000 tons. Considering the national policy objective of maintaining food self-sufficiency, it is important to improve and consolidate the food producing capacity of the province in general, and Indragiri Hilir Regency in particular where prospects of income-generating agricultural diversification are at present very limited.

The project aims (i) to identify effective measures for reducing wastage of paddy during harvest and post-harvest operations, and (ii) to disseminate the improved technology package among rice-producing farmers.

2. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are (i) to identify an appropriate package of improved post-harvest technology, and (ii) to formulate a pilot program, including institutional development.

3. SCOPE OF WORK

Major items to be studied are as follows:

(1) Evaluation of local harvest and post-harvest operations

- Reaping and threshing practices and implements used
- Pre-milling (drying and winnowing) and milling practices and implements/facilities used
- On-farm and off-farm storage and transportation conditions
- Socio-economic characteristics of work force
- Available institutional supports and bottlenecks

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(2) Formulation of a pilot program

- Identification of an improved technology package suitable to local socio-economic characteristics
- Identification of appropriate scale of capital costs (building and equipment) and sequence of implementation
- Identification of training requirements for local institutional support personnel

4. EXECUTION OF THE STUDY

The executing agency is the bureau of agriculture (Dinas Pertanian), in close consultation/coordination with the provincial and regency BAPPEDAs.

Fields of expertise and man-months are tentatively as follows:

Rice production specialist	4 m/m
Post-harvest technology specialist	4 m/m

Time schedule is tentatively set for 4 months.

A-55

STUDY ON LIVESTOCK DEVELOPMENT*

1. BACKGROUND

1.1. Location

The project will be located in Kabupaten Indragiri Hulu, Riau Province.

1.2. Project's Role

One of the major agricultural policies of the current five-year plan is to sustain and/or improve national food self-sufficiency in a broad sense. With regard to rice production, Indonesia has been remarkably successful in achieving self-sufficiency, but for livestock and secondary food crops, a great deal still remains to be done for the provision of effective institutional supports in order to strengthen the national and regional capacity of supplying to the growing domestic market.

Livestock raising in Riau Province is less developed in comparison to the other three provinces in the Northern Sumatra Region. Meat for consumption is supplied largely from neighboring provinces such as West Sumatra and North Sumatra. According to the agricultural census of 1983, the total population of cattle and buffaloes in the province was about 32,000 and 30,000 heads respectively. Of the provincial total, 72% and 51% respectively were kept in Kabupaten Indragiri Hulu, while the other kabupatens had practically negligible large ruminant populations. Considering the availability of extensive grassland and/or partially wooded range land in the province, there is a possibility of increasing the provincial supply of red meat by introducing improved livestock farming and grassland management.

2. THE PROJECT

The basic activities of the project are (i) to improve natural pasture management for rotational grazing, possibly in combination with silvicultural development for conserving top soils and vegetation, (ii) to develop improved systems of livestock management, with emphasis on animal nutrition and disease control, and (iii) to organize effective training programs and extension services. These activities can be implemented by strengthening, and/or establishing, a rural livestock extension center (or centers) with appropriate equipment and facilities for demonstration and manpower training.

3. OBJECTIVES OF THE STUDY

Prior to the implementation of the project, a study is needed to specifically formulate the project. The objectives of the study are (i) to critically analyze the existing practices of animal husbandry,

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(ii) to identify locally suitable measures for improving livestock and grassland management, and (ii) to suggest appropriate institutional supports (training and extension programs) necessary to disseminate improved livestock farming.

4. SCOPE OF WORK

Major items to be studied are as follows:

- Analysis of the existing animal husbandry practices, and assess-ment of technical and socio-economic constraints for introducing improved livestock and natural pasture management
- Identification of suitable areas for grassland improvement and/or silvi-pasture development
- Suggestions on suitable breeds and grazing operations, training and extension programs on animal nutrition, animal health, forage and fodder crops, and the required facilities and equipment

5. EXECUTION OF THE STUDY

The executing agency is the livestock bureau (Dinas Peternakan) in close coordination/consultation with the provincial and kabupaten BAPPEDAs.

Fields of expertise and man-months are tentatively set as follows:

Animal husbandry specialist (Team leader)	8	m/m
Animal health specialist	4	m/m
Grassland improvement specialist	4	m/m
Agricultural economist	8	m/m
Construction engineer	5	m/m

Time schedule is tentatively set for 8 months.

B-66,62,71,72

COMPREHENSIVE STUDY ON WATER RESOURCES DEVELOPMENT IN INDRAGIRI RIVER BASIN*

1. BACKGROUND

1.1. Project Area

The Indragiri river (Kuantan river) rises on Lake Singkarak and Payakumbuh in West Sumatra and pours into the Straits of Berhana of South China Sea after draining a vast low land in Riau Province. The river length is about 550km and its total catchment area is 19,000 km^2. The annual runoff yield of the river is approximately 20,500 million m^3 or 650m^3/s.

The basin is susceptible to heavy rainfall; the annual rainfall reaches 2,100 mm to 2,400 mm in the upstreammost reaches but generally declines downstreamwards.

The Indragiri river basin is divided into three zones; the upstream reaches mainly located in West Sumatra where cultivation is intensively made, the midstream reaches consisting of forest-covered hilly zones and the downstream low land reaches which mainly falls in Riau.

Of these zones, most of the lowest land comprises recently formed peat swamp covered with swamp forests or mangrove forests. The population in the lowland is rather sparse; Kab. Indragiri Hulu and Indragiri Hilir which situates on the downstream reaches has a population of about 760,000 (1987) on the total area of 27,460km^2.

In Indragiri Hulu, estate crops such as rubber, palm oil, coconut are produced. In Indragiri Hilir, rice production is made mainly along the rivers by means of irrigation and drainage utilizing river tide effects and coconut plantation is widely made. The production of rice and coconut in Indragiri Hilir accounts for 37% and 64% of the provincial total production respectively. However, the per capita income in these areas is relatively lower than other areas.

1.2. Indragiri River IDEP

In order to raise the socio-economic status in Indragiri Hulu and Indragiri Hilir which mainly situates on the low land of the Indragiri river basin, implementation of the Indragiri River Integrated Development Program is proposed. In this program, water and land resources development is also given a priority among others.

In particular, the area has a great potential for water resources development but water also involves constraints in a form of flooding and inundation. Hence, a comprehensive study on water resources development is contemplated to be conducted as a key segment of the Indragiri River IDEP. With due consideration to the water balance

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among various users on many locations, the study will be made with a basinwide approach.

2. THE PROJECT

The Indragiri river has frequently flooded the lowland reaches. Particularly the area in and around Rengat is subject to inundation almost every year. The magnitude and occurrence of floods appear to have been amplified by recent various activities in the upstream reaches such as deforestation and cultivation. Heavy siltation has also accelerated the decrease of river discharge capacity year by year and hampered the inland navigation service. Frequent inundation also occurs in Payakumbuh in West Sumatra. and Tembilahan at the river month. Some countermeasures are required for food control in these flood prone areas.

The river banks are quite unstable due to the meandering effects and scouring, which also becomes a constraint to land enhancement along the river.

In the coastal zone or in the peat swampy zone, people have a great difficulty to access to potable water because surface and ground waters are usually colored and influenced by peat soils. Agricultural cultivation is very limited in the coastal zone due to the intrusion of saline water and acidic soils.

Irrigated paddy fields exist along the river between Teluk Kuantan and Air Molek and tidal irrigation schemes are developed in the downstream area in and around Tembilahan, Teluk Kiambang and Pulan Kijang. However, water in the river has not yet been utilized effectively. There are potential irrigable sites in the left bank of Rengat or S. Cenako.

A number of potential sites for hydropower developments are identified in the up- and mid-stream reaches upstream of Teluk Kuantan. General features of these schemes are as follows, though they are of very preliminary nature.

Items	Sinamar	Kuantan No.1	Kuantan No.2
Catchment area (km^2)	1,796	6,227	7,419
Annual runoff (m^3/s)	58	149	184
Type of development	dam	dam	dam
Gross head (m)	140	40	60
Installed capacity (kW)	89,000	109,000	210,000
Energy output (GWh)	522	385	768

Source: Reconnaissance Report, The Hydroelectric Power Development Projects for the Middle Reaches of Koeantan River, 1983, PLN.

The above dam and reservoir schemes could be formed as multiple purpose development inclusive of flood control, water supply and irrigation. On the other hand, the Singkarak hydropower project is

scheduled to be implemented. This project will divert a firm discharge of 36.4m^3/s (annual average 57.3m^3/s) from Singkarak Lake into the Indian Ocean through the Anai river.

As described above, the basin has some water-related constraints for development, and water resources in the basin have remained unused, though the development potentials are large if properly exploited or managed. Further, some conflicting use of water among the users can be foreseen.

Therefore, it is urgently needed to establish a comprehensive plan on water resources development of the entire basin.

3. OBJECTIVES OF THE STUDY

The objectives of the study is to establish a comprehensive plan for water resources development in the Indragiri river basin.

In this study, an emphasis should be placed on the establishment of a well-coordinated water resources development plan between West Sumatra and Riau.

Another objective of the study is to provide transfer of technology and method to the officials concerned for formulation, implementation and management of a basin-wide integrated water resources development plan.

4. SCOPE OF WORK

4.1. General

The proposed study area should be the entire basin of the Indragiri river for proper assessment of the long term water balance among the users, while the Indragiri Swamp IDEP focuses on the development of the lower reaches. The target horizon for the water balance should be put on the year 2008 or so in 20 years from the present.

The study will be carried out in two phases. The Phase I study is to establish a master plan on water resources development in the basin and to select priority projects in the upstream reaches and the Indragiri River IDEP area. The Phase II study is to conduct feasibility studies on the priority projects.

The followings will be but not always limited to the major concerns and issues for the study.

(1) Flood control and drainage improvement in and around Payakumbuh Rengat and Tembilahan(Inundation in Rengat could be prevented or not, by dam, levee, floodway, polder or any other non-structural measure.)

(2) Domestic water supply in the coastal swampy zone

(3) Expansion of irrigable areas in the mid- and downstream reaches, including aquaculure

(4) Hydropower development in the midstream reaches and impact of the transbasin hydropower scheme at Singkarak

(5) Improvement of the inland navigation system

(6) Watershed management including sediment control

4.2. Major Items to Be Studied

The study should include the following items:

Phase I

(1) Review previous studies and existing data and materials relevant to the study

(2) Carry out topographical survey including aerial photogrammetry

(3) Carry out geotechnical survey on the basin and structure sites

(4) Carry out hydrological survey including establishment additional observatories and measurement of runoff and sediment load

(5) Study and assess the ground water potentials

(6) Assess all water resources development schemes, completed or planned, including the Singkarak transbasin hydropower project

(7) Study the needs and method for watershed management including sediment control, soil conservation and afforestation

(8) Study the flurio-morphology and bank erosion

(9) Study and evaluate occurrence of floods, inundation area and flood damages

(10) Study and evaluate irrigation water demand and domestic and industrial water demand

(11) Study hydropower potentials and power grid expansion program

(12) Assess the water balance in the basin

(13) Study the socio-economic background in the basin including land use and land ownership

(14) Prepare and evaluate alternative schemes for water resources development

(15) Establish a master plan on the water resources development and select the priority projects

(16) Assess the impacts to the natural and social environments by implementation of the projects

Phase II

(1) Conduct feasibility studies on the priority projects

(2) Study and propose the institutional aspects for implementation and management of the projects and water resources in the basin

(3) Prepare the implementation programs for the priority projects

(4) Recommend action plans to be taken in the succeeding stage

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The executing agency for the Phase I study will be Directorate General of Water Resources Development, Ministry of Public Works.

Coordination with and support from other ministries and agencies and local governments concerned will be arranged by the IDEP Unit to be established in BAPPEDA TKI, Riau.

Technical assistance for the study is expected to be provided by foreign expertise under the official development assistance program.

The executing agencies for the Phase II study will be decided, depending on the selected projects.

5.2. Expertise and Man-Months

For executing the Phase I study, the following experts will be required:

Team leader
Water resources planner/Dam engineer
River engineer
Irrigation and drainage engineer
Water supply specialist
Hydropower engineer
Electric engineer
Geotechnical engineer
Hydrologist
Hydrogeophysist
Agronomist
Regional economist
Environmentist/Forestry expert
Topographic mapping expert

For the Phase II study, a team of experts will be reorganized. The total man-months required for executing the Phase I study will be about 100 man-months.

5.3. Time Schedule

The duration of the Phase I study will be 15 months.

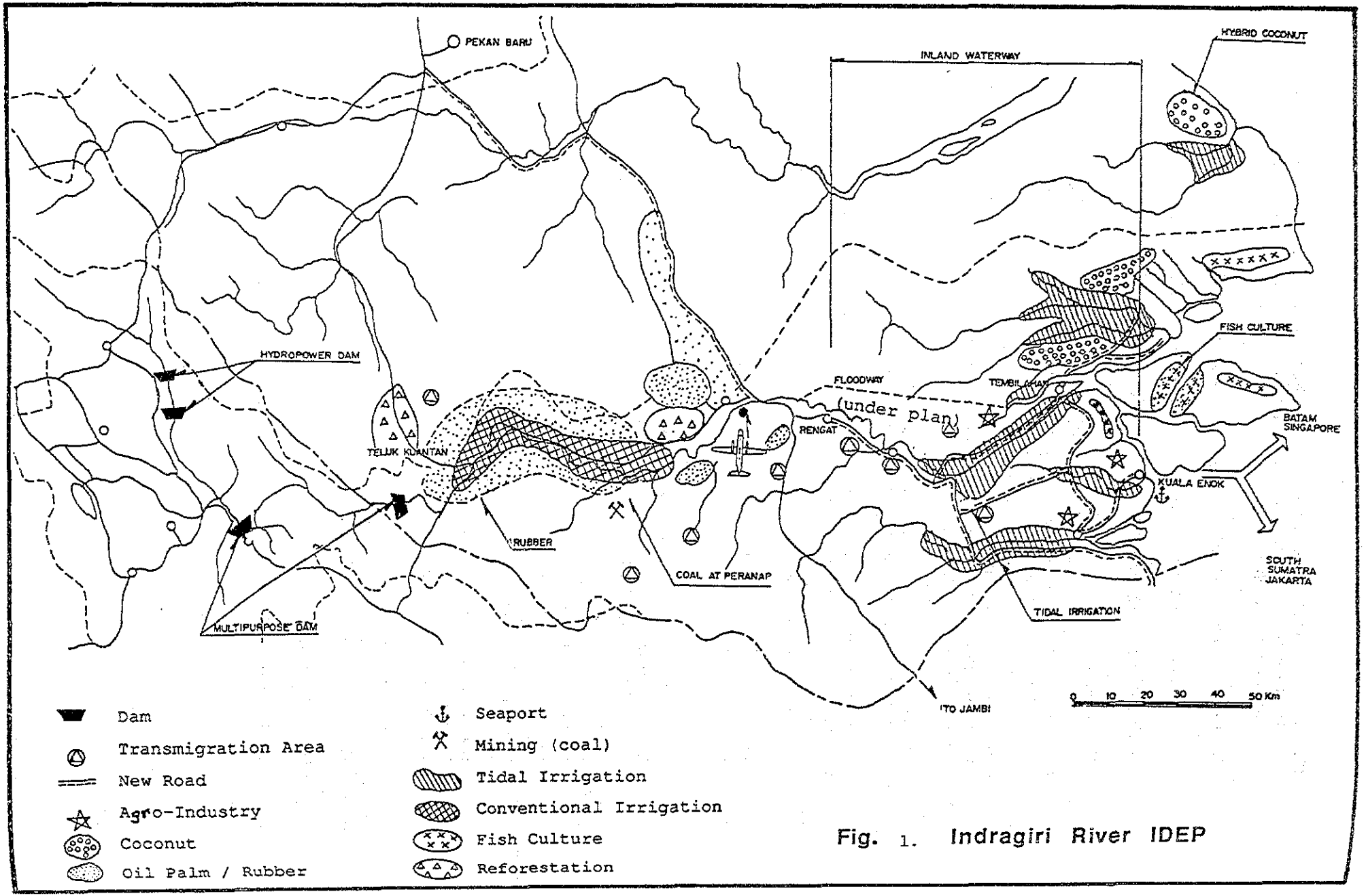

Fig. 1. Indragiri River IDEP

B-67

STUDY ON INTEGRATED SWAMP DEVELOPMENT PLAN IN THE INDRAGIRI RIVER BASIN*

1. BACKGROUND

The mainland of Riau Province lies on four major river basins namely, the Rokan, Siak, Kampar and Indragiri rivers. In the downstream reaches of these rivers, extensive low lands and peat swamps exist, which shares approximately 52% of the total land area.

The population in Riau is very sparse, particularly in the swampy low land. The economy of Riau Province has led by oil and logging sectors. However, the agricultural sector shows a low productivity due to traditional farming practice, lack of water, infertility of soil, and difficulty in transportation while 52% of the households are engaged in agriculture, including food and estate crops.

In particular, the per-capita income of the people in the downstream lowland of the Indragiri basin (Kab. Indragiri Hulu and Indragiri Hilir) is lower than other areas. Meanwhile, the area produces 50% of rice, 65% of coconut and 29% of rubber of the respective provincial total product. Therefore, the development of the Indragiri lowland is very important and more proper and effective use of the swampy land becomes essential for the short or long term development of the area.

It is a great concern of the central and local governments how to narrow the socio-economic disparity between the advanced regions and less developed areas like the Indragiri basin. The Indragiri River Integrated Development Program (IDEP) is proposed, aiming at the overall and balanced regional development of the area, taking fully into account the potentials on indigenous natural resources and locational advantages.

In this IDEP, more effective use (or conservation) of the vast swampy land resources is recognized as one of the important elements for the development of the area.

2. THE PROJECT

The rapidly increasing population in Indonesia has put pressure on more land and this trend will extend not only to Java but also to the outer islands. More need for effective reclamation of the swampy land which has been so far untouched or extensively used is expected to occur. In Indonesia, the total swampy land area accounts for approximately 394,000 km^2, which is about 20% of the national land as shown in Table 1.

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Table 1. Swampy Land in Four Major Islands (ha)

Island	Coastal Low Land Swamps	Inland Low Land Swamps	Total
Sumatra	9,771,000	3,440,000	13,211,000
Kalimantan	7,054,000	5,710,000	12,764,000
Sulawesi	84,000	385,000	469,000
Irian Jaya	7,798,750	5,181,750	12,980,500
Total	24,707,750	14,716,750	39,424,500

Source: BAPPEDA, TK.I. Riau, August 1988.

The Government of Indonesia has made continued efforts for the development of coastal and near-coastal swamp lands in Sumatra, Kalimantan and Irian Jaya, aiming at provision of agrarian transmigration settlement and for development of more efficient use of land.

The nationwide study on swamp development undertaken by the Ministry of Public Works in 1984 classified the suitability of swampy land for agriculture as given in Table 2. Though the study was at broad reconnaissance level, about 1.3 million hectares was rated to be suitable for agriculture in Sumatra.

Table 2. Suitability of Swampy Land for Agriculture (ha)

Island	Occupied	Unsuitable	Suitable	Total
Sumatra	2,089,100	6,301,800	1,380,100	9,771,000
Kalimantan	1,189,200	4,472,300	1,392,500	7,054,000
Irian Jaya	-	4,990,625	2,808,125	7,798,750
Total	3,278,300	15,704,725	5,580,725	24,623,750

Source: Notionwide study of coastal and near coastal swamp land in Sumatra, Kalimantan and Irian Jaya, 1984.
Directorate General of Water Resources Development, Ministry of Public Works.

In Indonesia, the low land generally has natural tropical swamp characteristics and is mainly divided into two groups; the coastal swamps and the inland swamps. The coastal swamps are influenced by tidal river hydrology or hydraulics, while the inland swamps are dominated by river floods and prolonged inundation.

Reclamation of the coastal low lands could be generally made easier and with lower cost than the inland lowland swamps, due to their drainability utilizing the periodical frequency of river tide levels. Inflow of fresh water during the high tide could be used to enhance the soil amelioration process and to reduce acidity. During the low tide, toxic and acid water could be evacuated out of the fields.

On the other hand, proper conservation policy or program of swamp forests and mangroves which widely cover the swampy land should be established from the environmental and ecological viewpoints.

In Riau, tidal irrigation schemes of 70,900 ha have been developed for rice cultivation along the rivers in the swampy land. Ninety percent (90%) of this irrigation type concentrates in the Indragiri river basin, mainly because a large variation of tide which reaches to 4 to 5 m at the maximum is available there. In the coastal zone of the Indragiri basin, a new trial for planting hybrid coconut is eagerly undertaken by private sectors. Further, plantation of ramy (material for high class textile) is introduced in the inner peat swampy area.

In the past, main efforts for the reclamation of swampy land have been directed to agricultural cultivation. In the long-term perspective, however, multiple use of the land including fishery, forestry, new energy source from peat, etc. should be developed by introducing more advanced technologies (if necessary and appropriate).

Hence, it is keenly required to proceed to establish an integrated plan on development of the swampy zone in the Indragiri river basin, taking fully into account the past valuable performances for swamp development in other areas or other countries.

3. OBJECTIVES OF THE STUDY

The objectives of the study are to conduct a comprehensive and multi-disciplinary study on development and conservation of the swampy land mainly in the Indragiri river basin for agricultural production, transmigration settlements, exploitation of new energy source, transportation and environment.

The study will be carried out in two phases, Phase I and Phase II. The Phase I study is to make an overall review of past experiences and existing studies on swamp development both in Indonesia and in other countries, aiming to prepare more definitive terms of reference for the feasibility studies in Phase II to follow.

4. SCOPE OF WORK

4.1. General

The proposed study area should be the low land swampy zone which extends over the Indragiri river basin and its surroundings. The plan will be formulated for the development for the coming 20 years, placing the target horizon in and around the year 2008 and should be a model to be transferable to other swamp areas in Indonesia.

In this study, full coordination should be maintained especially with other studies to be undertaken for the basinwide water resources development and establishment of a comprehensive transport system in the proposed area. A number of reports which are related with the swamp development are presented in Annex I. Further, basic information

on peat soils, water, etc. is expected to be provided from the Remote Sensing Engineering Project (RSE), Phase II which is underway by PUSDATA with the technical assistance from JICA. The outline of the RSE Phase II is presented in Annex II.

The followings, though subject to further study, will be the major concerns and issues for the study.

(1) Potentials are high or not for the extension of swamp reclamation for agricultural production of rice, palawijo, coconut, vegetables, fruits, etc.

(2) Possible or not to raise the current level of productivity on the tidal irrigation schemes.

(3) Potentials are high or not for aquaculture especially in the near-coastal zone to be related with the conservation of mangrove forests.

(4) How to exploit peat resources as a new energy source.

(5) How to establish an effective transport mode or system for settlements, production and marketing.

(6) High tide variation could be utilized for energy generation or not.

(7) How much and which area to conserve the swamp forest including mangroves from the ecological and environmental view points.

4.2. Major Items to Be Studied

The Phase I study should include the following items:

(1) Review previous studies and existing data and materials relevant to the study

(2) Review past performance on the swamp development in Indonesia or in other countries (e.g., Malaysia, the Netherlands, Japan, Finland, Bangladesh, etc.)

(3) Assess the soil properties for agricultural production

(4) Assess the breaching or amelioration effects of peat soils through traditional or advanced technology

(5) Assess the intrusion of saline water into the soil

(6) Assess the distribution, depth and thickness of peat layers

(7) Assess the distribution of wild habitats in the swampy zone

(8) Assess the recurrence and magnitude of tide effects

(9) Assess the soil mechanics of the swampy areas from the engineering view point, especially for road construction

(10) Study the potential of aquaculture in the Swamp

(11) Study the potential of tidal irrigation for rice and diversified crops

(12) Research the possibilities of energy source of peat and tidal generation

(13) Study the land tenure and ownership

(14) Study the diseases and health conditions for settlements

(15) Study the socio-economic background of the swamp area

(16) Identify the priority projects of short and long term perspectives and prepare the detailed terms of reference for the Phase II study

The Phase II study will be conducted in line with the terms of reference which is prepared in the Phase I.

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The executing agency for the Phase I study will be Ministry of Public Works in cooperation with Ministries of Agriculture, Mines and Energy, Transmigration and Environment under the full coordination of the IDEP Unit to be established in BAPPEDA, Riau.

For executing the study, technical assistance is required in a form of a team of expertise under the official development assistance program.

The executing agency(s) for the Phase II study will be decided based on the results of the Phase I study.

5.2. Expertise and Man-Month

For executing the Phase I study, the following experts will be required:

Team leader
Soil scientist
Agronomist
Hydrologist
Geologist
Hydrogeologist
Soil mechanics expert
Environmental specialist
Irrigation and drainage engineer
Fishery expert
Remote sensing specialist
Forestry specialist
Energy specialist
Civil engineer
Economist

The total man-months required for the Phase I study will be about 75 m/m in total.

5.3. Time Schedule

The duration of the Phase I study will be 10 months to prepare the definitive term of reference.

The Phase II study will be successively carried out for the period of 10 to 24 months, depending on the nature and scale of the priority projects.

ANNEX I

References

The following reports offer general guide and some specific references for conducting the proposed study.

- Guideline for Land Evaluation for Water Resources Studies in Indonesia, September 1984, Directorate General of Water Resources Development, Ministry of Public Works

- Nationwide Study of Coastal and Near Coastal Swamp Land in Sumatra, Kalimantan and Irian Jaya, August 1984. Directorate General of Water Resources Development, Ministry of Public Works.

- Water and Land studies, July 1981, Directorate General of Water Resources Development, Ministry of Public Work

- Remote Sensing Technology, 1988, JICA with Center for Data Processing and Mapping, Ministry of Public Works

- Symposium for Lowland Development in Indonesia, 1986, Government of Indonesia and the Netherlands

ANNEX II

Remote Sensing Engineering Project (RSE), Phase II

The remote Sensing Engineering Project (RSE), Phase II is being implemented by Center for Data processing and Mapping (PUSDATA), the Ministry of Public Works with the technical assistance of JICA. The project is a 5-year study to be undertaken from 1988 to 1993 following the Phase I project, aiming at the development of agricultural infrastructure.

The Phase II project will cover the following subjects:

- Production of thematic maps and evaluation maps necessary for formulation of agricultural development plans

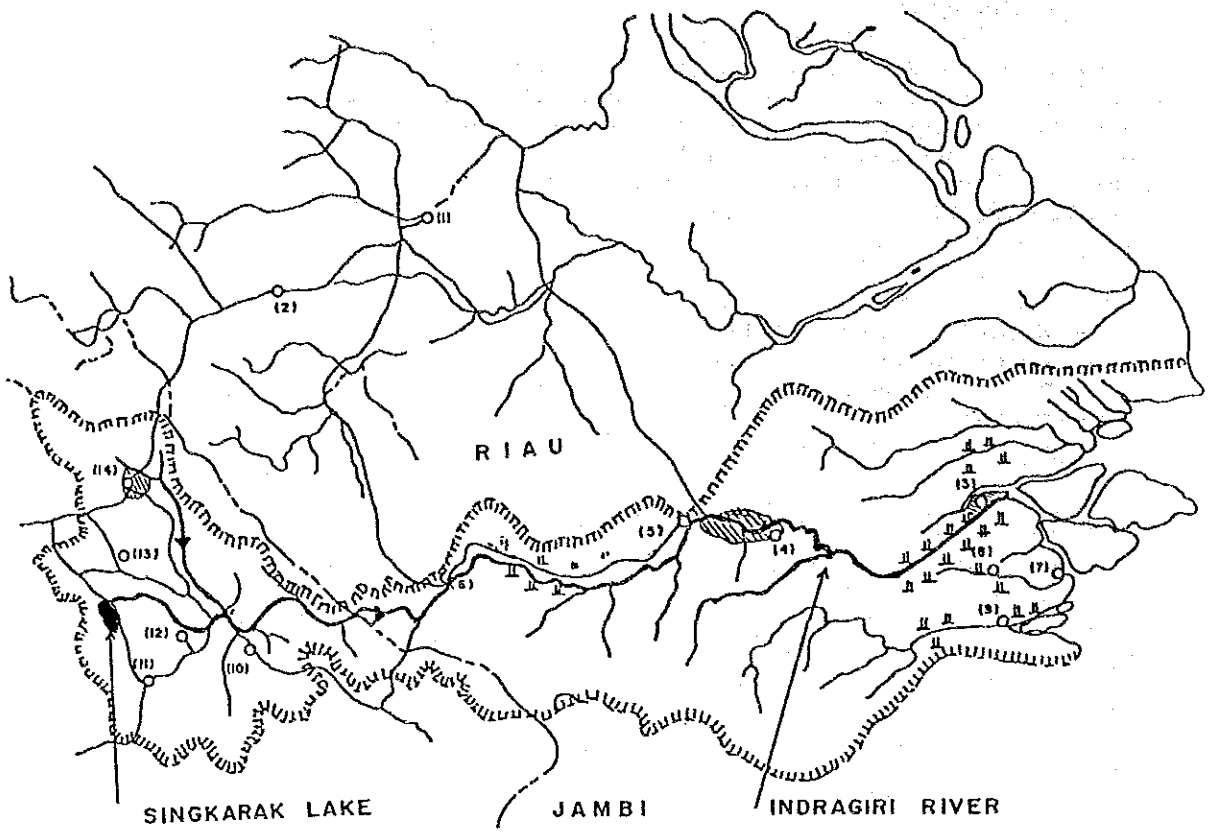
- Establishment of guidelines for development of agricultural infrastructure

- Establishment of spatial data base system for collection and use of agricultural development data and information

- Training for officials from the regional data centers and relevant organizations in utilization of remote sensing techniques

In the Phase II, the project intends to apply its techniques to two model case areas; one is to Samarinda, East Kalimantan and other is to the Indragiri river basin, Riau. The latter case study will cover the evaluation of agricultural development potentials in a vast swampy low land in the basin and the following items (tentative) would be evaluated through satellite data analysis supplemented by other field surveys:

- Peat depth
- Water treatment at Kuala Enok
- Water balance modeling
- Road construction for transport of agricultural products
- Transmigration
- Soil and water conservation



Legend:

—·—·—	: Provincial boundary	O	: Major City/Town
⊓⊓⊓	: Basin boundary	▲	: Damsite
———	: Major Road	—	: Paddy field
		▨	: Flood prone area
(1)	: Pekan Baru		
(2)	: Bangkinang	(9)	: Pulau Kijang
(3)	: Tembilahan	(10)	: Sijunjung
(4)	: Rengat	(11)	: Solok
(5)	: Air Molek	(12)	: Sawahlunto
(6)	: Taluk Kuantan	(13)	: Batusangkar
(7)	: Kuala Enok	(14)	: Payah Kumbuh
(8)	: Enok		

Fig. 1. Indragiri River Basin

C-6

FEASIBILITY STUDY ON CERENTI COAL RESOURCES DEVELOPMENT*

1. NATIONAL ENERGY POLICY

Within the framework of mining and energy policy of the Indonesian Government, coal production in Indonesia will be increased sharply and for this purpose the government has formulated and implemented an extensive coal program. The most important users of coal will be steam power generating plants which will take 70-80% of the domestic demand, secondly cement plants which will take 15-20%, and other users only 5-10%.

In the 1990's, there is a possibility of coal use as fuel in a secondary recovery system at the Duri field of Caltex in Riau Province. At the ultimate capacity of this plan, an equivalent of about 7 million tons of coal per year is needed for the production of steam in this system.

Other potential users of coal, besides power and cement plants in central Sumatra, are the existing oil refineries whose fuel for operation might be converted from oil to coal.

The Cerenti Coal Resources Development Project in Riau Province is planned with the objective of fulfilling the above mentioned demand for coal in this region.

2. BACKGROUND OF THE PROJECT

2.1. Location

The Cerenti coal field is located at north and south sides of Sungai Kuantan (Sungai Indragiri) at Kampun Cerenti and Peranap, Kabupaten Indragiri Hulu, Riau Province. A paved road runs along Sungai Kuantan, and a car can reach the coal field very easily from Pekanbaru or Padang (See attached map).

2.2. Project's Role

The coal field belongs to the Indragiri River Integrated Development Program (IDEP) of Riau Province, identified by a recent JICA Study on the Integrated Regional Development Plan.

Riau Province covers an area of 94,562 square km, with population of 2.5 million. The province has a large reserve of petroleum and gas, as well as some tin and bauxite resources. However, the IDEP area situating in the southern part of the province is one of the least developed areas in Riau.

Coal resources occurring in the IDEP area is one of the highest development potentials. If developed, they not only supply energy

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source to the region but also create job opportunities for local inhabitants. Furthermore, the development of the coal resources assists the improvement of productivity of agriculture and industry in the region. The northern part of Sumatra needs a great deal of energy resources to realize its high potentials and the coal plays a very important role in fulfilling the demand.

2.3. The Work in Progress

A geological and structural geological survey of the coal resources is being carried out to obtain basic information by the Directorate of Coal of Indonesia in collaboration with the New Energy and Industrial Technology Development Organization (NEDO) of Japan. This five-year survey will be completed in March, 1990. Currently, it is inferred that the sub-bituminous coal reserve there is substantially large, provisionally estimated at more than 1 billion tons.

The coal is regarded as sub-bituminous lignite on the basis of chemical analysis done by Directorate of Coal, whose results are shown as follows:

Moisture	: 20.1 - 25.1	Volatile matter	: 30.6 - 38.7
Fixed carbon	: 33.4 - 39.9	Ash	: 3.90 - 9.40
Total sulphur	: 0.12 - 0.27		
Carorific value	: 4,280 - 4,470 kcal/g		

(from data by Directorate of Coal, 1986)

After completion of the geology and geological structure investigation, a feasibility study of the coal resources should follow for the purposes of exploitation and production.

3. OBJECTIVES OF THE STUDY

3.1. Immediate Objectives

-To determine the minebility, mine plan, and design of the coal at Cerenti, Riau

-To determine its marketability and transportability from the mine to the consumers including Duri field of Caltex

-To assess impact on the Region in terms of employment, income distribution and environment

-To determine the financial and economic feasibility of the total system

-To determine the usability of coal as fuel in refineries

-To compare the feasibility of using other fuel such as natural gas

3.2. Long-Range Objectives

-To study investment alternatives

-To study impact of the coal development on regional development

4. SCOPE OF WORK

(1) Review of previous surveys and the Government energy policy

Review the related surveys (reconnaissance and detailed surveys) and the Government energy policy to confirm emplacement of the coal resources and identify major points which require investigation in feasibility study. Geological profiles are compiled from the results of all previous surveys.

(2) Comparative studies and marketing study

Referring to the data, especially those on its quality, reviewed above, a series of studies shall be done prior to the feasibility study: Comparative Transportation Study (from Ombilan, South Sumatra Kalimantan and other production areas), comparative study of other fuel use (natural gas), and marketing study.

(3) Feasibility study

A feasibility study is carried out to investigate development and exploitation of the coal. Major study items are as follows:

(i) Estimation of coal reserve

The amount of minable coal reserve is estimated on the basis of the detailed survey.

(ii) Design of mining operation

Mining pit or tunnel, mining method and plan, manpower, mining equipment, mining facility, power supply, transportation, infrastructure, etc. are designed for mine construction.

(iii) Institutional aspects of the implementation

(iv) Estimation of cost and benefit

Investment and O & M costs are estimated, and benefit borne by the production is calculated. Then capital requirement is studied.

(v) Social and environmental assessment

To facilitate social development in the Region in terms of employment and income distribution and to prevent environmental disturbances, assessment survey of social and environmental impact shall be carried out.

(vi) Evaluation of the project

After synthesizing all the results of the investigations above, the overall feasibility of the project is evaluated.

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The Directorate of Coal (DB) of the Directorate General of Mines, and the Directorate of Mineral Resources (SDM) of the Directorate General of Geology and Mineral Resources are in charge of the feasibility study. Directorates belong to the Ministry of Mines and Energy.

SDM has conducted reconnaissance survey and the fist stage of exploration work, and will carry out some additional survey (drilling) to confirm the embedded condition of coal deposits. DB will conduct a detailed survey for feasibility study.

5.2. External Inputs

(1) Personnel

A total of 100 man/monts of expert services are needed to support this project in 2 years. Experts include geologist, mining engineers, transportation engineers, mechanical engineers, socio-economists, environment experts.

(2) Equipment and services

-Vehicles (jeep and trucks)
-Bulldozers
-PC computers
-Books
-Helicopter support (whenever needed)

(3) Fellowship

There is a need for 10 man/months of fellowship for the period of 2 years.

5.3. Internal Inputs

The government of Indonesia shall provide:

-Counterpart personnel for all types of work, i.e., mine design, infrastructure studies, feasibility studies, etc.

-Operational cost for local personnel and local transportation

-Office space at Bandung

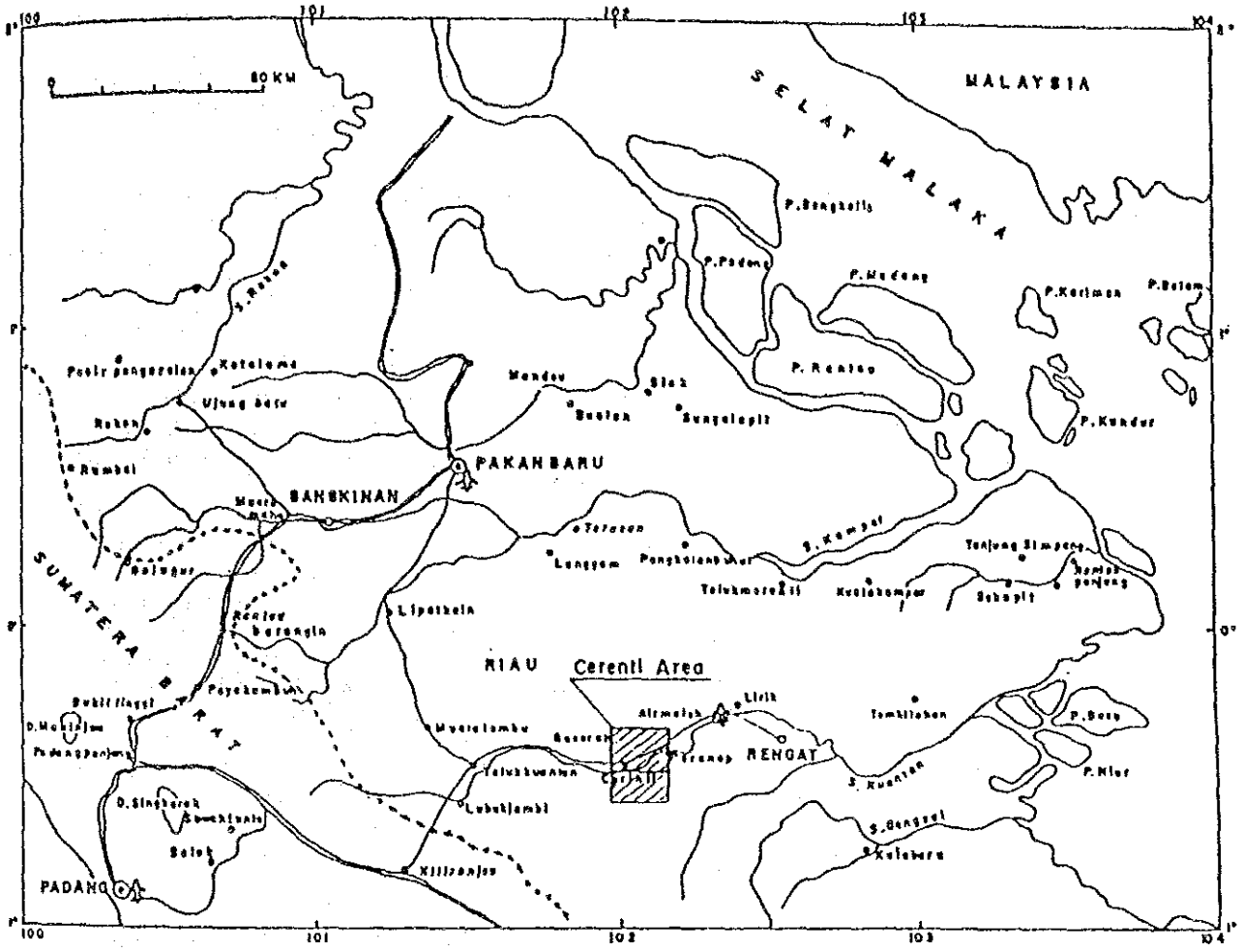

Figure 1. Location of the Cerenti Coal Area

FEASIBILITY STUDY ON INTEGRATED TRANSPORTATION SYSTEM DEVELOPMENT*

1. BACKGROUND

1.1. Project Area (See attached Figure)

The project area corresponds to the hinterland areas of the ports along the Indragiri River (Rengat and downstream areas) and their vicinity including Kuala Enok and Plau Kijang.

1.2. Project's Role

The Indragiri River originates in the Barisan mountain range, and extends 550km to the South China Sea. The basin of the river covers an area of 19,230 km^2 and more than 750,000 people (27% of Riau Province) live in this area. The basin has various kinds of agricultural products including coconuts, rice and rubber.

Since the basin is a heavy swamp area, roads have not been developed sufficiently and the Indragiri River remains the main transportation means for the passengers and cargo in the river basin area. Approximately 421 km of the Indragiri River is navigable, being 105 - 400m wide and 5 - 16m deep. Currently the maximum navigable ship sizes are 300 DWT for the Port of Rengat and 1,000 DWT for the Port of Tembilahan. According to the statistics in 1988, the main statistics of the transportation activities in the Indragiri River are as follows: i) number of ship calls: 2,856 (Total GRT: 853,714), ii) amount of cargos: 650.4 ('000 tons) and iii) number of passengers: 46,639. These statistics reveal the important roles of the river transportation for the social and economic activities in this region.

There are several sea ports in the vicinity of the river mouth. However, most of them are small ports with limited activities except for the Port of Kuala Enok. Kuala Enok is located to the south of the Indragiri River mouth across from Niur island. Due to several advantages such as calm waves, large water depth and broad water basin, the Port of Kuala Enok is currently used by private firms which require large-sized special ships for the export of coconut oil, bunkil and wood chips. Materials for these products are collected by small ships and barges. In 1988, more than 260,000 tons of these products were exported from the Port of Kuala Enok.

Concerning road transportation, Rengat is already connected with Pekanbaru and West Sumatra Highway by main roads, but there are no principal roads in the basin area except for the roads between Rengat and Tembilahan, and roads between Bagan Jaya and Kuala Enok which are currently under construction. These two roads will be main links in the future road network in the hinterland.

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Unfortunately, no efficient transportation network exists in the basin now and this is one of the most serious bottlenecks to be overcome for the promotion of social and economic activities in this area. From this point of view, efficient and comprehensive transportation system should be developed. The transportation system in the Indragiri River basin should consist of three transportation modes: river transportation, sea transportation and road transportation.

Each of these modes should play its respective role in the whole transportation system. Fundamentally, the products in the hinterland are to be transported to ports by roads, some of them to river ports and some directly to sea ports. Especially for bulky, export-oriented commodities, it is more economical in most cases to collect those commodities from small river ports and carry them to deep sea ports through a feeder system.

The Indragiri River basin has abundant agricultural potential and a considerable amount of increased production of these products as expected in the proposed agricultural projects as explained in the main description of the Indragiri River IDEP. In order to transport this large volume of commodities economically, an efficient transportation network is required, and the development of this network in the basin is a very urgent subject.

2. THE PROJECT

The development of the transportation network in the Indragiri River basin consists of four different projects. These projects are: i) study for the formulation of the master plan and short-term plan for the transportation system and related infrastructures; and development of infrastructures for ii) river transportation, iii) sea transportation and iv) road transportation. The above projects concerning the infrastructure development should be implemented based on the master plan and short-term plan formulation.

Concerning the river transportation, the Port of Kuala Cenaku, located 20km down stream from Rengat, has been under development to complement the Port of Rengat which is strictly constrained by water depth. Hence, the Ports of Kuala Cenaku and Tembilahan will play essential roles for the river transportation. The projects include the expansion and rehabilitation of existing facilities both for cargos and passengers, and the maintenance of river depth such as dredging taking account of the influence of large tidal range (4 - 5m) and siltation.

A deep sea port will play the key role in the system due to the fact that the maximum allowable ship size in the Indragiri River will remain around 1,000 DWT in the future and that this port will handle more international trade cargos as exports increase. There is no public deep sea port in the Indragiri River basin area. Hence a new port should be developed. Judging from several required conditions as a new deep sea port, Kuala Enok seems to meet adequate conditions as a new port development site.

Road transportation in the basin area is very poor, and even if the above-mentioned two main roads are completed, they will not be sufficient for the transportation of the agricultural products from the hinterland to the ports. These main roads should be connected with several trunk roads which will cover the agriculture projects area. Hence, it is necessary to develop a road network that will connect the main agricultural area to ports efficiently.

3. OBJECTIVE OF THE STUDY

The objective of this study is to formulate the master plan for the transportation network in the Indragiri River basin identifying the roles of each transportation mode and also to formulate the short-term development plan for related infrastructures focusing on ports which will form the cores in the transportation network of the basin area.

4. SCOPE OF WORK

4.1. General

This study consists of two phases, Phase I and Phase II. In Phase I, the master plan for the transportation network including three transportation modes will be studied. In Phase II, the study will focus on port facilities which will play the principal roles for the transportation of cargos and passengers in the hinterlands. The short-term development plan for the ports in the basin area is the main output of Phase II.

4.2. Major Steps of Work

The scope of work of each study is as follows:

Phase I

(1) to collect and analyze basic data on natural conditions, socio-economic conditions and related transportation conditions (river, road and sea)

(2) to evaluate the existing conditions concerning river transportations road transportations and port activities

(3) to forecast the future traffic volume through roads and ports considering future projects in the Indragiri River basin

(4) to identify the future locations and roles of ports and roads considering natural conditions, future projects in the hinterlands and other related conditions

(5) to formulate the master plan for the transportation network with efficient modal splits between the three transportation modes based on engineering and economic analyses

Phase II

(1) to collect and analyze detailed data on natural conditions such as soil conditions, wave and tidal conditions, siltation including field surveys

(2) to evaluate the existing conditions concerning port activities in detail such as characteristics of cargo and passenger throughput, the physical conditions of port facilities, natural conditions and the conditions of port operation and management

(3) to formulate the short-term port development plan for the specified ports based upon the master plan in the Phase I study

(4) to design the layout of all facilities for the above development plan in sufficient detail including preliminary design

(5) to carry out a rough cost estimation for the above plan and design a staged construction program taking environmental aspects into account

(6) to make economic and financial analyses for the above plan and evaluate the feasibility of the project

(7) to provide recommendation on port management and operations.

5. EXECUTION OF THE STUDY

5.1. Executing Agency

This study requires the close cooperation among three organizations: the Directorate General of Land Communication (DGLC) of the Ministry of Communications for river transportation, the Directorate General of Sea Communications (DGSC) of the Ministry of Communications for sea transportation (including port planning in the river) and the Directorate General of Highways (DGH) of the Ministry of Public Works for road transportation. For the smooth execution of this study, it is desirable to establish a study core organization with the close cooperation with other organizations.

Taking account of the contents of the study, it is proposed to designate DGSC as the core organization, then DGLC and DGH will cooperate with DGSC for the efficient execution of this study.

5.2. Expertise and Man-Months

The expertise required for the the execution of this study is as follows:

Phase I

Team leader
Transportation planner
Port planner
Road planner
Demand forecast expert
Port engineer
Road engineer
Economic analysis expert
In total 60 man-months are required.

Phase II

Team leader
Port planner
Demand forecast expert
Port engineer
Oceanographic engineer
Port operation and management expert
Economic and financial analysis expert
In total 55 man-months are required.

5.3. Time Schedule

Phase I	12 months
Phase II	12 months

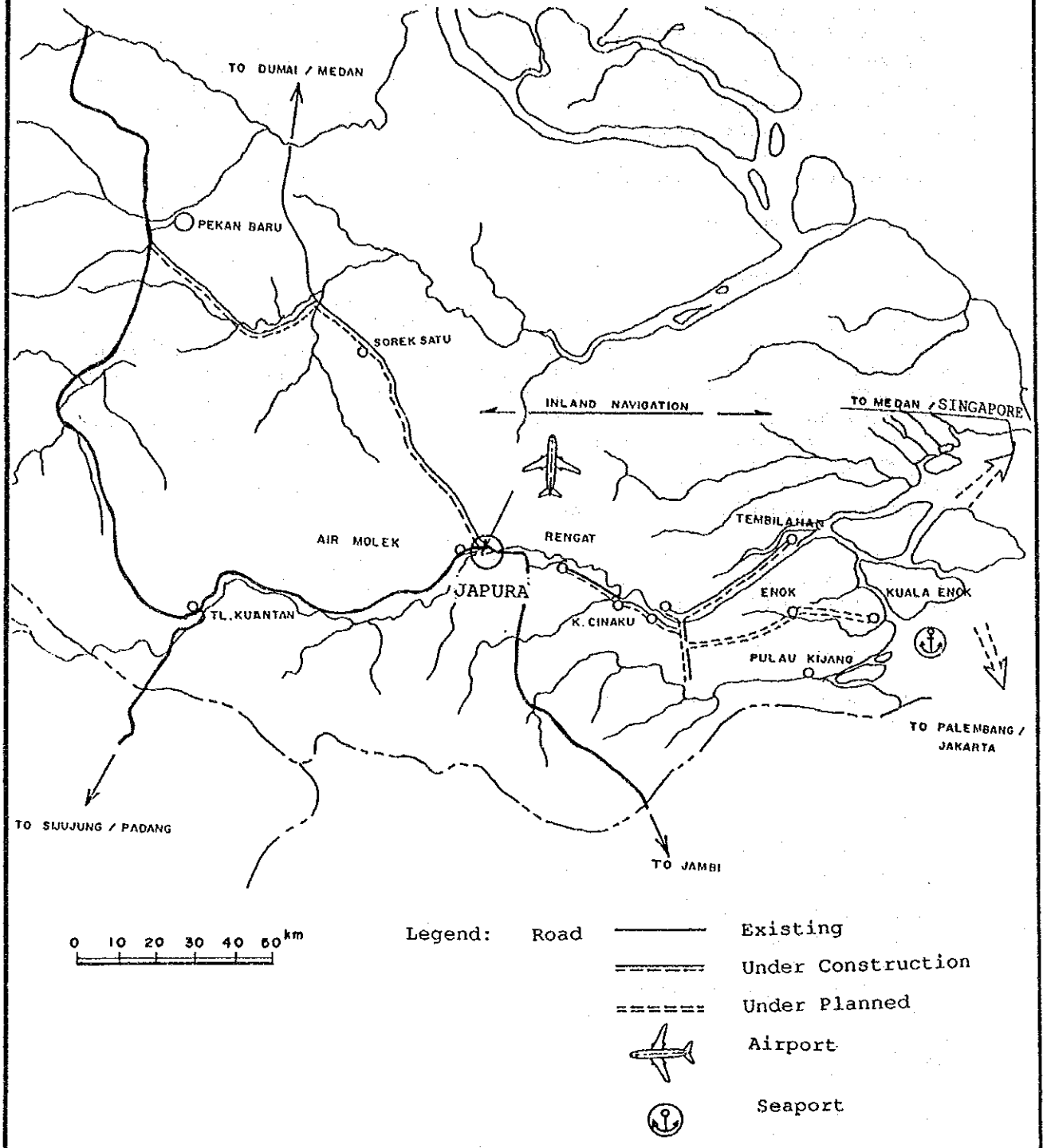

Fig. 1. Transportation Network in Indragiri River IDEP Area

G-49

FEASIBILITY STUDY ON SOUTH RIAU DIGITAL MICROWAVE SYSTEM*

1. BACKGROUND

1.1. Location

This project will be implemented in the southern part of Riau Province (referred to as South Riau here after). See map.

1.2. Project's Role

South Riau belongs to Riau Province, which is located in the middle of Sumatra and borders with West Sumatra Province and Jambi Province. The Riau province is the most underdeveloped of the four provinces of northern Sumatra. It is covered by wide swampy land and is economically underdeveloped. This area is considered one of the Integrated Development Program areas (hereinafter called "IDEP area"), and is going to be developed from the social and economic points of view under IDEP. In this area, the telecommunication services depend solely on satellite communication (SBK: Small Satellite Station). As there are no terrestrial transmission network, telecommunication services remain deficient both in quantity and quality.

This area is located close to the international market (Singapore, Batam), and the wide swampy land is expected to be developed through IDEP. The installation of telecommunication facilities is necessary for this area to participate in the international market. The construction and improvement of roads are projeccted in this area. In particular, the construction of the Trans-Sumatra Highway on the east coast which will run through South Riau is being planned for the future. However, as these will take a long time to construct, the proposed telecommunication networks are expected to be completed earlier than the transport networks.

Considering the above condition, it is desirable to introduce a terrestrial transmission network in order to expand communication and to make communication more reliable. This area can be highly developed by introducing the terrestrial transmission network. It is required that the planning of this transmission network be started so as to attain this objective.

2. OBJECTIVES OF THE STUDY

The objectives are to study and examine technical and economical feasibility of the construction of a digital microwave network in South Riau.

3. SCOPE OF WORK

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3.1. General

This work studies the construction of the digital microwave network plan in South Riau and its feasibility in the development areas shown in Figure 1 for eight months. PERUMTEL is requested to implement the construction of the digital microwave network during Repelita V based on this feasibility study.

3.2. Major Items to Be Studied

Major items to be studied and surveyed in this feasibility study are as follows:

(1) Data collection and discussion with staff from municipalities and POSTEL/PERUMTEL

(2) Study on the general conditions, circumstances and present situation of telecommunication facilities

(3) Forecast
Demand
Municipality development
Traffic

(4) Network Planning
Justification of terminal stations
Comparison study with other systems
Establishment of appropriate radio system (frequency, capacity)
Selection of transmission routes by map study
Maintenance and operation

(5) Cost Estimate

(6) Implementation Schedule

(7) Economic and Financial Analysis

4. EXECUTION OF THE STUDY

4.1. Executing Agency

The executing agency will be the Directorate General of Posts and Telecommunications, Ministry of Tourism, Posts and Telecommunications.

4.2. Expertise and Man-Months

The composition of the field survey team will be as follows:

(1) Foreign Consultant

Team leader

Network/transmission engineer

Radio engineer

Traffic/switching engineer

Cable engineer

Economist

(2) Requested Counterpart

Traffic engineer

Radio engineer

(3) Man-Month Estimation

Total man/months required will be 46 m/m for foreign consultants and 10 m/m for local consultants.

4.3. Time Schedule

The study should be conducted by foreign consultants in cooperation with counterparts from POSTEL/PERUMTEL. The duration of the study will be 7.5 months.

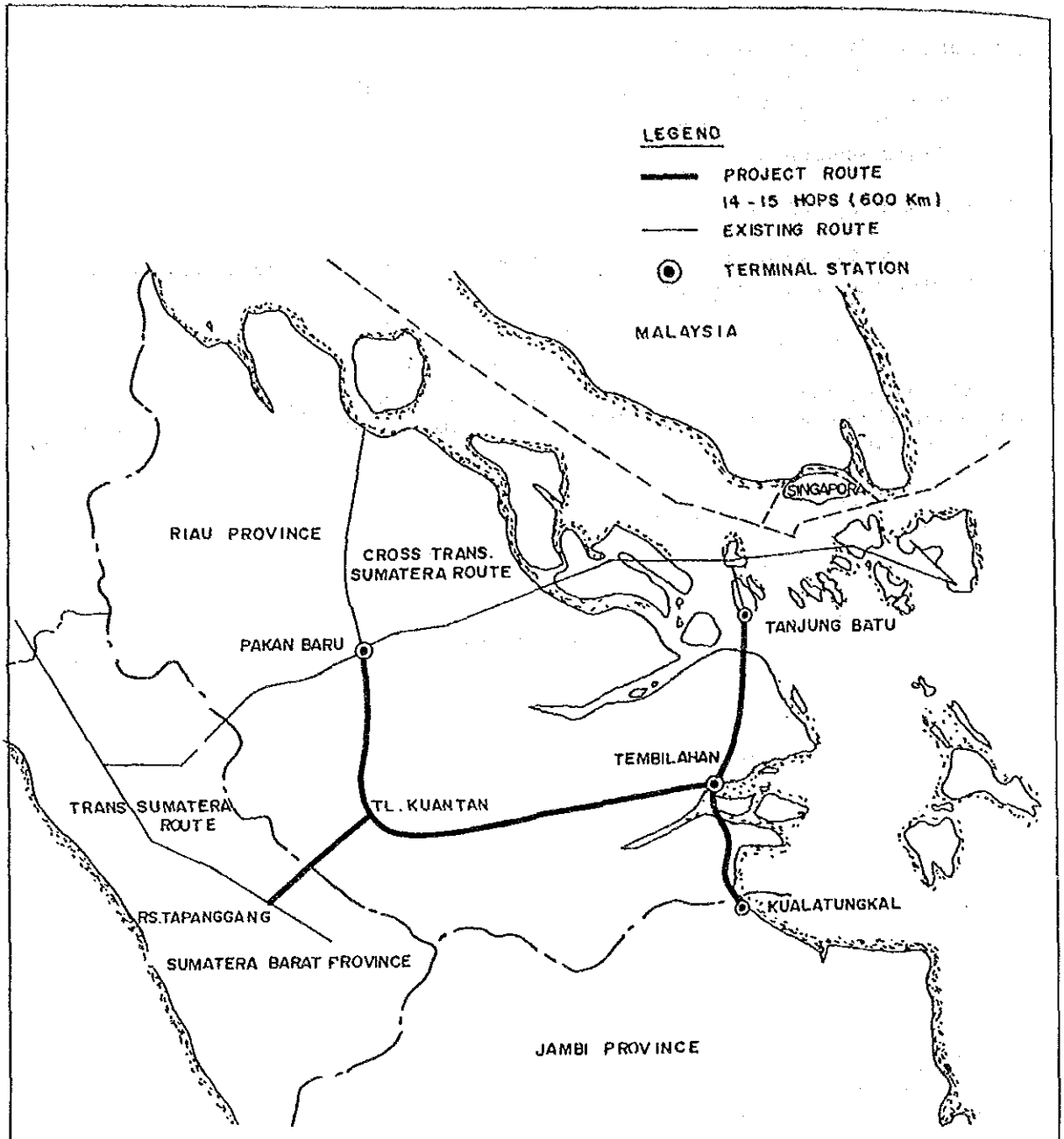

FIG. I . SOUTH RIAU DIGITAL MICROWAVE SYSTEM PROJECT

H-14

FEASIBILITY STUDY ON RE/AFFORESTATION DEVELOPMENT (RIAU)*

1. BACKGROUND

1.1. Location

This project will be implemented in Kabupaten Indragiri Hulu, Riau Province.

1.2. Project's Role

Under the Forest Products Increment Programme by the Fifth 5-Year Development Plan (Repelita V) in Indonesia, local inhabitants are expected to utilize nearby forests, namely, harvest construction logs, fire and charcoal woods, and promote conservation and expansion of forest resources.

According to the Branch Office of the Provincial Forestry Service in Rengat, Kabupaten Indragiri Hulu holds about 370,000 ha of unproductive land such as bush and scrub. Most of this land is owned by inhabitants as traditional land right (adat) and is devastated as being abandoned after shifting cultivation and rubber plantation. The provincial government and the Ministry of Forestry are promoting afforestation by traditional land right owners in order to rehabilitate the devastated areas and to increase forest resources and conserve soil and water.

The Rengat Branch Office is recommending local inhabitants to plant a species locally called Sungkai (Latin name: Peronema canecens, family: VERBENACEAE) because the species can grow on bare land and facilitate vegetative propagation through cutting. The timber has high use value and is used for plywood face, interior decoration, furniture, wood carving, etc.

Sungkai plantation just started in 1988 in a small lot, but if sizable supply is secured in the future, then its use will expand as the demand increases, and afforestation can further contribute to the local economy by inducing wood processing industries and home industries. An afforestation project in which efforts are directed from Sungkai plantation to its industrial utilization is thus planned as a model to be transferred to other non-Forest Land areas.

2. THE PROJECT (including possible alternative)

As for afforestation on non-Forest Land which is excluded from the Forest Land administered by the Ministry of Forestry, local land right owners perform land preparation, planting, tending, improvement cutting and harvesting, while the provincial government and the Ministry of Forestry provide seedling and fertilizer and provide guidance and extension services to them.

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This project is planned to accomplish afforestation of 5,000 ha within a 10 year period, 500 ha annually on non-Forest Land in Kabupaten Indragiri Hulu, as a model project to expand the afforestation effort. To carry out the project, a nursery to supply seedling, needed facilities for guidance and extension, and equipment and machinery will be fully provided. The species to be planted is mainly Sungkai, but other useful species are also provided and tried. To promote a wider use of Sungkai timber, research will be conducted on variations of current usage and possible ways to utilize branches and waste wood from lumber production. Also, market for the final products should be expanded.

3. OBJECTIVE OF THE STUDY

The objective of the study is to formulate a model project of afforestation in non-Forest Land. For this purpose, field survey, data collection and implementation plan making should be performed.

4. SCOPE OF WORK

4.1. General

The study shall consist of data collection, field survey, project planning and cost calculation.

4.2. Major Items to Be Studied

-To prepare a map of scale 1:20,000 drawn from aerial photographs (topography and vegetation should be dealt with)

-To list up land right owners, areas, and potential sites and to plot them on the map prepared above

-Land Availability:	District area, land use, land availability for the project
-To select project area	
-As for selected area:	Location, topography, existing vegetation and land use, climate, hydrology, soils, and geology
	Accessibility-existing access road and transportation requirement
-Population:	Population and labour supply
-Seedling procurement plan:	Annual requirement, nursery construction plan, nursery facilities, equipment and machinery, nursery practice system, cost of seedling

-Recommended method of land preparation
-Recommended method of planting
-Recommended method of tending
-Recommended method of stand improvement
-Forest Protection plan: Fire, pest and disease control
-Plan for procurement of working facilities, equipments and machinery
-Plan for maintenance of working facilities, equipments and machinery

-Plan for forest extension works: Social forestry
-Harvesting aspects and expected revenues
-Marketing aspects of Sungkai timber
-Existing Sungkai timber utilization
-Plan for processing of Sungkai timber
-Plan for costing of this project
-Socio-cultural aspects
-Institutional aspects
-Training aspects
-Environmental aspects
-Research and development aspects

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The executing agency will be the Riau Provincial Government and the Directorate General of Reforestation and Land Rehabilitation, Ministry of Forestry.

5.2. Expertise and Man-Months

The expertise required to carry out the feasibility study will be as follows:

Silviculturist

Forest soil specialist

Nursery specialist

Wood processing engineer

Sociologist

Legal expert with knowledge of local land tenure system

Economist

About 30 man-months will be required in total.

5.3. Time Schedule

Feasibility Study	6 months
Implementation	10 years

11. Riau Islands IDEP

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FEASIBILITY STUDY ON RIAU ISLANDS SEA TRANSPORTATION SERVICE*

1. BACKGROUND

1.1. Project Area (See attached Figure)

This project covers all small islands in Kabupaten Kepulauan Riau and Kotamadja Batam.

1.2. Project's Role

Among other areas in the northern part of Sumatra, Riau Province is well known for its many small islands.

For the inhabitants of those small islands, sea transportation has long been the sole means to support their lives and economic activities. The ships used for this transportation are traditionally called Nusantara, Lokal, Perahu, etc. by their size and function. These vessels have been playing important roles in inter-island transportations of cargos and passengers and no major changes are expected in the future. However, there are several problems with this transportation system including i) handling inefficiency in terms of tons/DWT; ii) weather-bound ship service; and iii) obsolete port facilities.

Besides the above traditional sea transportation services, ferry boat services have been in operation reflecting the increasing economic activities and the demand for automobiles on several islands in the Northern Part of Sumatra, although currently no ferry boat services are available in the Riau Islands.

As described above, sea transportations will continue to be essential for the inhabitants of these small islands, but there are several problems to be solved in the future. Taking account of this situation, adequate countermeasures are required to establish efficient and safety inter-island sea transportation networks considering the roles of traditional transportation and of ferry services.

2. THE PROJECT

This project consists of two element projects as follows:

(1) the study on the sea transportation system including the formulation of a master plan for the inter-island transportation system and the establishment of an improvement/rehabilitation plan for the port facilities of small islands ports.

(2) the improvement/rehabilitation of old port facilities on small islands. A single small jetty for each port will be sufficient.

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* This has been drafted for discussion purpose only by the JICA Team with the Counterpart Team and, therefore, is subject to change after discussion and further review before finallization for actual implementation.

3. OBJECTIVES OF THE STUDY

The objectives of this study are to formulate a master plan for an efficient and safe inter-island sea transportation network in the Region and also to establish an improvement/rehabilitation plan for the port facilities of related small island ports.

4. SCOPE OF WORK

The following items shall be covered in this study:

(1) to collect and analyze basic data on natural conditions and socio-economic conditions.

(2) to evaluate the conditions of existing sea transportation among small islands focussing on the movement of passengers, cargos and vehicles, ship capacities, physical conditions of related facilities, natural conditions and the conditions of port operation and management.

(3) to forecast the future traffic volume for the ports including passengers, cargos, and vehicles.

(4) to identify the roles of Nusantara, Lokal, Perahu, ferry boats etc. as means of sea transportation for all service lines.

(5) to formulate a master plan for an efficient and safe inter-island sea transportation network based upon the evaluations of items (1) to (4) above.

(6) to formulate an improvement plan for the port facilities of related small island ports.

(7) to make preliminary designs and rough cost estimations for the related ports in item (6).

(8) to provide recommendations on the management and operations of sea transportation among small islands.

5. EXECUTION OF THE STUDY

5.1. Executing Agency

The directorate General of Sea Communications (DGSC) of the Ministry of Communications is in charge of inter-island sea transportation in general. And the Directorate General of Land Communications (DGLC) of the Ministry of Communications is in charge of ferry boat services. Both of these organizations are concerned with this study.

5.2. Expertise and Man-Months

The xpertise required for the execution of this study is as follows:

Team leader
Port planner
Demand forecast expert
Shipping expert
Port engineer

Oceanographic engineer
Port operation and management expert
Economic and financial analysis expert

The total man-months required will be about 40 m/m.

5.3. Time Schedule

The duration of the study will be 12 months.

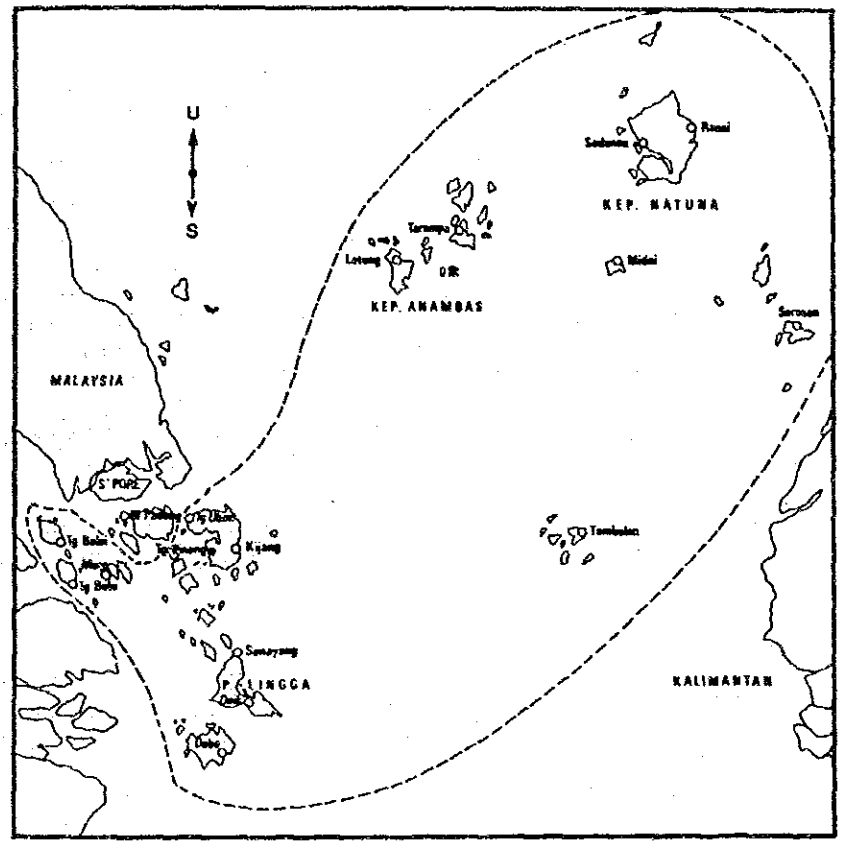

Figure 1. Riau Islands

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FEASIBILITY STUDY ON AREA DEVELOPMENT PROGRAM FOR RIAU ISLANDS*

1. BACKGROUND

1.1. Program Area

The proposed program will be implemented on one or a few islands in Kabupaten Kepulauan Riau. To identify the appropriate program site(s), a feasibility study will examine the whole area of kabupaten.

1.2. Program's Role

Kabupaten Kepulauan Riau (population: 419,846 in 1987) consists of a number of islands scattered in the South China Sea off the eastern coast of Riau Province. Historically, this archipelago represented a prosperous region favorably located at a junction of East-West trade. The archipelagic situation, however, has long turned out rather disadvantageous since modern economic and social development set off in Indonesia. As a result, some remote islands are lagging behind in isolation while others, particularly those close to Singapore, are making significant progress.

The program is therefore proposed to cope with this imbalance by stimulating productive sectors in the local economy and providing basic social services in underdeveloped islands.

2. THE PROGRAM

The exact location(s) and components of the proposed program will be specified by a feasibility study, for which this document stipulates terms of reference. Nonetheless, following components are very prospective candidates to be included in the program:

(1) Smallholder rubber/coconut plantation improvement

Rubber and coconut represent two major agricultural products in the area where food crop production is inhibited by unfavorable soils and climate. Smallholders, however, tend to lack proper latex-processing techniques, nor are they willing to increase productivity by tending the trees more in appropriate ways. This component will therefore aim at disseminating proper skills (planting, tending, processing) among farmers. A possible sub-component is the establishment of a pilot plant for processing rubber and coconut.

(2) Fishing villages community development

The typical community in the area is a fishing village with a few hundred population, clinging to the shore, far separate from other villages, and without any means but the small boat to communicate with the outside world.

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Even though fishing is by far the most important production activity in such villages, they usually lack infrastructure essential to their operation, e.g., jetty, ice plant, fish storage and fishing gear storage. Isolation and hard access also keep very low the levels of social services (education, medical care, electricity, transportation, etc.) available there. The objective of this component is to provide isolated fishing villages with basic infrastructure, productive and social, which is small-scale but indispensable for their development.

(3) Road network development

Road networks on the islands of Kabupaten Kepulauan Riau remain rudimentary if any. Sea transportation has traditionally been the sole means of communication even within an island. Lack of road access, however, practically deprives many inhabitants of access to better economic opportunities and better social services. An extensive road network may prove infeasible, but some sections can possibly find enough justification, especially when they link the program sites identified in components (1) and (2) above to the central town of the island.

(4) Medical service by boat clinic ("sailing doctor")

Adequate medical care is essential to keep the society productive and capable to develop. In most communities in the area, however, the level of medical services available is minimally low. The concept of "sailing doctor" is therefore proposed to overcome this situation.

A boat equipped with basic medical equipment and staffed with a doctor and a nurse visits remote communities on a regular schedule basis (possibly, once a month). The boat may be stationed at Tanjung Pinang and operated in cooperation with a local hospital.

3. OBJECTIVES OF THE STUDY

The objectives of this feasibility study are (i) to identify one or a few islands in Kabupaten Kepulauan Riau as the program site(s), (ii) to specify the program components, and (iii) to develop a detailed implementation plan.

4. SCOPE OF WORK

4.1. General

This study shall cover the entire territory of Kabupaten Kepulauan Riau. The consultants shall perform all field investigations, social and technical studies, economic analyses, financial and institutional investigations, and related work herein described. In the conduct of this work, the consultants shall cooperate fully with the government which will provide policy guidance, data and services as required to carry out the study.

4.2. Plan of the Study

(1) Review of Socio-Economic Conditions

The consultants shall make a kabupaten-wide review of socio-economic conditions to clarify each island's characteristics. Items to be reviewed include:

Population
Settlement pattern
Land use
Agricultural production (food crops, tree crops, livestock, fishery)
Manufacturing production
Mining production
Road system
Sea transportation
Air transportation

(2) Field Investigations

The consultants shall take fieldtrips to prospective islands making first-hand observations and collecting additional data and information.

(3) Identification of Program Site(s)

Based on the investigations done in (1) and (2) above, the consultants shall select one or a few islands as the program site(s). The selection should take into account the size and location of the island as well as the readiness of local residents to participate in such a program.

(4) Socio-Economic Survey

The consultants shall conduct an extensive socio-economic survey in the selected island(s) to gather detailed information on socio-economic conditions. The data will be used to prescribe appropriate program components in the following step. Survey items may include:

Household	Family composition Landholding Occupation/Source of income Income and expenditure Diet
Economic	Production Marketing
Social	Education Health care Water supply Housing
Institutional	Village organizations (administrative, cooperative, etc.)

(5) Program Components

After analyzing the survey outcome, the consultants shall prescribe program components (with specific location identified) which can attain the program goals most effectively. It is preferable that the components are interrelated. Some technical analyses should be carried out to preliminarily design those components.

(6) Impact Analysis

The consultants shall assess overall impact of the program. Impact (whether positive or negative) on the following aspects shall be measured in some quantitative terms:

Income generation and distribution
Employment
Environment
Other significant aspects (if any)

In addition, some qualitative assessment of the long-term effect on social aspects (social mores, organizational capability, educational achievement, etc.) shall supplement the quantitative evaluation.

(7) Feasibility Analysis

The consultants shall examine the feasibility of the program. As is expected, financial feasibility may not prove positive. This step is nonetheless required to roughly measure cost and benefit of the whole program. It is at least necessary to verify that economic feasibility is sufficiently positive.

(8) Implementation Plan

The consultants shall develop a detailed plan for the program implementation. With this respect, the organizational setup needs a careful examination both on the government side and on the participants' side. The plan must delineate a workable setup with appropriate recommendations if any.

5. EXECUTION OF THE STUDY

5.1. Executing Agency and Organizational Setup

The executing agency of the study will be Directorate General of Regional Development (BANGDA), Ministry of Home Affairs. To provide policy guidance a Steering Committee will be formed with representatives from BANGDA, Ministry of Agriculture, Ministry of Public Works and BAPPENAS. Coordination among BAPPEDA I (Riau), BAPPEDA II (Kepulauan Riau), ministries and agencies concerned will be the responsibility of the IDEP Unit, which is to be established in BAPPEDA I (Riau).

5.2. Expertise and Man-Months

Expertise needed to carry out the study will be:

(1) Team leader

(2) Regional economist

(3) Sociologist

(4) Cultural anthropologist

(5) Agricultural expert

(6) Fishery expert

(7) Transportation expert

In total about 70 man-months will be required.

5.3. Time Schedule

The duration of the study will be about 18 months.