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JRATUNSELUNA BASIN
UPDATED DEVELOPMENT PLAN

APPENDIX G

SOCIAL AND ENVIRONMENTAL ASSESSMENT

MAY 1980

SUBMITTED BY

PRC ENGINEERING CONSULTANTS, INC.
ENGLEWOOD, COLORADO, U.S.A. SEMARANG, INDONESIA

DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
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PREFACE

The Directorate General of Water Resources Development (DGWRD) of the Ministry of Public Works, Government of Indonesia (GOI) contracted PRC Engineering Consultants, Inc. (PRC/ECI) to provide consulting engineering services for preparing an integrated development plan for the Tuntang/Jragung Rivers in the Jratunseluna Basin. The study for the preparation of the plan started on May 16, 1979 and was originally scheduled to be completed on November 30, 1979.

An interim report on the study was submitted by PRC/ECI on August 15, 1979 which was reviewed by all the concerned agencies and later discussed on September 24, 1979 in a meeting held by the DGWRD at Jakarta. In that meeting and in subsequent discussions between PRC/ECI and DGWRD, it was the consensus of opinion of all the participants that the study on the Tuntang/Jragung Rivers should be modified by including the entire Jratunseluna Basin in certain aspects of the study. In that modified study the interrelationships of the existing, proposed and the potential development works of the Tuntang/Jragung Subbasins and those of the adjoining subbasins within the Jratunseluna Basin should be examined. Thus, the master plan for the development of the Jratunseluna Basin which was prepared earlier by NEDECO in the year 1973, would be reviewed and updated insofar as it related to the development of water resources for providing Irrigation and Municipal and Industrial water supplies to the project areas.

Furthermore, it was decided that social impacts of the Rawa Pening Project, as proposed in the Tuntang/Jragung Rivers Basins Development Plan, should be studied. Subsequently, the scope of that study was broadened to also include other works on the Tuntang River, which were proposed in the Development Plan. The report describes that study and the results thereof alongwith recommendations for carrying out necessary investigations of the socioenvironmental aspects of the projects should any of those be considered for implementation. Some general remarks are given in the report which are applicable to any project proposed to be undertaken in the Jratunseluna Basin.

Under directions from the DGWRD, the Department of Social Sciences of the Satya Wacana Christian University at Salatiga was associated with this study who advised the Consultant of the social, religious and cultural norms of the population in the project areas and provided information about the previous and the current organizations which were set up to administrate the Rawa Pening lake and its operation. They also helped the Consultant in obtaining and analyzing the date required for this study. The Consultant gratefully acknowledges the assistance and the guidance provided by the University in completing this important study.

Semarang, May 1980

PRC Engineering Consultants, Inc.

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TUNTANG/JRAGUNG RIVERS BASINS

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SOCIAL AND ENVIRONMENTAL ASSESSMENT

Part I - Physical Environment

G.1. INTRODUCTION

G.1.1. Format

This appendix consists of an evaluation of the project with regard to its impact on the physical and cultural (socio-economic) environments. The format used follows those principals and guidelines established by all agencies of the Government of the United States of America subsequent to the enactment of Public Law 91-190, the National Environmental Policy Act of 1969. The United Nations Environmental Program, established in 1973, follows the same basic principles. Those of the Agencies of the United States involved in capital projects, e.g., Agency for International Development, have adopted this format in their procedures for environmental review of capital development projects. The general format is as follows:

a. Proposed Project
b. Description of Environment
    i. Existing Environment
    ii. Future Environment
c. Environmental Impacts of Proposed Action
d. Adverse Effects Which Cannot Be Avoided
e. Relationship Between Short-Term Use of Environment and Long-Term Productivity
f. Irreversable Commitments of Resour
g. Alternatives to Proposed Action

Part II of this appendix which deals primarily with the social-environmental assessment of the impact areas, however, does not follow this general format in every respect. The prediction of human behavior, and its reactions and actions pertaining to the proposed projects cannot be ascertained with any degree of firmness The very inquiries concerning the impact populations, attitudes and responses to a future project, which may or may not come into existence, alter those responses, and may be influential in altering and/or shaping actual responses and behaviour patterns that will occur at the time of project construction, if it occurs. Consequently, section and paragraph headings may not be consistent with the abovementioned format throughout the appendix.

G.1.2. Constraints

This is not an Environmental Impact Statement; it is more in the nature of a prefeasibility environmental review. The time frame allocated to this section of the Report was such that in some instances suppositions, projections, and discussions concerning the nature of the environment and potential impacts vis-a-vis the project are based by necessity on conjecture. If the project proceeds to the next stage of development, several studies should be implemented and sufficient time allowed to obtain data pertinent and necessary to the effects of the project on the environment

G.2. PROPOSED PROJECT

G.2.1. Introduction

This study is to establish that particular mix of projects that could provide flood control and year-round irrigation waters for 35,000 hectares (ha) of land on the coastal plain East of Semarang, Central Java. Projects considered are dams at three sites (Jragung, Glapan, and Gunung Wulan); a transbasin diversion and increasing the impoundment at Rawa Pening. The present irrigation system is assumed sufficient to handle with necessary modifications any new supplies of water delivered by any mix of alternatives of this project. There are other projects within the general area that might have an effect on parts of this project.

G.2.2. Jragung Dam and Reservoir

As designed, the Jragung dam would provide an irrigation water supply to a minimum 7,627 ha on a year-round basis, provide power generation from a six megawatt power plant, and alleviate yearly flooding on 1,800 ha. The original plan proposed supplying the City of Semarang with 2,000 l/s of municipal water. Project life is established at 50 years. The project will require transbasin diversion of flows from the Tuntang River. A base camp covering 50 ha will be built near the damsite which can be reached via Merakmati on the Semarang-to-Yogyakarta highway. The 20 km access road will have to be rebuilt to accommodate the traffic and heavy construction loads. Approximately 90 families will be dislocated in the reservoir site.

G.2.3. Glapan Dam (Barrage)

As projected, the Glapan Dam will have a gross reservoir volume of 125×10^6 m^3, and flood some 1,900 ha. Discharges from the

reservoir, if built as an independent project, will aid in the irrigation of 13,517 ha on a year-round basis. Access to the site will be south of Gubug on the Semarang-to-Purwodadi highway. The 8.5-km road will have to be rebuilt, including bridges, to accomodate the movement of construction materials and heavy equipment. In addition to displacing some people, the reservoir will flood some roads.

G.2.4. Gunung Wulan Dam

The Gunung Wulan Dam will inundate 3,000 ha and form a reservoir containing, 520 x 10^6 m^3 of gross capacity. Located south of Glapan, the Gunung Wulan area will be reached by a 7-km extension of the proposed Glapan access road. With the smaller reservoir, 17,125 people will be displaced. The total service area would be 34,950 ha; 11,625 ha in Jragung area and 23,325 ha in the Tuntang. An annual power generation of about 60 Gwh energy will be provided by a 10 MW power plant. No railroad right-of-way will be lost to the reservoir.

G.2.5. Flood Control Projects

Flood control canals and drains will be rehabilitated and widened to provide capacity for peak flows of 1-in-20 year for the Jragung area and peak flows of 1-in-50 year with or without dam on the Tuntang River. The widening of floodways and river channels will require dislocation of families living along the canals and rivers, rebuilding all highway and railroad bridges under which the floodway passes, modification of weirs, and building year-round roads on the levees of the floodways for access and maintenance. Drop structure will be designed and installed as necess

G.2.6. Rawa Pening

Some form of modification to the present water release system at the spring-fed, natural lake of Rawa Pening will be proposed. The size and nature of this project will depend upon the mix of other projects At this stage plans for Rawa Pening are very preliminary in scope. One such proposal for Rawa Pening would raise the weir at Jelok 3.5 m and another is to construct a levee around Rawa Pening to create a reservoir of 125 x 10^6 m^3. [See Appendix C - Part I]. From this reservoir, covering 2,850 ha, municipal water for Semarang and irrigation water for the Tuntang service area could be provided. Also, via a transbasin diversion, irrigation water could be provided for the Jragung service area. Sustained flows from the lake will continue to provide hydro power generation at the Jelok and Timo Power Plants

G.2.7. Transbasin Diversion

As proposed, the Tuntang diversion will supply up to 18 m^3/s of transbasin flow to the Jragung River system. A 2.5 m high weir will divert water into a concrete-lined tunnel. The tunnel, with an inside diameter of 3.0 m, will be 555 m long between the portals.

G.2.8. Powerstations

A new power generation plant was earlier proposed by others at Sambirejo. The present power plants at Jelok and Timo will continue power production in the upper Tuntang System.

G.2.9. Other Projects in General Area

Other projects or proposals that might have an effect on the Jragung-Tuntang Project are the Kedungombo Dam, the present canal

building and rehabilitation program in the Jragung Service Area, the new oil-fired power plants being constructed in Semarang and the proposals of the City of Semarang to obtain municipal water.

G.2.9.a. Kedungombo

This dam designed by Snowy Mountains Engineering Corporation (SMEC) will have a 22-MW hydro power plant and will supply irrigation water to 42,500 ha of land along the Serang River. Part of the irrigated land to be supplied from this reservoir is located immediately east of the Tuntang Service Area, the eastern boundary of which is the left bank of the Telang River. This area extends eastward from the right bank of the Telang River and cov

G.2.9.b. Rehabilitation of Irrigation Systems

For the past several years the PROSIDA has been engaged in rehabilitating canals and drains and building new canals in the Jragung River service area. With the existing canals rehabilitated, the service area will be able to maximize the use of the present water supply. It is reported that with the new canals the system will be sufficient to handle the water provided by the Tuntang-Jragung Project.

G.2.9.c. Hydropower Generation

At the present time a consulting team is supervising the start-up and initial shake-down period for two 50 MW, oil-fired generating units. One of the units is presently on line operating at about 60-70 percent of capacity. The other unit will be online in the near future.

G.2.9.d. M & I Water Supply for Semarang

At the present time the City of Semarang has an extreme shortage of water. For several years the city officials have sought means to provide water for present and future needs. Many reports prepared by various consulting groups suggest the obvious solution of tapping the springs at Rawa Pening. The concern of the city's officials is great enough that they might initiate their own solution to their water problem rather than wait for an integrated basin-wide solution.

G.3. DESCRIPTION OF ENVIRONMENT

G.3.1. Introduction

The format outlined in Section G.1.1. requires a description of the Existing and Future Environment. The existing physical environment is summarized from other appendices. The cultural environment is developed from the literature and from recently gathered data. For the sake of clarity, the Cultural Environment and Social-Economic assessment of the various projects will be discussed in a separate part of this appendix. Conflicts and obvious inaccuracies in some data cast suspicion on all data; consequently all data should be read with caution. The future physical environment is discussed on a with-and-without project basis. The future time is arbitrarily fixed at the year 2000 for this

G.3.2. Existing Environment

G.3.2.a. Physical Environment

(i) Physiography

From a physiographic standpoint, and for ease in relating to discussions within this section of the report, the project area can be separated into three units. These are the coastal plain, the upland, and the highland. Each of these is divided into two sub-units.

The highlands are volcanic and consist of the volcanic
and the volcanic agglomeratic slope wash. Although the
e material changes, the side slopes remain uniformly
to the upland. Gullies are common and erosion is severe

under the canopy of lush vegetation.

The uplands are divided into an agglomeratic apron overlying what appears to be an undulating erosional surface on Tertiary marine sediments and the exposed marine sediments. Although there are some floodplains, the streams are entrenched and steep and some side slopes reach 1H:1V. The uplands are forest land and the forestry department has been working on programs of reforestration.

The lowlands are composed of the slope-wash floodplain sediments of the rivers and the littoral-floodplain accretion sediments of the outer coastal plain. Slope wash and flooding have built up the inner plain since Quarternary time. The outer plain is more recent and onlaps the interplain. It is formed from sediments brought to the ocean by the rivers. The boundary between plains is along a line connecting the rather abrupt changes in the courses of the coastal plain rivers.

(ii) Geology

Volcanic uplands overlook the Tertiary (Miocene) sedimentary foothills and the extensive coastal floodplain. Fairly recent tectonic uplift deformed the relatively soft and unconsolidated marine deposits. It appears that surface faulting is related only to the folding process; the faults are probably not connected to basement faults nor are they presently tectonic.

The Tertiary sediments consist of soft marls and claystone with some limestone reefs or thicker sandstones. Volcanic breccias are found. Present day sedimentation on the coastal plain is very rapid with the area between Salatiga and Rawatu being filled in by sediments since the 17th Century. The present

sediment load in the rivers and streams and the debris-choked irrigation canals and drains are testimony to the fact that the same processes are active today.

The extensive sediments imply that an active erosion process is occurring upstream. The steep upland slopes and drainage systems provide a high gradient for conversion of the 2,600 mm of yearly precipitation into energy. The entrenched streams and rivers, the gullies in the uplands, and the massive loads of sediment on the coastal plain bear witness to the amount of energy expended.

Java is located on the Indonesian island arc and volcanic front, and is riding over the Indo-Australian tectonic plate. As a result, some seismic activity should be expected. [18].

(iii) Climate

Climatically, Java is influenced by the Trade Winds which are themselves modified by the seasonal monsoonal flow. In November through March (the Northern Hemisphere winter) monsoonal flows develop out of the Asian high pressure system and, crossing the South China and Java seas from the north-west, bring highly saturated air to north central Java coast. Orographic lifting and broad frontal activity cause condensation and heavy precipitation. From May to September the monsoonal flow is reversed. The air masses moving from the south-east, and shorter distances over water, are less saturated requiring greater lifting for condensation, and thus orographic precipitation occurs at high elevations if at all. During this period convective activity can cause local precipitation.

The average yearly precipitation at a foothills station, some 20 percent higher than coastal stations, is 2,683 mm based on 56 years of record. On the average 660 mm of rainfall are received in the dry season but this precipitation is local in extent and spotty in occurrence, contributing to low rainfall and dry years. In spite of the high yearly rainfall (over 2,540 mm), there can be terrible droughts in the dry season.

The highest temperatures occur in the project area in October and in May, approximately one month after the equinoxes. The coolest temperatures occur in January and in February during the wet season. Though it is southern hemisphere summertime, the daily temperatures are reduced by the cloudiness and rainfall The humidity is high at this time and, if calculated, a discomfort index would also be high.

(iv) Hydrology

Within the area covered by the project are several hydrologic systems, natural and manmade. The separate hydrologic regions on the coastal plain are

REGION	AREA (ha)	TO BE SERVICED BY
Tuntang	11,806	Glapan or Gunung Wulan
Glapan Barat	8,140	Glapan or Gunung Wulan
Bonangrejo	1,270	" " "
Karang Asem	700	" " "
Grogol	4,440	" " "
Jragung	4,112	Jragung
Panongan	1,505	Return flow from other systems.
Ketitang	849	" " "
Glapan Setu	7,545	" " "
Guntur	1,937	" " "

The herein projects are investigated only on the Jragung Tuntang Rivers; two other rivers, Dolok and Telang, serve limiting boundaries to the project service area. The Dolok er is the western boundary; the Telang is the eastern boundary. four rivers have similar characteristics. They are narrow entrenched, and are intermittant in that through nature's ight or man's diversion, flow effectively ceases in the dry ion. All are subject to flood in the wet season. In the : years the flood potential has increased substantially owing ncreased deposits of sediments downstream.

Since the 19th Century, measures have been taken to control flooding on the Tuntang River. The early efforts consisted of building dikes on the right side of the Tuntang to protect land to the east, which is irrigated in part by water from the Glapan diversion. The Glapan weir was constructed on the Tuntang River in 1859. The Jragung weir was constructed in 1932. The main canal starting on the left bank of the river irrigates an area

of 5,767 ha; 4,262 ha of this total are south of the western Glapan main canal and are located on both sides of the river.

The Western Glapan Main Canal derives water from the Tuntang river at the Glapan weir. The design capacity was to be sufficient to distribute irrigation water to Glapan Barat (8,140 ha), Ketitang (849 ha), and Glapan-Setu (1,545 ha). The various irrigation systems were rehabilitated by the PROSIDA Project, partially financed by the World Bank through I.D.A.

The Jragung and Tuntang rivers drain from the northern part of the volcanic highland situated to the west of the project area. The Jragung headwaters are on the slopes of Ungaran; the headwaters of the Tuntang are at Rawa Pening.

Rawa Pening is a natural lake formed by geological activity at the footslopes of a cluster of volcanoes. Base flow into the lake is from springs and the lake empties over a basaltic sill on the east side. The out-flow becomes the Tuntang River. At the height of the dry season the lake covers about 120 ha and stores 17×10^6 m^3 of water. In the wet season the lake expands to about 3,480 ha and has a corresponding storage capacity of 48×10^6 m^3.

The wide variation in the surface area at the lake allows the local inhabitants to farm out onto flats as the lake recedes during the dry season. The lake's surface is contaminated with vegetation. Some 215 species and 52 families have been identified. In the shallow areas and flats rooted vegetation, Hydrilla verticillata, and grasses, Pandiuim repens, can be found. On the surface, floating vegetation such as Nymphara spp., and water hyacinth, Eichornia crassipes, flourish. In fact the rapid growth of the hyacinth, 10 to 30 percent a week, contributes

to the difficulty of controlling weeds. Accumulations of these weeds downstream at the intakes of the powerstations can cause problems.

Control at the outlet is established by a hinged-gate weir constructed in 1937. Studies have been made on expanding the storage capacity of Rawa Pening, but no definite plans have been submitted until now. Previous plans would have encroached on the fertile rice fields surrounding the lake and thus expansion was thought unjustified.

Any diversion of water from the Tuntang River for M & I needs of the city of Semarang, without providing additional storage will interfere with downstream diversions for agriculture as well as interfering with power generation at the Jelok and Timo powerstations.

The first use of the flow from Rawa Pening for hydroelectric power was made in 1912. In 1937 the Jelok Power Plant was built and in 1962 the station at Timo was put into operation using the tail water from Jelok. As noted previously, one phase of this proposed project will rehabilitate the powerstation at Jelok and build a new plant below Timo at Sambirejo.

(v) Biologic Resources

The coastal plains have been farmed for centuries with farmers following the seaward march of the accreting shoreline. The flat, watered land in the vicinity of Rawa Pening has been cultivated for over 150 years. As population pressures increased, migrants moved into the flood plains up rivers and streams, gradually moving into the steeper and steeper slopes, terracing and clearing rainfed areas for crops out of brush areas in the cut-over forest. They destroyed the second-growth vegetation

and the habitat for indigenous animals. Many of the animal species surely fled earlier, frightened away by the advancing noise of agrarian settlement or were killed when the area was originally logged-over. In Java, as in much of Southeast Asia, song birds are popular in the home. Most of these are caught in the wild, caged, and sold. This reduces the bird population. Bird's eggs are often sold in the market and considered a delicacy. Thus, near settled areas, the larger native wildlife has either been driven away, captured and caged, or eaten.

The nature of the streams are such that aquatic life is restricted to deep pools or nonexistant. Owing to the long dry season and off-takes for irrigation, the rivers become intermittant. The Tuntang River, which heads at Rawa Pening, carries perennial flows. Other streams and rivers not favored with a year-round base flow become little more than open sewers in the dry season.

There are no virgin natural areas within the project area. The impact of man has been such that the natural system is out of equilibrium. The project could, in fact, help restore equilibrium by moving settled families and agriculture out of the upland forested areas. Forest land makes up about 20 percent of the total land surface in Central Java. There are four classes of forests: protection, production, nature reserve and combined. Protection forests are planted generally above 40 m on slopes steeper than 30 percent. Their function is to protect the watershed and prevent erosion. Production forests cover 502,000 ha in Central Java and are utilized for perpetual production. Nature reserve areas include game reserves, parks and those areas which support unique flora or fauna, or areas which are suitable recreational and/or academic pursuits.

The fourth category is a combination of the first two. There are no nature reserve areas within the project area.

(vi) Flooded Areas

On a regular yearly basis 5,000 to 6,000 ha of rice land are flooded in the wet season. The causes of the flooding vary with the area flooded. A low-lying area west of the Tuntang just below the upland, floods with the runoff from an overflow structure at the Glapan Weir and with runoff from minor streams in the upland. The major area of yearly flooding lies to the west of the Dolok River from the Semarang-Gubug highway on the south, to the Semarang-Demak highway on the north. The flooding here results from the rapid change in gradient of the Dolok River as it enters the coastal plain and because of loss of channel capacity owing to extensive sedimentation in the channel. Overtopping of the banks of the Dolok has been frequent over the years and sedimentation heavy, resulting in the base of the channel a grade with or higher than the farm land adjoining the levees. Not only do flood waters cause damage in the area flooded but they also hamper drainage, extending the problems from the flooding over a much larger area. Inadequate drainage prolongs inundation several weeks longer than it would be with good drainage, causing additional damages to crops and infrastructure. In addition, a flood-caused delay in planting the second crop puts part of the season into the dry period, resulting in crop losses. The floods of 1976 and Jan/Feb 1980 were extensive, inundating over 25,000 ha of area.

(vii) Soils

The soils of the service area appear to be vertic, relatively impermeable, and do not exhibit distinct alluvial and illuvial

horizons. Vertisols are clayey, have a high bulk density and develop deep wide cracks during early in the dry season. Differences in the structure of the surface soils are important from a use standpoint. The surface of the majority of the Vertisols is massive and very hard when dry. A seedbed for diversified crops can be extremely difficult to prepare. Two classes and four subclasses of soils have been defined in the Tuntang Service Area.

There are salinity problems in part of the service area. A report by NEDECO indicates that coastal areas between 0.50 and 1.0 m Mean Sea Level can expect a 7 to 25 percent reduction owing to saline conditions. Soils exhibiting saline conditions have been reported in the Jragung service a:

G.3.3. Future Environment

G.3.3.a. Physical Environment

(i) Physiography

In the year 2000 the project, if constructed according to present time tables, will have been in operation for 13 years. From a broad-scale, physiographic aspect, barring a widespread geologic event, little change will have occurred. On a local scale, changes may occur in the coastal geomorphology.

Without the project the Tuntang and Jragung Rivers will continue to transport the products of erosion from the highlands and uplands to the coastal plain and will continue to contribute sediment and nutrients to the deltaic or estuarine areas. With the continued supply of sediment the present processes will

continue into the future.

With the dams built, sediment load will be diminished and deliverability at the coastline might be reduced to the point that equilibrium is lost. Certainly with the construction and implementation of the Kedungombo Dam, sediment deliverability by the Serang will be curtailed. The effect of both projects reducing the delivery of sediment could affect shoreline stability and cause erosion and loss or land surfac

(ii) Geology

There are no projected changes to the geology per se with or without the project. Some mineral resources will be lost to the Glapan Dam site and reservoir. At the present time, limestone is mined for use in making lime in this area.

(iii) Climate

There are no projected changes in the climate. However, heavy traffic and construction activities in the vicinity of any of the projects will cause local air quality to be lowered.

(iv) Hydrology

Without the project, sediment will continue to be transported to the coastal plain. Although some sediment will continue to be discharged to the sea, a great deal of sediment deposition will occur in the canals and river channels by the year 2000. Silting of river channels and canals will continue with continued loss of water capacity. Flood frequency will increase with resultant damage more widespread. It is possible that the beds of the

the channels and canals will continue to be elevated over the adjoining farmland and increase the potential for widespread flooding. Without the project the two small generating plants at Jelok and Timo will continue to operate. Without the project there will be insufficient water to irrigate 4,112 ha of the Jragung irrigation system and the systems served by its return flow.

With the project the transbasin diversion will divert water from the Tuntang to the Jragung. The flood control projects will widen the main drains and channels where necessary and remove sediment deposits so that the system can handle the 1-in-20 year occurrence on the Jragung and the 1-in-50 year occurrence on the Tuntang. If dams are built, they will further reduce the potential for flooding. As previously noted, if dams are built a great deal of the sediment normally carried by the river will be deposited in the reservoir. As water is released from the reservoir, it will be free of its bed load and some of its suspended load depending on residence time in the reservoir. In this condition there will be a tendency for released flows to pick up bedload. Normally this situation can produce problems in the downstream section. However, presently, where channels and canals have an excess of sediment deposited in them, the sediment-free released water will aid in flushing the system.

If the dams are built, stream flow will be altered. Regulation of flow following the construction of either dam will promote uniformity of flow in the respective river. The reduction in extremes of flow and storage of flood waters will make year-round irrigation possible in many areas not enjoying that benefit now. Uniformity of flow will allow introduction of food fish to the rivers and reservoirs. Continuous flow will eliminate the

pools of stagnant water that form in the dry season. This will remove breeding grounds for mosquitoes and provide a more reliable, but still contaminated, source of water for those who depend on the rivers and canals for water needs.

Without the project, the river system throughout the reservoir site will remain essentially the same. With the project, the river will become a lake.

Rawa Pening can be expected to change very little in the future without the project. With the project, the situation around Rawa Pening could be changed substantially. By building dikes and increasing the height at the weir, additional storage will be added to the existing reservoir area. The pressure increase will be 3.5 metric tons/m^2 over the surface of the lake. Added to this will be the loading imposed by the earth-filled levees. A lake covering about 3,500 ha will have been created.

(v) Biology

Without the project the life processes on the coastal plain will continue as they are. Offshore fisheries and biologic reproduction in the deltaic and estuarine areas will continue to evolve. Within the reservoir area on the upland, the processes will be similar to those of today. Selective harvesting within the forest area should be expected. If the forest service is successful in its reforestration program and is able to move the squatters, harvesting teak could develop into a continual business based on a renewable resource.

With a project where no dams are built, this situation would remain the same; with the dam many changes will occur.

The decline in sediment delivered to the coastline has been mentioned. Since nutrients can be attached to sediments by ionic bonding, the amount of nutrients could also decrease. With a decrease in nutrients biologic growth will be reduced. With dams regulating the stream flow and reservoirs storing water for sustained release in the dry season, a generally uniform flow will exist throughout the year, stabilizing the riverine habitat. Introduced fish species will provide a source of animal protein. Development of riparian vegetation will be controlled then, as now, by continual cutting for fodder.

Within the reservoir area, great changes in the environment will occur with the project. The most obvious change is from a riverine habitat to a lacustrine habitat. In those areas where the reservoir narrows, some vestiges of a riverine environment will remain. As a result, vegetation more adapted to lake ecology will be established. Several species of fish will be introduced and, depending on the operation of the reservoir, might thrive. Development of any fishing industry will be limited by the size of the reservoir, the amount of sediment fluctuations of the water surface, and the configuration of the side slopes. Under optimum conditions production would be less than 22 kg/ha. Many factors can be detrimental to the production of fish. Heavy sediment concentrations in the water limit light penetration which limits production of fish food. Heavy sediment concentrations can also inhibit the action of the gills and bury eggs; particularly eggs of the pelagic species. Steep side slopes can limit those areas from the growth of aquatic and shoreline vegetation essential for the protection and feeding of fish. Vegetation can be affected by fluctuations in the water surface and by the lack of light through roily,

sediment-laden waters. If either reservoir is drained completely during part of the year, all lacustrine species will disappear.

Because of the weedy, aquatic vegetation in Rawa Pening, both reservoirs will have problems. In particular, water hyacinth, Eichornia crassippes, would cause problems. Other species expected to flourish are Salvina Culcullate and Nymphara spp. Fluctuations in water level, high sediment content of waters, and the relatively steep sides of the reservoirs would probably reduce the establishment of rooted vegetation and grasses.

At Rawa Pening, the added height of the proposed dike and steep sides may cause a decrease in stands of rooted vegetation and grasses. If the surface is maintained at a fairly constant level, conditions for fish might reach the optimum; annual production might reach 76 metric tons.

(vi) Flooded Areas

Discussed in Hydrology Subsection 6.3.3.a. (iv).

(vii) Soils

No radical changes in soils will occur without the project; they will continue to develop under present environmental conditions. With the project soils receiving water so as not to dry out will change in character.

G.4. ENVIRONMENTAL IMPACTS OF PROPOSED ACTION AND MITIGATING MEASURES

G.4.1. Introduction

Several facets of the natural physical environment will be affected. Obviously the purpose of the project is to modify the hydrology. In so doing, the vegetation and animal life of the area covered by the reservoir will change. The riverine environment will change to a lacustrine environment with the attendant changes in the floral and faunal species. Certainly this change cannot be classified as detrimental since the present ecological systems are not unique. Other changes will occur in the hydrology downstream from the dam. River flows will be regulated throughout the year. Since many of the people of the region rely on canal water and river water for all their water needs, the rivers, streams, and canals become open, stagnant sewers by the height of the dry season which is a definite health hazard. By releasing a minimum amount of water throughout the dry season, the waterways will be continually flushed. As the reservoir fills and the incipient lakes are stocked with fish, an additional source of animal protein will become available.

There will be sediment problems through large quantities of bedload being trapped in the reservoir. This will mean less sediment to the coastal plain and to the Java Sea. This reduction in sediment could cause changes in the coastline and changes in the coastal biology.

G.4.2. Effects on Coastal Morphology

By the year 2000 the effects of the reduction in sediment delivered to the mouths of the Jragung and Tuntang should be showing

some changes in coastal morphology. It is possible that no changes will occur, or if they do occur they will not be detrimental. To understand the processes and the consequences of reduced sediment, a study is required.

No mitigation measures can be suggested until the study is completed to ascertain if in fact detrimental effects are there.

G.4.3. Effects on Natural Geologic Resources

Currently limestone is being exploited within the limits of the proposed Glapan Reservoir. If the Glapan Dam is constructed, the area will be flooded. However, the limestone deposit will probably be used in construction of the dam and other structures. In addition, the nature of the stratigraphy is such that other limestone deposits are available. No mitigation measures are specified since the deposit is not unique and will probably be mined during construction.

G.4.4. Effect on Air Quality

Heavy vehicle traffic along the Semarang-Gubug and Semarang-Magelang roads creates a local air quality problem. If the project is implemented, this local problem will be extended from the respective roads into the project sites. Air quality will be similarly reduced around each dam site. The air quality along these extensions will improve after construction when the heavy traffic has abated, but the total overall quality along these corridors will be reduced permanently because of the local traffic making use of the new roads. Air quality will not only be diminished by vehicular emissions, but also by dust and particulate thrown into the air by traffic on gravel or dirt roads.

Air quality will be diminished in any quarry sites where construction materials are obtained and on the dam sites where blasting will be required for abutments and other dam features. These effects will be temporal with air quality returning to present conditions when the project is completed.

Mitigation measures during construction will be limited to wetting the roads and blasting areas.

G.4.5. Effects on Hydrology

G.4.5.a. Effects on Flood Control

No documented total for losses attributed to floods is available but the effects are yearly and can be widespread. The project will eliminate the yearly floods and consequently will save millions of rupiahs annually. Not only will it prevent floods, but the project will allow additional crops to be raised on flood affected land. The effect is positive.

G.4.5.b. Effect on Streamflow

The project will regulate streamflow so that large flows with potential for overbank flooding will be attenuated in the wet season and in low flow periods, in the dry season, flows will be augmented by releases from the reservoirs. The continual flow will eliminate the pools and remove the breeding grounds for mosquitoes and provide a more reliable but still contaminated source of water to the villages.

Passage of the water through reservoirs will reduce the sediment load and release of this water could cause downstream erosion problems.

It is likely owing to the amounts of sediment on the rivers and drains that the released water will pick up some of this sediment and aid in keeping the channels and drains sediment free. Therefore; no detrimental effect is projected.

No immediate effect is projected at Rawa Pening. The lake will be larger and deeper. The additional about 3.0 m depth might cause problems through loading. Studies should be made to ascertain the effect of loading on the spring system partially feeding the lake and on the sediments and structural stability of the lake. The raising of the water level at Rawa Pening and the ability to provide additional water could be the key to the successful completion of the project. There will be a loss of crop land.

G.4.5.c. Effect on Water Quality

There are no records of water quality in the lower reaches of the rivers and canals in the project area. Some studies have been done in the Rawa Pening Area by Satya Wacana University [1,13]. However, it is said that almost every river in Central Java is contaminated to a greater or lesser extent. Considering the purposes to which the rivers and canals are put, a high dissolved solids content, a large coli bacillus count, nitrogen and phosphate higher than natural and a high BOD brought about by organics can be expected to be found throughout the water system. The situation would change from dry season to wet season. With the project increasing the net area planted to rice and a commensurate increase in the use of fertilizers and insecticides, there might be a secondary effect on water quality.

At the time fertilizer is applied in the form of urea or TSP, water is not running through the paddy; the paddy may have as much as 10 cm of standing water. Taken into solution, the urea would

be transformed to ammonium carbonate. The ammonium ion would have an attraction to the clay. Later, when water is turned into paddy, if exchange ions are present, some ammonia might be released to the water. Little harm would come to the fish. If the water carries a high sediment load, the ammonium ion could be captured in the water and leave the paddy via the overflow drain. In the case of insecticides, care should be taken by the farmer in applying Diazion or Furadon. The half-life of the compounds is 7 to 10 days and it is possible to have large accumulations of them in the drains and depressions. Such accummulations could be fatal to fish, particularly if there is a lack of oxygen in the water.

In the reservoir after closure, the water quality is expected to follow the familiar pattern of a preliminary nutrient increase which will be exploited by every level in the food chain. Initially, reproduction of lacustrine life will be slowed by production of reducing substances such as hydrogen sulfide. Depending on the amount of organic material left in the reservoir, the generation of hydrogen sulfide could continue for years.

Because there are presently several species of aquatic weeds in Rawa Pening, one can expect these weeds to flourish in any downstream impoundment. Jragung Reservoir will be infected via the transbasin diversion. Water quality is affected through the death and decaying processes of these weeds in which nutrients can be released to the water and the BoD increased.

General water quality in the reservoirs will depend on the inputs from upstream in the upper watersheds. If sediments and organic wastes continue to be supplied via the tributaries to the reservoirs, then the quality and overall usefulness of the reservoir's water will be affected.

G.4.5.d. Mitigating Measures for Water Quality

Proper application of fertilizers and insecticides is a must to maximize net income. Instructing the farmer in application techniques is a function of the Extension Service and a mitigation measure for this possible impact on water quality.

To reduce the generation of hydrogen sulfide, organic matter (brushland trees) should be removed or burned prior to filling.

Weed control can not only be expensive but create additional problems. Removal of the noxious weeds from Rawa Pening prior to filling the reservoirs would be an expensive mitigation measure. Lacking total removal, the best solution may be to turn the problem into an asset by harvesting the weeds for production of cattle feed or fertilizers. The possibility exists that the proposed dike around Rawa Pening could aid in the control of water hyacinths, depending upon the release schedule for the water. As the hyacinths are a problem on the lake, this would be a benefit.

Controlling inputs from the upper tributaries may be difficult. Sediment is a particularly onerous problem. An upper watershed improvement program to instruct and demonstrate erosion control and provide health and sanitation education would help mitigate the effects of harmful inputs.

G.4.6. Effects on Biology

Indonesia is considered by many to have the richest display of flora anywhere in the world. This derives in part from the country's warm, moist climate and its varied topographic and geographic position between Australia and Southeast Asia. Vegetation zones are generally

altitudinal and range from beach formation and mangrove swamps to tropical alpine scrub. Exploitation and population pressure have been so severe that there are no areas of natural vegetation or natural habitats in the reservoir area. Thus, there will be no adverse effects on the natural vegetative environment. There will, however, be effects on the second-growth vegetation.

G.4.6.a. Effect on Coastal Biology

The potential for problems on the coast owing to a decrease in sediment has been discussed. It is likely that there also would be a reduction in nutrient deliverability, producing an effect on offshore fisheries. There are no figures available and no studies have been made concerning this facet of the environment. It is suggested that a biological study be conducted in conjunction with the coastal geomorphic study.

G.4.6.b. Effect on Inland Fisheries

Currently, in the dry season, the rivers and many canals become interconnected pools of stagnant water forming virtually open sewers. This will be corrected by the project so that river fish can be introduced Similarly, as long as the reservoir is not drained completely, lake species can be introduced into Rawa Pening. These new environments could provide additional animal protein for the local diet. To maximize the quantity, no fishing should be allowed for the first two years at the reservoirs and after that, limits should be established on the number of fish harvested. So many factors are involved in fish production that assessment of this benefit is not possible at this time.

G.4.6.c. Biologic Effect on Water Quality

The presence of aquatic weeds in Rawa Pening was discussed in the previous section. In decomposing, they can increase the BOD so that water quality could be detrimental regarding fishing potentials of the reservoir. On the other hand, fish require protection which the weeds provide. The best program might be to harvest the more noxious weeds as suggested earlier.

G.4.6.d. Effect on the Forest

Several hundred hectares of forest land will be affected by the creation of the reservoirs. Unless the trees are harvested prior to filling the reservoirs, a valuable supply of timber and firewood will be lost. Removing the trees prior to filling will serve to mitigate the loss and will also aid the water quality of the filled reservoir.

G.5. ADVERSE EFFECTS WHICH CANNOT BE AVOIDED

G.5.1. Sediment

If the project is implemented under present conditions, there is no way to avoid collecting a great deal of sediment in the reservoirs. The problem has been recognized and can be taken into account when designing the dams and establishing operating schedules for the reservoirs. While these will aid in reducing the impact, the fact remains that over a great number of years, sediment will accummulate in the reservoir to the point that the reservoir loses its significance.

G.5.2. Air and Water Quality

If the project is implemented, there will be short-term adverse effects on the air quality brought on by travel over dirt and gravel roads, by blasting for dam structures and by blasting in the borrow areas. These can be mitigated to a degree. The long-term adverse effect will be brought on by hydrocarbon emissions and introduction of particulate matter into the atmosphere by heavy traffic along the roads to the project areas.

Secondary adverse effects on water quality by additional applications of fertilizers and insecticides could be mitigated with proper instruction. Similarly, the potential secondary adverse impacts on water quality by industry could be mitigated with proper planning. Since both the proper instruction on application of fertilizers and insecticides, and planning to avoid the impact of industrial waste are beyond the influence of the project, they are only mentioned here.

G.5.3. Loss of Land

With the construction of the dams and filling of the reservoir, land will be lost. Forest land and crop land will be flooded; there will be the loss of property and other commercial enterprises and the resultant loss of income. Some mitigation will be possible. The forest lands will be cleared and exploited prior to filling the reservoir, the local merchants will be moved, (most likely transmigrated with the rest of the villagers), but the land will be lost to the reservoir. The loss is not irreversible in that if the reservoir were to be drained, the land would be recovered, but only at the loss of the reservoir.

G.5.4. Additional Studies Required

There are potential unfavorable adverse impacts which to assess fully require additional study. The loss of sediment to the coastal plain could cause adverse impacts to the shoreline and the local biology. There are other, technical, aspects of the Rawa Pening project which require more inquiry.

Both of these are important and will require more study. A more detailed inquiry into the environmental aspects concerning water quality and impact on the fishing in Rawa Pening needs to be made.

G.6. SHORT AND LONG-TERM RELATIONSHIPS IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS AND ALTERNATIVES TO PROPOSED STUDY

These subjects, always called for in the format of an environmental statement, are grouped under one heading in this report. The scope of a pre-feasibility study, the short time allowed, and budgetary considerations all combine to limit the data necessary to discuss these subjects. Alternatives within the proposed study are discussed in Appendix C - Part I.

Alternatives to the proposed project would have to include the (1) no project alternative; (2) relying on coal or hydrocarbons to generate the small hydroelectric components written into the project, or doing away with power generation altogether because of its small size; and (3) considering alternative plans that would provide similar benefits to the people of this north-central part of Java. Concerning the last alternative, a mix of projects that would supply municipal and industrial water, provide some flood control efforts, enhance the attractiveness of the area for labor intensive industry, and supply irrigation demands should be considered.

At the feasibility level, these items must be considered or time and money must be provided for their study now. What is the solitary effect of cleaning and widening the drains, canals and channels? What is the effect of storage at Rawa Pening and a trans-basin diversion to the Jragung River? These are important questions which must be considered and which will require additional study time.

Part II - Cultural Environment

G.7. INTRODUCTION

G.7.1. Background

Persuant to the Contract between the Ministry of Public Works of the Government of the Republic of Indonesia and PRC Engineering Consultants, Inc. of Denver, Colorado, U.S.A. (May 15, 1979) and realizing that the successful implementation and completion of any project to be done in the Jratunseluna Basin (subproject Tuntang/ Jragung River Basins) depended upon the well-being and interests of the population in the basin, both in the service and impacted areas, the Directorate General of Water Resources Development, Ministry of Public Works, Republic of Indonesia commissioned studies to be done with regards to the social and environmental aspects of the project area. Environmental aspects of the Tuntang/Jragung Rivers Basins were covered in Part I of this appendix, while this section deals with the socioeconomic problems arising out of the proposed projects.

The Jratunseluna Basin Project proposed to develop the water resources in the basin in an area some 7,700 km^2 in size, encompassing a population of some 2,361,524 people [1971 census; Jratunseluna Basin Development Plan, Vol. 2, 1973]. At this stage of the project, and in-depth social and environmental survey of the entire basin area in all respects was neither possible nor feasible. Therefore, only three major project areas that could be implemented within the next decade were studied in any detail: Rawa Pening, Glapan Barrage, and Gunung Wulan. Subsequent socio-economic generalizations will be drafted for the rest of the basin area. Should any further work be done on the basin, and most especially, should the prefeasibility studies on Rawa Pening, Glapan, and Gunung Wulan progress to feasibility stages, extensive studies of the socio-economic impact of the proposed

projects should be implemented as soon as possible.

G.7.2. Data Constraints

While recognizing that the nature of this and other studies in the basin serve only as reconnaissance, or prefeasibility studies for the proposed projects, it should be noted at the outset that socio-economic studies are not amenable to short-term (e.g. one or two months or less) time constraints. That is to say, all qualitative, and some of the quantitative data presented here must not be viewed in terms of concrete reliability. Some data, such as average per capita income, could not be collected in the time allowed for all areas and other data was simply not available. Other data, such as responses to transmigration, attitudes towards specific projects, or assessments of reaction to proposed projects, are subjective in nature and responses given herein were taken from only the most superficial strata of the population. Some areas and populations such as the coastal fishermen or populations in flood control areas, were not contacted.

At all levels of data gathering what was felt to be important was the "reality of orientation"; i.e., what the people themselves perceived to be true, rather than what might be true in more concrete terms. The credibility of any one portion of the study population, and/or other sources was not the issue; rather, under the assumption that people tend to act according to what they believe to be true, the data gathered was treated as if it were true.

Given the time constraints, many of the economic factors pertinent to mitigation were deliberately omitted, as was a survey of some of the more important governmental levels of information; e.g., transmigration costs and implementation levels of service programs. The study focused primarily on the top informational levels in data gathering,

and cannot be viewed as being either representative or comprehensive.

One more additional warning must be issued with regard to the data contained in this report. Frequently the data (both quantitative and qualitative) received was contradictory in nature. While every effort was made to resolve conflicting statistics, and information, this was not always possible. Subsequently the data used in some cases is the result of judgemental factors, and no doubt may contain numerous errors.

In summary, all data and subsequent recommendations and guidelines must be evaluated cautiously, keeping the various constraints stated above in mind.

G.8. CULTURAL ENVIRONMENT - SERVICE AREA

G.8.1. Demography - Service Area

With more than 140 million people, Indonesia is the fifth most populous nation. The average density of 74 persons per km^2 is deceptively low inasmuch as 65 percent of the population live on only 7 percent of the nation's land surface on Java and Madura. The population for 10 kecamatans in the service area is 506,349, estimated in 1977 (Table G-1); and a breakdown by sex and age groups is shown in Table G-2. This is an increase of 38,145 since 1973; a low 1.7 percent increase per year. A regional report on Central Java [11] reports this same figure as net increase; the gross increase was 2.1 percent with 0.4 percent out migration. The same report documents a massive outflow of rural population to the urban areas and estimates 80,000 people per year leave the province for Jakarta. Dempet on the coastal plain and Kedungjati, lying in the upland, had the lowest population increase, 0.2 and 0.4 respectively. The highest rates of increase were in Wonosalam, Godong, and Demak, all on the coastal Plain, 2.8, 2.6, and 2.4 percent respectively.

The increase in women in this 5-year span was 3.2 percent greater than the increase in men. If a general ratio of 50-50 births, $\pm$ 1 percent is assumed, then one must conclude that an excess of men either died or moved out of these kecamatans. It is highly likely that many men migrated to Semarang or other larger cities in search of employment. A look at the sex ratios for the individual kecamatans reveals that Dempet had a decrease in the population of women and an increase of 500 man in the 5-year period. In Kedungjati there was a five percent decrease in the number of men but an average nine percent increase in the number of women. It would appear that whole families moved out of Dempet but only men left Kedungjati in search of opportunity.

There are approximately 263,124 people within the service area. The average family size reported by various studies [6, 7, 8] is 4.5 people. However, there may be more than one family per house. The extended family averages 5.5 people per kitchen and is greater in better irrigated areas than in poorly irrigated areas.

G.8.2. Economically Active (Labor Force) - Service Area

For the purpose of this discussion, the economically active segment of the population will be defined as those in the age group 15 through 54. The percentage by age groups of the total population for selected areas is presented in Table G-3.

As can be seen, the percentage distribution of total population within the age groups selected is similar for Demak and for the total population of Central Java and the Republic. There are proportionately more older people in Grobogan. The population dependency ratio is an index of how many people are supported by the economically active age group. In computing this index for the Republic, the age grouping is lowered to 10 years and the resulting index is 1.62. Considering just the 15-54 age group the national index is 2.0 as is the index for Kabupaten Demak. The index for Kabupaten Grobogan is 2.1. Tables G-3 and G-4 present these data and the farm and non-farm labor statistics. Only Demak, Godong, and Kedungjati have a dependency index greater than 2; if the statistics are correct, Kedungjati has an incredible index of 7.

In Dempet, Guntur, and Wonosalam, the total employed is greater than the number of adults. This implies that some of the "10-15 years' age group are working. With neighboring kecamatans exhibiting a dependency index greater than 2 (e.g. Demak) it is possible that there are workers living in one kecamatan and working in adjoining districts.

The higher dependency index in Demak and the greater than average increase in population might indicate a migration pattern into Demak and a consequential high unemployment rate.

Table G-5 presents the distribution of the labor force over 11 categories. This information was available only for Kabupaten Demak. The percent of total population employed is interesting and reinforces the previous statement with respect to commuting labor.

In 1973 it was reported that 38 percent of the population of the area had a livelihood. The data presented here show that 61.4 percent of the population is employed. Either there has been a tremendous increase in available jobs or these figures conceal a large under-employed sector of the labor force. The latter is most likely the case particularly when considering farm labor. It has been reported that for one planting and harvesting of rice, employment opportunities are limited to 46.6 days. Labor requirements vary from 86 to 214 persons/ha per crop through weeding. If this information is correct three crops of rice would take less than one half year of employment days and agricultural workers are under-employed.

G.8.3. Income and Cost of Living

Table G-6 presents average income and expenditures for nine major commodities for the years 1973-1978. The price of the commodities increased by 66 percent over this six-year period; the average income over the same period tripled. Data from the Bureau of Statistics show that expenditures for food items in urban areas of Java took 70 percent of income in 1970; by 1976 this figure had decreased to 58 percent. Rural expenditures for food for the same period show but little change, declining from 78 percent of income in 1970 to 76 percent of income in 1976.

There are interesting statistics since non-agricultural workers buy their food while farm laborers may be paid in kind. Furthermore fishermen, foresters and cash-crop farmers buy their rice while farmers may substitute maize and cassava for rice. This implies that rural income has not increased significantly during the sampling period. This is borne out by the data presented in Table G-7 showing the percentage distribution of gross regional domestic product of Central Java for 1971 through 1975. The agricultural sector actually declined in percentage of gross regional domestic product by over 9 percentage points. Compared with the percentage of total income in Kabupaten Grobogan for the year 1975, these percentages are close except for agriculture and manufacturing.

It was reported that in 1973 gross farm income in Wonosalam was Rp. 251,156, while in Sayung it was only Rp. 26,526. In another report by Satya Wacana University [8] a gross income per ha of Rp. 104,002 and net of Rp. 84,906 was reported for the service area. The Jratunseluna Basin Development Plan [9] reported farm income at Rp. 7,436. There is a wide variety of incomes which illustrate the problems in obtaining, reporting and analyzing data.

Farm labor wages in the Serang Basin were Rp. 80 - 100 per working day plus a Rupiah 30-meal, with females paid 20 percent less [19]. In 1973 construction labor was Rp. 150 with some earning Rp. 175 - 200 per day. The effects of devaluation on income is not known.

G.8.4. Manufacturing, Industry and Commercial Enterprises

In the previous two sections, data were presented on the potential labor force and the income per sector for 11 sectors of the economy. An estimated 79 percent of the population in the service area are involved in agriculture but they only garner 63 percent of the total income. On the other hand, those involved in wholesale and retail

trade average about 2.5 percent of the labor force, but they earn 19.8 percent of the total income. This illustrates the economic disparity between agriculture and mercantilism and makes it easier to understand why many agriculturists are involved in trading during periods of low labor demand on the farm. This latter statement also explains why there are more rice traders in poorer areas than in richer.

Within those kecamatans containing the service area in Kabupaten Demak the percentage of the population in any given category varies with geography in its most general aspects. For example, Bonang has significantly more people engaged in fishing (12%) and fewer engaged in transportation (0.1%) than the average for the kabupaten. Since it is located on the coast, the high number of fishermen is expected; to explain the low number of people in transportation by citing the lack of a good road system does not carry over to Dempet (a low 0.1% and a better road and rail system) nor to Guntur (a better than average 0.6% of population in transportation and a poorer road system).

Demak, the kabupaten capitol, has a greater-than-average number of people involved in industrial labor, trade, transport, civil service and army. The governmental offices, the transportation network and its central location within the Kabupaten all help explain the distribution of labor. At this time this information is not available for Grobogan and further comparison for the service area cannot be made.

Central Java supports many household and cottage-type industries that can be subject to price competition from modern industries. The net result can be that the value added by the unpaid family worker in cottage industry is less than wages. Cottage industries then become a function of time rather than economics since the family members can work at odd moments during the day rather than keep a

steady work schedule. There does not seem to be much of a handicrafts industry in the service area as there is nearer Yogyakarta.

G.8.5. Agri-Business and Agri-Infrastructure

Although the subject of many studies, the marketing of agricultural good is still obscure. Four possible reasons for this obscurity are offered:

1. Most of the agricultural commodities do not leave the farm;
2. There is no record of those leaving the farm into the market stream;
3. Government intervention confuses the market;
4. The marketing operations of so many small merchants are not recorded nor understood.

In Kabupaten Demak and Kabupaten Grobogan information is not readily available on those commercial establishments serving the agricultural sector. Much rice appears to be marketed through middlemen with local bicycle-men, (buyers) acting as individual middlemen between the farmer and the next larger link in the rice-marketing chain.

Thus most of the rice appears to be purchased from numerous small farmers in small quantities for storing, processing or reselling. Many of the traders are non-indigenous nationals of Chinese descent who often provide credit to farmers at high rates of interest[1/]. In areas where rice planting occurs within a short time-period, the effect is large quantities of rice reaching the market at the same time and depressing the price. It is the practice to repay loans in kind after harvest. Thus, those merchants who also finance the farmer are repaid in low-priced rice which increases in value during storage.

1/ This however provides credit to landless farmers who have no other source of credit.

The merchant not only benefits from the interest paid but also from the increase in the rice price.

Many of the middlemen merely serve a transportation role buying gabah (dry un-hulled rice) from the farmer and selling it to others. Others buy the gabah, mill it or have it milled, and then sell the milled rice. No survey was made of governmental milling and storage facilities and their role in the farmer-to-consumer chain. In general, rice milling and storage facilities are more likely to be found in a well-irrigated area than in a poor one.

G.8.6. Landuse, Farm Size and Land Tenure

Much of the information relating to distribution of land use is conflicting. The information presented in Table G-8 is not complete and not too much faith should be placed in the figures at this time. No data are available on farm size but a ratio of irrigated land to the number of farmers for the kecamatans in service area, Kabupaten Demak, averages 0.8 ha irrigated land per farmer; of the estimated 116,675 owners in the area (LPIS, 1975 Demak-Grobogan Area), 80 percent posesses less than one (1) ha. Different figures are presented in different reports, e.g., 0.75 ha and 0.5 ha, for the average land holding.

The price of class 1 irrigated riceland has increased almost three hundred percent since 1977. This dramatic jump in price is in part attributed to the devaluation of the rupiah in 1978. For Kabupaten Demak land price per square meter for various types and classes of land are shown in Table G-9. These prices may be low; Satya Wacana Christian University study found land prices on the Serang Basin vary from Rp. 300,000 per ha for good dry land to Rp 1 million for well-irrigated land. Based on the information in this table the average size farm would be worth Rp. 682,500. The figures presented in the table illustrate a problem common perhaps to most nations in

the world and that is the extremely high prices offered for class 1 residential and industrial land with the resultant loss of prime agricultural land as towns and industrial areas expand.

Agricultural land rent in 1973 was Rp. 30,000 per ha per season for class I land and Rp. 20,000 per ha per season for class II in the service area. Based on the land price and devaluation these figures are probably low. Renting agriculture land by season is called morojejeg. Puton is rent collected two years before cultivation. Rent is cheaper in this manner. Also cheaper is ngemping where land is rented one year prior to cultivation. Land is seldom rented in these ways unless the land owner is in need of money. For the sake of clarity, land prices, governmental assessment of land, and land rental for the impacted areas (Rawa Pening, Glapan and Gunung Wulan) will be discussed separately in the following Section: Impact Areas.

G.8.7. Crops and Cropping Pattern

The cropping pattern, production, and yield for the kecamatans containing the service area are presented in Table G-10. Data from the years 1974 and 1978 are compared. In some kecamatans yields increased significantly; in others yields declined. In all kecamatans the average number of hectares planted changed; in some it increased; in some it decreased. The increases in the sorghum yields illustrate the emphasis given this crop by governmental farm advisors. The increase in cassava and maize yields have been dramatic and could reflect the use of fertilizer and increased attention given to these crops in the dry season. As observed in the western and more dry areas of the service area, there has been a dramatic change in cropping patterns by the increased numbers of farmers planting tobacco.

The reader is referred to Appendix B Parts I and II for an in-depth discussion of agriculture in the service area.

G.8.8. Education Facilities

Data obtained on school facilities and pupils are not reliable and thus are not presented here. Data was obtained for the number of public schools and religious schools but the number of students attending religious schools is not known. Since some areas rely heavily on the scholastic and secular training offered by religious schools, the number of students attending school could be a gross error.

Statistics from other areas when compared with these from the public school system in the service area indicate no real difference in the general pattern of attendance, in that school attendance decreases rapidly through grade school. Less than five percent of those attending grade school continue on to junior high school. At the village level most gradeschoolers drop out at the fourth grade and more girls quit than boys. There are several factors; uppermost is the economic one. While schooling is generally free, some systems do have a tuition to pay and uniforms to buy. Farm families often require the labor of the entire family in cultivating land, harvesting the crop, and tending to other farm duties. The new varieties of rice are often threshed in the field so that at harvest time everyone in the family is busy cutting, threshing, or transporting rice. The economic factor is emphasized by research by Satya Wacana University finding that the highest number of school-aged children in school correlates with better irrigated areas. Those that complete their education are children of the well-to-do.

Another factor affecting school attendance is location of the school. Grade schools are located so that all can attend with a minimum of transportation. Junior high schools and senior high schools are so few in number that attending can put an additional burden on the child. Either the student commutes great distances or else he stays in town generally with relatives and attends school.

This puts additional financial strain on the family. Researchers at Satya Wacana University suggest more village girls drop out of grade school than boys because girls can marry at about 10 years of age.

Perhaps most important is that the young receive little encouragement from their parents, particularly at the village level. The parents question the present usefulness of education when the child could be doing something useful for the family rather than sacrifice for the future for an unknown benefit. One might say that to these farmers the value of an education when discounted to its present worth is zero.

G.8.9. Transportation and Communication

The highway from Semarang to Purwodadi is a secondary road and in extremely bad condition as are all other roads within the service area. Many roads are unfit for motor vehicles in the rainy season. Drainage is bad; bridges are out or in a bad state of repair; overloaded trucks are tearing-up the macadem roads. Roads into the proposed reservoir area will not accommodate heavy equipment. In all probability all bridges will have to be replaced and the roads widened, should the projects be implemented. The road from Semarang to Demak is newly rebuilt and in good condition.

A first-class railroad traverses the area from Semarang to Purwodadi and from Semarang to Demak to Purwodadi.

Local travel is by foot, bicycle, motorcycle, draft animal, or becak. There are some small intra-regional buses which carry passengers and goods from village to village as the road conditions permit and along the main highway from villages to the larger towns.

3.8.10. Public Health

Within the service area there are two hospitals, one in Demak and one in Gubug. There are public health clinics, obstetrics and pediatric clinics with staff in each kecamatan. Seven doctors and 35 nurses serve the kecamatans in which the service area is found.

Family planning has not been a huge success. In spite of the fact that the population growth rate is down from previous highs in the late 1960's,(2.7% to 2.3%) only 12,000 people (about 12 percent of the families) in the 10 kecamatans are listed as accepting family planning methods in 1976.

Cholera is the major disease treated and has been the leading cause of sickness for several years. Treatment for tuberculosis and malaria are second and third in reported cases.

Over the past three years, Demak has reported more patients treated and had the highest number of cholera patients in the years 1975-1977 and the highest number of incidences of malaria (1977) and highest report of leper patients (1976) in the 10 kecamatans. The incidence of malaria was greatest in 1975 in Godong, 230 cases, in 1977. Venereal disease blossomed to 115 cases in Tegowanu; Tegowanu was also high in 1975 (93 cases). The reported incidence of malaria was down sharply between 1975-1977.

Statistics on prevalent diseases and illnesses are difficult to gather. Information on the number of people treated for stomach disorders and general gastro-intestinal problems were not reported. These problems are so common that often they are treated by home remedies and not officially reported. In Table G-11 some arthropod- and water-borne viruses and diseases known to occur in Indonesia are

presented. Of these only cholera is reported in the service area; none of the others are known to be reported in Kabupaten Demak and Kabupaten Grobogan.

No reports have been obtained on goiter, malnutrition, or vitamin deficiency. It is known that many cases have been reported in other districts occurring mostly in the hilly uplands. It is quite likely that these problems occur in the uplands of Grobogan.

G.8.11. Municipal Water

Within the service area only Demak has a municipal water supply system. Used primarily for governmental buildings, the town treats 20 l/s of water obtained from the Tuntang River.

In a few instances domestic water is obtained from cased wells by hand-operated pumps. More generally when water is obtained from wells, the wells are shallow and open and subject to contamination. Most of the people use canals, ditches and the rivers for a water supply for bathing and for toilet facilities.

Special Report No. I [17] discusses the problems of Municipal water in detail.

TABLE G-1

POPULATION DATA 1977

10 KECAMATANS IN PROJECT AREA

No.	Kecamatan	Adults		Children		Total		Total
		Male	Female	Male	Female	Male	Female	
1	Demak	18,658	19,938	12,764	13,538	31,422	33,476	64,898
2	Bonang	15,804	17,768	11,211	11,747	27,015	29,515	56,530
3	Wonosalam	9,487	10,489	9,827	10,366	19,314	20,855	40,169
4	Dempet	17,564	18,782	12,410	13,099	29,974	31,881	61,855
5	Karang Tengah	10,029	10,668	6,207	6,777	16,236	17,445	33,681
6	Guntur	10,404	11,090	10,568	11,092	20,972	22,182	43,154
7	Godong	16,440	17,730	12,682	12,890	29,122	30,620	59,742
8	Gubug	12,637	14,042	12,121	11,540	24,758	25,582	50,340
9	Tegowanu	7,880	8,778	7,975	7,855	15,855	16,533	32,488
10	Kedungjati	15,103	16,787	13,939	17,663	29,042	34,450	63,492

TABLE G-2

COMPARISON OF POPULATION STATISTICS

REPUBLIC OF INDONESIA (1971)

KABUPATEN DEMAK (1977)

Age	Indonesia 1971			Kabupaten Demak 1977			Kabupaten Grobogan 1977		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	9,606,158	9,492,535	19,098,693	46,985	47,626	94,611	75,590	84,901	160,491
5-9	9,525,224	9,236,857	18,762,081	49,164	49,384	98,548	59,791	62,571	122,362
10-14	7,353,370	6,826,167	14,179,537	38,627	36,982	75,609	60,261	62,945	123,206
15-24	9,189,436	10,167,328	19,356,764	45,851	50,248	96,099	71,314	72,744	144,058
25-34	7,667,616	9,160,828	16,828,444	35,970	47,530	83,500	8,574	61,905	120,479
35-44	6,011,866	7,069,027	14,080,903	37,552	40,050	77,602	1,989	53,697	105,686
45-54	4,329,646	4,183,812	8,513,458	24,180	24,644	48,824	5,038	46,618	91,656
55-64	2,208,419	2,356,115	4,564,534	12,418	14,384	26,802	33,071	35,629	68,700
65 +	1,439,842	1,538,535	2,968,377	7,761	8,790	16,551	16,430	18,297	34,727
Total:			118,352,791			618,146			971,265

TABLE G-3

PERCENT OF POPULATION
ECONOMICALLY ACTIVE

	0 - 14	15 - 54	55+
Indonesia (1971)	44.0	49.7	6.3
Central Java (1971)	44.0	49.5	6.5
Kabupaten Demak (1977)	43.4	49.6	7.0
Kabupaten Grobogan (1977)	41.8	47.6	10.6

TABLE G-4

NUMBERS ADULTS, CHILDREN FARM AND NON-FARM EMPLOYED FOR TEN KECAMATANS

Kecamatan	Adult	Children	Total	Farm	Non Farm	Total Employed
Demak	38,596	26,302	64,989	21,459	7,236	28,695
Bonang	33,572	22,958	56,530	27,504	4,558	32,062
Wonosalam	19,976	20,193	40,169	18,908	9,129	28,037
Karang Tengah	20,697	12,984	33,681	13,474	4,693	18,167
Guntur	21,494	21,660	43,154	24,487	5,673	30,160
Godong	34,170	25,572	59,742	26,276	112	26,382
Gubug	26,679	23,661	50,340	36,164	71	36,235
Tegowanu	16,658	15,830	32,488	22,903	-	22,903
Kedungjati	31,890	31,602	63,492	8,715	362	9,077
Dempet	36,346	25,504	61,855	31,355	13,145	44,500

TABLE G-5

DISTRIBUTION OF LABOR FORCE FOR SELECTED KECAMATANS IN WHICH SERVICE AREA IS LOCATED

Desa Kabupaten Demak	Population	Farmer	Farm Labor	Fisherman	Industrial White Collar	Industrial Labor	Construction Labor	Commercial Trade	Transportation	Civil Service & Army	Pensioned	Others	Total Working	% Total Population Employed
Bonang	56,530	7,903	15,841	3,760	9	41	228	755	4	121	25	3,400	32,062	56.9
Demak	64,898	6,902	14,433	124	96	1,359	443	2,848	538	922	915	1,030	28,695	45.6
Dempet	61,855	11,253	20,102	0	26	112	249	540	20	375	49	11,823	44,500	72.0
Guntur	43,154	9,366	15,121	0	16	36	491	311	193	364	33	4,262	30,160	70.0
Karang Tengah	33,681	5,132	8,317	25	26	278	1,291	846	53	352	84	1,847	18,167	54.1
Wonosalam	40,169	7,082	11,826	0	9	124	163	603	67	205	39	7,958	28,037	69.8

TABLE G-6

AVERAGE ANNUAL INCOME PER CAPITA CENTRAL JAVA -
AND AVERAGE ANNUAL COST OF NINE MAJOR COMMODITIES
FOR PURWODADI AND DEMAK - YEARS 1973 - 1978
(Rupiahs)

	1973	1974	1975	1976	1977	1978
Per Capita Average Income Central Java	30,235	37,154	51,339	67,898	78,837	92,008
Per Capita Average Annual Cost of 9 Major Commodities in Central Java	19,509	21,330	25,249	29,743	31,171	32,425
Purwodadi **	18,608	21,714	25,602	31,142	31,017	31,934
Demak **	18,460	20,891	25,915	30,260	31,331	32,389

* Average based on data from 35 cities in Central Java
** Per capita income 1977 Purwodadi Rp 63,365, Demak Rp 71,079

TABLE G-7

PERCENTAGE DISTRIBUTION OF GROSS REGIONAL DOMESTIC PRODUCT OF CENTRAL JAVA AT CURRENT PRICES

	1971	1972	1973	1974	1975	Grobogan Percent Total Income 1975
Agriculture	50.15	47.08	49.07	44.18	41.00	63.3
Mining & Quarry	0.65	0.55	0.48	0.56	0.49	0.5
Manufacturing	15.63	15.47	14.83	17.49	20.83	2.2
Construction	2.16	1.82	1.73	1.85	1.58	1.6
Public Utilities	0.20	0.20	0.18	0.23	0.24	-
Transport & Communication	2.06	2.25	2.20	2.51	3.77	1.2
Trade (Wholesale and Retail)	17.43	20.70	19.34	20.56	19.48	19.8
Banking & Financial	0.59	0.68	0.66	0.90	0.87	0.1
Renting Property	3.93	3.82	3.18	3.07	2,63	2.2
Public Administration	4.68	5.02	6.07	6.38	6.99	7.4
Service	2.52	2.41	2.26	2.27	2.12	1.5

TABLE G-8

GENERAL LAND USE SELECTED KECAMATANS, KABUPATEN DEMAK & GROGOBAN 1977

	DEMAK						GROBOGAN						
Kecamatan	Tech	Semi Tech	Non Tech	Total	Homeyard & Upland	Other	Tech	Semi Tech	Non Tech	Total	Homeyard & Upland	Other	Total Land
Bonang	341	1,563	4,120	6,024	1,274	821	-	993	4,969	5,962	970	1,185	8,117
Demak	822	1,450	1,636	3,908	1,891	226	593	1,245	2,006	3,844	1,943	239	6,026
Dempet	2,596	4,000	204	6,800	2,485	1,049	6,462	175	370	7,007	2,686	659	10,352
Godong		Unknown					3,994	967	853	5,814	2,371	211	8,398
Gubug		Unknown					211	1,524	1,436	3,171	2,363	1,162	6,952
Guntur	-	725	2,353	3,078	2,595	69	40	541	2,488	3,069	2,574	108	5,751
Karang Tengah	-	1,318	2,378	3,696	886	447	-	1,106	2,580	3,686	905	438	5,029
Kedungjati		Unknown					719	61	682	1,462	2,482	10,914	17,526
Tegowanu		Unknown					-	633	2,072	2,705	2,293	-	5,164
Wonosalam	1,595	1,607	1,884	4,086	1,615	85	1,505	1,598	979	4,082	1,615	90	5,787

TABLE G-9

PRICE PER m^2 SELECTED LAND TYPES AND CLASSES

KABUPATEN DEMAK 1977 - 1979

(Rp/m^2)

	(Rupiahs per square meter) 1977	1978	1979
Land Near Urbanized Areas			
Industrial Class 1	2,100	2,500	3,000
2	1,200	1,500	2,000
3			1,500
Commercial Class 1	900	1,500	3,000
2	375	1,000	2,000
3			1,500
Residential Class 1	1,200	1,500	2,500
2	720	1,000	2,000
3	360	750	1,500
4	120	250	1,000
Rural Land Residential Class 1	120	200	400
2	90	150	300
3	60	100	200
4	30	50	150
Riceland Class 1	72	100	200
2	48	75	150
3	24	50	100
4	12	25	75
Fishpond Class 1	36	75	125
2	24	50	100
Upland Class 1	36	65	100
2	24	40	75
3	12	25	50
4	6	15	30

TABLE G-10

CROP YIELDS PROJECT AREA 1/

Kecamatan	1975 2/		1976		1977		1978	
	Yield (t/ha)	Production (t)	Yield (t/ha)	Production (t)	Yield (t/ha)	Production (t)	Yield (t/ha)	Production (t)
Demak	2,014	1,379.5	2,459	9,419.8	2,515	19,479.6	2,263	12,105.9
Bonang	1,925	625.5	2,172	7,721.2	2,173	14,768.5	1,989	11,245.1
Wonosalam	2,465	1,673.5	2,576	14,076.5	2,498	20,691	2,555	13,816.4
Dempet	2,350	3,976.2	3,001	29,247.8	2,690	37,646	2,968	26,519.1
Karangtengah	2,004	2,068.5	1,965	8,886.7	1,556	10,752.3	2,275	12,260.6
Guntur	1,641	457.8	1,907	10,926.6	1,854	8,144.9	2,401	10,818.2
Godong	2,245	2,960.8	2,672	12,426.2	2,669	15,797.9	2,891	6,851.8
Gubug	2,108	1,969.3	2,635	9,593.4	3,341	21,574.2	3,132	15,597.6
Tegowaru	1,801	981.8	2,101	5,047.5	3,100	5,831.7	3,401	13,428.5
Kedungjati	2,194	1,687.2	2,182	4,040.6	2,634	5,629.7	3,190	4,501.5

1/ The tabulated yields and productions are for rice crop only. Data on other crops were not fully available. However, similar variations as in the rice crop irrigated areas were observed in other crops as well.

2/ Dry season only.

TABLE G-11

SOME ARTHROPOD AND WATER-BORNE DISEASES AND VIRUSES

KNOWN TO OCCUR IN INDONESIA

Disease or Virus	Infectious Agent	Reservoir	Made of Transport	Remarks
Angiostrongyliasis	Nematode 3rd Stage larvae	The rat	Intermediate host snails and slugs. Prawns, fish, and land crabs that have consumed snails or slugs transport larvae	Differential diagnosis includes tuberculosis and meningitis among others.
Viral Encephalitides (Japanese Encephalitides)	Group B togaviruses	Unknown	Bite of infective mosquitoes	Mild cases often occur as aseptic meningitis.
Dengue Fever (Breakbone fever)	Virus immunological types 1, 2, 3,4 Group B togaviruses	Man-mosquito and monkey-mosquito	Bite of infective mosquito	Epidemics explosive, but fatality rate low.
Hemorrhagic Fever	As above	Unknown, probably man and A. Aegypti	Bite of infective mosquito, Aedes Aegypti	A severe gengue illness - almost exclusively observed in Orien-members of population.
Cholera	Vibrio cholerae	Man	Ingestion of contaminated water or food contaminated by flies	
Filariasis	Brugia malayi	Animals including man w/filariae in the blood	Bite of mosquito harboring infective larvae.	Only recently found in man.
Schistosomiasis	S. Japonicum	Man	Intermediate host is snail. Infection comes from body contact with infected waters	Small focus known on Lake Lindoe Paloe District, Sulawesi. Only genus Oncomelanea is natural host for S. Japonicum

G.9. FUTURE ENVIRONMENT - SERVICE AREA

G.9.1. Demography

The current project population increase is 2.3 percent a year. Population densities are particularly high in the more urbanized areas; farms are small and unemployment is high. There is an apparent decrease in the rate of increase in some kecamatans: notably Dempet and Kedungjati. This is balanced however by increases in Demak, Godong, and Wonosalam. A comparison of population statistics for 1973 and 1977 shows an increase in the rate for Demak (2.4% to 3.7%), Wonosalam (2.8% to 3.8%) and Godong (2.6% to 3.5%). Based on these increased rates, in the year 2000 Demak will have a population of 120,126; Wonosalam a population of 75,277; and Godong a population of 107,834. At those rates an expected 85 percent increase in population in 23 years, (the year 2000) and a doubling of the population in 27 years, (the year 2005) will occur. There will be great stress on the social and psychological fabric of the family in both urban and rural areas. In more urbanized areas there will be additional stresses on the infrastructure; crime rates and the incidence of disease should increase; while the standard of living decreases. Based on population statistics, population projections for the 10 kecamatans containing the service area and for the service area itself are presented in Table G-12.

Even with project, this population increase should be expected. There may, however, be some changes in distribution. The major distribution change is the major reservoir areas (Rawa Pening, Glapan, Gunung Wulan) where over 16,448 families will be dislocated or affected. There will also be some dislocations in the service area where houses to be affected by the flood control programs are located on drains and river channels. The exact number of people who might be physically dislocated by the Rawa Pening dyke, cannot be given at this stage,

as the best way to handle the population at this impact site has yet to be determined.

The population estimated to be displaced by the Glapan reservoir is 0.01 percent of the population of the service area. The population to be displaced at Gunung Wulan is also 0.01 percent of the population of the Jratunseluna Basin area (15,101 and 17,125, respectively).

G.9.2. Dislocation in the Service Area

The flood control program will widen some drains and channels so that they can accommodate the flood flows expected in the wet season. In order to do this, it will be necessary to relocate people who have built their houses along these drains and river channels. The number of families involved in this dislocation is not known at the present. However, owing to the settlement pattern, i.e., the tendency to locate houses along water course, one can expect high densities in the affected areas.

G.9.3. Economically Active Labor Force

Based on projected population increases an increase in the number of economically active people can be expected by the year 2000. The projections to the years 2000 and 2020 for selected kecamatans are presented in Table G-13 based on 50 percent of the population. (The percentage of economically active population in Demak in 1977 was 49.7 percent). With no new job opportunities opening by the year 2000 the six kecamatans listed will have an unemployment rate of 20 percent. By 2010 the unemployment rate will have increased to 29 percent. This condition could be exacerbated by migration to the Kabupaten center of Demak.

The project will provide jobs for skilled, semi-skilled and unskilled laborers. By using combined labor and capitol intensive

methods during the 10 years of successive project construction, the number available will depend upon the particular phase of construction in a given project area. After the project, approximately 500 people, full and part-time, will be required for operations and maintenance

Table G-13 shows that in 1977 in 6 kecamatans there were 47,638 farmers and 85,650 farm laborers (about 28.7 percent of the total population). Assuming the number of farm laborers will have the same general proportion to the total population, there will be approximately 131,500 agricultural workers. The 1979 ratio of hectares rice land planted per year to the total number of farmers and farm laborers is 2.26. Based on the projected change in cropping pattern and increased rice planting with project for the year 2000 and assuming the number of farmers remains the same, this ratio is still 2.26. If these assumptions are correct, the gain in acreage planted through the project is roughly equivalent to the increase in the population. Nevertheless it is generally agreed that agricultural labor is employed only 30-35 percent of the time, consequently there will be a great deal of underemployment.

Unfortunately for the agricultural sector, even though additional water will be available through the project to allow three crops of rice each year, it is unlikely that additional labor will be needed. Currently in areas where three crops are grown, small paddies are used and planting dates are staggered so that work in the fields is more or less continuous throughout the year. This allows a farmer to maximize family labor and minimize the need for agricultural laborers.

Part of the project will make a supply of 1,500 liters of water per second available to the city of Semarang. If a guaranteed water supply can be used to attract industry, there might be an outlet for the growing ranks of the unemployed and underemployed, but the time

lag between water available, established water supplies and developed industry must be considered in any evaluation of Semarang or other towns as potential job markers.

G.9.4. Income and Cost of Living

The cost of living is rising at a 11-12 percent per year. If this continues, by the year 2000 the cost of living will have increased over two and one-half times. This will be true with or without the project.

From 1973 to 1978 the average income increased by 300 percent. This kind of increase to the year 2000 is not expected to continue, particularly in the rural areas. Rural income has not increased as significantly as urban income.

With the project there will be additional income generated within the service area. By the year 2000, an additional maximum of 14,200 ha of rice crops per year could be grown; however these additional hectares will require additional inputs of fertilizer and insecticides. Based on a projected 5.2 tons per hectare yield, there will be an additional 73,840 tons of rice to be marketed and milled. This would be an increase over the without-project future. Since this increase will not come immediately, but only gradually as additional water and better farming methods became available, there is no projection that any massive effort will be necessary to bolster marketing and milling facilities. The usual market forces should be able to sustain the required marketing, transportation, processing and storage facilities. (See Tables G-14 and G-15 for the cropping pattern and projected yields).

If population trends continue, and there is no reason to believe they will not, a large segment of unemployed people is projected. If present cropping patterns continue so that few farm laborers are

used over a longer period of time, then a large number of part-time agricultural workers will enter the labor market. Unless the government establishes some minimum wage, the excess labor supply will lower demand and tend to lower wages. The result would be a reduction in earning power for the laboring class. One way to ameliorate this condition is the early establishment of labor-intensive industries.

G.9.5. Manufacturing, Industry and Commercial Enterprise

The year 2000 might see more industry in the Demak-Purwodadi areas. Presently there are not many industries in Demak or Purwodadi. It is possible that too much reliance is placed on obtaining products out of Semarang. Another factor may be that the area is really not noted for any particular type of handicraft which can have a beneficial effect on generating a large home-industry.

With the project, there may be sufficient water in some of the smaller towns so that small industries could be developed. Particularly favorable would be those using agricultural products as raw materials. One industry that might suffer with the project is the fishing industry along the coast. If the decrease in sediments and nutrients to the coasts has an adverse effect on the fishing, the livelihood of 3,760 fishermen in Bonang plus the other fishermen along the coast in other kecamatans could be threatened. An assessment of the potential harm to this segment of the population has not been made.

As previously mentioned, one way to ameliorate some of the potential problems in the labor sector is the establishment of labor-intensive industry. With the potential for 1,500 liters per second of municipal water to be delivered to Semarang under the total project, an opportunity exists for attracting industry to the area. Plans have been drawn and sites for expansion have been established within existing

industrial park areas. Governmental incentives and encouragement would aid immeasurably in the industrial growth of the Republic. The restrictions of profit and the threat of nationalization hamper private enterprise. Waste, fraud and misappropriation all limit the desirable effects of the aid provided by governmental agencies and governmental-run industries.

G.9.6. Agri-business and Agri-infrastructure

With the project additional rice will be grown in the service area. This rice will enter normal trading channels. Because of the present cropping pattern in the 3-rice crop areas, the effects of this increased production will be minimized. That is, there probably will not be a great quantity of rice reaching the market over a short time period. Therefore the existing processing market and storage facilities should be able to expand normally to meet the demand without outside aid, from the government or from some lending agency. Should the project go to feasibility, an in-depth survey should be made of the marketing, processing and storage facilities and their potential for expansion in the service area.

The additional land to be put into rice will require additional supplies of fertilizer and insecticide. Much of the additional supply will probably be supplied through governmental efforts. Local merchants who sell fertilizers and insecticides will benefit. No data is available presently to quantify this benefit.

No data have been gathered to assess the future, with or without the project, of the general agricultural infrastructure. There will be an increased demand for credit but without data for the present credit situation the future cannot be predicted.

G.9.7. Land Use, Farm Size and Land Tenure

It is difficult to project land tenure into the future when the population projections indicate dramatic increases in potential agriculturists. At the present time, there is an average of 0.52 ha irrigated land per farmer in the service area. Averages are misleading; probably 60 percent of the farmers own less than 0.5 ha. By the year 2000 the average farm will probably be closer to 0.25 ha per farmer with a majority of farmers owning less than 0.3 ha. This will be the case with or without the project because of the increase in population.

Land use in the service area in the future is likely to be the same with or without the project unless some of the towns within the service area use some of the water as an industrial supply. There are no known plans for such usage in the service area. However, in Semarang, with 1,500 liters per second municipal and industrial water to be made available from the project, there will be changes in land use. Presently there are several industrial areas being developed. See Special Report I [17] for an indepth discussion of the industrial planning and industrial land use in Semarang.

The land use in the reservoir areas will change with the project. The 50-year old and older teak trees that would exist on the forested slopes of the reservoirs will have been lumbered out while still young and immature. The rain-fed crop lands along the rivers and in the flatter areas will be gone. Many of the houses, schools, governmental buildings and stores all will be gone and in their place will be man-made lakes.

With or without the project land tenure will change in the villages and in the towns. With a 39 percent increase in population

within the service area, many houses will have to be built to accommodate the 39,000 to 40,000 families projected to exist in the year 2000. Unless high rise structures are used, which is unlikely as it is not traditional, there will have to be many hectares of land changing from other uses to house lots. The principal source of land for houses has been agricultural land. If each home site occupies 0.1 ha, then by the year 2000 an estimated 4,000 ha will be required. Historically, land taken out of production for residential building has been farmland.

As the population grows, the land will become more valuable. Farmers who are reluctant today to rent or share-crop their farms may change their minds in the future. [Hüsken 1978]. When year-round water becomes available to Class III land it will become Class I land. Based on present values this would change land values from Rp. 100/m^2 to Rp. 300/m^2. The potential to double one's assets may lead to land speculation in the lower classes of the sawah. Rural residential land is reported as varying from Rp. 1,000 to Rp. 125/m^2; according to location (Decree of Government, head of Central Java province; May 5, 1977).

G.9.8. Crops and Cropping Pattern

Without the project, it is assumed that the cropping pattern will continue. The recent shift to tobacco in the western side of the service area will continue as long as the prices hold and tobacco remains a high value cash crop. With the project including building the dikes around Rawa Pening to have 100 x 10^6 m^3 capacity of storage in the lake, year-round irrigation water will be available to 11,640 ha, of service area in addition to 1,500 l/s of water to be diverted to Semarang for Municipal and Industrial (M & I) uses. A capacity of 125 x 10^6 m^3 at Rawa Pening will serve year-round irrigation water to 14,200 ha, and supply 1,500 l/s M & I water to Semarang.

Without the Rawa Pening project, 1,500 l/s could be delivered to Semarang from the proposed Glapan Barrage (Storage Capacity 125 x 10^6 m^3) and irrigate 13,517 ha with year-round water. Although the proposed Glapan project would not be affected should the dyke at Rawa Pening no be built, the total amount of the service area would be affected. Obviously the loss of 465 ha at Rawa Pening, 1,900 ha at Glapan and 3,300 ha at Gunung Wulan will disrupt the cropping pattern and crops in the affected areas. However, the increased production of rice in the area resulting from the implementation of the proposed projects will not only more than offset the losses of land due to the project works but will also greatly enhance the economic and social status of the population.

G.9.9. General Infrastructure

G.9.9.a. Education Facilities

Without the project additional educational facilities will be needed to serve the increasing population. The same situation will exist with the project. However, with the project some of the schools that presently exist in the reservoir area may have to be moved. New schools will be required to serve the children of migrant construction workers who will be working on the dams. On the other hand it is possible that the additional area to be planted to rice in the service area will increase the economy of the area so that more children will be able to finish grade school and go on to Junior and Senoir high schools. This would require additional facilities in the secondary school system.

G.9.9.b. Transportation and Communication

Even without the project, road repair and new roads will be

necessary within the service area. With the project, and an increase in rice production, a better transportation system will be necessary if this increased production is to reach the market. Although there will be a substantial increase in the population, there is an economic limit to the number of individual bicycle-man rice traders that can operate successfully in the area. Economics of scale will dictate a more efficient marketing operation. Should transmigration not be decided upon for some of the people in the impact areas, road repair and/or new roads should definitely be instigated in these areas. This road maintenance and up-grade will be necessary for communication, and job accessibility, as well as providing a feasible base for the development of various sorts of home industries in both service and impact areas.

As the project is now planned, no major highways or rail roads will be disrupted in the Kedungjati area (near Glapan and Gunung Wulan). Roads through the Gunung Wulan area will have to be relocated if the Gunung Wular Dam is built. Roads may require relocating, and at the very least, bridges, both highway and railroad, will have to be rebuilt to accommodate the flood control program.

G.9.9.c. Public Health

With or without the project the population will increase 85 percent by the year 2000. Overcrowding will result and without proper sanitation facilities, conditions will exist for a potential outbreak of one of the indigenous diseases. Cholera, which has been the most prevalent disease reported in the service area, could reach epidemic proportions. Untreated, the mortality rate of cholera is very high. Similar problems could develop with the arthropodbone diseases.

Additional problems could develop under project conditions. The formation of a lake at Rawa Pening needs to be assesed in terms of a potential health hazard, as the lake water will be closer to the villages. The closeness of the water is a matter of some concern to village officials, as they are apprehensive that it will form a breeding ground for mosquitoes, and hence an increased incidence of malaria in the area. The concentration of laborers at the construction sites could contribute to an environment conducive to the spread of diseases. Similarly, increased vehicular traffic to and from the construction sites will increase the probability of accidents. The increase in the number of people will lead to an increased incidence of crime.

G.9.9.d. Municipal Water

Without some additional source of municipal water, Semarang's rational, planned growth is limited. Without some additional source of industrial water, jobs for the many immigrants to Semarang in search of a future are not "favorable". The project would make available 1,500 l/s of municipal water; thus, water could be used in industrial applications to ease the detrimental effects of a population increase.

TABLE G-12

POPULATION PROJECTIONS THROUGH YEAR 2010

FOR PROJECT SERVICE AREA

Kecamatan Containing Service Area	Rate (1971-1977)	1977	1990	2000	2010
Bonang	1.8	56,530	69,758	79,933	90,109
Demak	2.4	64,898	85,146	100,722	116,297
Dempet	0.2	61,855	63,463	64,700	65,937
Godong	2.6	59,742	79,935	95,468	111,001
Gubug	1.8	50,340	62,120	71,181	80,242
Guntur	1.8	43,154	53,252	61,020	68,787
Karangtengah	1.8	33,681	41,562	47,625	53,688
Kedungjati	0.4	63,492	66,794	69,333	71,873
Tegowanu	2.0	32,488	40,935	47,432	53,930
Wonosalam	2.8	40,169	54,791	66,038	77,285
TOTAL		506,349	617,756	703,452	789,149
Service Area	1.8	263,124	324,695	372,057	419,420

TABLE G-13

ECONOMICALLY ACTIVE POPULATION
YEAR 1979 AND FUTURE PROJECTIONS

	1977	2000	2010	Presently Working	Difference 2000	Difference 2010
Kab. Demak	309,073	451,247	513,061	382,687	68,560	130,374
Kec. Bonang	28,265	39,966	45,054	32,062	7,904	12,992
Demak	32,989	50,361	58,148	28,695	21,666	29,453
Dempet	30,928	32,350	32,968	44,500	(12,150)	(11,532)
Guntur	29,871	47,734	55,500	30,160	17,574	25,342
Karangtengah	16,840	23,812	26,844	18,167	5,645	8,677
Wonosalam	20,084	33,019	38,642	28,037	4,982	10,605
POTENTIAL UNEMPLOYMENT:						
TOTAL Six Kecamatans in Service Area					45,621	75,537
TOTAL Region Demak					65,560	130,374

TABLE G-14

CROPPING PATTERN

PERCENT OF AREA AND NUMBER OF HECTARES

	Year 1979 Without-Project		Year 2000 With-Project	
	Percentage Service Area	Hectares	Percentage Service Area	Hectares
Surjan	16	5,500	12	4,125
1 Rice Crop	25	8,594	0	
1 Rice + Palawija	5	1,719	0	
2 Rice Crops	21	7,219	23	7,906
2 Rice + Palawija	1	344	10	3,439
3 Rice Crop	32	11,000	55	18,906

TABLE G-15

PROJECTED YIELDS TONS/ha

	Year 2000	
	Without-Project	With-Project
Rice	3.8	5.2
Maize	1.5	1.5
Sorghum	2.3	2.8
Soybean	0.9	1.0
Tobacco	0.6	0.9

G.10. EFFECTS ON CULTURAL ENVIRONMENT AND MITIGATION (Service Area)

G.10.1. Effect on Demography

To date, no survey has been made to ascertain the number of people (families) to be dislocated by the flood control program in the service area. Inasmuch as the dislocation will occur along the widened canals, channels, and drains it is likely that the families can be moved laterally into the adjoining agricultural land and dislocation will be minimized.

G.10.2. Effect on Economically Active Labor in Service Area

The need for agricultural labor will increase after the project is built and more water becomes available to improve the cropping pattern and the cropping calendar in the service areas. To keep up with the overall development effort the employment of labor and the labor itself are expected to be more efficient. Obviously, the land owners will strive hard to derive maximum benefit from the availability of much needed irrigation water; and also the agricultural workers will have the incentive to put in more time and effort to share the project benefits.

One of the most positive effects of the project could be the provision of industrial water to the city of Semarang. The industrialization hopes of the regional planners, if fulfilled, could aid in relieving the constant problem of unemployment. No figures are available at this time on proposed or planned industries for Semarang.

G.10.3. Effects on Income and Cost of Living

Farm income will increase when the additional rice land is put under cultivation because of year-round water. Based on today's prices, only the extra rice grown would have a value of approximately Rp. 100 billion gross in the year 2000. This figure includes the extra farm labor, extra inputs of fertilizer and insecticide, and the marketing and milling costs.

There will be certain losses of income attributed to the project. The loss of cropland in the reservoir areas and the loss of dry season cropland at Rawa Pening will create a loss of income for those farmers. Similarly, there may be a loss of agricultural land to the Flood Control Program in the service area. There may also be a loss of business establishments to the Flood Control Program; as well as a loss of commercial enterprises in the reservoir areas, and a consequent loss of income.

If there is a significant change in coastal morphology and biology, the local fishing industry could be affected. A decrease in fish production would create a loss of income for the fishermen.

However, all these losses combined together will be insignificant compared to the benefits which will accrue from the projects resulting in prosperous living conditions for the population.

G.10.4. Effects of Manufacturing, Industry and Commercial Enterprise

The year-round water may be sufficient to establish some small industries in the service area. Certainly, the provision of 1,500 l/s will aid expansion of industry in Semarang. Planning is essential in industrial expansion so that new industries do not cause deterioration of air and water quality and general deterioration of the quality of li

G.10.5. Effects on Agri-business and Agri-infrastructure

The additional rice cultivated area and production will increase the need for milling, transporting and storing facilities. There will be an increased demand on the general marketing infrastructure. It is assumed that the extra area under cultivation will be phased in over a sufficient period of time so that the demands for services will be dampened and that the natural marketing forces will increase to handle the extra rice.

Additional inputs of fertilizers and insecticides will require increased stocks of these materials. It is assumed that local merchants will be able to supply the increased inputs without additional governmental support.

At this time, effects on other items, those discussed qualitatively above, and on general agricultural infrastructure have not been surveyed. It will be important to make such a survey if the project goes to feasibility.

G.10.6. Effect on Crop and Cropping Pattern

There will be an increase of between 11,640 ha and 14,200 ha in the service area with the project. The amount of surjan will be reduced and all one-crop riceland will change to at least two-crop riceland.

G.10.7. Effect on General Infrastructure

1. Schools will be lost in the reservoir area. New schools will be required where population increase, attributed to project construction, are projected in the service area. Mitigation of the stress on the school system can be made through proper planning and coordination with school officials.

2. The loss of roads and new road requirements brought on by the project can be handled together. The new roads and appurtenant structures will be in much better condition than the roads lost to the project and the transportation system will have a net gain.

3. The potential loss of the railroad through the Glapan Reservoir is a major effect. Mitigation of this effect will be expensive.

Public health, in many instances, will be improved by the project. Beneficial effects are increased supplies of water, dilution and flushing of canals and streams in the dry season, and elimination of mosquito breeding grounds. Adverse effects could be increased particulate matter in the air, potential for crowding at or near construction sites, increased potential for traffic accidents, and loss of property and life. Mitigation measures are available. Wetting of roads and construction sites can reduce the particulate matter in the air. Proper planning will reduce crowding and reduce the potential for spreading diseases and violence. Posting speed limits and restricting traffic will reduce the potential for traffic accidents.

G.10.8. Previous Studies/Recommendations

Two previous socio-economic studies were commissioned by the Jratunseluna project in 1973 and 1975 [1,2]. Both studies, done by the Research Institute in Social Sciences at Satya Wacana Christian University cover the service area: The 1973 study covers the Jratunseluna area as a whole, and the 1975 study focuses upon the Tuntang-Serang area of the Demak-Grobogan regency. Both studies include a number of specific recommendations and suggestions, and should be referred to by future researchers and policy-makers. Many of the recommendations, however, should probably be revised and up-dated in accordance with the modifications arising out of the new, modified integrated development plan as discussed in this final report.

A number of recommendations and conclusions, however, are still felt to be applicable. Among some of the more salient ones that are pertinent to the service (Demak-Grobogan) area are:

1975 study:

1. The necessity to strengthen the transportation (public) for marketing and storage of projected increased yields.

2. The regulation of land "authority" (re: 1961 U.U. Pokok Agraria):
   - that rent and sharecropping management be better supervised;
   - that not all of the area that is to be benefited by the increased irrigation be planted to rice, as some palawija (dry-land) crops are more profitable than paddy;
   - the necessity for the improvement of better planting techniques to include better credit for farmers, and instruction in the use of fertilizers, insecticides, etc.

3. Some measures be taken to ensure a more equal distribution of food-stuffs in the area, particularly with project implementation.

4. Better control and with regards to the maintenance of current and projected irrigation facilities.

5. A correlation and or abolishment of mili bayar (payment before distribution) and water pilferage systems. This latter point is well argued in the study, and concludes that without some sort of effective management of both old and new systems, optimum irrigation under the proposed project would not be possible; it might even fail altogether.

G.11. CULTURAL ENVIRONMENT - IMPACT AREAS

G.11.1. Introduction and Scope

This section of the social and environmental assessment focuses upon those three project areas where the most severe amount of social disruption and displacement can be expected to take place. For each of the impact areas - Rawa Pening, Glapan and Gunung Wulan - an attempt was made to determine the attitudes, responses and general needs of the affected population. Some of the findings and general recommendations have already been mentioned in the Service Area portion of this report. This repetation is unavoidable to a certain extent, as the distinction between service area and impact area are not easily made. In reality the two frequently overlap, both in consequence and geographic areas.

The data constraints outlined in paragraph G.7.2. of this report need to be stressed and recalled here. The subjective nature of attitudinal and behavioral data makes it more susceptible to error and interpretation than quantitative data. This constraint is particularly important to remember given the short amount of time available for this study. Nevertheless, the data may be considered to meet the minimum requirements for a prefeasibility study, and hopefully will supply enough information upon which to make further policy.

G.11.2. Problems

The problems of the impacted areas were conceived to lie in two distinct but interrelated areas: impacted population and governmental agencies. Beyond the known effects of the project (inundation of cropland, private property, other land use areas, and displacement and/or disruption of a portion of the population) it was necessary to determine wherever possible, the scope and magnitude of the project's impact upon the general population, and the governmental agencies

that might be expected to be involved in handling the social service aspect of project implementation. Determination of governmental agencies currently involved (technical), that needed to be involved (human resources), and programs available, was as an important element in the socio-economic assessment of the problem as the identification and assessment of affected populations.

In addition to identification of population and governmental agencies, a general assessment of the projected impact will be made and guidelines for mitigating measures drafted for each area. Figure G-1 illustrates the impact areas in the general context of the overall project plan.

G.11.3. Methodology

The basic methodology used for the collection and analysis of data was the same for all of the impact areas. Basically a format was devised along the lines of diagnostic research suggested by William F. Whyte (1978). The format devised was to utilize a team approach to assess the problem as initially defined (paragraph G.11.2.), through the utilization and identification of various channels and flow patterns of information (i.e. horizontally, vertically, and diagonally). One team was to identify all governmental agencies that were currently involved in the project, and what departments needed to be involved from the human resources side of the problem. That team was to interview various selected key individuals in each governmental department identified as having involvement, and to find out what programs, services, and alternatives to the impact areas were available through existing governmental agencies. A preliminary assessment was made as to how each department worked, what resources were available to them and from them; whether or not the departments worked well together, and degrees of cooperation, etc. The second team was to assess the problem through information channels existing at the local level in

the impacted areas. In addition to collecting quantitative data concerning population, income, job occupation etc., this team was to try and determine the attitudinal responses to the respective project, and inquire about any special problems that the local population might perceive as being adverse to project construction. These attitudinal responses ranged from response history in the Rawa Pening area, to attitudes towards transmigration and the identification of tempat kramat (spiritual places) in Glapan-Gunung Wulan areas.

By focusing solely on primary lines of communication and channels and levels of information, it was hoped that maximum reliable data could be gathered in a minimum amount of time.

G.12. RAWA PENING

G.12.1. Area

Rawa Pening is a natural depression approximately 35 km south of Semarang. It is currently used for storage of water for the utilization of the Jelok and Timo power plants, and irrigation water for land downstream of the Tuntang River (See Appendices A-Part I and C-Part I for a full description of the lake). Presently (1979) the lake covers 2,400 ha. The proposed plan for Rawa Pening is to build a dyke around the circumference of the lake, thus avoiding flooding any desas in the area while enabling the storage capacity of the lake to be expanded. (See Appendix C-Part I for plan specifies). For a storage capacity of 100 x 10^6 m^3, an additional 400 ha is proposed to be flooded, which would increase the surface of the lake to 2,800 ha. A storage capacity of 125 x 10^6 m^3 would require between 450 and 465 ha maximum inundation, and would increase the lake surface to approximately 2,850 ha. Figure G-2 illustrates the proposed dyke, the projected new high water mark, and affected villages. It also shows the area which is currently flooded at the high water level, but which can be expected to be farmed year-round with the building of the dyke. The total land thus reclaimed under the proposed plan amounts to 178.3 ha.

G.12.2. Project Description

The entire area around Rawa Pening is reputedly prime sawah. Traditionally the farmers have farmed the land left dry by the receding water. Consequently, some land has been able to be farmed for only 1 crop a year, while other areas have been able to be farmed for two crops a year. The yield however, fluctuates with the position of the land around the lake. Some sawah around Rowosari and Candirejo produces 3 tons/ha/crop; and the fields near Bejalen and Pojoksari produce upwards of 4-5 tons/ha/crop. If an average yield of 3 tons/ha

is assumed, and presupposing that all of the proposed inundated land can only be cropped once a year, the projected loss of production from the inundated land is estimated at Rp. 139,500,000.-. By the same figures, the resultant gain in farming from the reclaimed land around the lake can be estimated at Rp. 53,490,000.-, resulting in a net loss of Rp. 86,010,000.-.

The benefits to be gained from the proposed dyke are:

1. The diversion of 1,500 l/s to the city of Semarang for municipal and industrial use. According to a 1976 study done by Directorate General CIPTA KARYA, the city was receiving only 800 l/s, while its projected needs by the year 2000 are 6,840 l/s.

2. The Rawa Pening project would also supply year-round irrigation water to the Demak-Grobogan service area. The areas served would be 11,640 ha and 14,200 ha with storage capacities of Rawa Pening of 100×10^6 m^3 and 125×10^6 m^3, respectively.

3. The cost of usable storage in Rawa Pening per unit volume is less than all of the other projected reservoirs primarily because of less dead storage capacity needed for sedimentation. It is expected that the reservoir sedimentation at Rawa Pening will not be as severe as in the other reservoirs. The total capital outlay for the reservoir of 100×10^6 m^3 is estimated as $ 18.2 million (US) and $ 24 million (US) for a reservoir of 125×10^6 m^3. These figures do not include any compensation costs to the local population.

The benefits and losses just discussed are immediate and tangible at a superficial review of the proposed project, and are discussed in greater detail in other sections of this report (See Appendix E - Part I). They are presented here, only to give a general context against which the social benefits and losses must be viewed.

For the inhabitants of the Rawa Pening area, however, the lake is a good deal more than a promising reservoir or a proposed source of water for the city of Semarang. The area itself is physically beautiful - the mountains of Telomoyo, Ungaran and Merbabu can be seen overlooking the lake from the west; the air is cooler than on the coastal plains, and the rainfall and overall fertility of the land promise good yields every year, in theory if not in fact. The area has been farmed by the people for more than 150 years, and possesses a rich and varied history. The fact that there are as many as 25 varieties of the folk story concerning Rawa Pening's origins is an indication of long habitation and use. The lake is viewed as a benefactor - when all else fails, the people believe that, somehow, the lake will feed them and their families. Despite the history of repeated raising of the lake level, starting with the formation of a reservoir by the Dutch in 1912-16, again in 1938, and most recently in 1966, the people have not abandoned their lands nor their villages. Rather, villages have been moved and people absorbed into other villages around the lake.

G.12.3. Demography

Population. As of the date of the study there are 17 desas surrounding Rawa Pening which would be affected in one way or another by the proposed dyke. The affected population is 53,371 people. Table G-14A shows the population by sex of the desas around the lake.

G.12.4. Livelihood and Income

Table G-15A gives the occupational breakdown of the local population. Unfortunately, average per capita income was unavailable for all of the desas; therefore,no attempt was made to assess the actual income loss to the population as a consequence of the proposed project. However, information supplied by the Satya Wacana Researcl

Institute indicates that approximately 60 percent of the people immediately around Rawa Pening, are below the poverty line in Indonesia.

G.12.5. Land-ownership

At this level of study it was not deemed necessary to establish precise ownership holdings in the affected area. What was done was to establish property lines for the affected desas in order to get a general picture of the amounts of land that each desa might be expected to lose through the projected inundation. This proved to be a difficult task, as some areas were held by owners outside of the respective desas and precise location of these areas was not always easy to discover. Other areas in the proposed inundation area, while owned by people in the desa, were in effect under the management of other sources, usually the military. No data or records were available to determine the exact area under control of t

Another constraint to land use and ownership data arises out of the history of the lake itself (see paragraph 12.8 of this section). Because of the parcelling of the land under the Dutch in 1938 ("red" and "black" poles), and efforts by the government to limit the fragmentation of land holdings, the result is a complex system of landownership and use.

During field reconnaissance, cartain discrepencies were found in the maps of the area which were available in the local offices. The exact extent of flooding of the desa lands as a result of the proposed project could, therefore, not be fully determined. Nonetheless, wherever possible rough estimates of flooded land were obtained from key individuals. Table G-16 shows approximate villag areas, estimated land loss (rice fields only), and the percentage affected land based on these estimates wherever information was available.

To clarify some of the points discussed later in this report, an explanatory note as to the status and types of land holding problems in the area needs to be made.

There are five major types of holdings in the area: sanggem land or holdings; bengkok land; bondo desa land; "red pole" and "black pole" land.

(i). Sanggem is a parcel of land owned by a villager with the status of holding. It originates either from communal land which was distributed among the people, or from an opening in forest land cleared by the original settlers (the latter called yasan land).

(ii). Bengkok land is government land, given to the village officials (lurahs/kepala desas) with hak pakai (right of use) status in lieu of governmental salaries. Bengkok land is traditionally located in the most fertile areas, which usually have permanent irrigation throughout the year. At Rawa Pening there are a number of parcels of bengkok land near the border of the lake (See Table G-16).

(iii). Bondo desa is land owned by the village government which is used for the benefit of the village people. Prior to 1930, bondo desa land was the biggest part of the land holdings for those villages located on the eastern side of the lake; and consisted primarily of a cultivatible floating island. This island was lost to the people with the raising of the lake in 1938.

The maps showing the boundary lines of desas affected by the project are available in the office of the Jratunseluna Basin Project.

G.12.6. Land Value

The individual desas were canvassed generally as to the approximate perceived value of their lands. The results are presented in Table G-17.

According to the decree of the Governor, (Head of Central Java Province; Dec. 8, 1974, No. Pem. 321/74-181/23 jo. Letter of May 5, 1977 No. DA. III/150/um/1977) the established general land prices according to class and kind (unit price per m^2) are:

Rice fields	Class I	Rp. 750.-
	Class II	Rp. 500.-
	Class III	Rp. 350.-
	Class IV	Rp. 200.-

A quick comparison of the two land value tables shows that the highest asking price around the lake area is some 25 percent higher than official prices. While the table does not indicate what class of land is thought of in the estimated value, it would not be presumptuous to assume that Rp. 10.6/ha refers to prime sawah; i.e. Class I land for the desas.

G.12.7. Linkage Patterns

G.12.7.a. Markets

In trying to establish the parameters of the impacted area, communication patterns, and marketing-goods-services orientations for the various desas needed to be assessed. Using the villages of Tambakboyo and Asinan as a mid-point (See Fig. G-2) the primary orientation for goods and services for villages on the eastern side of the lake is Salatiga, while those on the western half are more oriented

towards the town of Ambarawa. Within these two halves, are to be found two kabupaten (sub-district) capitals: Tuntang and Banyubiru. These two towns serve as both primary and secondary market centers for the lake residents.

Salatiga in particular is a market for the agricultural goods and services (beyond rice), for the villages of Tuntang Kelurahan, Lopait/Gembolo, Kesongo, Candirejo, Rowosari, and Rowoboni, and rice from Tambakboyo and Asinan.

Ambarawa in turn serves as a market for the villages of Tambakboyo, and Asinan (although there is some linkages between these villages and Salatiga as well), Bejalen, Pokosari, Gondorio, Ngampin, Ngrapah and to a limited extent - Banyubiru.

The towns of Ambarawa and Salatiga also serve as important center for other services: hospitals, public service and secondary schools. They both serve important functions as locales where landless and/or poor farmers can seek other types of employment; as traders, in transportation, industrial and construction workers. etc.

Some of the villages (Gondorio, Ngampin, Kauman, Kebondowo, Tegaron, Tuntang and Lopait) are located on or near major traffic arteries. Others, such as Rowosari, are relatively isolated. A few of the villages (Tuntang, Lopait, Rowosari, Rowoboni and Ngrapah) suffer from a lack of good roads and/or are not connected with any major population centers through public transportation, even though, as in the case of Tuntang, they are relatively close to major highways.

Almost every village has small warungs (stalls; shops) where the villagers can purchase the daily necessities of life: sugar, coffee, cigarettes, etc., but those villagers (e.g. Rowosari, Rowoboni, Ngrapah, etc.) who do not live either in or near a kabupaten capital

must commute some distance for other goods.

Jombor deserves special mention in any discussion of linkage patterns, as it has a local reputation for being an important center for rice trading. According to local sources most of the rice for the town of Salatiga is supplied by the traders from the villages of Jombor and Candirejo. Jombor in particular buys rice from outside, processes and sells it to others.

Villages that have rice-mills (e.g. Tambakboyo and Pojoksari) often serve as processing centers for other villages in their areas.

G.12.7.b. Labor

Under adat (tradition, custom), no one who comes forward at harvesting time can be refused; however, some preliminary research studies (Warsito - 1976, 1979; Hüsken - 1978) indicate that the traditional linkage patterns concerning the utilization of labor and manpower may be breaking down. There is an increase of sharecroppers, and a spread of such institutions as tebasan (selling the product before harvest) and borongan tandur. Not infrequently the penebas (the middleman who buys the crop) will bring in laborers from outside the village, although most laborers come from within the villages themselves. Contributing to the change in traditional labor patterns and labor-linkage needs was the large amount of credit extended to farmers under BIMAS and INMAS program, and the new strains of rice introduced under these programs. The net result has been an increase in labor-saving devices, a decrease in the kinds and numbers of laborers involved, and a change in overall harvesting techniques. This has resulted in higher rates of unemployment for agricultural laborers as a whole, and a higher rate of affluency for already well-to-do, or rich farmer.

G.12.8. Religious and Political Affiliations

With the exception of Ngampin (154 Catholics, 327 Protestants, 16 Hindues) the majority of the population in the impact area of Rawa Pening is Islamic; but only in the south-eastern quadrant of the impact area does there seem to be a high percentage of santri kolot (devout Moslems). While precise data concerning political affiliations was unable to be obtained, indications are that the politics are split amongst three major parties: P.P.P. (Party Persatuan Pembangunan), P.D.I. (Partai Demokrasi Indonesia) and GOLKAR (Golongan Karya). There is every indication that religious ideology will frequently dictate political ideology as well. The landlord-sharecropper relationships so prevalent throughout Central Java, also have an undisputed influence in the political sphere; (i.e. sharecroppers are potential sources of votes and support in elections)

G.12.9. Historical Background

The responses and general attitudes of the population around Rawa Pening to the proposed Rawa Pening project cannot be understood without some knowledge of the overall historical background of the area, and the history pertaining to the raising of the lake.

The entire area, and in particular the south-eastern quadrant, has been a contested and politically active area for centuries. It was a frontier between the cultural influences of Demak (Moslem) and the ancient Javanese kingdom of Mataram. Under the Dutch, it was an area which the Dutch used as a defence line during the long conflict from 1825-1830; and again in the bitter years 1945-1950 when Indonesia was fighting the Dutch for its independence. It was part of the Merapi-Merbabu uprising in 1950; and a reputed Communist hideout and resistance area in the years 1965-1966.

Over and above its rich political and cultural history, the area has always been attractive in terms of its natural water resources. The Dutch first "created" a lake in 1912-1916, transforming the pre-existing swamp-forest into a lake. The Dutch again raised the lake in 1938, creating the "red" and "black" pole land areas previously mentioned.

According to local sources, when the Dutch proposed to raise the lake in 1938, they first asked the poeple around the lake, and then staked out a series of circles or areas: yellow, red, and black. The yellow area was to be completely flooded, and was duly compensated. Red pole land was also fully compensated for, but with the additional proviso that whenever possible, i.e. during the dry season when the waters of the lake were receding, the land was allowed to be cultivated by the people. Since the dependability of red pole land was never certain, the entire risk for farming these lands was to be borne by the farmers themselves. Black pole lands were only flooded during the rainy season, and consequently were leased back to the farmers. Because the Dutch government was the theoretical owner of the land, it occasionally extracted corveé labor for its use. With the advent of Republic, the land was given back (in ownership use) to the people. While data is conflicting concerning exact compensation, and the tax system used by the Dutch, the consensus seems to be that the Dutch paid F. 25.- for each square meter, and F. 3.5/quintal (100 kg); or 500 kulan/ha in 1938. According to local informants, this price was two times higher than the common price at the time. The exact hectarage totals are conflicting, with the common figures given being 464 ha of red pole land, and 250 ha of black pole land.

Compensation was paid for the areas in both 1938 and 1939, but was discontinued because of the Japanese occupation of Indonesia in 1940.

Under the Dutch system, the black pole land could only be farmed six months out of every year, and the farmers were required to pay tax on the land for the privilege of using it. This same principle, (i.e. tax) was also applied to red pole land and a "production sharing system" was instituted between the farmers and the district government on the basis of 1/5 : 4/5 (one-fifth for the government and four-fifths for the farmer). Later the ratio was changed to 1/4 : 3/4.

Six hamlets in the Bejalen area and seven hamlets in the Rowosari area had to be moved due to the inundation. The villages in the Bejalen area were absorbed by the villages of Tambakboyo, Kupang and Ambarawa. Those in the Rowosari area were shifted into surrounding villages, while a hamlet of Candirejo (Rowogombal), was transferred to a parcel of non-irrigated land and renamed Kumpulrejo. The previously cultivable floating islands (bondo desa) were also lost with this inundation.

The events of September 30, 1965 resulted in martial law being imposed over the entire country. Under the Old Order, the government management of the lake proved ineffective - water usage for electricity had reportedly decreased, and the previously stablized planting schedule of the red pole lands reportedly disrupted. Given the ineffectiveness of the previous management, the maintenance of the lake was given to the military, and a Rawa Pening Project Command (Koproning) was established. The Command was to increase the electricity generation, as well as to protect the prime sawah area and ensure civilian law and order. In 1965-66 the Koproning authorized the raising of the lake by an additional 40 cm (from El. 463.30 to 463.70), to improve its storage capacity for the generation of electrical power. At the same time, the army was reported to have commandeered the red pole land

in order to control its management. Each farmer utilizing red pole land was required to get a permit (Rp. 150) in order to farm the land, and a 2/5 : 3/5 production sharing arrangement was required from the farmers. The farmers were required to report to the sub-district military command prior to harvesting, and the military then oversaw the harvesting of the padi.

The times, overall, were difficult and trying. The civilian government had broken down, and there was a great deal of discontentment among the civilian population. The army was needed to establish some measure of security and stability for the area, yet the emotional tenor of the times was such that any dissension or discontentment with the administrative decisions - such as the one to raise the lake - were considered undesirable. By the early 1970's a measure of stability had returned, both to the country as a whole, and to the Rawa Pening area. Officially, in March of 1972 the management and maintenance of Rawa Pening was transferred to the Department of Public Works.

Whereas the Dutch had compensated the people fully and immediately for the loss of land crops, little evidence was found to confirm that the administrative authority of 1965/66 did likewise. During the course of the study only one incidence of compensation of any kind was discovered. The village was to have received Rp. 20,000 (lump sum) and reportedly received only Rp. 15,000 to date, paid in three separate installments of Rp. 5,000.-

G.12.10. Response History

Nearly three decades of maintenance and management by four different kinds of administration (Dutch, Japanese, civilian and military) have resulted in confusing and contradictory response patterns.

Doubtless, prior to the Republic's literacy drive, history was maintained at the rural level by means of an oral tradition. Because such a tradition can only exist through painstaking memorization, there is little doubt that the substantive history of the area is accurate, although some of the details, such as actual area flooded, may be contradictory. There is little reason to doubt the fact that the Dutch paid well and promptly, and that for reasons that are difficult to pint-point, the current administration has not yet done so.

The colonial Dutch administration was undoubtedly authoritarian in its dictates. It was to its own interests, more than to the interests of the people involved, to pay the compensation costs promtly, and it is for this same reason that the Dutch told the villagers that precisely on July 28th of each year, they were allowed to farm the red pole area. Regardless of their personal feelings, the farmers in the area viewed this authoritarian dictate as providing them with both a measure of security and stability. The Dutch were allowing them to farm government land, and they were insured of a minimum amount of subsistence securit

The urgent demands of 1965/66 were probably equally "authoritarian" in nature, but totally dissimilar in context to those of the Dutch. It is unfortunate that the raising of the lake coincided

with a time of civilian disturbances. Under the contingencies of the then-existing conditions, neither dissent, nor loss of land and crops, were able to be compensated for. Nevertheless, the failure and/or inability of the government to pay compensation for losses incurred, the uncertainity of the villagers towards those times when they could expect to plant their crops; and the perpetual threat of flooding to both property and crops as a consequence of the 1966 raising have all led to covert feelings of hopelessness, resentment, and frustration. As mentioned previously, much of the land that is proposed to be flooded under the project, is in fact currently flooded during the rainy season. Crops are lost, and villages flooded out. The topographical map error was probably present when plans were prepared for raising the water level. What appears to have happened is that the technical reality (i.e. the 1966 high water mark) and the formal reality (i.e. actual land inundated) were never measured against one another. Therefore, insufficient land rights were acquired, lands flooded that were not thought to be, and the error perpetuated itself. Since many areas in Central Java are subject to flooding during the rainy season, (even areas that would normally be dry in moderate seasons), it is not inconceivable that the error was put down to unusually heavy local rains. The population, however, feels that their property (desas and home yards) and crop losses over the past thirteen years are a direct consequence of the 1966 raising of the lake.

Cultural Central Javanese/Indonesian norms and historical circumstances all act against the direct free expression of opinion in Javanese society. It is difficult for someone to voice their dissatisfaction openly in a public meeting, nor is it permissable under behavioral norms to force a direct confrontation. The usual response pattern is one of extreme protocol and indirect approach. These approaches are directed towards the maintenance of harmonious relationships. In the case of Rawa Pening, the farmers' complaints have been voiced primarily to the village heads. A few individual

attempts have been made to deal with the power structure directly, but those resulted in bureaucratic stalling, with no resolution. In 1976 the local branch of the HKTI (The Federation of Associations of Farmers in Indonesia) met four times with district chiefs (camats, lurahs) of the four districts in the Rawa Pening area, in an effort to take the issue of the destruction of rice fields directly to Parliament. It was decided to ask the amount equivalent to the loss of 4 tons/ha/year for the 600 ha felt to be lost in the Rawa Pening area from the years 1966 to 1976. Although the issue was reportedly the cause for a heated debate in Parliament, no further resolution of the problem has occurred as of this date. With the current price of grain, at Rp. 120,000/ ton, the property damage claim amounts to approximately Rp. 288 million.

Attempts to elicit attitudinal responses as to why the government had not paid, or a settlement had not been reached, inevitably met with voluble, but non-specific replies. Simply put - the people either did not know or refused to speculate.

G.12.11. Response to the Proposed Project

The cultural norms mentioned before regarding opinion made it difficult to assess the response to the project with any precision. On one level the response to the proposed dyke was extremely favorable; however, further questioning revealed tenuous, but nonetheless real, reservations concerning the project. While a detailed response questionnaire was not given to the population around the lake, this response is in accord with a 1975 survey done by Satya Wacana Research Institute (SWRI/L.P.I.S.) of 16 villages concerning a similar project. (SWRI, 1975). In that survey not one of the respondents agreed without reservations to such a project; 20 percent agreed with condition; 26.66 percent did not agree; and 53.34 percent abstained.

It is the abstention figure that is the crucial one indicating not apathy but feelings of hopelessness and frustration alluded to earlier The people believe on the one hand that the proposed dyke could be beneficial to them in terms of increased jobs (through tourism), a better source of livelihood (through expectations of better fishing) and possibly electricity for the villages. On the other hand, they believe that the government will do as it pleases without concern for their welfare. This feeling has been reinforced by lack of a solution to the contested destruction caused by the 1966 raising of the lake. The inconcreteness of the current response, and presumably the high abstention figure in the previous survey, also reflect a degree of apprehension on the part of the population. With or without foundation, the fear of reprisal that existed at the time of the 1965-66 happenning has persisted down to the present day. That fear stems not only from the continuing administrative set up alluded to earlier, under which the local population has been dissatisfied, but also from some of the well-to-do landowners in the area, who tend to discriminate against laborers and/or poor peasants.

This highly complex set of factors, (history, cultural values, religion, income and educational level/status) appears to have resulted in a degree of factionalism and a breakdown of traditional cooperative measures: gotong-royong, tolong-menolong (mutual aid and cooperation). Consequently, while not prevailing in all sections of the lake population, this factionalism hinders a clear response to the proposed project. Person A will say one thing in order to retaliate against B, and B will say quite the opposite for the same reason. "Yes, the government is welcome to the land for the project", and "no, it is not". Part of this contradiction seems to stem from the fear that the distribution of the perceived benefits will not be equal. Other elements of contradiction could not be determined.

Linkage patterns between and among the villages is also part of the overall contradiction in response. Beyond the clearcut, or formal linkages of communication and economics, are the informal linkage patterns of leadership, politics and powerbases. Two villages, not connected in an economic sense, may be strongly connected through the informal linkage system; one will follow another's lead in resistance or acceptance of various governmental projects, and policies.

The importance of the relative strength or weakness of an official at the district and desa level, factionalism, and informal linkage patterns cannot be stressed too strongly when one recalls that it is these officials who must implement any governmental policy at the local level. Internal and intercine bickering and jealousy greatly damage the effective implementation of any proposed program, and put undue stress on higher governmental levels who are called upon to fill the decision-making void.

The major constraint to a positive consensus of opinion regarding the proposed project appears to be the lack of a resolution regarding the 1966 (to 1979) flood damage. If frequency of occurrence of a particular verbal theme is regarded as a valid measure of intensity and importance of a particular item to a population, then the inhabitants of the the area around Rawa Pening are in favor of the project providing that the government compensates them, for the old land lost (red pole) and any new lands (black pole and new paddi area) that might be lost. In trying to ascertain whether or not the people would be willing to accept compensation for "newly" flooded lands apart from the contested compensation for "old" ones, the tentative opinion was that they would not. They would prefer to be paid in one lump sum for all lands lost, both new and old. This opinion, however, came from only the most superficial sampling, and should not be considered as an inflexible response reflecting the opinion of the total population.

G.12.12. Response Towards Dislocation

The response towards possible disruption and/or dislocation closely follows the pattern discussed in the previous section, i.e. it is frequently contradictory in nature. The overall feelings towards transmigration (if necessary) or relocation are favorable; the convert ones are not. People in villages such as Bejalen say that they "have had experience" in such matters, e.g. when the Dutch forced relocation of six villages. Hence they are in favor of the dyke (dislocation) - but only if the relocation is bedol desa: the relocation of the entire village, including village officials. Yet, they would prefer to stay on the land, if possible. In only two desas, Rowosari and Rowoboni, was the total response pattern weighted in favor of relocation without constraints, and this is only due to the deprivation these people have experienced over the past 13 years as a result of consistent flooding. The devastation to the housing compounds and rice crops of Rowosari has been so great that between the years of 1976 and early 1979, 263 people have already transmigrated, with an additional 50 families registered to be transmigrated. Yet even in these areas one hears the response "if the government will (only) pay ...."

The village of Candirejo represents one of the few cases where the response towards relocation was definitely negative. Although the estimated figures in Table G-16 (Affected landuse) suggest that 50 percent of the total rice fields of the village will be affected, there were indications that the affected area might be a good deal more. Even knowing that the livelihood of some 1,200 souls (farmers and farm laborers) or approximately 53 percent of the known occupational labor force (Table G-15A) would be severely impacted, the response was couched in rationalizing terms: they would find other jobs; they would supplement the loss through fishing or genjer (aquatic weed used as vegetables); they would find some way to live

Statistically in this village, only 9 percent of the population can be expected to have an income over the poverty line [SWRI Vol. 1, Series 2, 1978], without the loss of rice lands through the proposed project. Regardless of what the consequences of the project might be, the people of Candirejo do not wish to be moved.

G.12.13. Governmental Agencies and Services

In addition to the Department of Water Resources Development which is in charge of the Tuntang-Jragung and Jratunseluna Basin Projects, the Departments of Agriculture, Forestry, Fisheries, and Public Service are all involved in one degree or another with the proposed Rawa Pening Project. Table G-18 lists those governmental agencies which would be involved in the human resources side of the project. All told, there area minimum of thirteen (13) governmental agencies who are either directly involved, have an interest in the project, or need to be involved in handling the social impact aspect of the study should it go to feasibility and/or design stages.

There are a number of pre-existing programs and services that would be available to those people who might be dislocated under the proposed project. (Table G-18). Of these, the two departments that would be of the most importance to the Rawa Pening population are the department of Transmigration (Departemen Tenaga Kerja dan Transmigrasi) and the Department of Industry (Departemen Perindustrian) with their extensive training programs.

There are, however, a number of factors which limit the effectiveness of these departments. The problems of the transmigration program are well-known and well-documented (Hardjono, 1977; Van Arsdale and Soemintawikarta; 1979, as well as other sources). Suffice it is to say that the influx of as few as 3,000 families (1/3 of the known population of the Rawa Pening impact area) would put a strain on

the resources of the provincial department as it currently exists.

The statement also holds true for the Department of Industry. As of October 1979, the various interrelating departments (Industry and Trade, and Cooperation) only had the capacity (man-power) and funds to handle approximately 1,000 people for the entire Central Java area. The constraints apply not only to the planning level, where the initial survey was conducted, but also to the implementation level. For example, the motorcycle mechanic training program occasionally has problems providing its trainees with enough motorcycles upon which to practice. Another problem exists in employment opportunities and employment assistance. Local industry is not always willing to hire new trainees (for reasons not specified), and employment assistance and follow up are meager. The departments admitted that the influx of an additional 20,000 people, or a little over 1/3 of the Rawa Pening population, would be a problem.

G.12.14. Discussion and Analysis

It is unrealistic to assume that fertile land that has been farmed continuously for over 150 years will be easily given up; nor is it reasonable to assume that in an area such as Rawa Pening, physically beautiful and fertile, the people would embrace the concept of disruption and/or dislocation whole-heartedly. This is not to say that either the project or the sacrifices (economic and social) that would be asked of the affected population were rejected outright. They were not. The proposed project was, as a whole, received favorably, but with constraints. It is these constraints, and other factors, that must be examined more closely for their integrated impact upon the project.

G.12.14.a. Constraints of the Impact Area

It is suggested that an attempt be made to reach a compromise concerning the disputed property damage claim resulting from the 1966 raising of the lake. In the course of discussions with local informants, it was suggested that if the people were aware of the total benefits that the project could be likely to generate, both to the lake inhabitants and to the inhabitants of the service area, they might be more favorably inclined to reach a compromise over the previously disputed lands. They might be willing to make a distinction between compensation payments concerning lands previously flooded and lands to be permanently flooded with the project, rather than insisting upon a lump sum payment.

The participation of the lake inhabitants concerning the project is necessary in any case, to insure maximum implementation and completion of the project at any advanced stage of study and/or design. Negotiations concerning the disputed land could be started in the course of the information program designed to explain the project to the local inhabitants.

An analysis of the charts concerning perceived land value, occupation, and area to be impacted indicate the necessity to deal with each desa individually, and not with the area as a demographic whole. This constraint carries with it a good deal more time than that which might be necessary otherwise, but promises maximum results. Another necessity for dealing with each desa as a distinct entity, are the varied responses concerning transmigration.

G.12.14.b. Constraints Concerning Governmental Agencies and Programs

While the study substanstiated the fact that currently, the

various governmental agencies and programs would be under duress if they were required to handle a sudden influx of people; it is also found that a number of mitigating measures could be taken to alleviate this problem. It was the understanding of the project study that in cases such as natural disasters or major development plans, special funds, manpower and trainers could be found and allocated. Because the governmental agencies and programs play an integral, if not vital, part of any succesful development program, special consideration must be given to this part of the study.

It was not and is not an aspect of this study to assess the effectiveness of any training, manpower, or transmigration program or department; nonetheless, it is the responsibility of this study to provide enough useful information to assist policy-makers in making the best decision possible. It is this responsibility that prompts a separate discussion and some suggestions concerning the human resources side of the social problems connected with Rawa Pening, or for that matter, any proposed development program to be undertaken in Central Java.

On paper, at the planning level, sufficient programs and services already exist to handle, or at least mitigate effectively any of the social impact problems that might arise out of a development program. What is lacking, however, is the necessary superstructure, e.g. the necessary skilled (if not experienced) manpower to plan, coordinate, and implement the logistics necessary to undertake those services necessary to a project. There does not appear to be the number of instructors necessary to train the "trainers". The lack of materials, supplies, employment assistance, and follow-up of trainees is lacking at the implementation level, as previously mentioned. Just as there are a number of studies and manpower assessments that need to be made from a technical (or engineering) aspect of a development project, an equal amount of time, study, and funds

should be made available to ensure that any social disruption arising out of a project can be dealt with as well. Whether or not the Rawa Pening project, or any other project discussed within the confines of this section goes to the feasibility level of study, it is suggested that efforts be made to strengthen the existing superstructure of the human resources agencies. It is not felt that any expenditures or allocation of manpower to those departments would be wasted. Rather, it is somewhat analogous to preventive medicine. Any strengthening of these agencies in any capacity could only ensure a more effective implementation of any program that, they might be called upon to undertake in the future.

If these measures are taken, without the project, the agencies can be ensured of enhancing their on-going programs and policies to their clients. With the project, and the possible interjection of approximately 15,864 people (the total number of farmers, farm laborers and fishermen excluding the desas of Tambakboyo, Asinan, and Jombor where the losses are negligible in comparison) the respective agencies can only be assumed to be strained to their utmost to provide the services needed, <u>if</u> efforts are not implemented as soon as possible to strengthen the existing superstructure.

G.12.14.c. <u>Summary</u>

The social impact arising out of the proposed Rawa Pening dyke project is a serious one. Four hundred and sixty-five hectares of land are proposed to be flooded, some of it permanently (i.e. year-round), and the lives of 53,371 people will be affected. While the gravity of the situation is not at issue, it should not be considered as being overwhelming or the problems insoluble. The benefits arising out of the proposed project must also be considered; water to the city of Semarang; increased irrigation for as much as 14,000 ha; the

potential to develop local industry in the service area as well as Semarang; increased flood control, and increased health benefits, to name some of the most obvious primary benefits. Both the advantages and disadvantages of the project must be given due consideration, and the decision made as to whether or not the study should be persued to the feasibility stage. Because this is a pre-feasibility study only, and because much of the data gathered at this stage is both incomplete and suspect, concrete recommendations were not felt to be in line. Only a series of guidelines, suggestions and observations have been presented.

G.12.15. Guidelines

G.12.15.a. Transmigration

Because the overall response to transmigration in the Rawa Pening area was not favorable, transmigration would probably not be the optimum solution to many of the social impact consequences of the proposed project. There are villagers that are favorable to the program, but with constraints; as there are villages, such as Candirejo, that are opposed to the idea completely.

Because the villages of Rowosari, Rowoboni, and Ngrapah have suffered the most from the continuing inundations of the lake, they would probably be the desas most receptive to the idea. The total population of these three villages is 6,691 or approximately 1,338 families (assuming 5 people per family). Based upon the projected land loss estimates, both Rowoboni (62%) and Rowosari (83%) stand to lose a considerable portion of their rice fields, adding another dimension to any assessment of the advisability of transmigration for these desas.

Transmigration for the desa of Candirejo is not suggested. The village is not receptive to the idea, and has a high degree of politically aware and educated people.

If transmigration is to be considered as a partial solution to any of the social impact consequences of the project, it is suggested that the respective departments involved in the process be notified as far in advance as possible. Both budgetary considerations, and the necessary plans would need to get underway as soon as possible, in order to insure a smooth transition and minimize the stress on departmental resources, and impacted population.

If transmigration is not considered as a viable solution to the social impact consequences, it is still suggested that a strengthening of the superstructure be undertaken.

G.12.15.b. Industry and Manpower Development

It is suggested that, given the unfavorable response to transmigration, and the number of possible constraints that might be placed upon the government in regards to land compensation; and possible political repercussions arising out of the current status of land compensations at the Rawa Pening area; the majority of monies to be spent in the area (if the project goes to feasibility and/or design stage) be allocated to those departments that deal with home industries, fisheries, and manpower development. This suggestion applies to the area with or without the project.

There exist a number of possibilities for the development of home industries, and/or the generation of jobs in and around the Rawa Pening area. A quick review of the table on occupations (G-15A) will show that a significant portion of the population around the lake area is already involved in employment outside of the non-farming

sector as industrial laborers, construction laborers, traders and in transportation, etc. The large segment of the labor force in the category labelled "Other" for the villages of Tuntang and Lopait may include people who are employed by two plantations nearby, namely Getas Rubber and Assinan Coffee.

An informational representative from the office of Meher has been initially contacted concerning the possibilities of supplying a market for the development of various goods manufactured from bamboo. While this contact was extremely superficial, it nonetheless generated a number of specific ideas which would be worth persuing: home industries that require a labor force in the production of fishing equipment, weaving goods, bamboo umbrellas, etc. Since markets have always been one of the prime problems in the development and continuation of home industries, this idea may prove to be fruitful and should be persued.

A paper presented at the Second Annual Seminar on Rawa Pening (October, 1979) at Satya Wacana Christian University dealt with the possibilities of the development of a small scale fishing industry in the Rawa Pening Area, specifically the development of fish farms. This industry would not only help regenerate the deteriorating fishing conditions in the lake, but might also provide a base of employment for some of the fishermen in the Area. [Goeltenboth, F., et al. 1979; Prayitno, 1979]. Further investigation of this development is suggested.

A number of subsidiary, or service industries could also be generated from the development of fish farms in the area. These include the making of poultry meal from the fish bones, the manufacture of fish pellets to be used in the fish farms, the manufacture of the fishing cages, etc.

The presence of water hyacinths has been a continuing source of problems for Rawa Pening [SWRI 2nd Seminar, Widyanto L.S., et al. 1979]. The construction of a dyke in the area offers a potential source of alleviation of this problem, as well as the possibility for employment of some people around the Rawa Pening area. The hyacinths can be transported to Tuntang for use at the compost factory said to be located there. The hyacinths can also be used as mulch for the surrounding areas, thus providing some soil conservation measures as well as fertilizer.

G.12.15.c. Transportation

The construction of the dyke serves as a possible potential for the improvement of the roads in the area. One of the proposed benefits to the population will be the presence of a motorcycle road on top of the dykes. While this will improve transportation linkeages overall, it should be noted that several of the villages (Tambakboyo, Ngasinan, Rowosari, Ngrapah) suffer from lack of poor roads, either within the villages themselves or in the connecting roads to major highways in the area. The general improvement of roads necessary for the building of the dyke could serve as a general opportunity to improve the condition of the roads in these villages as well. The development of better means of transport and communication would not only serve to facilitate the development of local industries (access to market), but it would also improve the opportunity of the local inhabitants to seek and maintain jobs outside of their respective villages. With the loss of agricultural land, and the projected increases in population that are bound to occur in the area with or without the project, a means needs to be provided to enhance the opportunities of the population to obtain employment outside of the villages.

It is suggested that with the improvement of the roads in the area, measures be taken to connect all of the villages around the lake with public transportation (buses, colts, etc.). This communication/ transport linkage is another important element in improving th chances of employment for the lake inhabitants.

G.12.15.d. Benefits

The building of the dyke around Rawa Pening could serve as an opportunity to improve the quality of life of the people in the area to some extent.

It has been estimated that for reasonable cost, and no adverse effects on the major project, potable water could be supplied to the villagers around the lake through means of a water supply main. The pipe could be supplied to every village and equipped with an automatic shut-off valve, thus ensuring water conservation and minimizing health hazards. Given the overall poor quality of potable water available to the residents at the current time [7], this benefit would greatly improve the health and sanitation situation of the villagers.

Flood control for villages currently being flooded could be provided by the building of the dyke. This benefit would be especially helpful to the villages of Ngrapah and Rowosari, and would also reduce the fear and anxiety of other villages in the area who are occasionally threatened by the flood waters from the lake and rivers

The dyke provides an opportunity for increased security on the part of the farmers who remain in the area in planning their crops. While the amount of land that would be able to be farmed as the lake waters recede cannot yet be determined with any degree of accuracy,

it is nonetheless possible that the raising and lowering of the lake waters could be scheduled to a sufficient extent to allow the farmers in the area to plan accordingly. Thus, the irrigation benefits of the project would not only accrue to farmers in the service area, but also in the impact area.

G.12.15.e. Land

While the amount of reclaimed land (178 ha) is not equal to the amount of land that is proposed to be inundated, the consequence of the ability to farm this land year-round instead of only part-time does offer a measure of mitigation. If the government purchases all the land affected by the proposed project, it might be able to establish a system whereby the reclaimed portions of land would be available to farmers who lose land. This possibility should be explored in more detail.

An attempt should be made in the construction and/or design of the lake (should the project progress to that stage) to provide adequate irrigation facilities to the reclaimed land. This should be able to be done with a minimum of additional cost.

G.12.15.f. Attitudes

An additional benefit that might arise from the proposed building of the dyke is the potential for easing some of the tensions that currently exist in the area.

It is suggested that a massive informational program be mounted at any stage further than prefeasibility. This informational program could serve a number of functions:

1. It would inform the villagers of the possible benefits accruing to them from the building of the dyke.

2. It offers the opportunity to establish a basis whereby the currently contested property damage issue could be negotiated.

3. It would help generate a feeling of participation and self-determination on the part of the villagers, thereby reducing the current feelings of hopelessness and frustration.

G.12.15.g. Water Board

It is suggested that a local "cooperative", i.e. Water Control Board be established for the management and maintenance of the lake. This might prove to be beneficial in a number of areas:

1. By the creation of a board prior to the persual of any further studies in the area, maximum coordination between and among departments, consultants, and engineers would be facilitated. At a design level, it could help ensure the solutions to any unexpected or on-going problems arising out of construction and/or design.

2. By coordinating the programs, services, plans, and information of governmental agencies (i.e. Fisheries, Water resources, Agriculture, Conservation, Public Service) with each other and with the needs and requirement of the local inhabitants.

3. By including representatives of the local government on the board, alleviation of current tensions and prevention of future tensions could be mitigated, and lines of authority clearly established.

4. By creating a governing body for the lake maintenance and management, a more efficient operation of the lake for all sectors could be ensured.

5. The creation of a board might also assist in improving the quality of the lake, and in fishing in particular. Under the Water Board, could be a number of possible job openings. Of particular benefit could be the establishment of Pengawas Perikanan Wilayah (game wardens) to protect and ensure that the quality of fishing in the area would be protected. This job position might help alleviate some of the pressures of the fishermen in the lake area and it is suggested that they should be considered as primary sources of the jobs.

6. At a later, or development stage (i.e. after the creation of a dyke) any further developmental plans would be under the control and administration of one functioning body, rather than having to create a new one for this purpose.

G.12.15.h. Labor

While the building of the project would disrupt the livelihood of approximately 15,000 farmers and farm laborers, this figure is deceptive. The occupational table does not indicate what percentage of the population works more than one job, and hence may be listed in more than one job category. It is possible that the actual numbers of affected farmers and farm laborers is somewhat smaller than 15,000. Further assessment and study need to be made concerning sources of income for people in the area, and all sources and time allocations allotted to various forms of work. Another consideration that must be taken into account is the amount of population that would be barred from the farming sector in any event (through land holding fragmentation, population pressure, increased desire for mobility, etc.).

It is strongly suggested that labor-intensification methods be used in any proposed dyke building. The possibility exists that as many as 2,000 - 3,000 people could be employed by the construction over the estimated 3 - 5 years of building. In addition to the utilization of a local labor force, this construction would offer the opportunity for on-the-job training of construction and/or supervisory management personnel. This could be integrated with one or more of the existing programs of the department of Industry and/or Manpower development. If the decision should be made to use a mix of labor intensive methods and some capital intensive methods, this would also provide further training opportunities for a segment of the population.

G.12.15.i. Compensation

Since a number of the impacted villages (See Table G-16) will lose bengkok and/or bondo desa land, it is suggested that provisions be made for special consideration, compensation and/or adjustments for governmental leaders or village so impacted. Any further negotiations concerning previously contested lands should also take this further into consideration.

G.12.16. Further Studies

A number of further studies need to be made should the project progress beyond the prefeasibility stage. While the following list is not all inclusive, it should provide guidelines for further research and policy-making in addition to the suggestions already given.

Further studies need to be made on the linkage systems between and among the existing villages in the impact area, and towns and villages outside of the immediate impact area. For example, Salatiga represents the primary market for surplus agricultural and rice products from the villages of Tambakboyo, Tuntang, Lopait, Kesongo, and Candirejo. If these villages are severely disrupted, with a consequent loss of livelihood and food stuffs, what is the impact with consequence to Salatiga? This same type of question would also hold true for the towns of Ambarawa, Banyubiru and Jombor.

The actual source of labor for various towns and industries in the area (e.g. Getas Rubber Plantation, Assinan Coffee, Ambarawa, etc.) needs to be studied in greater detail. The possible disruption or dislocation of the labor supply, as well as the addition of a labor surplus should be assessed and studied.

With or without the proposed project, but in particular with the possibility of the proposed project, the development of local (home) industries in the area needs to be explored and studied. This is particularly true when one recalls that at least 60 percent of the existing population in the area is below or near the poverty line established for Indonesia.

Further studies need to be conducted with regard to the development and improvement of fishing in the area. It needs to be determined whether or not the building of the dam in the area would help or hinder the development of such an industry, as well as the viability of such an industry.

It is suggested that the possibility of developing the reservoir as a recreational area in the future should be studied if the project proceeds to a feasibility stage.

A more detailed study needs to be made with regard to the environmental impact of the proposed study on Rawa Pening. This study, it is suggested, should also include the possibility of the proposed project being utilized as a developmental model in the Central Java area for further research purposes.

A study needs to be conducted with regard to the proposed reservoir aggravating the health and sanitation situation in the area.

A cost analysis should be made with respect to the supplying of water to the lake inhabitants.

A cost analysis needs to be made with regard to improving and/or supplying additional irrigation facilities to the land around the lak and in particular the lands to be reclaimed under the proposed project.

An assessment needs to be made as to how much land areas would be required regarding the actual construction of the dyke.

The assessment of individual land ownership in the area (. e.g. private holdings, absentees ownership, military holdings, etc.), needs to be made, as well as a study regarding reciprocity patterns of landuse and ownership.

The establishment of an integrated regional planning agencies should be considered and studied. This regional agency would consider and control the optimum coordination of training programs, labor sources, existing and proposed industries to be developed or expanded in the service and impact areas, job preference, manpower allocation, et al. Hopefully this would maximize regional development, and serve as a mitigating measure for the under-employed and jobless population that would arise out of the proposed project.

TABLE G-14A

POPULATION OF 15 DESAS RAWA PENING IMPACT AREA

Desa	Male	Female	Total	Total No. Families*
1. Tuntang	1,881	1,924	3,810	863
2. Lopait	1,278	1,575	2,853	541
3. Kesongo	2,189	2,492	4,681	929
4. Candirejo	1,803	1,904	3,707	732
5. Jombor	777	799	1,576	327
6. Rowosari	801	841	1,642	320
7. Pojoksari	1,159	1,234	2,393	537
8. Banyubiru	2,591	2,688	5,279	1,159
9. Ngrapah	1,727	1,707	3,424	-
10. Kebondowo	2,509	2,544	5,053	1,012
11. Tegaron	1,859	2,044	3,939	754
12. Ngampin	1,783	1,911	3,694	795
13. Gondorio	1,122	1,200	2,322	427
14. Bejalen	671	782	1,452	-
15. Rowoboni	806	818	1,652	-
16. Tambakboyo	1,620	1,591	3,219	641
17. Asinan	1,331	1,371	2,702	563
Total	25,907	27,425	53,371	9,600

* Total number of families was not available for all desas.

TABLE G-15A

OCCUPATIONAL BREAKDOWN OF RAWA PENING AREA BY DESA

Kind of Livelihood	Tuntang (persons)	Lopait (persons)	Kesongo (persons)	Candirejo (persons)	Jombor (persons)	Rowosari (persons)
1. Farmer	147	325	284	371	284	310
2. Farm Laborers	506	1,042	296	837	244	502
3. Fisherman	137	20	461	40	-	35
4. Businessman	61	-	-	20	-	-
5. Industrial Laborers	52	8	154	32	-	-
6. Construction Laborer	155	18	254	192	65	6
7. Home Industries	-	-	-	-	-	-
8. Government Official & Army	188	19	38	82	10	38
9. Pensioned Government Official	61	9	20	19	6	3
10. Transportation	12	110	-	16	26	2
11. Trader	53	9	99	301	63	15
12. Other	1,281	1,006	228	-	55	312
TOTAL	2,653	2,566	1,834	1,910	753	1,223

TABLE G-15A

OCCUPATIONAL BREAKDOWN OF RAWA PENING AREA BY DESA

Kind of Livelihood	Pojoksari (persons)	Banyubiru (persons)	Ngrapah (persons)	Kebondowo (persons)	Tegaron (persons)	Ngampin (persons)
1. Farmer	311	731	124	212	1,150	344
2. Farm Laborers	350	1,510	341	1,440	421	580
3. Fisherman	10	21	-	27	11	-
4. Businessman	-	-	-	-	-	-
5. Industrial Laborers	1	12	35	6	-	244
6. Construction Laborer	10	26	12	36	-	255
7. Home Industries	1	7	-	2	-	41
8. Government Official & Army	40	77	46	38	41	91
9. Pensioned Government Official	50	182	6	60	9	56
10. Transportation	3	36	-	-	-	57
11. Trader	12	37	12	-	-	556
12. Other	83	11	271	42	24	549
Total	881	2,650	847	1,863	1,656	2,773

TABLE G-15A

OCCUPATIONAL BREAKDOWN OF RAWA PENING AREA BY DESA

Kind of Livelihood	Gondorio (persons)	Bejalen (persons)	Rowoboni (persons)	Tambakboyo (persons)	Asinan (persons)
1. Farmer	691	178	535	379	146
2. Farm Laborers	325	768	341	584	1,778
3. Fisherman	-	40	80	186	13
4. Businessman	-	-	-	-	-
5. Industrial Laborers	15	-	-	4	-
6. Construction Laborer	21	5	15	56	12
7. Home Industries	29	-	-	5	-
8. Government Official & Army	-	25/9	21	82	57
9. Pensioned Government Official	17	34	13	25	8
10. Transportation	7	1	5	2	-
11. Trader	9	18	31	5	1
12. Other	13		66	901	24
Total	1,127	1,078	1,107	2,229	2,039

TABLE G-16

AFFECTED LAND-USE BY DESA

RAWA PENING AREA

Desa	Total Area/ha	Total Rice Field/ha	Assumed* Loss/ha (Rice)	% of** Affected Land (Rice Only)
1. Tuntang	290,225	50,132	33(25)@	66 %
2. Lopait	274,353	61,000	16(4)	26 %
3. Kesongo	326,438	116,200	70(6.88/.3)	60 %
4. Candirejo	288,009	178,266	88.77(20.076)	50 %
5. Jombor	117,889	82,395	-	-
6. Rowosari	219,574	114,490	95(6.405)	83 %
7. Pojoksari	177,085	146,980	-	-
8. Banyubiru	457,050	178,087	102	57 %
9. Ngrapah+	-	-	-	-
10. Kebondowo	438,875	121.0	-	-
11. Tegaron	543.0	108.12	-	-
12. Ngampin	303.89	153.77	-	-
13. Gondorio	261.75	73.00	7	10 %
14. Bejalen	96,570	81.6	-	-
15. Rowoboni	162,800	97.35	60(15)	62 %
16. Tambakboyo	189	119,492	14	12 %
17. Asinan	547,84	93.592	33	35 %

* These figures are rough estimates only; presented as an informational aid in the evaluation of the impacted area.

\+ No data.

@ ( ) - bengkok and/or bondo desa area.

TABLE G-17

LAND VALUES IN RAWA PENING IMPACT AREA

Desa/Village (Kelurahan)		Land Value	Rental Price
1. Bejalen		Rp. 5 x 10^6/ha	Rp. 150,000
2. Pojoksari	(Poor farmers)	6-7 x 10^6/ha	
	(Wealthy farmer)	10 x 10^6/ha	
3. Tuntang (Kelurahan kampung)	(unflooded)	5 x 10^6/ha	100,000
	(flooded)	2.5 x 10^6/ha	100,000
4. Lopait	(unflooded)	10 x 10^6/ha	150,000
	(flooded)	3 x 10^6/ha	
5. Kesongo	(unflooded)	10 x 10^6/ha	150,000
	(flooded)	5 x 10^6/ha	100,000
6. Candirejo	(unflooded)	3.35 x 10^6/ha	125,000
		2.5 x 10^6/ha	
7. Jombor	(unflooded)	5 x 10^6/ha	125,000
	(flooded)	2.5 x 10^6/ha	
8. Rowosari	(unflooded)	10 x 10^6/ha	100,000
9. Tegaron	(outside area)	6 x 10^6/ha (1 sure crop)	
		2 x 10^6/ha (crop unsure)	
10. Kebondowo		7-8 x 10^6/ha	
11. Banyubiru		10 x 10^6/ha (max. 150,000)	
12. Ngrapah		4-5 x 10^6/ha	
13. Rowoboni		4-5 x 10^6/ha	
14. Gondorio		7 x 10^6/ha	
15. Ngampin	(unflooded)	7 x 10^6/ha	
	(flooded)	1 x 10^6/ha	
16. Tambakboyo		7.5-10 x 10^6/ha	
17. Asinan		7-8 x 10^6/ha	

TABLE G-18

GOVERNMENT AGENCIES AND SERVICES

I. Departments which handle training and extension.

1.1. Departemen Tenaga Kerja dan Transmigrasi
(Department of Manpower and Transmigration)

Direktorat Jenderal Pembinaan dan Penggunaan Tenaga Kerja
(Directorate General of Manpower Improvement and Manpower Allocation)

1.2. Departemen Perindustrian
(Department of Industry)

1.3. Departemen Perdagangan dan Koperasi
(Department of Trade and Cooperation)

1.4. Departemen Pertanian
(Department of Agriculture)

1.5. Departemen Pendidikan dan Kebudayaan
(Department of Education and Culture)

1.6. Direktorat Jenderal Pendidikan Luar Sekolah dan Olah Raga
(Directorate General of Outschool Education and Sport)

II. Department of Community/Public Service.

2.1. Departemen Kesehatan
(Department of Health)

2.2. Bank Rakyat Indonesia

2.3. Departemen Tenaga Kerja dan Transmigrasi

- Direktorat Jenderal Transmigrasi
- Direktorat Jenderal Pengawasan Perburuhan (Labor Supervision)

TABLE G-19

TRAINING AND EXTENSION PROGRAMS

I. Training and Extension.

1.1. Tailor training
1.2. Carpenter training
1.3. Motorcycle mechanical training
3.4. Steel/Iron work training
3.5. Home industries training and extention
3.6. Management training
3.7. Farming extention (Paddy, Palawija/secondary crops, Horti-culture, cattle-breeding, chicken and duck breeding and fishery)

II. Services.

4.1. Health services
4.2. Credit
4.3. Guidance and consultation

G.13. GLAPAN (IMPACT AREA)

G.13.1. Introduction and Scope

While similar in its overall outlines to the general problems discussed in G.11.1. of this appendix, the Glapan project differs from both Rawa Pening (G.12.) and Gunung Wulan (G.14.) in a number of ways. In August 1979, the proposed Glapan dam was being studied to provide a live storage capacity of 160 x 10^6 m^3, which would have displaced some 21,000 people and inundated approximately 3,000 ha [14]. At that time the proposed project was shelved from further consideration due to socio-economic factors and other constraints. By October 1979 the enhanced desirability of an increased reservoir at Gunung Wulan made it necessary to re-evaluate the socio-economic consequences of a new, but smaller reservoir at Glapan. Unlike Rawa Pening, where there were no actual desas to be flooded, the modified project scheme at Glapan called for the inundation of six (6) desas (villages) or 25 dukuhs (hamlets) and the displacement of an unknown number of people (unknown due to plan modification) and only inundating approximately 1,700 ha of land.

For this reason, and because no assessment had been made for the impact area, a socio-economic assessment of the impacted area was conducted in November-December of 1979. At this preliminary level of study, no attempt was made to survey those villages (such as Beduri) that might be affected by the building of the dam, but which were not in any actual danger of being flooded. Study efforts were confined solely to those desas known to be in the flood plain of the project under consideration.

G.13.2. Area - General

Compared to the haunting beauty of the Rawa Pening area, the Glapan area appears to be dull in contrast. (Figure G-1). With the exception of an occasional spot along the river bank, the area has little to distinguish it from many other areas in Central Java. The tropical lushness however, is deceiving, as closer inspection reveals powdery gray soil at height of the dry season (October), and crops such as corn appear spindly in appearance indicating the poor fertility of the soil. The project area can be reached by the Salatiga-Kedungjati-Gubug highway, but the road overall is in extremely poor condition for autos, and other than occasional colts (small buses), the primary means of transportation are motorcycle-taxis. The area is locally, very heavily dependent on the surrounding state forest areas, and a number of individuals supplement their incomes through primary (tending, clearing, planting new trees) and secondary jobs associated with the forestry area. The forestry area is predominantly teak and mahogani, with some sonokeling and occasional bamboo.

Although all of the desas possess some sawah (rice fields) and dry fields play an important part in agricultural subsistance, a brief glance at Table G-25 will show that in major part of each desa, the land is under forest, with 75 percent of the land in Kalimaro and 83 percent of the land in Deras being the most notable. Just as the lake was viewed as the primary "benefit" to the people in the Rawa Pening area, the forest represents the same idea to the people in the Glapan (and Gunung Wulan) area. Quite a few people frequently supplement their income through the collection of teak leaves (used as wrapping material) and through the collection of firewood, in addition to whatever primary occupations they have.

At the beginning of the rainy season, when the survey was undertaken, the villages appeared extremely dusty, as the rains had not yet

started there, and the Tuntang River was quite low. However, the severity of flooding when it occurs in the area could be imagined from the high water marks at the Glapan Weir; and the remanants of floating debris.

G.13.3. Project Description

The current proposals for the Glapan Barrage are to build a dam with low-crest gated spillway less than 1 km upstream from the existing Glapan Weir, abutting the desa of Beduri/Brebes. It has a proposed capacity (gross) of 125 x 10^6 m^3 with high water elevation at 30 m. The land map used for the survey indicated a total land inundation of approximately 1,740.63 ha, with six desas and 25 dukuhs to be flooded containing a current population of approximately 15,101 people or 3,348 families. The project in an individual capacity will provide perennial irrigation to 13,517 ha in the Tuntang service area. [See Appendix C - Part I for details]. Due to the type of dam construction proposed, one wet season crop (rice) can continue to be farmed, but one dry season (palawija) crop will be lost. Table G-20 shows the amount of land to be flooded according to use.

Table G-21 lists the project area by Sub-district (Kecamatan), Desa (Village) and the dukuh of each desa (hamlets), while Figure G-3 illustrates the proposed reservoir area and the affected desa. It will be noticed that the south-western portion of the reservoir looks as if it might inundate the Kedungjati area (Klitikan, Kalibedah, Bulak, etc.) but the project engineers indicated that those villages could be protected from flooding by the construction of a levee some 2 to 3 m high around the affected low-lying areas. No major highways in the area would be affected; the connection between Gubug and Kedungjati will be maintained. Nor will the major railway line running through

the area be substantially affected by either the building of Glapan or Gunung Wulan. (See G.15 Kedungjati for further discussion).

G.13.4. Demography

In order to fully assess the proposed impact of the project upon the Glapan area, a detailed examination of overall demographic factors needs to be presented and assessed.

G.13.4.a. Population

Table G-21 has presented the desas and dukuhs by sub-district that will be affected by the building of Glapan dam. Table G-22 shows the population breakdown in the Glapan impact area, as of June 1979, by age.

G.13.4.b. Livelihood and Income

Tables G-23 and G-24 show the listed occupations of the people in the area and the income generated from various traders, respectively. While the two tables do not form a one-on-one correspondence between listed occupations and data available for income generated from such occupations, the two together nevertheless form a basis by which to assess the general quality of life of the people in the area as it exists at the time of this study. In addition to those occupations listed in Table G-23, it must be remembered that a number of individuals are doubtlessly engaged in more than one occupation as a means to supplement their incomes. Among the other forms of occupations/livelihood to be found in the area are riverfishing, cultivating (maintenance and care) of the extensive forest land around the area, firewood gathering etc. The forest offers a number of increased jobs and job-related opportunities for the people in

the area as part-time laborers in cutting down trees, thinning the forest, and planting trees in exchange for tilling the ground to produce a limited number of crops. The income table indicates that there are a number of carpenters and masons in the area; presumably these skilled craftsmen are included in the job category (Occupational Table G-23) listed as construction and or industrial laborer. It should be noted, however, in assessing the livelihoods of the people in the area, as well as in evaluating the total overall population actually present in the area, that the skilled laborers do not actually reside in the desa(s) all the time, but either commute to or reside in the nearby larger cities of Semarang, Salatiga, Solo, and even as far away as Jakarta. Consequently, although offically liste on the village records as being "present", they are in fact, not actually permanent residents.

In addition to the skills of carpentry and masonry, eight (8) mechanics are in Deras and 2 in Kalimaro; while four (4) people in the desa of Wates are said to be "sewers" (skilled in the art of sewing).

G.13.4.c. Land and Buildings

The proposed Glapan project will inundate approximately 1,700 ha or approximately 36 percent of the total area owned by the desas (approximately 4,846.24 ha). All of the desa's rice fields (324.76 ha) and homeyards (552.91 ha) can be presumed to be flooded. Table G-25 lists the land use by desa in the Glapan area, and the average perceived land values where known. The Forestry area comprises 66 percent of desa land use. In addition to the displacement of approximately 15,000 people over 3,900 buildings (mosques, houses, schools, etc.) will be lost to the reservoir. Table G-26 shows the number of types of buildings in each desa, and the perceived land value of the buildings by the inhabitants.

G.13.5. Linkage Patterns

The centrality of the kecamatan offices at Kedungjati makes this kota (town) the central hub of marketing and services for the desa of Deras. For the villages of Jumo, Kalimaro and Wates it is easier to go to the sub-district capital of Gubug to sell surplus crops or to buy daily necessities when the local markets are closed. Wates serves as the market place (every 5 days) ordinarily for the villages of Jumo, Kalimaro and Wates.

or schooling above the primary level, the village children must go to either Kedungjati or to Gubug. Because the village of Deras is relatively isolated due to poor road conditions and lack of public transportation linkages, it is assumed the relatively near distance of Kedungjati (3 km) makes it the locale where the village children of Deras attend. The nearest health facilities are also located in either Kedungjati and/or Gubug; and the train station at Kedungjati serves as a transhipping center for the transportation of agricultural products to either Semarang or to Solo.

G.13.6. Religious Affiliations/Beliefs

In every village there is at least one (1) large mosque, and a number of smaller mosques. The village records state that the overwhelming majority of village inhabitants list their religious affiliation as Moslem. Only in Panadaran are there to be found churches (Catholic) and a few Protestants in addition to the followers of the Catholic faith (359). While informed sources report no indications of the traditional Javanese practice centered around ancestor worship, there nevertheless exists in every village one grave believed to belong to the founder (father) of the village. If not actually worshipped, it is sacrosanct. There are two water

springs at the desa of Kalimaro which are also regarded as sacred; however, only outside visitors are reported as visiting the springs for religious purposes.

G.13.7. Leadership Roles

Because the successful implementation of the project in any further stage of study will require the informed cooperation of the local population and leadership, a superficial sounding was made to determine the strength and influence of local leadership in the six desas. At the time the study was conducted, the lurahs in the desas of Wates, Kalimaro and Penadaran were temporary appointees, holding the post only until the next election could be held. Even in a temporary position, however, the role expectations and obligations of a village-chief require the dispensing of information and protection of inhabitants under his control. This sense of protectiveness and responsibility is an important factor to consider in any continued project development, as it operates in a twofold fashion. On the one hand, a village chief may only choose individuals of his choice to participate in a program, or receive information. On the other hand, he may excuse inhabitants from participating in a particular program or from paying tax. In one instance, it is known that a village chief in the area paid out of his own pocket to cover the debts arising out of IPEDA (Regional Development Contribution) assessment.

While there appear to be no outstanding individuals of exceptional charisma or leadership qualities in the area, the village officials are considered to be respectable individuals by the people over whom they govern. One of the major constraints to effective development in the area is the high degree of mobility on the part of the population, which makes joint ventures (cooperation) on the part of a large number of people difficult to be accomplished.

As the major land-holder in the area (66 percent of village land is forest) the Forestry Department (Perhutani) exerts considerable influence over the lives of the people in the area. Although successful negotiations were conducted with the Forestry service in the past to raise low wages, popular belief has it that the Forest service plays a dominant role in the political life of the area. One reported incident reputedly has the service saying that "not one leaf from the forest floor will be taken" if support for a local candidate was not forthcoming.

G.13.8. Response to the Project

Since 1975 [19], the Glapan area has been studied in a variety of ways to determine the feasibility of building some sort of water development project in the area. As a consequence of this, some of the villages were already aware of the existence of the project. Other villages were not previously aware of any plans concerning the area. Those areas who had heard about the project were reported as "restless"; e.g., they talked about where to go, whether or not they will be separated from friends and neighbors, etc. At this level of study, the best that can be determined is that the response to the project as it stands currently, is neither pro nor con. The general impression is that more information would need to be given to the inhabitants before a more definitive opinion could be elicited.

G.13.9. Response to Transmigration

Since transmigration was the most obvious solution to handle much of the impacted population, a preliminary evaluation of the populations' reaction and beliefs concerning transmigration was gathered. Overall, the population said that they would obey the

government if requested to transmigrate. They are not, however, in favor of transmigration, preferring to remain in the area; either by moving to unsettled/untilled lands, or to be absorbed by other villages in the area which would not be flooded.

Transmigration is not totally unknown to the local inhabitants, as at least five (5) families (approximately 25 people assuming an average of five people per family) from each village in the area have already been transmigrated. In 1975, 200 people were sponsored in a transmigration program headed by a private Catholic foundation in Semarang. Although the government has encouraged transmigration, and yearly, attempts to upgrade the overall quality of the program, it cannot be considered to have been successful in this area. Because it is a government sponsored program, the lurahs are frequently reluctant to admit their failure to promote the program, or that their efforts have resulted in somewhat less than an enthusiastic response. The primary reluctance of the villagers seems to stem from what they have heard about the difficulties all transmigrants face in new settlements. Although industry and hard work are apparently valued amongst the villages, the degrees and types of difficulties said to be faced by transmigrants offset whatever proposed benefits may be presumed. Mobility, here, does not mean a desire to be cut-off from one's own village and/or familiar surroundings. Rather, the mobility seen in the area comes from the younger generation or skilled craftsmen who seek employment outside of the village. Even in these instances, either the job is not terribly far away, or they return to the village.

G.13.10. Discussion and Analysis

In the course of analyzing the data gathered for both Glapan and Gunung Wulan impact areas, it was soon apparent that the two

areas, while distinct in detail, could be dealt with in terms of recommendations and guidelines as a single, over-lapping geographical area. What was felt necessary for the analysis section of each was to point out and emphasize those features that were the most distinctive for each area, and which might require special attention or focus.

Beyond the acquisition of the quantitative data on population, land use, income, occupation etc., an effort was made as well to try and assess the underlying attitudinal responses of the population to the proposed project, and to try and determine the needs of such a population not only in an immediate sense, but what their needs and requirements might be in the intervening years between prefeasibility, feasibility and implementation levels of project planning and design. It was also felt to be essential to try and determine if in the intervening time lag between project studies, any significant changes might occur which would affect project implementation. It became obvious that such an assessment was beyond the purview, and even the necessity of this study. Attempts in this direction raised more questions than could possibly be answered, but which might prove insightful for further researchers and planners. This was another reason why a separate section was decided upon to deal with the overall consequences and anticipated results of the proposed projects in the Glapan and Gunung Wulan areas.

There are, however, four major topics of concern that are of importance to the Glapan area: handling of the graveyards and/or disposition of the grave of the founder of the village; population mobility in the labor area and population growth; and response to transmigration.

G.13.11. Guidelines

G.13.11.a. Disposition of Graves, and Special Places

Even though the registered, dominant religious affiliation of the Glapan area is listed as Moslem, it is still significant that the graves in the area are relatively well-tended and that the necessity to reserve the founder's grave is sufficiently important to be mentioned to the research staff. It is well known in anthropological circles that religion is one of the most conservative segments of any culture; it is most resistant to change and long after overt religious practices have changed, traditional beliefs linger on; frequently in the form of proverbs or superstitions. Suffice it to say that, regarding the handling of the graveyards in the Glapan area and the springs in the Kalimaro, special care and planning should be done for these two areas by project planners and staff who work there in the future. It must be remembered that regardless of the personal beliefs or practices of the project personnel, they are dealing with the subjective, often times irrational, emotions of someone else. The disposition of these sacrosanct places could be handled in a number of ways, depending upon the traditional custom of the area. Even though the people may be reluctant to openly express their superstitions and/or beliefs, and may insist that the disposition of the graves needs little attention, it is recommended that care be taken either through the vehicle of Moslem practice or through the auspices of a more traditional (abangan) religious leader to handle the proposed and actual disposition of the graves in the area. Disrespect, contempt or scepticism should be concealed by the project staff at all costs, if necessary. Should it be the desire of the population to move the graves, or have a ceremony commemorating the loss of the graves, provisions should be made to do so. These are but guidelines, as the actual disposition of these areas needs to be tailored to each desa is requirements and to the area as a whole.

G.13.11.b. Population Mobility and Growth Patterns

There is an innate fallacy in every socio-economic assessment that deals with the potential displacement of populations; i.e. that the population determined at the time of the study will remain static until such time as the project is implemented. It is too easy to overlook the demands that will be made upon various governmental agencies and project resources at the time of project implementation, should the project progress to that stage. Using an estimated growth rate of 2.3 percent for the Glapan area, the projected growth rate over the next ten, fifteen and twenty years is illustrated in Table G-26A.

Future studies and plans for the area should take the projected increase in population and other considerations into account:

1. By the time of transmigration (if such is decided), what, exactly is the composition of the population by age and by sex? That is, are there a number of households that have no male head-of-household; are there a significant number of older people that may not adapt well or be able to sustain the rigors of transmigration; will there be a significant increase in the labor force (ages 10-54), etc.

2. Forty-nine (49) percent of the total population currently in the impact area is involved in agriculture (7,393 people); however this figure represents 82 percent of the labor force (ages between 10-54 or 8,994 people). Consequently, if transmigration is considered as one of the possible alternatives to project disruption, the agricultural skills of the population should be taken into account. It should also be remembered that in this area, dry land farming is as important if not more important than sawah. It may be that this population would be better equipped to deal with non-sawah agriculture in a transmigration settlement in the outer islands than, for example, the farmers in such areas as Rawa Pening who are almost exclusively centered around paddy production.

3. Because of the inevitable time lag between the various levels of study necessary before any development project can be implemented, it was thought justified to try and project population projections by age category and distribution for the impact population present at the actual time of project implementation. This projection, it was felt, would assist development planners in determining needs for the population at the time of project implementation, and assist in effective planning for the area in the interval between project studies, and implementation. For example, whether or not schools should continue to be built in the area; what will be the demands on the labor market, etc. Table G-27 illustrates the projected population increase, by age, for the village of Kalimaro, and the percentage distribution of each age category for the next 20 years at five year intervals. Due to the time constraints, lack of all necessary data, and the complexity of the projection, it was not possible to do a projection for each desa. These same constraints prevented an adequate analysis of the data. Subsequently, Kalimaro is considered as a representative case, and the table is presented more for informational purposes to give a picture of the types of problems and needs that might arise in the intervening years between study and implementation of the project.

Somethings, however, can be noted from the outset:

1. Facilities for primary schools and kindergartens will continue to be needed.

2. That if project implementation is not begun within the next 10 years (1989), by that time 58 percent of the population (ages 10-54) can be considered to be available in the prospective, active labor force.

3. That 35 percent of the population (14-35) can also be considered to be in their most active and reproductive years. It is recommended that a further, more in-depth study concerning population projections be done for the entire area, taking into consideration the actual mortality rate in each age category. While a 2.3 percent growth rate was used in calculating these figures, the actual growth rate for each desa should also be determined and used in each assessment. The resultant study should enable project planners and concerned governmental agencies to determine with greater precision the needs and demands for both the development project and governmental programs.

There is a reported trend of boro, (i.e. going outside the village to work) in the impact area. This is strengthened by the presence of a number of occupations outside of the agricultural sectors. With this tendency towards mobility, and the projected increase in the active labor force, it is recommended that efforts be made to:

1. Strengthen the local transportation service to increase job accessibility; and improve the transportation network overall.
2. Direct transmigration efforts towards the labor segment of the population (especially the young mobile generation).
3. Encourage and support more spontaneous transmigration.
4. Expand job training programs and opportunities in the non-agricultural sector.

G.13.11.c. Response to Transmigration

The elaborate patronage system found in Javanese society, coupled with the cultural norms referred to in the section on Rawa Pening that inhibit frank and open expression of dissatisfaction and opposition, almost always result in an overt agreement both to the project and to the idea of transmigration. Other research, however, tends to support the findings of this study (Bandung, 1975; LPIS Satya Wacana 1975) in that the response to transmigration is not altogether favorable. It is generally accepted that amongst the less urbanized and more traditional Javanese villagers the primary support system comes not from kinship ties, but from the neighborhood. Consequently, many villagers are concerned with the possibility of being separated from their friends and neighbors; i.e. that the requirements from transmigration will necessitate the fragmentation of the village. Other concerns of the villagers concern the potential difficulties to be found in a transmigration settlement, and the uncertainty as to whether or not it will benefit and/or enhance their quality of life.

Because the state forest represents 66 percent of the total hectares owned by the desas (Table G-20) yet the project will only inundate 411.25 ha, or 13 percent of the available forest land, it is suggested that alternatives to transmigration be explored in that sector; or the possibility of land in the surrounding area for the population (kabupaten or kecamatan) be inquired into.

The two recommendations in the preceding section on population, i.e. spontaneous migration and encouragement of the young in the active labor force, apply equally well to this section. If gradual redistribution of the population is encouraged and implemented well in advance of any project implementation, some of the adverse effects suggested in the previous section might be mitigated, if not avoided. The resettlement of a portion of each desa, from the younger age brackets, might also mitigate any later transmigration problems by establishing an enclave in the other islands that would contain familiar people ("neighbors") prior to the transmigration of the entire village to that same locale. This might also help ensure that those households and/or segments of the population that might require additional assistance in a new locale would be assured of aid, through continuing associations wherein gotong-royong (mutual and cooperation; assistance) could be evoked along traditional lines.

TABLE G-20

GLAPAN BARRAGE AREAS INUNDATED

Kampung Area (Luas Kampung) ha	Sawah Area (Luas Area) ha	Dry Land Area (Luas Tegalan) ha	Forest Area (Luas Hutan) ha	Total Inundated Area (Luas Genangan) ha
387	846	96	411	1740

TABLE G-21

POPULATED AREAS AFFECTED

1. Area

Kecamatan Sub-district	Desa Village - 6	Dukuh Hamlet - 25
Gubug	Gunungwulan	Nangkluk
	Penadaran	Penadaran Kedungkakap Kedunglo Sasak Bantengan Jalinan Daleman
Kedungjati	Wates	Wates Pancuran Bedono Tamban
	Jumo	Jumo Persen Tawangsari Karangrandu Dawung
	Kalimaro	Kalimaro Lukas Krangkak Karangploso Kepil
	Deras	Grobogan Banjarsari Deras

TABLE G-22

GLAPAN PROJECT IMPACT/AREA

POPULATION BY AGE AND FAMILIES

Age	Glapan*	Penadaran	Wates	Jumo	Kalimaro	Deras
0 - 4	142	152	350	444	563	600
5 - 9	122	341	223	454	276	367
10 - 14	127	361	341	277	244	457
15 - 24	342	501	286	505	451	343
25 - 35	122	319	294	291	339	378
35 - 44	110	336	230	323	390	379
45 - 54	85	149	147	157	385	225
55 - 64	45	127	173	160	360	132
65 -	38	109	242	120	156	110
Total	1,143	2,573	2,302	2,731	3,264	3,088
Number of families	262	616	529	573	690	678

TOTAL AFFECTED POPULATION: 15,101

* June 1979

TABLE G-23

LIVELIHOOD OF THE PEOPLE OF GLAPAN AREA

	Glapan	Penadaran	Wates	Jumo	Kalimaro	Deras
Farmers	144	461	415	918	1,036	987
Farm Labor	288	806	97	489	865	887
Home Industries	-	6	-	-	26	-
Industries Labor	-	14	-	-	-	-
Construction	-	39	-	-	-	-
Trader	-	9	-	19	12	7
Gov. official	16	4	5	36	16	-
Pensioned Gov. official	5	2	2	3	8	-
Others	8	9	10	26	15	6

TABLE G-24

INCOME IN GLAPAN AREA

A. Income by Occupation

Occupation	Income
a. hoeing	Rp 300.- - Rp 350.-/day
b. ploughing (animal)	Rp 1,000.- /day
c. forestry	Rp 200.- /day
d. picking tobacco leaves	Rp 500.- /q* wet
e. cutting tobacco leaves	Rp 500.- /q
f. carrying tobacco leaves	Rp 200.- - Rp 300.-/q
g. tobacco drying	Rp 500.- /q dry
h. carpentry	Rp 750.- /6 hour
i. masonry	Rp 750.- /6 hour
j. fire-wood-seeking	Rp 300.- - Rp 500.-/day

* quintal

B. Income from Secondary Crops (Yearly Maximum)

			Income
1)	Secondary crops:		
	- soybean	4 - 6 kw	Rp 12,000.- - Rp 15,000.-
	- corn	3 - 5 kw	Rp 12,000.- - Rp 20,000.-
		total cost	Rp 20,000.- - Rp 25,000.-
2)	Tobacco	3.5 - 4 tonnes	Rp 200,000.- - Rp 250,000.-
		total cost	Rp 60,000.- - Rp 75,000.-

TABLE G-25

LAND USE OF GLAPAN AREA

	Glapan ha	Penadaran ha	Wates ha	Jumo ha	Kalimaro ha	Deras ha	Total ha
Rice field	27.00	15.00	139.00	125.00	26.29	19.47	351.76
Dry field	73.00	64.00	66.48	88.00	171.32	75.41	538.21
Home yard	48.00	73.00	135.02	85.00	124.23	87.66	552.91
Forestry	500.00	575.60	-	-	1,006.30	1,119.10	3,201.00
Others	12.00	3.90	61.39	68.00	17.65	39.92	202.86
TOTAL	660.00	731.50	402.39	366.00	1,345.79	1,340.56	4,846.24

Land	Perceived Value of Land in Area
Rice field	Rp. 1,000,000.- - 1,500,000.-/ha
Dry field	Rp. 700,000.- - 2,000,000.-/ha
Home yard	Rp. 100.- - 250.-/m^2

TABLE G-26

BUILDING AND CONSTRUCTION

	Glapan	Penadaran	Wates	Jumo	Kalimaro	Deras	Total
Houses	267	321	728	701	858	945	3,820
Mosque	1	2	2	6	5	*	16
Small Mosque	3	7	8	9	12	*	39
Primary schools	2	3	2	3	1	2	13
Islamic school	2	-	4	1	2	2	11
Village office	1	-	1	1	1	1	5
Village meeting house	1	-	-	1	1	1	4
Market	-	-	-	1	-	-	1
Bridges	-	7	*	-	9	3	2
Churches	-	2	-	-	-	-	2
TOTAL	277	342	746	722	889	954	3,930

* no data available

2. Building/Constructions — Building Values (Perceived)

Houses	Rp. 700,000.- - 1,500,000.-
Mosque	Rp. 1,500,000.- - 3,500,000.-
Small mosque	Rp. 500,000.- - 700,000.-
Primary school	Rp. 2,000,000.- - 4,000,000.-
Islamic school	Rp. 1,000,000.- - 2,000,000.-
Village office	Rp. 1,000,000.- - 1,500,000.-
Village meeting house	Rp. 1,000,000.- - 1,500,000.-
Market	- 1,000,000.-
Bridges	Rp. 200,000.- - 500,000.-

TABLE G-26A

POPULATION PROJECTION FOR GLAPAN IMPACT AREA

	YEARS			
	1979	1989	1994	1999
POPULATION:	15,101	18,957	21,239	23,797

TABLE G-27

VILLAGE OF KALIMARO

POPULATION PROJECTION FOR 20 YEARS*

BY AGE CLASS

	YEAR									
	1979		1984		1989		1994		1999	
	1	(%)	5	(%)	10	(%)	15	(%)	20	(%)
0 - 4	565	17	568	16	610	15	678	15	735	15
5 - 9	275	8	507	14	568	14	610	14	678	13
10 - 14	245	8	269	8	507	13	568	13	610	12
15 - 24	450	14	466	13	510	13	776	17	1,069	21
25 - 34	440	13	444	12	449	11	466	10	510	10
35 - 44	390	12	410	11	435	11	444	10	449	9
45 - 54	390	12	390	11	390	10	410	9	435	9
55 - 64	360	11	372	10	387	10	390	9	390	8
65	150	5	150	4	150	4	150	3	150	3

* 2.3% projected growth rate.

G.14. GUNUNG WULAN

G.14.1. Introduction and Scope

Please refer to Section G.13.1.- Glapan Barrage

G.14.2. Area

The Gunung Wulan dam site lies upstream from the Glapan Barrage site by approximately 9 km. There are no dramatic changes in either topography or general physical description to distinguish it from the Glapan area. There are, however differences in religious practices, linkage patterns, land use and cropping patterns, and forestry and occupations. Some of differences, however, may only be superficial in nature, reflecting the greater quantity of data that was able to be collected for this area as opposed to Glapan.

G.14.3. Project Description

Gunung Wulan is considered to be the only site on the Tuntang-Jragung Rivers suitable for a large scale storage site. With a maximum crest elevation of 76.0 m, a reservoir was proposed with a gross storage capacity of about 520 x 10^6 m^3 and a live storage capacity of 260 x 10^6 m^3. This storage facility would have the ability to irrigate some additional 35,000 ha of land. The land area to be inundated is about 3,300 ha with the possible necessity of having to relocate 17,125 people or 3,500 families. The dam also would be able to supply the city of Semarang with an additional 2,000 l/s of water. Costs are estimated at $ 148.83 million (US). From the engineering point of view,

Gunung Wulan is a viable project in and of itself, but is of particular importance in considering any overall (integrated) development plan. [See Appendix C - Part I for further detail]. Figure G-4 illustrates the project area and the affected desas.

Table G-28 shows the amount of land according to type that the project will inundate. Table G-29 shows the projected population for the Gunung Wulan area for the next 20 years.

G.14.4. Demography

G.14.4.a. Population

The impact area administratively lies in three regencies: Semarang, Grobogan and Boyolali; three (3) kecamatans (sub-districts) and will affect six (6) desas with a cumulative total of 39 dukuh (hamlets). Table G-30 lists the respective regencies, sub-districts, desas and dukuhs affiliated with each desa. The total number of people to be affected by the project as of the study date are 17,125 (3,500 families). Table G-31 gives population distribution by age, sex and desa. As mentioned in other sections of this report, however, this population figure is not totally reliable due to the number of people who do not actually reside in the village due to employment demands or other reasons. Recalling the innate fallacy of population counts mentioned in G.13.10 of this report. Table G-29 illustrates the population projections.

G.14.4.b. Livelihood and Income

Because the sawah area, overall, in the Gunung Wulan area is narrow, a number of diversified occupations exist in the area outside of the agricultural sector. Table G-32 shows the occupational breakdown in the desas. As the supplemental notes on the table indicate

however, these standard occupational listings disguise the actual occupations of a major portion of the population. Since the usual and expected ratio of laborers (farm) to farmers in Java is 2:1, the Gunung Wulan area shows some interesting discrepencies. Ngombak, for example, only lists 5 people in the category of farm laborer, and Karanglangu lists none. In both of these areas, however, it should be noted that a substantial number of people (600 and 100, respectively) are known to supplement their income through earnings related to the forest. The village of Repaking has a minimum of 122 people engaged in activities other than farming: tempe (8), bamboo crafts (22), wood collectors (10), carpenters (30), masons (30), mechanic (3), driver (1), radio repairer (3), watch repairer (3), bicycle repairer (4), motorcycle mechanics (2), tailors (3) and black smiths (3), yet none of these appear in the category labeled "other". It is this kind of contradictory and confusing data which makes reliable assessments of the livelihood and income in the area difficult. Table G-33, Occupation and Income, indicates the occupational picture much more accurately, and the two tables should be integrated in evaluating the overall picture of income and livelihood in the area. It can be seen from a comparison of these two tables, that the reason for a paucity of agricultural laborers is not hard to find: even if the figures represented in the income table are taken cautiously, they nevertheless indicate a higher income is to be derived from work associated with the forest (salary range Rp. 150 to Rp. 1,500), than with agriculture (Rp. 150 to Rp. 400). This also indicates that the forest plays a much more dominant role in subsistance living in the area than might otherwise be supposed.

G.14.5. Property and Property Values

G.14.5.a. Agriculture

Because compensation costs are an important consideration in any socio-economic cost assessment of a project, an effort was made to gain as much information as possible concerning land use, ownership, production costs, etc. While much of the data was unavailable for all of the desas in every area, what was collected is presented here, with the expectation that future studies, should the project progress to feasibility, will be able to fill the gaps.

Due to the gaps in the data, inflation and fluctuating crop prices, no in-depth analysis of the following data in this or subsequent sections is attempted. Rather the data is presented primarily for its informational qualities to policy makers, planners and future researchers.

Table G-34 lists the kinds of plants, unit production and costs, plus perceived gain, for the area as a whole. Table G-35 and G-36 present the perceived value of the "perennials" (those trees and plants lasting more than two years) and the "perennials" that are currently available in the desas. The project proposes to flood 100 percent of the desa's sawah (205 ha), 39 percent of their total forest area; and 62 percent of the total land given to dry-land crop

G.14.5.b. Land-use and Ownership

The average land ownership is shown in Table G-37 by desa; only in the desa of Repaking was detailed data obtainable. When compared with the occupational breakdown in Table G-32,

some interesting anamolies in data crop up: the total number of owners listed for Repaking exceeds the number of people who listed their occupation as farmer by 14. The desa of Ngombak has the greatest number of farmers listed, and also seems to be an area where the land ownership is higher than for the surrounding areas, yet it also lists the fewest number of people in the job occupation category of farmer laborer. Karanglangu has the second largest number of farmers listed for the six desas and no farm laborers, yet it possesses the smallest amount of sawah (9 ha). Repaking owns the greatest amount of sawah, yet according to the occupational table, has only the fourth largest number of farmers. Tables G-38 and G-39 list ownership in the impact area, and land value as perceived by the local inhabitants. It will be noted that Repaking has the highest overall listings for land value, followed by Ngombak. Ngombak, after Karanglangu, also possesses the least amount of sawah (13 ha), yet the highest listing for rice fields occurs in Tempuran (Rp. 2,000,000) which also possesses the most rice fields of the six desas. (61,27 ha).

G.14.5.c. Buildings and Private Property

The proposed project will inundate a substantial amount of both personal and private property in addition to land loss. All of the kampung (physical village) area will be lost. Table G-40 lists the type, numbers and construction material of the major buildings/property in the six respective desas. Over 6,000 houses will be flooded; in addition, 21 bridges, 21 schools (elementary and kindergartens), 80 religious buildings, one granary, one market, and one public health center will be inundated. Table G-41 indicates the values of the buildings (from the local point of view) and the value of houses according to architecture. (This latter table was only available from Repaking). It is obvious from the tables that data was not available for each desa in every category. It is to be hoped that should the study proceed to

a feasibility stage, this gap in information can be filled. However, total compensation costs for housing alone, based upon local appraisals at current prices for five (5) desas, is Rp. 5,854 billion or approximately 0.06 percent of the estimated cost of the project.

G.14.6. Linkage Patterns

A number of things strike the observer in assessing the linkage patterns of the impact area: that transportation needs are most often served through motor-bike and small colt buses; that three of the six desas are relatively isolated through heavily damaged roads (e.g. Kentengsari, Karanglayu: Kedungjati-Boyolali Regency road and Bantal: village road); and that with the exception of Bantal, whose primary market center is Salatiga, all other of the five villages depend on Kedungjati and/or Salatiga-Gubug for their marketing requirements and consumer goods. Of interest is the fact that the village of Kentengsari buys rice in addition to other basic staples such as sugar, coffee, tea, etc. The area around Gandu, desa Repaking, is said to be a substantial market center for the area, including some marketing linkages with villages outside of the proposed inundation area and some linkages with Kedungjati.

One aspect of the linkage patterns in terms of the overall transportation is the high mobility pattern exhibited by the local population. This mobility pattern manifests itself primarily through boro, or "going out to work". In addition to such major towns as Jakarta, Semarang, Salatiga, and Palembang, it is not unknown for a portion (undetermined) of the population to go to the outer islands, usually Sumatra, for temporary work. Although it was reported that

some of the borotani include married people, the predominate population sector appears to be unmarried young people. An interesting aspect of boro is that it includes through conotation a return to the village of origin at least once a year during Idul Fitri (fasting months' thanksgiving time) or more often if the jobs taken outside the village are of a more impermanent or temporary nature, i.e. less than 6 months a year, or when there is no work to be done in town.

G.14.7. Religion and Sacrosanct Places

According to information received, the entire population of the impact area, with the exception of 16 solitary individuals, are Moslems. Similar to the Glapan area, however, are several strong indications that the form of Islam practiced in the area is not strictly orthodox.

Tempuran reported a "former" holy place, Sendang Pertiwi (Dewi Fatimah), but supposedly only outsiders since 1965 have come to Sendang Pertiwi to "offer sacrifice".

While neither Ngombak nor Karanglangu have any reported "holy" places these two villages are nonetheless linked together through Asrah Batin (ceremony) held twice a year. According to legend, two ancestors of the respective villages married, not knowning that they were brother and sister. In order to atone for this sin, the villages were required to perform this ceremony "until heaven and earth come together". Karanglangu is considered to be the brother, visiting Ngombak, the sister. Up to the present day, intermarriage between the two villages is forbidden.

Two holy places are recorded for the village of Kenteng, desa Kentengsari. The first is in the hamlet of Ngawar (the grave of

Raden Bagus Supardi), and in addition to sacrifices being offered here, every fifth day of Jumat Wage (Jumat = Friday; Wage = Javanese market day) the villagers are not permitted to pass the grave. The second place is Gunung Sentono also known as Gunung Wulan (mountain of the Moon) or Gunung Kentengsari. These are places sought by those whose desire the "blessings" of meditation. For both Kentengsari and Repaking there are reports that "sacrifices" are still practiced. While the exact nature of the "sacrifices" is not specified, it can presume to follow the customary practice of the area concerning ancestor worship, as the holy place for the desa of Repaking is the grave of the village ancestor.

There is a Javanese term "tempat keramat", which roughly translated, refers to a place of "power", or a place that contains strong para-psychological vibrations. The "tempat keramat" is usually a tree or stone, and not infrequently associated with a grave, usually the founder of the village. In the course of the study, it was told to the research staff that the proposed dam at Gunung Wulan would not succeed for three reasons: the land was porous, there was an underground river at the proposed damsite, and that the roh halus, the spirits, would be angry.

G.14.8. Leadership

Overall, the leadership in the Gunung Wulan area appears to be composed of consientious men, who live up to the expected role expectations of a lurah. Several of the lurahs have an elementary school education; one is an ex-Information Service official from the Kecamatan Wonosegoro, and another is a successful cattle trader. The lurahs, as a whole, seem to experience a number of difficulties in implementing various governmental development programs: family planning (Keluarga Berencana), Family Welfare Education (PKK/Pendidikan

Kesejahteraan Keluarga) and particularly the BIMAS (mass guidance) program. Some of the difficulties stem from a lack of village awareness (family planning) or others from the misallocation or delay of BIMAS funds. The same constraints that were discussed for Glapan concerning the function of the lurah as the central figure in the flow of information, hold true for the Gunung Wulan area.

In addition to the formal leadership provided by the lurahs, school teachers also play an important leadership role (informal) either through being head of the LSD (Lembaga Social Desa or Village Social Institute), or through providing advice and guidance. Reflection of the status of Repaking in the area (e.g., land value for buildings, public health center, market place, et al.) indicates that this desa probably holds a tacit position of power in the area. Another power base is felt to reside in the desa of Kenteng, through the local reputation of the lurah there, and through his kinship ties with a mbah dukun (literally, grandfather medicine man) who resides in the dukuh of Kedungcengeng (listed as Kalicinging on the map). The mbah dukun is also the kepala desa (village chief) and apparently has a considerable reputation beyond the immediate vicinity. People from as far away as Jakarta, and other areas in Western Java are said to come and "visit the old man"; i.e. to ask for his blessings and prayers for successful completion of desired personal undertakings.

The importance of the Forestry Department in this area should not be forgotten. Both the land use and the occupational table (G-37 and G-32, respectively) indicate the importance of the forest in the lives of the people of the region; either through land use/control or as a means to supplement their incomes. It is probable that forestry officials are influential in local affairs as well.

G.14.9. Response to the Project

As in Glapan, the project was known to a few desas through the initial studies done by the Jratunseluna Project (NEDECO) in 1975. Ngombak, Kentengsari, and Karanglangu were all aware of the existence of such a project, while Tempuran and Repaking were not.

This advanced knowledge has resulted in a mixture of uncertainty and speculation, at least among informed sources. Some were questioning whether or not they should move, or wait and see what would happen. This mixture of uncertainty and curiousity has inhibited any definite response to the project. Similar to Glapan, it seems necessary to supply the residents (both officials and inhabitants) with more information concerning the project before any concrete response can be given. The best that can be said, is that there were no indications of adverse reactions to the proposed project.

G.14.10. Response to Transmigration

Section 14.6. discussed the role of boro (going out to work) in the lives of the people. This form of job hunting seems to share a common ground with the idea of transmigration as a whole. The people apparently see no discrepancy between transmigration of a permanent nature, and the ability of those who work away from home to return to homebase at least once a year (at Idul Fitri). Still, reports indicate that opinions about transmigration are based upon some fact as well as personal speculation. Interest in transmigration is high, but the program as a whole is viewed with mistrust. The common reservations concerning the transmigration program are the difficulties the settlers face in the first few years; difficulties with marketing of goods; poor communication, health services and limited educational facilities.

The villagers of Gunung Wulan prefer boro over transmigration for whatever economic difficulties they face. It is said by them that unsuccessful transmigration will harm their entire lives, whereas similar "unsuccess" in the area of boro only means a return to the village.

Information about transmigration in the village of Kedung Wulan appears to be plentiful, either through transmigration officials, or through letters or direct contact with visiting transmigrants.

The villagers of Repaking, however, counteract the criticism concerning initial difficulties by emphasizing that the important value of life is to work hard wherever one is.

Ngombak village, on the other hand, was primarily sceptical about the benefits to be derived from transmigration. They would prefer to stay on their own land.

As might be expected, the general response pattern to transmigration is mixed. Unlike Rawa Pening, however, the general response pattern is weighted more towards the positive side. Since 1974, forty four (44) families have joined government sponsored programs and 30 families migrated spontaneously. The most popular area seems to be Sumatra, through the Transad (Army Transmigration Program or Transmigrasi Angkatan Darat). Those who join this program are said to receive four (4) hectares of land in addition to credit to finance initial cultivation costs. Most of the transmigrants to date are farm laborers, and interest in transmigration rises considerably during the paceklik (a time of scarcity of food). However, as mentioned elsewhere in this report, most people would prefer to stay close to familiar surroundings and not face the prospect of being sundered from neighbors and friends.

G.14.11. Guidelines and Analysis

G.14.11.a. General

The questions raised in the discussion concerning Glapan and the effect of projected population increases in the intervening years between project study and implementation are considered to be valid for Gunung Wulan. (Section G.13.11.b.). What must be remembered though, is the need for individuality; i.e., the need to determine precisely the projected needs and population increase according to the increase for each specific desa, and to devise plans accordingly. The type of population projection based upon age category that was done for the desa of Kalimaro (Table G-27), should be done for each desa in the Gunung Wulan Area as well. It is not sufficient to merely analyze and discuss short-term goals and problems of an impact area if it means overlooking and/or disguising future problems of a greater magnitude.

The most distinctive areas of Gunung Wulan which require special attention focus upon livelihoods, religion and/or sacrosanct places, special areas of inquiry, which require further study peculiar to the area.

G.14.11.b. Livelihoods

Gunung Wulan presents an interesting case not only in light of tentative transmigration programs (depending on final disposition of the project), but also because of the three impact areas studied, it has the most mobile and diversified labor force.

In addition to the traditional occupations of farmers, farm laborer, traders and the like, there are considerable numbers of people who possess skills in the fields of carpentry and masonry.

While this may no doubt be due to the fact that the area is heavily dependent on the surrounding forest, it was not present to the same extent in Glapan, which is equally dependent on the forest lands. Occupational Table G-33 dealing with occupation and income lists a category known as "stone shatter" and another listed as "stone gatherer". While the precise number of people engaged in this occupation is not now known, (and should be ascertained in future studies) it is known that a significant number of the population engages in this form of labor, e.g. collecting stones from the river to be used for building (foundation) material and for road repair. This industry, it is reported, is substantial enough to require the usage of the railroad facilities located at Kedungjati. In 1973 for example, 909 tons of stone were shipped in 6 months (January through June) from Kedungjati [Bandung Institute, 1973]. Present data indicates the stone collectors are given Rp. 800/m^3 of rock. Obviously, if this has become a primary source of income for a portion of the population, to the exclusion of having other means of livelihood and/or skills, special training will have to be provided for this segment of the population.

The diversification of labor in the Gunung Wulan area should be examined in more detail before any consideration or plans for transmigration are drafted. Skilled craftsmen would be wasted if transmigrated to a locale which demanded an agricultural labor force, and vice versa.

Much more data needs to be gathered concerning livelihoods in this area, considering the heavy dependency of the people on the forest, and the wide diversification of jobs in the area.

G.14.11.c. Religion and Sacrosanct Places

While other cultural norms and standards make it highly unlikely that severe repurcussions will arise out of inundation of any religious buildings, tempat keramat, founders graves, shrines, et al.; enough

information concerning Javanese religious (traditional) practices and value systems was not available to the consultant so that definite predictions as to possible reactions on the part of the local population could be made.

However, the prophesy concerning the failure of dam construction should serve as a warning to project planners and developers. It is not unknown for roh halus (spirits) to have assistance from their more human counterparts. Knowing this, initial attempts were made by the study to try and determine what could be done to mitigate the anger of the spirits, and/or their human messengers. It was suggested to the research staff that if pangestu were sought (i.e. permission to go or to do something, also blessing), all would be well. The seeking of pangestu should probably be sought not just from the lurah of the affected desa, but from the mbah dukun of Kedungcengeng, who appears to be an influential figure in the area. Hand in hand with the principal of pangestu, is the concept of kulo-nuwun, or "asking permission to enter". In other words, not only must the proper leaders be asked in the informal power structure, but also those officials who represent the formal power structure, i.e. local governmental officials--Bupatis, Camats, and Lurahs (District, Kecamatan and village heads).

Merely seeking permission from various people, however, will probably not be totally adequate for proper disposition of the graves associated with the tempat keramat, or other graves in the area. It is suggested that here, as in Glapan, local custom be determined, and local input sought as to the best and most correct way to handle these areas, especially founders graves such as the one in Repaking.

Since the holy place at Tempuran, Sendang Pertiwi, does not appear to have strong emotive feelings attached to it, mere clearance with the proper authorities of the area (probably after they, in turn, clear it with the village inhabitants) would appear to be sufficient. Planners and future researchers, however, should be prepared if a stronger reluctance

than indicated here is met with. It must be remembered that this is a prefeasibility study only, and in-depth reactions may have been gauged incorrectly. The same premise and suggestion holds true for Gunung Sentono/Gunung Wulan (meditation places). Sincere concern and desire to elicit local help in the proper disposition of these areas will undoubtedly go a long way in ensuring maximum cooperation and good-will.

Special mention of the villages of Ngombak or Karanglangu must be made. Any disruption of these villages obviously threatens to disrupt their long-standing association. This holds true for both local transmigration or transmigration to the outer islands. It is presumptious at this point to try and attempt to do anything more than suggest some ideas as to how best to handle what looks to be a troublesome problem. If the bi-yearly ceremony carries with it a number of subsidiary benefits and linkages (economic, reciprocity patterns, trade associations, etc.) any suggestion of separation and/or disruption of tradition could meet with resistance. It is suggested that the ceremony, Asrah Batin, itself be studied in detail to ascertain its full ramifications. Special care should be taken with these two villages to try and find a satisfactory solution to any potential disruption. If mass transmigration of any sort is decided upon for the area, perhaps provisions could be made to settle the inhabitants of the two villages close to one another, so that this tie could be maintained. Maximum local participation in this problem would be essential for successful resolution.

G.14.11.d. Further Areas of Inquiry (Data Collection)

There are a number of specific areas of inquiry that pertain directly to the Gunung Wulan area.

1. Generally, all gaps in data in the various tables presented herein need to be filled. This includes such areas as to what, exactly is represented by the 2,000-odd people in the category "Other" for Ngombak; property evaluation for all buildings; the amount of land owned by various people in each desa, etc.

2. Inquiries should be made into villages such as Ngombak and Karanglangu as to where they get their agricultural laborers, to see if there are linkage patterns not seen by the current study.

3. A study should be made of the desa Repaking in some detail as data currently available on the village suggest that it holds a position of some influence beyond the local vicinity.

4. A study should be made regarding the river-stone labor population, and the magnitude of the trade and importance of this industry, not only for the area, but for those markets (unknowns) who depend upon river stones from this area for various purposes.

5. A precise determination of land-holding to be flooded in each desa needs to be made, not only for the purposes of compensation, but also as to the ultimate distribution of the land. The cumulative land holdings for the desas is more than the amount of land to be flooded by the project.

TABLE G-28

GUNUNG WULAN AREA

Kampung Area (Luas Kampung) ha	Sawah Area (Luas Sawah) ha	Dry Land Area (Luas Tegalan) ha	Mix Plant (Kebun Campuran) ha	Forest Area (Luas Hutan) ha	Inundated* Area (Luas Genangan) ha
451.87	290	926.25	25	1,369.9	3,308.125

* Approximately 245 ha are river.

TABLE G-29

POPULATION PROJECTION FOR GUNUNG WULAN IMPACT AREA

	Year			
	1979	1989	1994	1999
Population	17,125	21,497	24,086	26,986

TABLE G-30

GUNUNG WULAN IMPACT AREA
ADMINISTRATIVE DISTRIBUTION

Regency	Subdistrict	Village	Hamlet
1.Semarang	Bringin	Tempuran	Krajan, Cekelan, Gatakan, Glompong, Tepusan.
2.Grobogan	Kedungjati	Ngombak	Moro, Metuk, Cokoan, Karang Geneng, Ngombak, Kaliratan, Gayam Botak.
3.Grobogan	Kedungjati	Kentengsari	Kentengsari, Tegalrejo, Kenteng, Ngawur, Monosari.
4.Grobogan	Kedungjati	Karanglangu	Kleben, Kalinongko, Nglangu, Karang Gajah, Grogol.
5.Boyolali	Wonosegoro	Repaking	Repaking, Kalicinging, Kalikidang, Gumukrejo, Wuluhan, Candi, Traban Rekesan, Dukuh, Tegalrejo, Gandugayam, Gandusentong, Gandu.
6.Semarang	Bringin	Bantal	Gunungbantal, Gayam, Karangmaja, Kungkruk.

TABLE G-31

POPULATION DISTRIBUTION BY AGE AND SEX AND DESA

GUNUNG WULAN

Age Group	Tempuran			Ngombak			Kentengsari			Karanglangu			Repaking			Bantul		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	144	118	262	296	239	533	110	227	337	255	288	543	245	234	479	125	124	249
5-9	88	87	175	217	296	513	127	192	319	279	281	560	271	292	563	49	46	95
10-14	121	116	237	236	202	438	138	178	316	320	372	592	239	215	454	54	87	171
15-24	151	159	310	132	231	363	172	125	297	393	420	813	459	481	940	110	110	220
25-34	111	102	213	167	204	311	179	166	345	240	273	513	178	181	359	97	102	199
35-44	106	110	216	91	202	293	186	139	325	253	275	528	150	153	303	98	102	200
45-54	84	52	166	171	101	272	138	194	332	155	138	293	163	166	329	144	160	304
55-64	65	67	132	140	101	241	125	188	313	88	57	145	112	115	227	78	86	164
65	32	34	76	80	81	161	24	24	48	45	57	102	64	71	135	36	43	79
Total	902	845	1,747	1,530	1,657	3,187	1,199	1,433	2,632	2,028	2,061	4,089	1,881	1,908	3,789	821	860	1,681
Total Number of Families	359			580			553			856			804			348		

Total population: 17,125. Total families: 3,500.

TABLE G-32

LIVELIHOOD IN GUNUNG WULAN IMPACT AREA BY DESA

Village	Farmer	Farm Labourer	Construction Labourer	Industries Labourer	Trader	Transportation	Government Off./ Army	Pensioned	Others
1. Tempuran	49	85	194	3	2	2	14	21	85
2. Ngombak*	953	5	-	-	6	-	47	33	2,085
3. Kentengsari**	752	665	-	-	4	-	25	15	817
4. Karanglangu***	807	-	112	-	11	-	70	6	-
5. Repaking****	550	350	194	-	-	-	22	3	-
6. Bantal	500	574	-	-	2	50	15	-	-

As of November 1979

* 600 supplement income from the forest (leaves and firewood); 26 as carpenter, driver, mechanics
** 50 tempe makers; 125 supplement income from forest; 25 carpenters and masons
*** 100 supplement from forest; 110 carpenters
**** Many trades here; carpenters, blacksmiths; mechanics; 22 bamboo craftsmen

TABLE G-33

OCCUPATION AND INCOME IN GUNUNG WULAN BY DESA

Kinds of Work/Activities	Wages / Income (Rp)				
	Tempuran	Ngombak	Kentengsari	Karanglangu	Repaking
1. Hoeing (6.30 - 16.00)*	300	400	250	300	
2. Ploughing (6.30 - 09.00)	150			400	
3. Weeding/manuring			250		
4. Transplanting (6.30 - 15.00)	150				
5. Carpenter/day	1,000		500	500	500
6. Masonry/day	750		500	500	650
7. Construction labor/day	550				
8. Sawing/day	1,000			500	
9. Collecting leaves/day	240 (2x)		150		
10. Collecting fire wood/day	300	800	300	1,500	
11. Tempe maker/day	450				500
12. Stone-shatter			300		
13. Stone-collector			300		
14. Bamboo craftsman					250
15. Mechanic					500
16. Radio repairer					500
17. Watch repairer					500
18. Bicycle repairer					700
19. Tailor					750
20. Black-smith					1,000

* Time worked

TABLE G-34

KINDS OF PLANTS AND PRODUCTION

IN GUNUNG WULAN AREA

Kind of Plant	Production/ha		Production cost/ha
	Units	Rp	
Tempuran			
a. paddy	45 qu	450,000	75,000
b. soya-been	6 qu	300,000)	50,000
c. ground nuts	7 - 9 qu	300,000)	
d. cassava	40 qu	70,000	35,000
Ngombak			
a. corn	400 ontong (ontong jagung maize-ear)	20,000	65,000
b. cassava	40 qu	100,000	5,000
c. soya-bean	6,5 qu	195,000	40,000
Kentengsari			
a. soya bean	2,4 qu	64,000	?
b. corn	1,600 ontong	60,000	?
c. cassava	20 qu	40,000	?
d. sesame seed	120 kg	30,000	?
e. coconut	5/tree/year	3,600	?
Karanglangu			
a. cassava	600 kg	21,000)	
b. corn	500 kg	50,000)	
c. sesame seed	1 kg	400)	multiple-cropping
d. kedele	2 qu	70,000)	20,000
e. green nut	25 kg	10,000)	
f. tobacco	160 kg	48,000)	
g. sweet potato	100 kg	3,500	
Repaking			
a. corn	10 qu	80,000)	150,000
b. sesame seed	425 kg	170,000)	
c. paddy	35 qu	350,000	125,000
d. tobacco	-	600,000	200,000
e. sweet potato	90 pikul (1 pikul = ± 62.5 kg)		
f. ground nuts	10 qu	300,000	100,000
g. soya-bean	500 kg	100,000	40,000

TABLE G-35

GUNUNG WULAN

PERENNIALS PLANTED IN DRY LAND,

HOME YARD AND FOREST BY DESA

Village	Dry Lands	Home Yards	Forest
1. Tempuran	teak, mahoni, manges, coconut, sawo, jack fruit	sawo, mango, coconut	mahoni, teak (main trees), sonokeling, Lamtoro.
2. Ngombak	coconut, capok, turi (sesbania glandifora)	coconut, jack fruit, mango	teak, mahoni, sonokeling.
3. Kentengsari	teak, coconut	coconut, mango dondong, capok, teak, jack fruit	teak, mahoni.
4. Karanglangu	coconut, capok, kluwih, bamboo, jack fruit	coconut, mango, dondong, jack fruit, kluwih, capok, sawo	teak
5. Repaking	coconut, mahoni, akasia, bamboo, jack fruit, mango, kluwih	bamboo, mango, jack fruit, mlinjo, dondong, akasia, sawo, orange, coffee, waru, lamtoro, blimbing	teak; mahoni.

TABLE G-36

VALUE OF PERENNIALS BY DESA

Kinds	Tempuran	Ngombak	Kentengsari	Karang-langu	Repaking
1. Teak	125,000(m^3)			50,000 Q 50 m x 12 m	60,000 Q 60 x 8 m
2. Jack fruit		4,000	10,000	7,000	15,000
3. Mangoes	20,000	5,000	10,000	4,000	8,500
4. Coconut	3,000	6,500	4,000	7,500	3,900
5. Mahoni	50,000		-	-	15,000
6. Sawo	-		-	-	8,000
7. Kluwih	-		-	6,000	5,000
8. Lerak	-		-	-	15,000
9. Bamboo				100	

TABLE G-37

LAND OWNERSHIP/AVERAGE
IN GUNUNG WULAN BY DESA

Tempuran	0.25 ha
Ngombak	0.44 ha
Kentengsari	0.13 ha
Karanglangu	0.25 ha

Repaking *

Area	Number of owners
0 - 0.25 ha	149
0.26 - 0.5 ha	38
0.51 - 0.75 ha	9
0.76 - 1 ha	5
1.1 - 1.5 ha	76
1.6 - 1.75 ha	78
1.76 - 2 ha	168
> 2 ha	41

* Data of this nature only available for this desa

TABLE G-38

LAND USE AND OWNERSHIP IN GUNUNG WULAN BY DESA

Village	Total area (ha)	Rice Field				Total Rice-field	Home Yard	Dry Land	State Forest	Others
		Technic. irriga-tion	Semi tech-nical Irrigation	Village Irrigation	Rain fed					
1. Tempuran	431.81	-	-	30.50	30.70	61.27	44.15	85.53	217.86	15
2. Ngombak	1,692.849	-	-	-	13	13	50	186	1,434	9,849
3. Kenteng-sari	1,226.361	-	-	-	-		94.872	104.246	1,015,250	11,993
4. Kr. Langu	744	-	-	-	-	9	172	138	422	3
5. Repaking	864.77	-	25	40	-	65	112	657	-	30.77
6. Bantal	648.80	-	-	-	57	57	91	36	462,80	2
TOTAL	5,600.59	-	25	70.50	109.77	205.27	564.02	1206.78	3,551.91	72.61

Source: Village Office

TABLE G-39

VALUE OF LAND/ha IN GUNUNG WULAN BY DESA

Village	Rice Field Rp	Dry Land Rp	Home Yard Rp
1. Tempuran	2,000,000	500,000	1,000,000
2. Ngombak	1,000,000	1,750,000	1,750,000
3. Kentangsari	-	400,000	500.000
4. Karanglangu	1,000,000	-	1,000,000
5. Repaking	1,000,000	750,000	4,670,000

TABLE G-40

IMPORTANT BUILDINGS IN GUNUNG WULAN BY DESA

Materials	Tempuran	Ngombak	Kentang-sari	Karang-langu	Repaking	Bantal	Total
1. Houses							
- bricks	-	-	-	-	-	3	3
- wood	356	1,257	806	1,819	1,091	503	5,832
- bamboo	-	3	151	-	-	220	374
2. Bridge							
- concrete	1	-	-	3	1	-	5
- wood	1	1	1	9	-	3	5
- iromane wood	-	-	-	1	-	-	1
3. Village hall							
- teak	1	1	1	1	1	1	6
4. Elementary School							
- wood	2	3	4	3	2	2	16
- bricks	1	-	-	-	-	-	1
5. Religious							
- wood	1	-	-	1	2	1	5
6. Mosque							
- wood	2	1	4	5	-	2	14
7. Small home of worship							
- wood	4	8	15	15	-	19	61
8. Village office							
- wood	1	1	1	1	1	1	6
9. Watch home							
- wood	1	1	-	-	4	1	6
10. Village Granary							
- wood	-	-	-	-	-	1	1
11. Market							
- wood	-	-	-	1	-	1	2
12. Kindergarten							
- wood	1	-	1	1	1	-	4
13. Centre of Public Health							
- wood	-	-	-	-	1	-	1
TOTAL	372	1,275	984	1,860	1,104	758	6,353

TABLE G-41

VALUE OF BUILDINGS IN GUNUNG WULAN BY DESA

Kinds of Buildings	Tempuran	Ngombak	Kenteng-sari	Karang-Langu	Repaking	Bantal
	Rp	Rp	Rp	Rp	Rp	Rp
House	500,000 (8 x 8)	1,000,000	3,000,000	500,000	1,000,000	-
Elementary School	2,500,000	2,500,000			400,000	-
Village Hall	800,000	1,000,000			400,000	-
Village Office		900,000				
Mosque				1,500,000	1,500,000	-
Small House of Worship				400,000	400,000	-
Watch House					35,000	-
Centre of Public Health					350,000	-
Granary					300,000	-

Value of Houses in Repaking *

Type of House	Cost of Construction	Present Value
1. Pencu 	Rp. 1,500,000	Rp. 300,000
2. Limasan 	1,000,000	450,000
3. Kandangan "Cattle House" 	800,000	200,000
4. Joglo 	2,000,000	300,000

* Information from Repaking

G.15. RECOMMENDATIONS AND GUIDELINES FOR GLAPAN AND GUNUNG WULAN

In an effort to avoid unnecessary repetition, this section deals with general guidelines and recommendations that are applicable to both areas, in terms of common problems and geographical boundaries. This section should be utilized in conjunction with the special areas, discussions, and recommendations that were presented for each area separately.

An up-dated environmental (physical) report should be made for the impact areas in view of the modified integrated development plan, and the tendency to focus primarily on the service areas of the combined mix of projects. This study could probably be short-term in nature, but sufficient time should be allowed to make sure that nothing of significance has been overlooked. This study could be integrated with a feasibility study, but would necessitate an additional amount of time if done in that fashion.

The mere inundation of some 5,049 ha and the potential disruption of 32,226 people (combined totals for the two projects) will obviously generate socio-economic problems. This prefeasibility study, however, did not uncover any problems of magnitude that would preclude recommendation for the two projects (Glapan and Gunung Wulan) to proceed to the feasibility stage. The problems that currently exist, and the more obvious problems that could occur in the future must be evaluated by the policy makers in the Jratunseluna Project as to their severity with regard to the projects progressing to a feasibility level of study. It is felt that if subsequent and proceeding guidelines are given due consideration by policy makers, planners and other researchers, the transition between feasibility and prefeasibility studies should be able to be carried out without undue difficulty.

With or without the project, an intensive information program is recommended for the local inhabitants of the two impact areas. This

information program is necessary without the project because of the current feelings of worry and apprehension that exist in the area. Should either or both of the projects be dropped from further consideration, the population should be told to allay their anxieties. With the project, an intensive information program is necessary to ensure maximum cooperation and participation from the impacted population at all levels. This information program could initially be directed towards the Kecamatan and desa level of government, but a general information program for all inhabitants would probably be better in order to minimize distortion of information, and maximize participation.

Population projections are recommended for the labor force and school age children in the impact areas. The time lag between studies, and potential project implementation could result in unnecessary economic overrides (costs), and snags in human resources programming and planning.

Should the project proceed to the feasibility level of planning, it is highly recommended that project planners find out what other on-going, or proposed development projects are planned for the area. For example, should a new school be built, postponed, or alternatives sought? Should any attempt be made to upgrade or improve the existing road system in the area, or not? Should a proposed bridge be built according to existing plans or could costs be changed in light of the proposed dam construction? These are the types of questions that should be asked by project planners, and by various other governmental agencies that are currently involved in development programs in the area.

If the project proceeds to the feasibility level of study it is suggested that policy makers and planners start drafting plans not only for those who will need to be moved, possibly transmigrated, but plans devised for those who will be left behind. It is highly likely that there will be some who, for various reasons, either will not be moved,

or cannot be moved. This segment of the population, it is felt, deserves equal consideration with the plans and programs that will be devised for the segment of the population that will leave. The reader is referred to, Table G-18 and Table G-19 dealing with governmental agencies and programs.

The discussion on governmental limitations and constraints presented in section G.12.14. (Rawa Pening) of this section holds equally true for the impacted areas of Glapan and Gunung Wulan. It will be remembered in that section that a general strenghthening of the superstructure of human resources agencies and programs be made. Even with the staggered implementation schedule of the mix of development projects presented in this report, the existing superstructure at the present time is not seen as being able to handle the load of any one development project, let alone a continuing series of projects.

Given the skepticism and reservations that both the populations of Glapan and Gunung Wulan hold with regards to transmigration, it is suggested that efforts be directed towards encouraging spontaneous transmigration as much as possible now, particularly amongst the younger generation who will inevitably be barred from the agricultural sector, or be greatly under-employed through labor demands arising out of the continued population growth rate.

Effort should be directed towards exploring the possibility of local transmigration, i.e., somewhere in the local area. Because of the influence and holdings of the Forestry Department in the area, it is suggested that they be heavily involved in efforts directed along these lines.

Further studies are required in all areas that concern land holdings and use: actual desa land to be inundated must be determined;

thought must be given as to who will own and/or control that portion of the land that is not to be flooded; how much area, where, and what kind of forest land is held by the Forestry Department, etc. The desa maps on Glapan and Gunung Wulan, which are available with the Jratunseluna Project office should be of some assistance in this area.

Projected compensation costs for each desa should be done as soon as possible, to assess the actual economic costs of the proposed project.

For better determination of the needs of the population both in the intervening years between study and implementation, and for effective relocation efforts, further and more extensive studies should be done with regard to income and occupation; e.g., how much is earned by a household, in what way, and the total amount of that income.

In addition to the importance of Kedungjati for the impact areas of Glapan and Gunung Wulan, the initial data suggests that the town of Salatiga also is a correspondingly important center for goods and services for the impact population. Inquiries into the secondary impact consequences of the proposed project on Salatiga should be instituted.

Labor intensive methods should be used in dam construction as much as possible, with employment preference given to the local residents.

G.16. KEDUNGJATI

G.16.1. General

Because current project design calls for the area of Kedungjati and its immediate surroundings to be protected, it was not figured in the original problem definition or subsequent methodology. However, in the course of the studies on Glapan and Gunung Wulan it became increasingly obvious that the kota of Kedungjati and the other villages could be severely impacted by the projects indirectly. Kedungjati has been studied twice previously, first by the Bandung Institute of Technology/Center of Urban and Regional Studies in 1973 [2], and then by the Institute of Research on Social Sciences/Satya Wacana University in 1973 [12]. Both of these studies, however, were primarily concerned with the impact of the proposed Glapan projects that would have flooded the area, and the possible consequences (costs) of the loss of the area if that proposed project were to be implemented. With the modified project, Kedungjati, and the desas of Klitikan, Kalibedah, Bulak, Gunung Wulan (Note: only one dukuh of the desa Gunung Wulan is proposed to be flooded by the Gunung Wulan Project), Kedungtuman and Kedungbólo needed to be protected by a dyke. The railroad currently running through Kedungjati and the existing major highways that converge in the area would also be protected thereby.

It soon appeared in the analysis of the data from Glapan and Gunung Wulan and from the two previous reports, that Kedungjati was a major focus for goods, services, transportation, higher education, marketing et al. for the desas in both of the proposed impact areas of Glapan and Gunung Wulan. The question then arose: What will happen to the populations in and around the Kedungjati area if they remain, while everything else around them is gone? Will they, in effect become economic and sociological ghost towns? These questions in turn, posed other questions. Because sufficient time was neither available nor scheduled to delve

into this problem further, the decision was made merely to reconnoitre the area, present what current data was available, and document some of the more obvious questions that cropped up in the course of the existing study.

Table G-42 is a summary of the most current data available for Kedungjati. It covers Landuse; population by age and sex, and the livelihoods of the people in the desa.

Kedungjati is also the administrative headquarters for the Kecamatan (sub-district) Kedungjati. Having perceived that there might be a problem with the protected desas, further examination revealed that of the 21 villages that make up the Kecamatan, 8 were in the impacted areas, and two others were to be protected from inundation (one of the two is the desa of Kedungjati itself); i.e. 38 percent of the Kecamatan will be lost to the proposed projects. If the two protected desas are included, 48 percent of the entire kecamatan can be expected to be impacted by the proposed project in one way or another.

G.16.2. Questions and Guidelines

Any feasibility study of the Glapan Gunung Wulan areas should explore the possible ramifications of the two projects on Kedungjati and the protected villages from the point of view of what will happen to those towns and desas, as functioning units, and to the populations of those towns.

G.16.2.a. Questions

1. What will happen to the school system if students from such villages or Desas no longer attend? Will it affect the other students in the area, or can the impact be absorbed by Gubug or Salatiga?

2. Do new administrative areas have to be established? Should they be established?

3. Table G-42 indicates that the majority of the land owned by the desa Kedungjati is forestry, (89 percent), while those areas that might be expected to sustain the population (dry field and home yard), only comprise 8 percent of the total holdings. Where does Kedungjati get its rice? Can the sawah in those other villages in the area produce enough rice to sustain themselves and Kedungjati if/when the projects are implemented?

4. Since the most important function of Kedungjati is to serve as a storage and trans-shipping area for various goods in the area (stone, wood, agricultural products), what will happen to the volume of goods when the local suppliers are non-existent? The 1973 Bandung study [2, P.49] stated that at that time passenger and freight volume was decreasing, but that no conclusions could be drawn because "there were no data explaining to what extent .... part of the passenger/freight (sic) are originating from or destining in Kota Kedungjati itself." Considering the volume of river stones referred to earlier in the section on Gunung Wulan (909 tons/6 month period), this area should be explored in some detail.

G.16.2.b. Guidelines

It is strongly recommended that as a part of any feasibility studies to be done in the area, the potential adverse impact to the protected villages, and in particular Kedungjati, be included in any research design. If, in fact, there are severe socio-economic impacts arising out of the socio-economic isolation of these villages, project plans might wish to be modified, and costs reass

TABLE G-42

DESA KEDUNGJATI - RECONNAISSANCE DATA

1. Landuse

1.1. Dry field	51.0 ha	[Note: No sawah
1.2. Home yard	70.0	
1.3. Forestry land	1,317.7	By rice from out side;
1.4. Others	35.0	surrounded by forestry]
TOTAL	1,437.7 ha	

2. Population by age and sex (October 1979)

Age groups	Male	Female	Total
0 - 9	401	430	831
10 - 14	314	321	635
15 - 24	314	299	613
25 - 34	371	397	768
35 - 44	301	423	724
45 - 54	299	314	613
55 - 64	298	325	623
65 - more	153	175	328
TOTAL	2,451	2,684	5,135

3. Livelihood

3.1. Farmer	329)	only dry field
3.2. Farm labor	207)	
3.3. Home industry	15	
3.4. Industries labor	15	
3.5. Traders	14	
3.6. Transportation	2	
3.7. Government official	627	
3.8. Pensioned gov. off.	82	
3.9. Others	237	

G.17. JRATUNSELUNA BASIN

G.17.1. Conclusions and Discussions

All too often in the past, development projects have ignored the socio-economic aspects of a proposed development plan; at best the proposed inundation or impact to a population has been reduced to a single paragraph or sentence. Policy makers and technical personnel frequently can only see the benefits of a particular project, and while they may be aware that there will be consequences arising from a proposed project, they are likely to dismiss these as inevitable consequences of any project and are only viewed as constraints should the economic costs of these consequences prove to render the project economically unattractive or unfeasible. It is uncomfortable to contemplate that these "inevitable consequences" are in fact, human beings (and their private property) whose entire way of life will be irretrievably changed by any project that proceeds to the implementation level. Another flaw of development projects in the past has been the tendency to focus solely on the service area of a given project, and rarely or infrequently on the impacted areas. For these reasons, the Jratunseluna Basin Project is to be commended for their concern and foresight in requiring that socio-economic-environmental statements be made for both the service areas and areas. It is unusual for such care to be expressed at the prefeasibility level of study. If the need is felt to make such socio-environmental studies, it is usually done at the feasibility level of project design, resulting in unnecessary confusion and plan modifications which could have been avoided had such studies been done earlier.

In an attempt to further assist the Jratunseluna policy staff in their continuing efforts to forsee all possible consequences and benefits arising from development of the basin, the following observations are presented.

Socio-economic and/or environmental impact statements dealing with both physical and cultural impacts of proposed development projects require as much time, if not more, as that given to studies necessary for more technical aspects, e.g., hydrology, geology, dam construction, etc. Regardless of individuals and/or institutions contracted to do the cultural-environmental studies, policy-makers and planners should be aware of the hazards involved in relying too heavily upon data of socio-economic nature that was compiled within a brief period of time. As the studies included in this appendix have consistently stated, data is frequently missing; difficult to obtain and/or unavailable in the time allocated; specious, and analysis subject to error. At the prefeasibility level of study, the possibility always exists that some important fact may have been overlooked or missed. It is an expensive proposition in terms of credibility, reputation (to the project overall), and funds if, due to time constraints, studies overlap one another because of inadequate preparation or come to be viewed as mere token studies commisioned only out of an obscure sense of obligation. This latter point cannot be lightly or easily dismissed. It is of concern to the concientious policy maker, and planner as well as to the social science researcher.

Because socio-economic assessments frequently deal with material of a sensitive nature; status, property, vested interests, etc., and the alteration of people's lives, they are particularly vulnerable to criticism from a variety of sources. While any study has an obligation to report the data it uncovers or gathers in the course of the study, it is not uncommon for data to be unfavorably received by the audience for which it is intended. Nevetheless, the socio-economic study may represent the only forum whereby the impact population can voice its concerns, needs and fears. There are countless documentations of various implemented projects that have ultimately failed because the socio-economic values and requirements of a particular population were not taken into consideration. Consequently, anything less than a full

and open accounting of data, prepared and collected under reasonable time schedules, is susceptible to both error and criticism; i.e., labelled as token studies. While this may not be the case in all situations, projects such as Jratunseluna should be aware of this potentiality for adverse public relations and damage to their reputations, and protect themselves by ensuring that sufficient time is allocated to conduct all studies necessary for a comprehensive and well-done, total development program.

Should any project discussed or proposed within the confines of the report be considered for implementation, it is strongly recommended that full consideration be given to the necessity for comprehensive socio-economic-environmental studies for both the service and impact areas of any project, or mix of projects.

In addition to the need for additional studies, policy makers and planners are asked to consider two other general constraints and implications that arise out of socio-economic studies, and other studies as well.

The mere presence of strangers in an area, asking personal questions, spreading out maps, wandering around with the full equipment of a surveying party, tends to put the local population in a state of turmoil and unrest. Many times the people simply do not know what is going on; what will happen to them, or what could happen to them in an unspecified period of time. The consequences of this uncertainity can manifest themselves in a variety of ways: land speculation, apathy, reluctance to assist in data collection for fear of personal repurcussions; and general hostility to the Project. Word of mouth is frequently the only means of communication at the village level, and word of mouth is known to be one of the most effective and influential means of shaping opinion, and consequently, behavior. Like ripples from a stone thrown into a pool, lack of concern, disrespect, indifference or contempt for local customs by project staff can spread far beyond the immediate project

area, and have adverse consequences for projects in other areas, over and above the consequences to local project needs and requirements. The policy of kulo-nuwun, (i.e., asking permission to enter) should be strictly adhered to when entering any area, even if formal letters of explanation and permission have proceeded project staff. This policy apparently was not followed by earlier staff personnel conducting studies in 1975 and 1973, and is still remembered and resented by the people in Kedungbowo area and in the Gunung Wulan impact area of this study.

One further word of advice is offered with regard to the viability to transmigration as an alternative to any or all of the problems arising out of the impact consequences of development schemes in the Jratunseluna basin. Interested parties are referred to the book by J.M. Hardjono, Transmigration in Indonesia for a comprehensive report on the program as of 1977 [4]. Table G-43 presents the transmigration program for the Kabupaten Demak for the 1977 year; listing families and number of people in the transmigration program from 1972 to 1977. At best, the transmigration office moved less than 6 percent of the number in the reservoir area of Gunung Wulan (17,125). The population in Rawa Pening that could be adversely affected is approximately 53,000 people, and 15,101 in the Glapan area. Considering that in 1975-76 only 12,109 people were transmigrated for all of Java, serious reservations must be held as to the ability of the program as it currently exists to effectively handle much of the dislocation needs arising in the Basin. It does no good to transmigrate people if conditions are such that they will return to their original neighborhoods, or to Java. In the case of Glapan and/or Gunung Wulan, return to the original village site would be impossible. Consequently the population could be expected either to immigrate to nearby large towns such as Demak or Semarang, or to settle in villages around the reservoir sites. In either case, it can be expected that this portion of the population will put stresses on the infrastructure of any area in which they settle, e.g., jobs, health, sanitation, housing, etc. Perhaps if transmigration efforts could be directed towards more spontaneous transmigration, and focused

towards the most mobile segment of the population in the areas until its existing superstructure and large scale programs can be strengthened, some of the pressure could be alleviated when it came to large scale relocation efforts at the time of project implementation.

G.17.2. Recommendations and Guidelines

Many of the recommendations and guidelines in this portion are phrased as questions, rather than presented as concrete recommendations, as it was simply not possible at this level of study to survey, and or assess the projected needs of the basin in its entirety. This section serves primarily as a summary of recommendations for the three impact areas of the cultural environment section, and as a guideline for future research should the development plans for the basin proceed further.

It is recommended that a "clearing house" of information be established for any future studies to be done in the Jratunseluna Basin. "Clearing house" used in this sense, is meant to convey one central location where all information concerning the Jratunseluna Basin could be collected, stored and made available to any and all persons concerned with and/or interested in the development of the Jratunseluna Basin. This central location would greatly facilitate the time necessary for future studies in the Basin, and upgrade the efficiency and quality of the reports and plans done in the Basin. This clearing house should contain all studies done to date on the Basin, by all groups,namely, local government researchers, foreign consultants, etc. While no locale can be suggested at the present time, should the idea prove effective, it is further recommended that a clearing house of information for development projects for the Central Java region be established. This should aid not only indigenous agencies invloved in development work, but would also expedite the efficiency and ability of foreign consultants to assist in development planning. One of the most time-consuming aspects of any agency or staff is to discover what has already been done in a particular area, what is

being done, and where to go for necessary information and help. The clearing house could not only help to co-ordinate development efforts, and assist in future studies, but it could also serve to direct researchers and technical personnel to other agencies and or institutes that might be needed to assist in project development. Merely serving as an "information bureau" would be beneficial, and any private arrangements for future help would be done outside of the clearing house. A Regional Scientific and Development Centre for the Central Java and Yogyakarta region is already in existence at Gajah Mada University in Yogyakarta, employing a consortium of five universities throughout Java. This centre could be expanded into a development network, utilizing the resources of all private and public universities and research institutes in the Central Java area, and coordinating development plans for the region.

It is suggested that the utilization of existing research centers and local personnel be continued. Certainly in the socio-economic area, the local universities and research facilities have the ability to handle any further studies of this nature that may be required at more advanced levels of study. It is recommended, however, that if foreign consultants are used in the technical side of development planning, a foreign consultant also should be used in the human resources side of the problem, to ensure maximum understanding and coordination between the two aspects of planning and study; the technical and social aspects of a project.

A summary of the more important recommendations for the three impact areas focused upon in this study are as follows:

1. Rawa Pening. The most important factor in this area is unresolved contested property damage arising out of the 1966 raising of the lake. It is felt that unless some sort of resolution of this problem can be reached, the successful implementation of the proposed project will not be possible. [See G.12 Rawa Pening for details].

2. In the Glapan and Gunung Wulan areas care must be taken with regard to proper disposition of graveyard and/or sacrosanct places.

3. Special care must be given to the villages of Ngombak and Karanglangu in the Gunung Wulan area due to their special affiliation.

4. Population projections must be ascertained.

5. Coordination of on-going and future development plans in the area by other agencies must be made with the proposed plans for project implementation.

6. A special study needs to be conducted with regard to the potential adverse impact on the Kedungjati area and the other villages associated with it under the current proposed plan.

These recommendations are merely the most salient ones for the area; readers are directed to the Gudelines section of each impact area for further details and subsequent recommendations.

Further socio-economic studies are required in the Penggaron, Dolok, Kedungbowo and Banjirejo of the Basin.

A further study of potential impacts to the coastal shoreline and on the fisherman on the coast (area of Bonang) needs to be made.

A survey needs to be made regarding the existing marketing, storage and processing facilities in the Service Area to determine if, in fact, these facilities are adequate to handle the projected increase of agricultural surpluses due to project implementation.

A socio-environmental study should be conducted in the Muncul Spring area to determine if any adverse effects to either environment or population will arise out of the proposed project in the Rawa Pening area.

An inquiry should be made into the existing transportation network in the Service area to determine whether or not it can handle projected

population increases and to see what measures could be taken to mitigate population increases and demand on transport arising out of project implementation.

Studies need to be made concerning the utilization and distribution of the increased water supplies proposed with the various projects:

1. Who will control the dispersion of the water?
2. Who will have the authority for distribution?
3. Who will be in charge of construction and/or maintenance of irrigation facilities? Government or farmers?
4. If farmers are to be responsible, will adequate credit be provided? Are there local cooperatives that can be used for this purpose, or should some be organized?

An effort should be made to ascertain whether or not the benefits proposed under the mix of projects actually exist, or are mere theoretical abstractions.

Will adequate fertilizers, insecticides, and training/extensio programs be available to the farmers who can be expected to benefit under the projects? Credit?

Have the projected needs for the service area been sufficientl identified, studied, or assessed? Are further studies needed, and so, in what areas?

Given population projections (both known and to be determined b age group and sex), by the time of project implementation will there be any special needs and/or demands that will be required for the population in the Impact Area?

Has adequate thought and/or programs been provided for that segment of the population that will inevitably be left behind?

What, if any, are the benefits for the people in the impact area?

Linkage patterns both in the Service and Impact areas need to be analyzed, and should encompass the surrounding terrain of each area within a given radius to be certain that there are no secondary adverse effects to project implementation.

Because the project alone will not help the population in either the Service or Impact areas unless there is a corresponding increase in available job opportunities, what provisions need to be made to increase and enhance job opportunities in both sectors of project implementation?

A survey is needed in the Beduri/Brebes villages who will not be directly inundated by the building of the Glapan Dam, but who may suffer from secondary impact affects.

Care needs to be taken that proper protocol and/or respect for local adat (custom) is followed in all areas of the Basin that are subject to Basin development.

While the above list is by no means exhaustive, it is hoped that it will prove useful to policy-makers, and to further researchers, if any of the projects in the Basin proceed to a feasibility level of study.

TABLE G-43

TRANSMIGRATION: NUMBER OF FAMILIES AND PEOPLE MOVED FROM KABUPATEN DEMAK 1972-1977

Year	Families	People
1972	76	378
1973	77	369
1974	45	182
1975	10	52
1976	195	,040
1977	187	972

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FIGURE III - 1

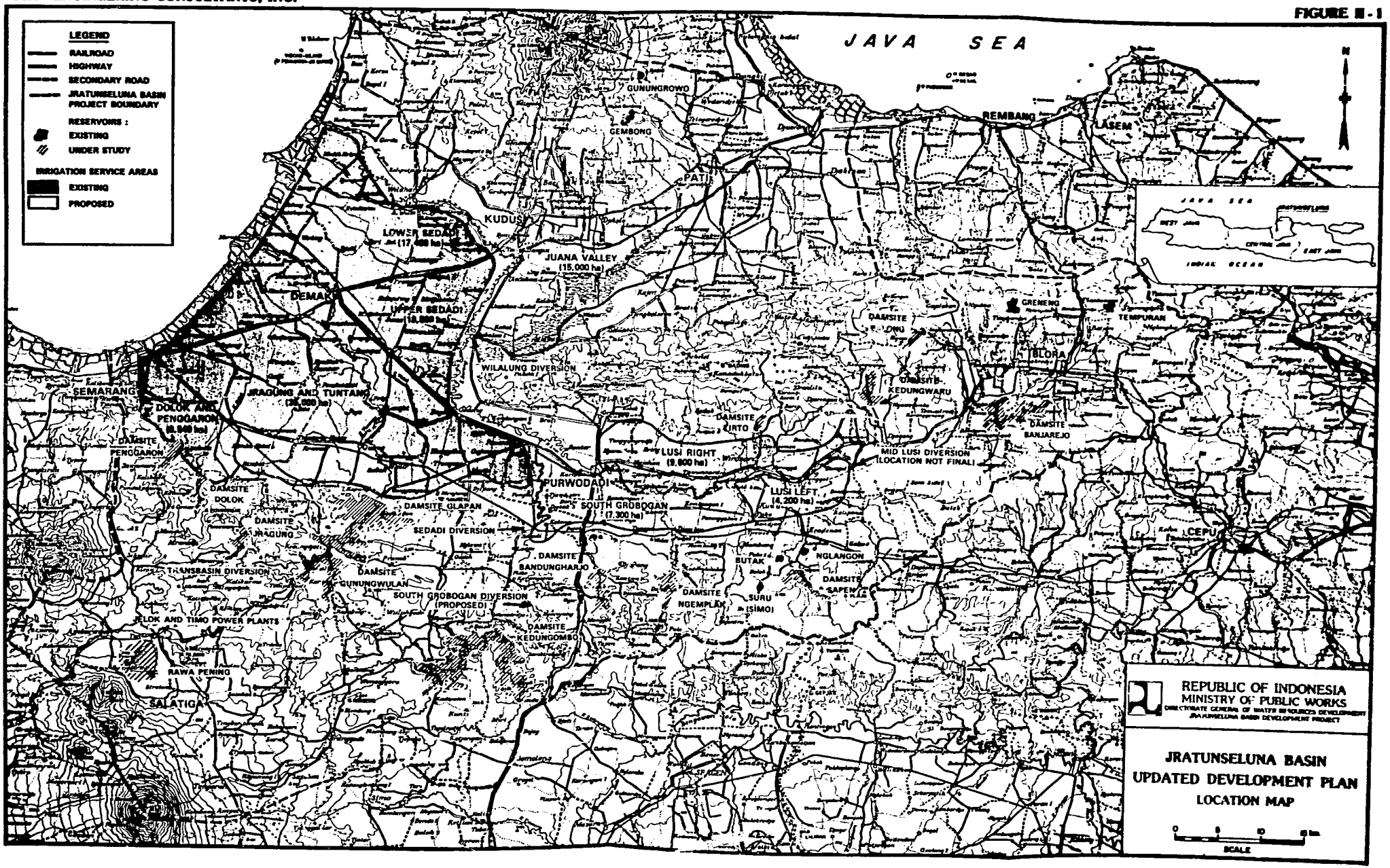

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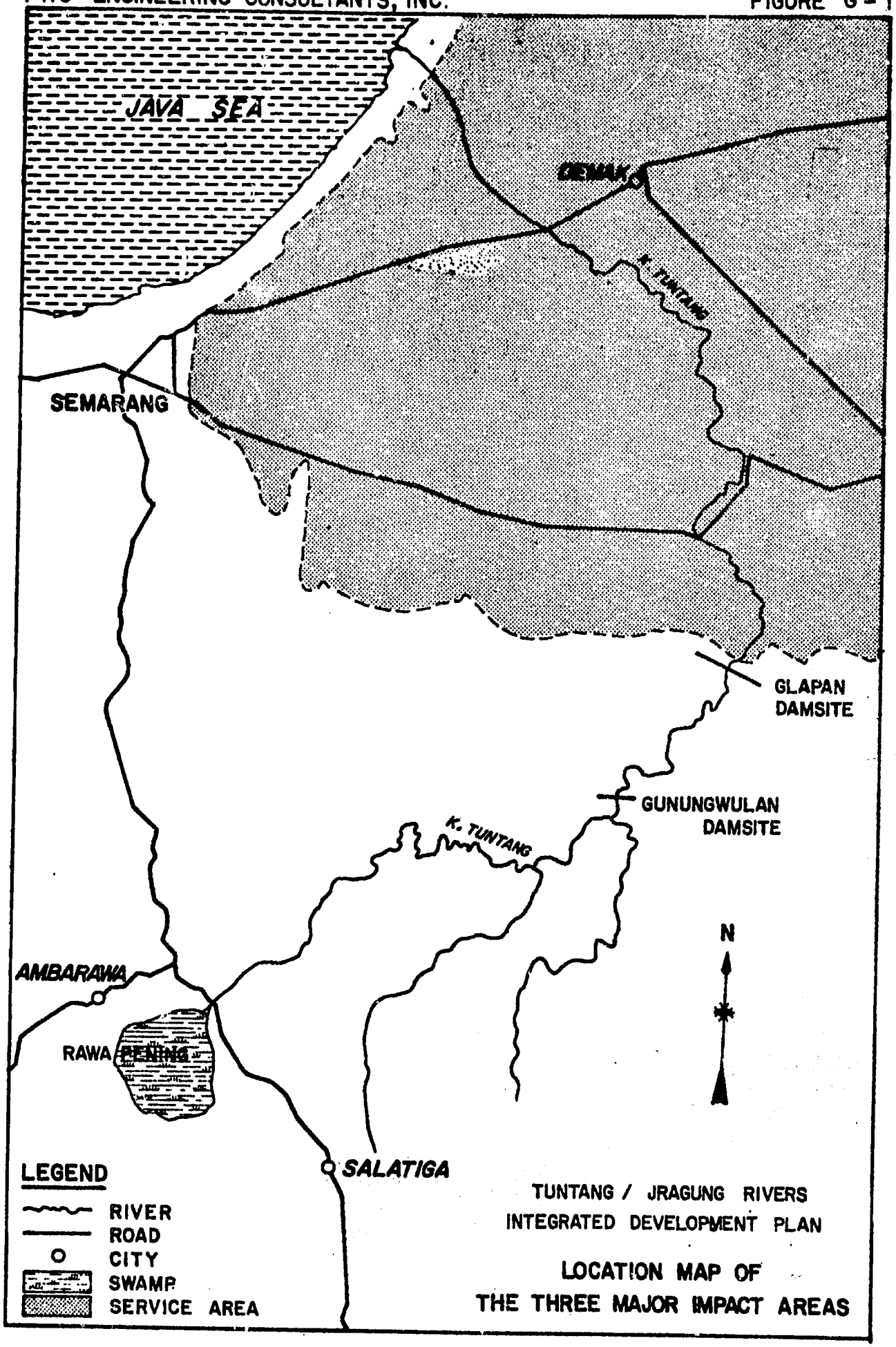
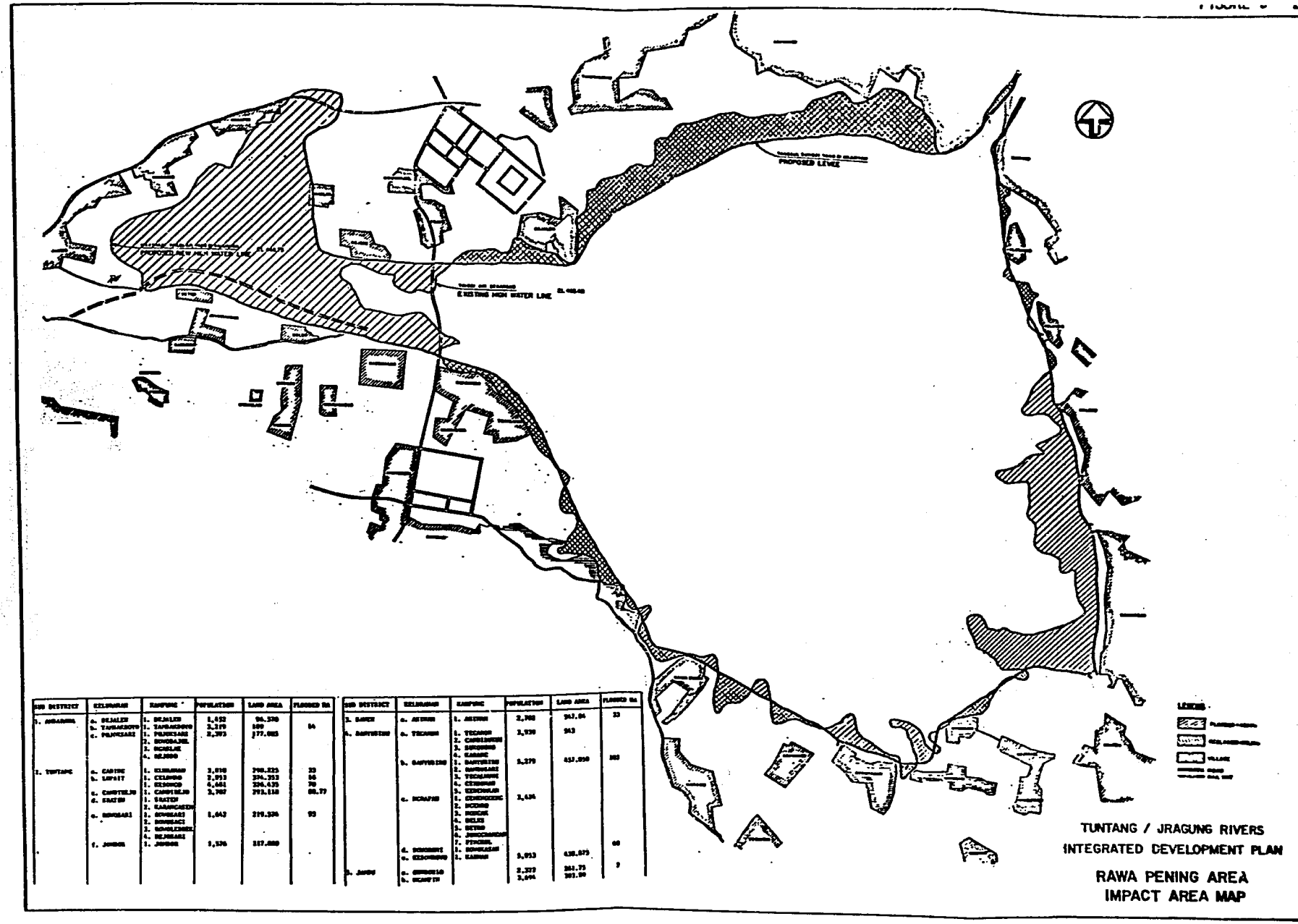
FIGURE G - 1




PROPOSED LEVEE
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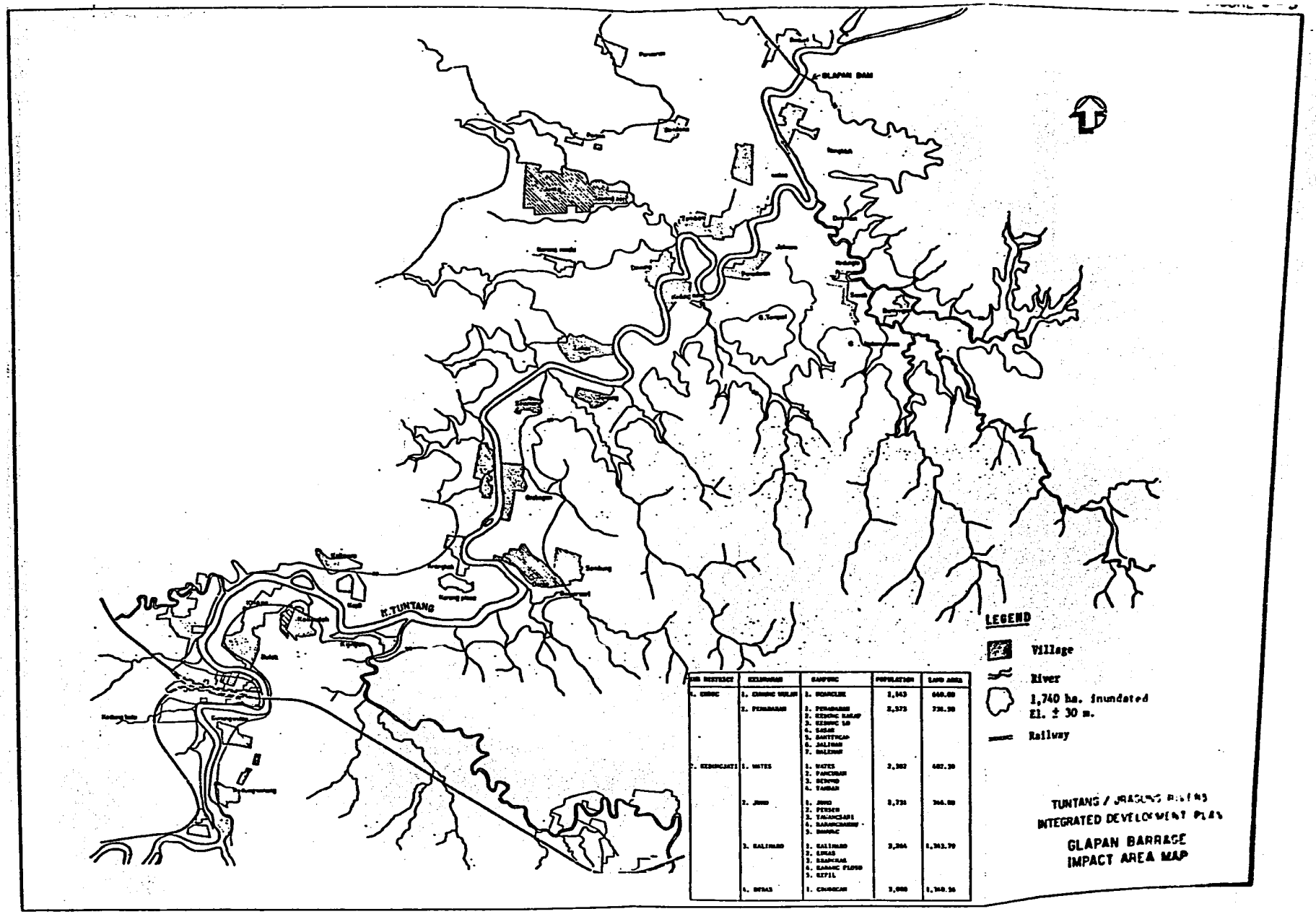
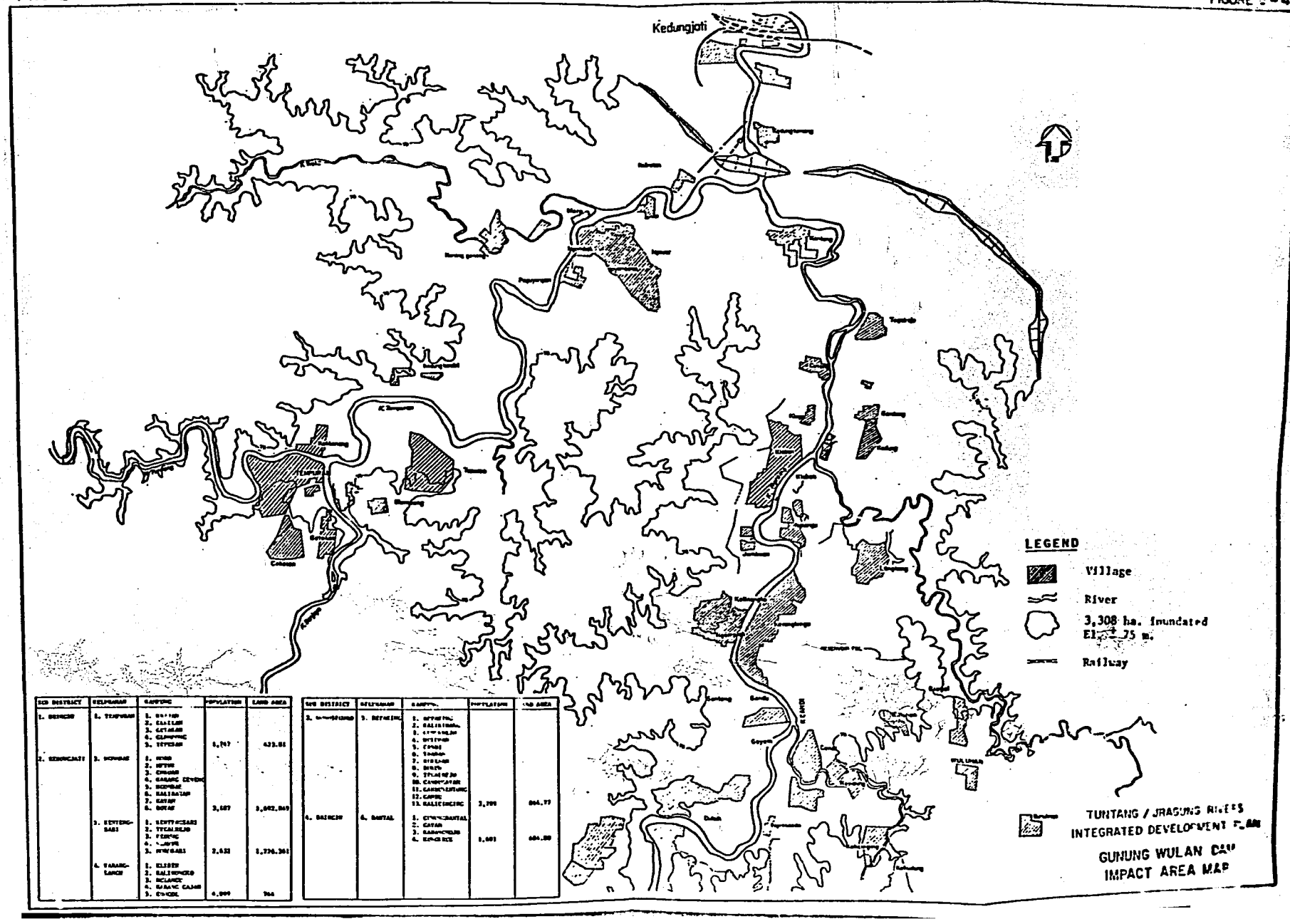
TUNTANG / JRAGUNG RIVERS
INTEGRATED DEVELOPMENT PLAN
RAWA PENING AREA
IMPACT AREA MAP


K. GLAPAN DAM
K. TUNTANG
LEGEND
Village
River
1,740 ha. inundated
El. ± 30 m.
Railway
TUNTANG / [illegible]
INTEGRATED DEVELOPMENT PLAN
GLAPAN BARRAGE
IMPACT AREA MAP


Kedungjati
LEGEND
Village
River
3,308 ha. Inundated
El. + 75 m.
Railway
TUNTANG / JRAGUNG RIVERS
INTEGRATED DEVELOPMENT
GUNUNG WULAN DAM
IMPACT AREA MAP