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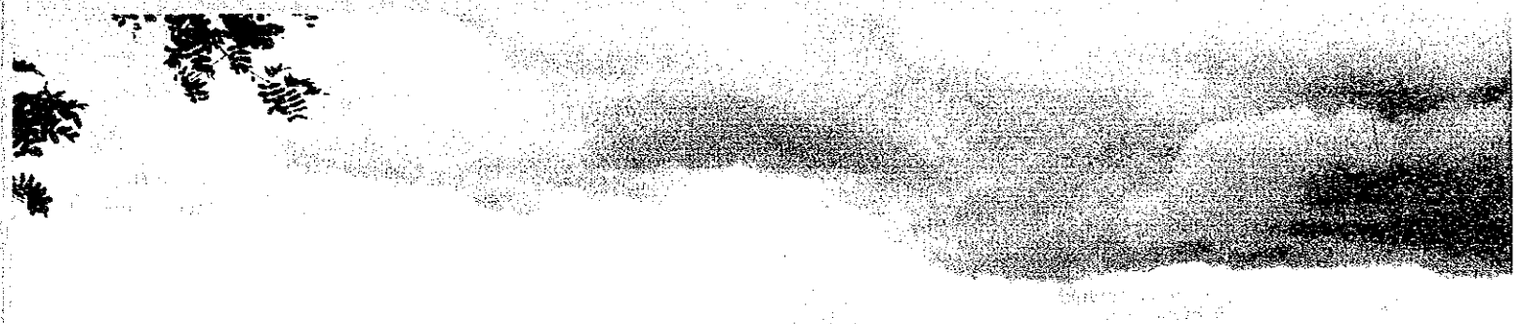
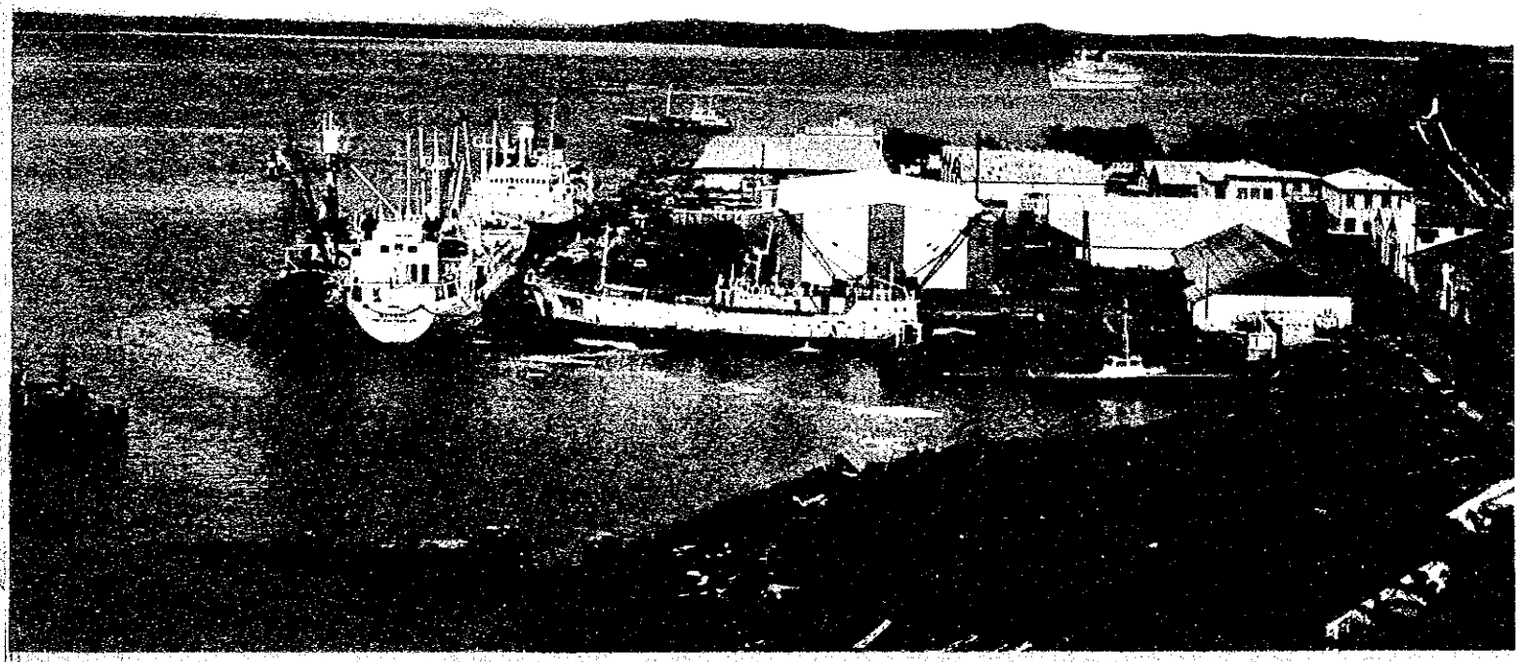
TEH DEMOCRATIC REPUBLIC OF MADAGASCAR

No. 52

FINAL REPORT

THE STUDY ON THE DEVELOPMENT OF THE PORT OF ANTSIRANANA IN MADAGASCAR





DECEMBER 1994

THE OVERSEAS COASTAL AREA DEVELOPMENT INSTITUTE OF JAPAN (OCDI)
NIPPON TETRAPOD CO.,LTD.(NTC)

FINAL REPORT THE STUDY ON THE DEVELOPMENT OF THE PORT OF ANTSIRANANA IN MADAGASCAR DECEMBER 199

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT AND METEOROLOGY
TEH DEMOCRATIC REPUBLIC OF MADAGASCAR

FINAL REPORT

THE STUDY ON THE DEVELOPMENT OF THE PORT OF ANTSIRANANA IN MADAGASCAR

DECEMBER 1994

CURRENCY EXCHANGE RATE

1 US Dollar = 1,860 Madagascan Franc = 108 Japanese Yen

(As of October, 1993)

PREFACE

In response to a request from the Government of Democratic Republic of Madagascar, the Government of Japan decided to conduct a feasibility study on the Development of the Port of Antsiranana in Madagascar and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent a study team to Madagascar three times between August 1993 and September 1994. The study team was headed by Mr. Toshiaki Okada and composed of members of the Overseas Coastal Area Development Institute of Japan (OCDI) and the Nippon Tetrapod Co., LTD (NTC).

The team held discussions with the officials concerned of the Government of Madagascar and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Democratic Republic of Madagascar for their close cooperation extended of the team.

December, 1994

Kimio Fujita
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

December, 1994

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Mr. Fujita:

It is my great pleasure to submit herewith the Report for the Study on the Development of the Port of Antsiranana in Madagascar.

The study team which consists of the Overseas Coastal Area Development Institute of Japan (OCDI) and Nippon Tetrapod Co., Ltd (NTC), headed by myself, conducted a survey in Madagascar from October 1993 to September 1994 as per the contract with the Japan International Cooperation Agency.

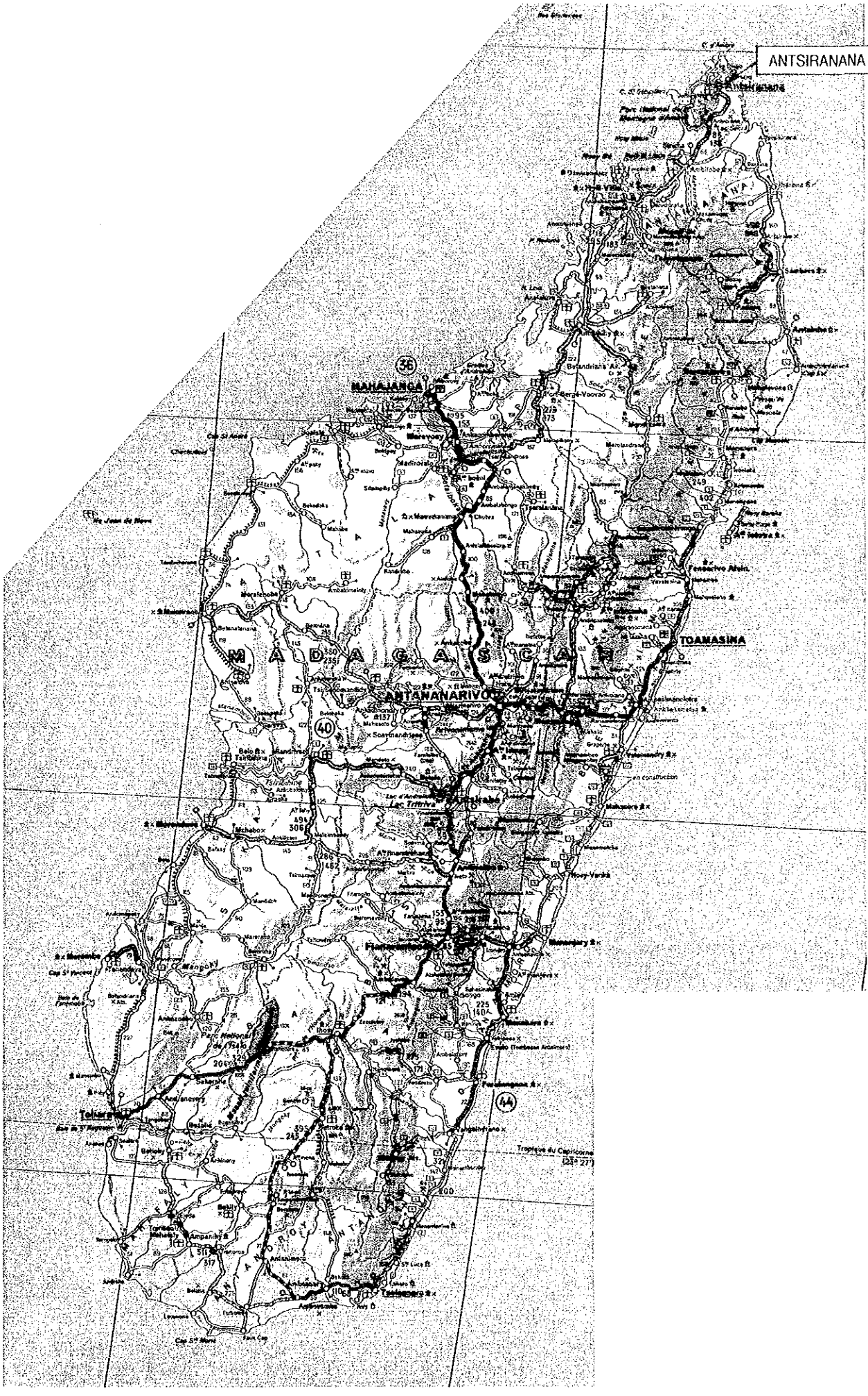
The findings of this survey were fully discussed with the officials of the Ministry of Transport and Meteorology of Madagascar and Other authorities concerned to formulate the Master Plan for the period up to the year 2010 and to formulate and examine the feasibility of the Short-Term Plan for the period up to the year 1998, and were then compiled into this report.

On behalf of the study team, I would like to express my deepest appreciation to the Government of Madagascar and other authorities concerned for their brilliant cooperation and assistance and for the heartfelt hospitality which they extended to the study team during our stay in Madagascar.

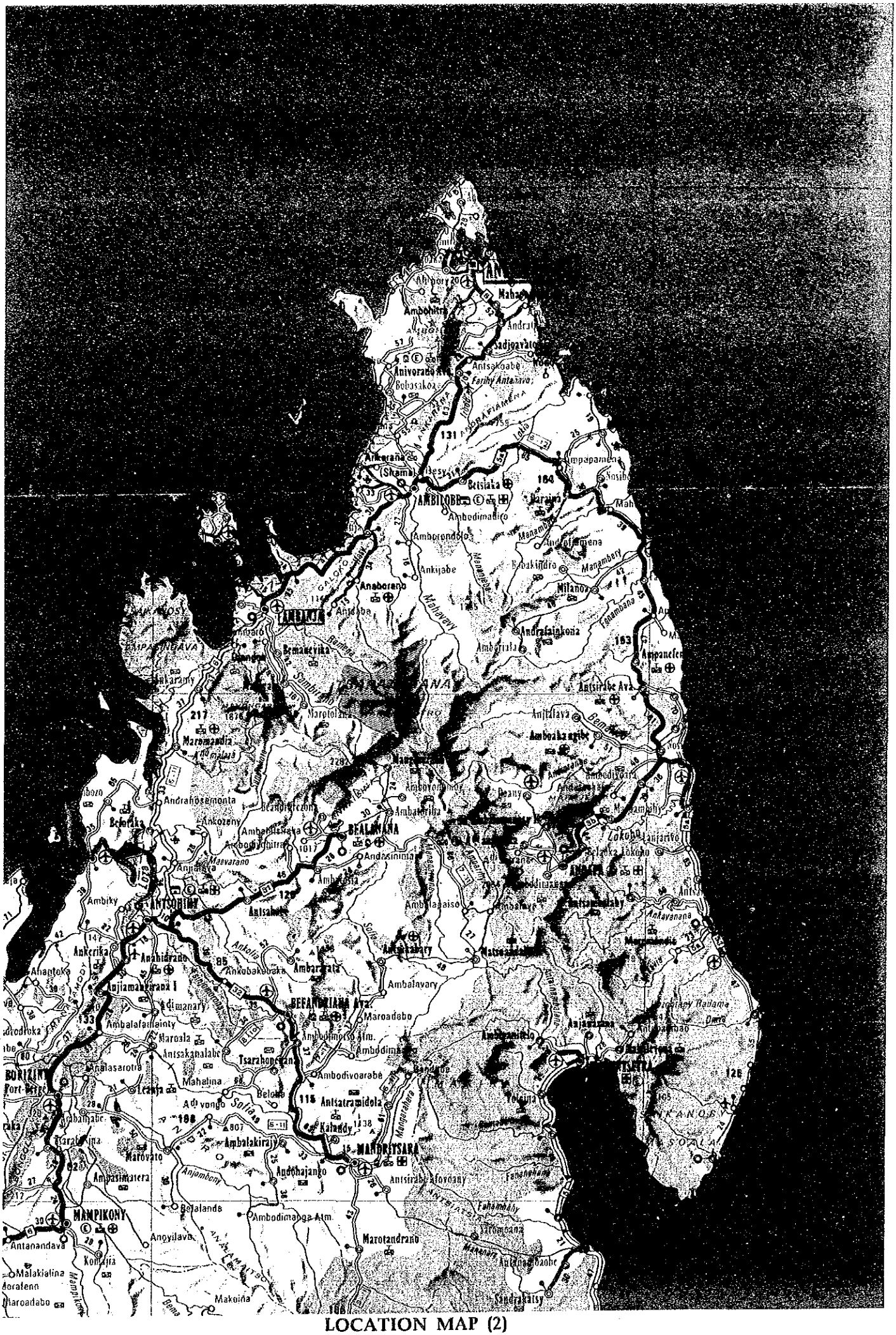
I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Embassy of Japan in Madagascar for giving us valuable suggestions and assistance during the preparation of this report.

Respectfully,

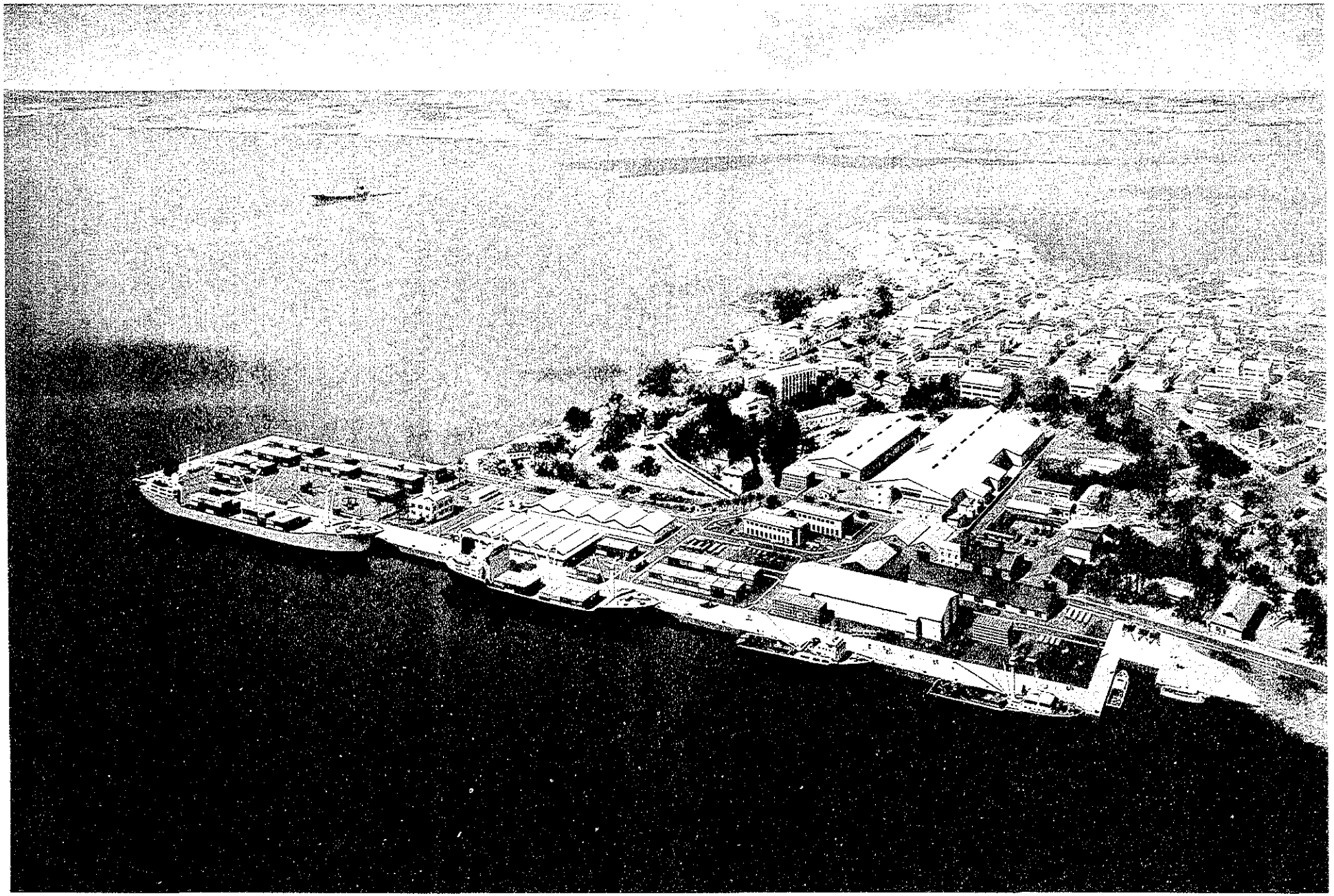
Toshiaki Okada
Leader of the Study Team for
the Study on Development of
Antsiranana Port



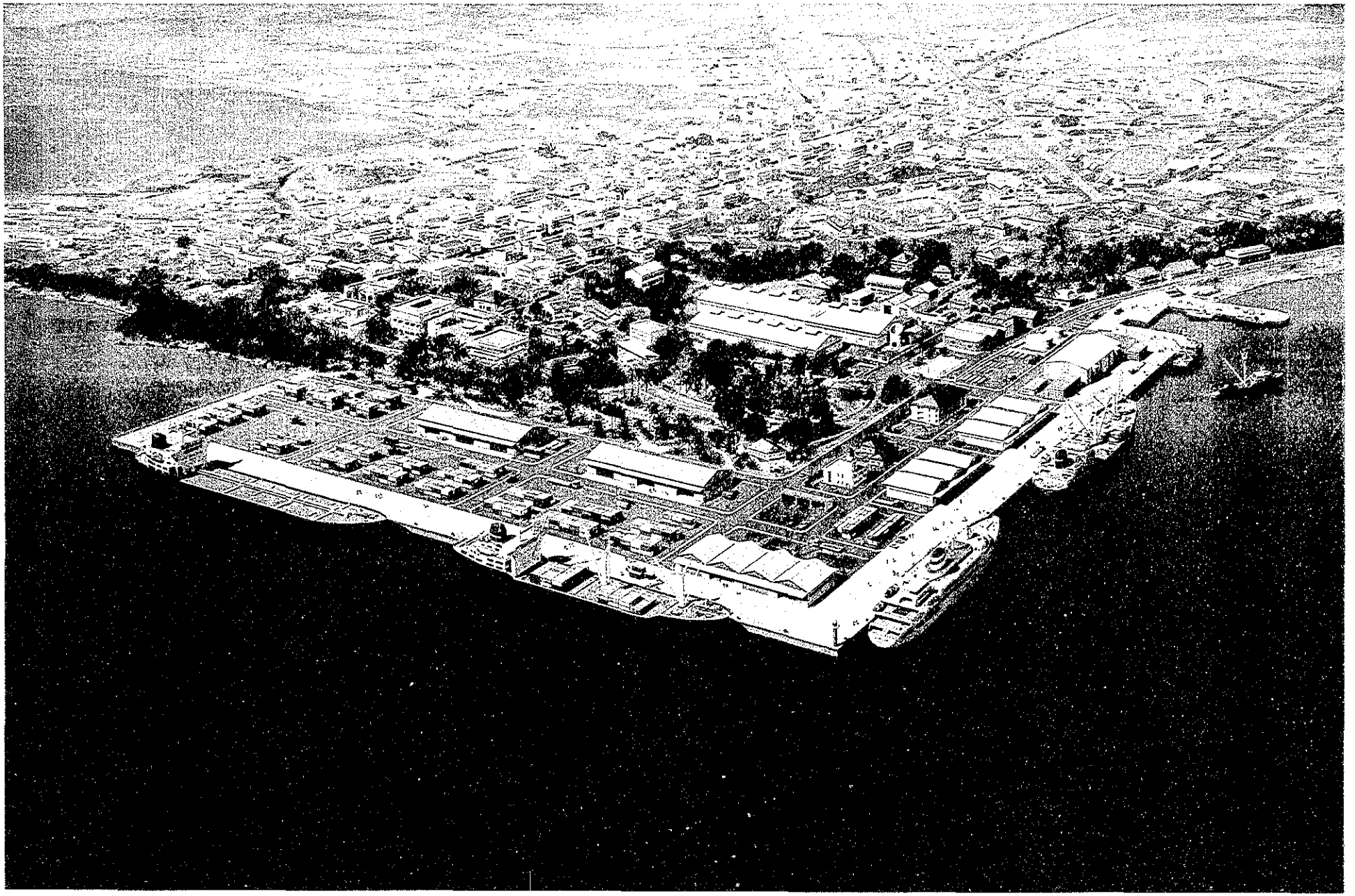
LOCATION MAP (1)



LOCATION MAP (2)



SHORT-TERM DEVELOPMENT PLAN



MASTER PLAN

ABBREVIATIONS

French/Malagasy

AUXIMAD	Société Auxiliaire Maritime de Madagascar
CCI	Chambre de Commerce et d'Industrie
CGM	Compagnie Générale Maritime
CMDM	Compagnie Malgache de Manutention
CMN	Compagnie Malgache de Navigation
CSM	Compagnie Salinière de Madagascar
DTM	Direction des Transports Maritimes
JIRAMA	Jiro sy Rano Malagasy
MTM	Ministère des Transports et de la Météorologie
ONE	Office National de l'Environnement
PFOI	Pêche et Froid Océan Indien
RNCFM	Réseau National des Chemins de Fer Malagasy
SECREN	Société d'Etude de Construction et de Réparation Navales
SIRAMA	Société Siramany Malagasy
SMC	Société Malgache de Cabotage
SMTM	Société Malgache des Transports Maritimes
SOLIMA	Solitany Malagasy
TST	Taxe sur les Transactions
TUT	Taxe Unique sur les Transactions

English

CDL	Chart Datum Line
CFC	Conversion Factor for Consumption
CFL	Conversion Factor for Labor
CIF	Cost Insurance and Freight
COD	Chemical Oxygen Demand
dB	Decibel
DMC	Developing Member Countries
DO	Dissolved Oxygen
DWT	Dead Weight Tonnage
ECU	European Currency Unit
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EPZ	Export Processing Zone
FIRR	Financial Internal Rate of Return

FMG	Madagascan Franc
FOB	Free on Board
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GL	Ground Level
GNP	Gross National Product
GRT	Gross Registered Tonnage
IALA	International Association of Lighthouse Authorities
IEE	Initial Environmental Examination
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
MLWL	Mean Low Water Level
MOL	Mitsui OSK Line
MSC	Mediterranean Shipping Company
MT	Metric Ton
NRT	Net Registered Tonnage
OD-Survey	Origin and Destination Survey
OECF	The Overseas Economic Cooperation Fund
PH/ph	Potential of Hydrogen
SCF	Standard Conversion Factor
SDR	Special Drawing Rights
SS	Suspended Substance
TEU	Twenty-foot Equivalent Unit
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
US$	US Dollar

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SUMMARY OF THE STUDY

CONCLUSIONS AND RECOMMENDATION

Through the course of the Study, the Study Team had many opportunities to hold discussions with counterpart personnel and has made various comments and suggestions on construction, maintenance, operation and management of the port. Conclusions and recommendations for the project prepared on the basis of the discussions are summarized herewith.

CONCLUSIONS

1) Background of the project (Major issues to be solved)

(1) The problem areas of the existing port facilities

The port of Antsiranana is located at the end of the wide bay on the northernmost part of the island of Madagascar. It is one of the major ports which handles foreign trade cargo. Its hinterland, Diego-Suarez Faritany and surroundings, is blessed with natural resources and highly valued agricultural products. Excellent and modern industries such as SECREN and PFOI are already working around the port. For that reason, the region has the potential to become prosperous. However, the region is far from other cities including the capital, Antananarivo, and it is nearly isolated, especially during the rainy season because of the poor land transportation system and communication system. Therefore, the port is extremely vital for promoting the economic activities in the northern part of country.

Presently, the existing facilities have many problems as illustrated below:

- Superannuation and deterioration of facilities

Almost all facilities are aged without adequate maintenance or rehabilitation. Most of them are damaged or obsolete and require repair or improvement. If necessary rehabilitation works are not carried out, these facilities will soon be out of use.

- Insufficient of quay length and depth

The length of quay is insufficient for the mooring of ocean-going vessels which call the port of Antsiranana. The existing quay depth is also insufficient to accommodate 10,000 DWT class vessels in full load, even though frequent calls of over 10,000 DWT class vessels are recorded. Some tankers are forced to handle oil products off the quay in the bay.

- Shortage of facilities and equipment to cope with containerization

The wave of containerization has reached Madagascar and container cargo traffic at the port of Antsiranana is gradually increasing. On the other hand, the port is not well equipped to receive containers. For example, open yard is unpaved and undulated with improper layout of the transit sheds.

Therefore, it is urgently required to prepare a new port development plan of Antsiranana, which shows directions for quickly solving the existing problems and ensuring the present roles or functions and, in addition, coping with the additional future demand for the port flexibly.

(2) Organizational matters

In principle, the following points are very important for port management and operation; ensuring efficient utilization of the port facilities, and providing reliable services at reasonable charges.

To realize the above, the port management body requires an adequate organization with talented people and appropriate competence and necessary budget. From such points of view, at present, the DTM branch of the port of Antsiranana has a lot of problems. It is under severe budgetary constraints together with considerable shortage of able staff to maintain facilities in good working condition. In addition, the available port statistics are totally substandard and administrative capability of DTM and its branches seems to be inadequate to deal with issues related to daily usage of facilities.

Therefore, in order to secure proper management and operation of the port after completion of the proposed project, organizational deficiency mentioned above should be corrected.

2) Master Plan (target year: 2010)

- The rehabilitation of the existing facilities and expansion needed to cope with forecast cargo demand comprise the main components of the Master Plan. The extension of quay is also necessary to handle cargo smoothly while the existing facilities are under rehabilitation.

-The major components of the scheme are as follows:

Component	Unit	Quantity	Remarks
Total quay length	m	1,040	This length contains the existing quay, 301 m, and the ongoing project, 47.5 m, under the French aid.
Maximum quay depth	m	12	The maximum calling ship is 30,000 DWT.
Rehabilitation	m	301	The Old Quay and the New Quay
Dredging	m^2	62,000	Berthing and Turning area
Reclamation	m^3	825,000	
Road	m	700	
Fence and Gate	m	1,100	
Container stacking yard	m^2	9,150	7,200 m^2 and 1,950 m^2 for laden and empty containers respectively
Open yard	m^2	100	
Light marker	set	1	
Tugboat	set	1	
Building	set	2	Port office and Custom office
Transit shed	set	5	Total area is 11,700 m^2.

- The planned quay in the Master Plan is extended 211.5m northward from the existing quay, and is then further extended 480 m eastward, taking into account the current port activities, natural conditions around the site and construction cost.

- In principle, each berth is specified for use by international vessels, coastal vessels, fishery boats and basin of small crafts.

- Construction cost is estimated at about 119.5 million US dollars.

3) Short-Term Development Plan (target year: 1998)

- In formulation of the Short-Term Development Plan, as many of the existing facilities as possible will be retained after necessary rehabilitation works in order to minimize the total construction cost.

- The proposed layout plan slightly differs from that of the Master Plan. It should be understood as a result of the need to minimize the construction cost.

- The major components of the Short-Term Development Plan, i.e., the first stage of the Master Plan, are as follows:

Component	Unit	Quantity	Remarks
Total quay length	m	560	This length contains the existing quays, 301 m, and the ongoing project, 47.5m, under the French aid.
Maximum quay depth	m	10	The maximum calling ship size is 10,000 DWT.
Rehabilitation	m	301	The Old Quay and the New Quay
Dredging	m^2	36,000	Berthing and Turning area
Reclamation	m^3	122,000	
Road	m	1,062	The road is included port access road with 608 m length.
Fence and gate	m^2	300	
Container stacking yard	m^2	4,925	3,275 m^2 and 1,650 m^2 for laden and empty containers respectively
Open yard	set	100	
Light maker	set	1	
Building	set	3	Two residences and their attached warehouse
Transit shed	set	5	Rehabilitation works by private sector

Note: Besides the above, oil pipeline and water supply line are to be constructed by private sectors.

- The principle of usage of the berths, in which each berth is specified for the use of international vessels, coastal vessels and fishery boats, is also applied.

- The Short-Term Development Plan ensures that port activities continue even during rehabilitation works.

- The total construction cost is estimated to be about 30.9 million US dollars, of which about 26.2 million US dollars is the public portion and the remainder(transit sheds, oil pipeline and water supply line) is the private portion.

- As to management and operation, there are a lot of problems to be solved urgently in order to make good use of the port. The relationship between central and local branches of DTM, the relationship between public and private sectors, level of port tariff and administration of port facilities are identified as main issues. Some measures to tackle the above problems have been proposed.

- According to the results of the economic analysis, the EIRR of the project is 14.2 % and shows 11.4 % in the most severe case of the sensitivity analysis. Judging from the above and other analyses in other countries with similar economic conditions, it is appraised that the project is feasible. Moreover, as superannuation of the existing facilities will continue to be a problem, it is thought that at least rehabilitation works should be implemented as soon as possible.

- According to the results of the financial analysis, the FIRR is -4.1%. This means that the project is not financially feasible. Port charges cannot be substantially raised if the port is to compete successfully with neighboring ports and alternative modes of transportation. And thus in spite of strenuous efforts to reduce the construction costs, the amount of investment will far surpass port revenues.

Considering the significance of the project, however, possible alternative countermeasures including the introduction of foreign aid should be taken to implement the project.

If the necessary amount of investment for the entire project cannot be attained, at least a part of the Short- Term Development Plan should be implemented as the first step to solve the most urgent problems the port faces at present.

- From the above point of view, the urgent improvement plan is proposed. The main items are as follows:

rehabilitation works of the existing facilities

extended quay length 120 m

construction cost 16.9 million US dollars

construction period after works within two years

- EIA identifies that the project will not cause any serious problem for the environment. The drainage from the tuna canning factory, however, needs to be paid full attention to avoid water contamination.

RECOMMENDATION

The proposed Short-Term Development Plan, in particular, rehabilitation works, is required to be completed very urgently to maintain present operational levels of facilities. It is appraised to be very significant from the economic point of view. Considering the present situation of budgetary and financial constraints, the critical factor is how and when the necessary budget becomes available. The following recommendations mainly concern operational aspects.

1) Strengthening of the port management body

- The existing port management body is not adequately functioning in managing and operating the port appropriately to serve and support the socio-economic activities of the hinterland. There is an insufficient number of staff responsible for statistics or maintenance of the facilities and so on.

Therefore, strengthening of the port organization through introducing the appropriate number of well-trained staff and adequate budgetary arrangement is required.

It is recommended that the Madagascan government reinforce the organization in the port of Antsiranana. At the very least, some more staff responsible for port statistics and technicians to maintain the port facilities should be assigned. The proposed organization chart is shown in section 5.8 Management and Operation.

- Although a considerable expense is needed on a recurring basis to maintain the port facilities in normal condition, is indispensable for promoting port activities and the economy in the hinterland. As the financial analysis implies, it would be desirable for the project if operation expenditures besides non-cash charges (i.e., depreciation of fixed assets and amortization of deferred assets) were covered by operation revenues. To increase operation revenues, following alternatives should be considered;

  i) to introduce an occupancy charge which is levied on privately owned fixed assets or utilities in the port as is imposed in some other countries

  ii) to charge a part of the capital investment cost to the major port users who will benefit from this investment and so on.

- Since management and operation of the port has become more and more complicated, more operational staff should assigned, and their productivity be raised. In Madagascar, almost all statistics including the port statistics are not available. Statistics provide a basis for examining the present activities and considering the future trend or demand. Therefore, in major ports as such as Antsiranana, staffs for statistics should be assigned. In addition, there must be much more coordination or communication between concerned people or companies etc. When port activities get more active. At that time more office workers who are capable, talented and well trained will be needed.

2) Entrusting local agencies with more authority and responsibilities

- It is said that the Madagascan government is examining the possibility of entrusting local agencies with more authority. This is very important and necessary because local agencies best understand the daily port activities and demands, many of which often have to be dealt with at once. Thus, to ensure smooth and efficient operation, the local agency, in principle, should have the authority to deal with the issues related to daily operation of facilities.

- Another area in which the local agency should participate is the drafting of the future port plan.

3) Promoting communication, coordination and cooperation between public and private sectors

- It is of paramount necessity for the local agency to communicate, coordinate and cooperate with public and private organizations such as CMDM, SOLIMA and the chamber of commerce and industry, so as to ensure efficient management and operation. They are major port users. Higher productivity in cargo handling or efficient and orderly use of the port cannot be achieved without their cooperation and efforts. In the construction phase, too, DTM requires their cooperation and some coordination with them.

4) Making the nationwide policy and strategy of port development

- As to the main role of the central direction, it is strongly recommended that DTM make the nationwide policy and strategy on port development. This contains the functional allotment of ports, the long term investment and financial plan, port marketing activity and so on. Since Madagascar is an island country endowed with abundant natural resources, ports and harbors are one of the key social capitals in reaching the full potential of a country. However, DTM is suffering from budgetary constraints and has to seek foreign assistance. It will help them acquire assistance from foreign countries if they have their own long term plan.

ORGANIZATION OF THE STUDY TEAM

The Study Team consists of eleven experts. Their names and responsibilities are listed below:

Title	Name	Responsibilities
Team Leader	Toshiaki OKADA	Overall Management
Co-Leader	Kenichi OKUMURA	Port Planning, Port environment
Specialist	Shoji KATSUDA	Regional Development Planning
Specialist	Hisafumi ISHIKAWA	Demand Forecast, Economic Analysis
Specialist	Manabu SUETSUGU/ Shinichiro USHIJIMA	Management and Operation, Financial Analysis
Specialist	Koichi IGARI	Facilities Design
Specialist	Yutaka OCHI	Construction method, Cost Estimation
Specialist	Kiyotaka SASAO	Natural Condition(I)
Specialist	Kazuo YAMADA	Natural Condition(II)
Specialist	Masaru KANASASHI	Magnetic Prospecting(I)
Specialist	Yoshiaki WATABE	Magnetic Prospecting(II)
	Masahiro SATO/ Yutaka FUJII	Interpreter

INTRODUCTION

INTRODUCTION

This report is the result of "The Study on the Development of the port of Antsiranana in Madagascar" which has been conducted from August 1993 to September 1994.

1.1 Background of the Study

The port of Antsiranana is located at the end of the wide bay on the northernmost part of the island of Madagascar. It is one of the major ports which handles foreign trade cargo. Its hinterland, Diego-Suarez Faritany and surroundings, is blessed with natural resources and highly valued agricultural products. Excellent and modern industries are already working around the port. For that reason, the region has the potential to become prosperous. Taking into consideration the topography of the region, the port is extremely vital for promoting the economic activities. However, presently, the existing facilities have many problems such as superannuation and deterioration of facilities, insufficient quay length and depth, shortage of facilities and equipment to cope with containerization. In addition, there are some organizational issues to be addressed, in order to ensure efficient utilization of the facilities and provide reliable services.

To cope with the above situation, the Government of the Democratic Republic of Madagascar requested the Government of Japan to carry out the following studies.

1) To evaluate the existing facilities
2) To formulate the improvement plan of facilities, equipment and other relevant infrastructure
3) To formulate a master plan with target year, 2010
4) To conduct a feasibility study of the short-term development plan with target year, 1998

1.2 Study Objective

In accordance with the conditions described above and in response to a request from the Government of the Democratic Republic of Madagascar, the Study is carried out to achieve the following goals.

1) To formulate the Master Plan for the port of Antsiranana up to the year 2010
2) To conduct a feasibility study on the Short-Term Development Plan up to the year 1998

1.3 Study Components

The Study is comprised of the following components.

1) Formulation of the Master Plan

- To review nation-wide socio-economic conditions for identifying the expected roles and functions of the port
- To prepare demand forecast up to the year 2010
- To formulate a basic layout plan for facilities of the port
- To prepare preliminary implementation programs
- To estimate construction cost

2) Feasibility Study on the Short-Term Development Plan

First, within the framework of the Master Plan, the Short-Term Development Plan is formulated with consideration of environmental aspects.

- To identify urgent problems and to define counter measures to be taken
- To prepare cargo demand forecast up to the year 1998
- To formulate an improvement plan of port facilities and other relevant infrastructure as well as rehabilitation of the existing port facilities
- To prepare a preliminary design of newly constructed or rehabilitated port facilities
- To prepare implementation programs
- To estimate construction cost

Second, a feasibility study on the above Short-Term Development Plan will be carried out including the following;

- economic analysis
- financial analysis
- necessary recommendations

1.4 Study Execution

The Study was conducted as follows:

1) Presentation of Inception Report, the first field survey and presentation of the Progress Report; Aug.-Oct. 1993
2) Presentation of the Interim Report and the second field survey; Feb.-March 1994
3) Presentation of the Draft Final Report and the third field survey; Sep. 1994

The Final Report is made on the basis of the comments of the Draft Final Report provided by the Government of the Democratic Republic of Madagascar.

CHAPTER 1

OUTLINE OF THE DEMOCRATIC REPUBLIC OF MADAGASCAR

1. OUTLINE OF THE DEMOCRATIC REPUBLIC OF MADAGASCAR

1.1 General

The Democratic Republic of Madagascar is an island country on the Indian Ocean, about 400 km away from the African Continent separated by the Mozambique Channel(Figure 1-1-1).

The latitude and the longitude are as follows:
The north of the isle ..... 11° 57′ of latitud
The south of the isle ..... 25° 38′ of latitude South
The east of the isle ..... 50° 27′ of longitude East
The west of the isle ..... 43° 12′ of longitude West

The area of the island is 587,000 sq.km, the fourth largest island in the world, with 1,580 km of north-south axis and 580 km east-west axis.

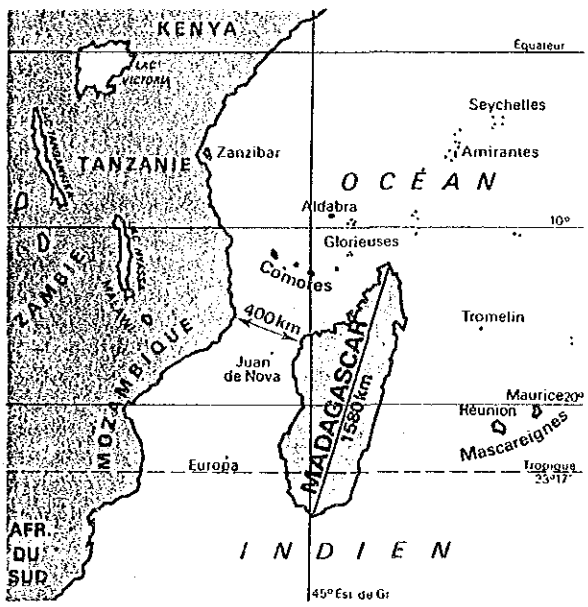

Figure 1-1-1 Location of Madagascar
(Source: MADAGASCAR, NATHAN MADAGASCAR)

It is largely agreed that Madagascars are derived from Malay-o-Polynesian who first visited the island about 1,500 years ago. There are 18 tribes in Madagascar.

The history of Madagascar is marked by six distinct periods; first, an era of monarchy which was followed by a colonial period, then three republics, each separated by a transitional period. The present republic just started in 1993.

Madagascar's administrative structure consists of six Faritany (provinces). Regional capitals are Antananarivo, Antsiranana, Fianarantsoa, Mahajanga, Toamasina and Tolialy, although regional zoning is now under restructuring (Figure 1-1-2).

The area of each province is as follows:

Antananarivo	.....	58,283 sq.km
Antsiranana	.....	43,056 sq.km
Fianarantsoa	.....	102,373 sq.km
Mahajanga	.....	150,023 sq.km
Toamasina	.....	71,911 sq.km
Tolialy	.....	161,405 sq.km
TOTAL	.....	587,051 sq.km

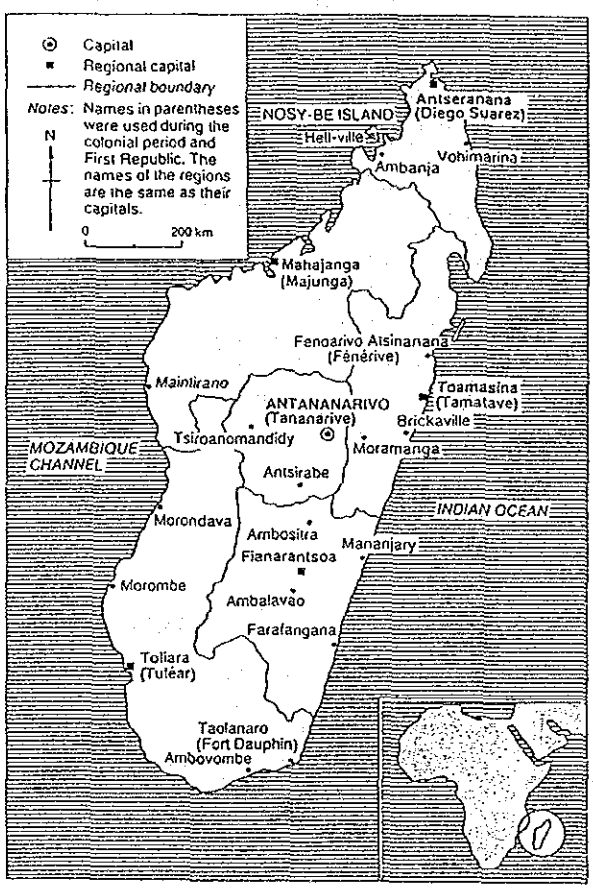

Figure 1-1-2 Regional Map of Madagascar

1.2 Geography

Madagascar's relief is highly varied and complicated by undulations (Figure 1-2-1).

The Central Highlands is a complex combination of high plains, hills, compact massifs, big domes and basins, about 1,500 m high.

The Eastern slopes, an undulating terrain (25 to 100 km in width) where small isolated plains alternate with low hills, are separated from the Highlands by steep cliffs.

The Western plains and plateaux have a smooth relief.

The far South is a gentle flat terrain.

The North is an area of complex topography, with volcanic and karstic landforms, basins and deltas.

As to the coastal lines, they can be divided into 4 categories .

In the North, they are rocky, fairly indented, bordered by isles.
In the West, they are low and sandy but not very indented. The bay silts up.
In the South, they are bordered by dangerous cliffs and dunes.
In the East, they are bordered by lagoons.

Antsiranana in the North is the best natural port. Toamasina in the East is constructed on a reef and protected by a breakwater.

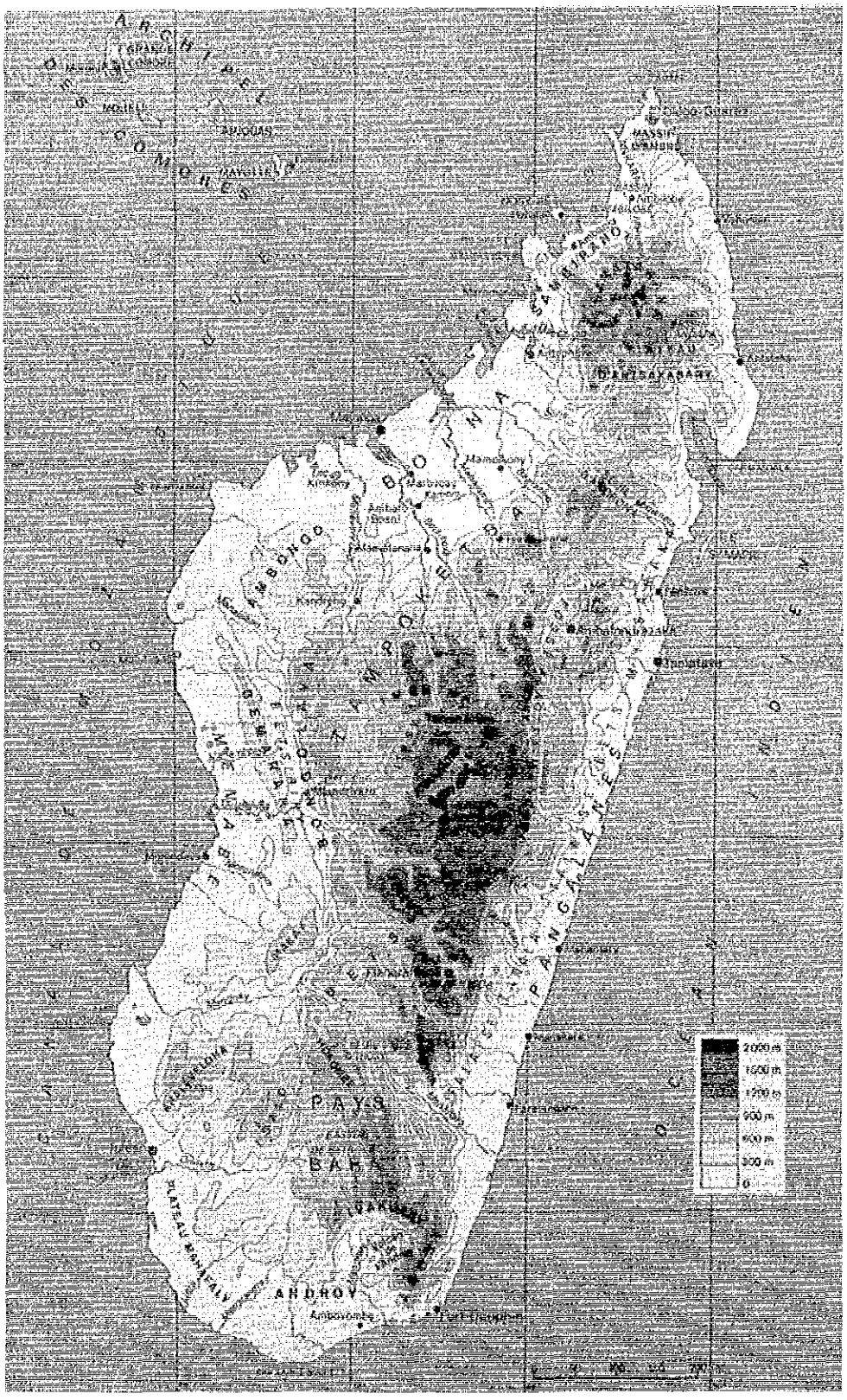

Figure 1-2-1 Topographical Map of Madagascar
(Source: MADAGASCAR, NATHAN MADAGASCAR)

1.3 Climate

Madagascar is a hot country, in general, except in the mountainous area, and there is a great variety of climate depending on the region (Figure 1-3-1). The temperature in the West is higher than in the East; it is lowest in the Highlands.

Two seasons can be clearly distinguished, from May to October, the cold season, and from November to April, the hot season.

Rainfall is usually heavy but precipitation varies by regions and seasons.

There are two winds from the sea that bring rain. The eastern trade wind blows throughout the year and regularly gives humidity to the eastern coast of the island. As it moves down to the west, this wind loses its humidity and it becomes dryer. The north-west monsoon blows only during the hot season and brings a great amount of rainfall to the middle part of the country.

The Central Highlands and the West region have a hot/wet season and a cold/dry season.

The south-west region is almost a tropical desert and rainfall is very scarce.

During a hot season, cyclones are sometimes generated and hit coastal regions.

Antsiranana belongs to the East coastal area. However, precipitation is exceptionally small, about 1,000 mm per year.

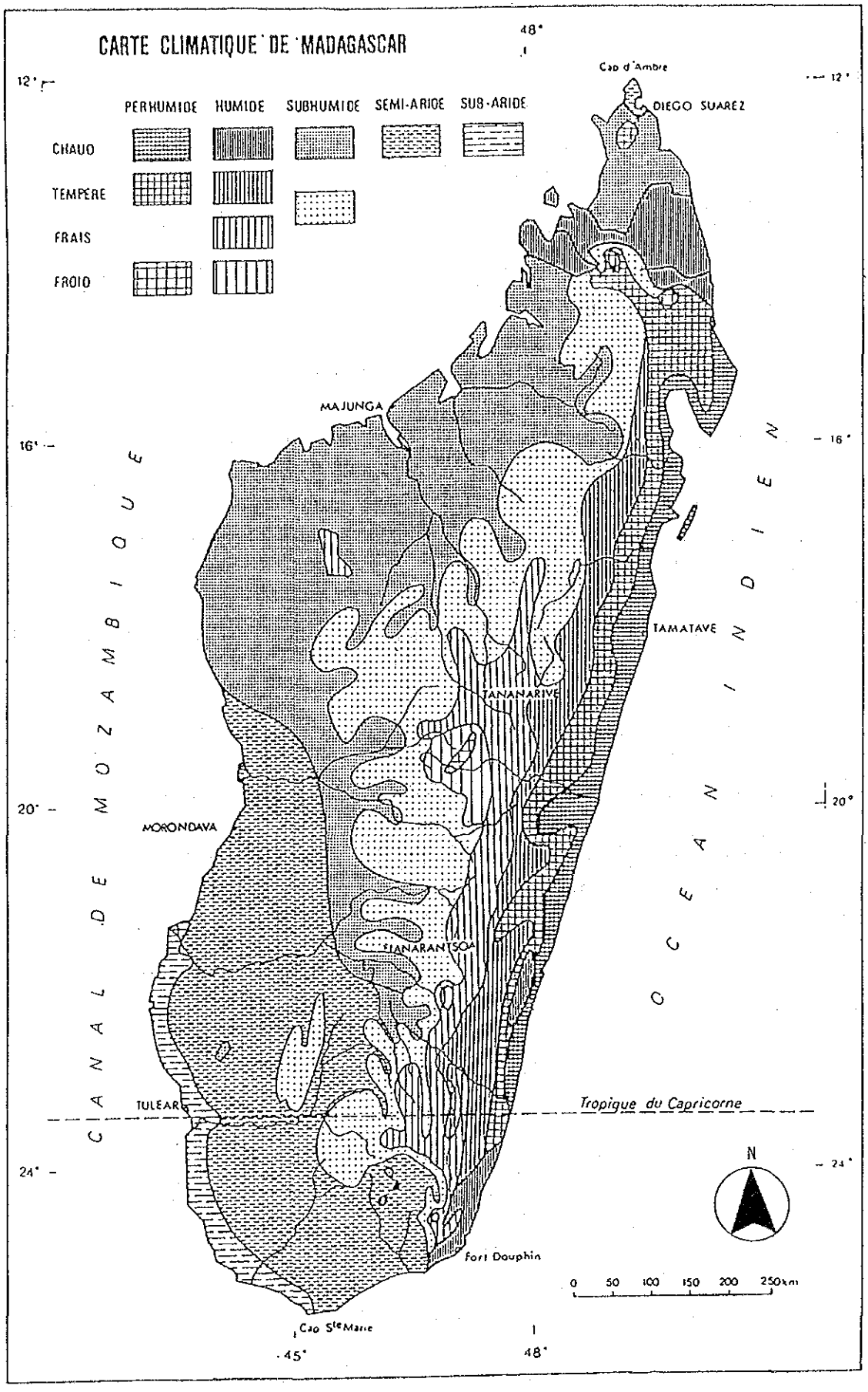

Figure 1-3-1 Climate Map of Madagascar
(Source: MADAGASCAR, Philippe OBERLE Editeur)

1.4 Land Use

Since 1985, Madagascar has made efforts to involve itself in a national development process through the implementation of a Structural Adjustment Program whose purpose is to reorganize the economy and restructure the planning system.

To execute this program, a study called "the socioeconomic appraisal-diagnosis and local and participative characteristic programs for the social dimension of development"("létude du bilan-diagnostic socio-économique et programmes à caractère local et participatif pour la dimension sociale du développement"<D.S.A.>) was carried out by Ministere de l'Economie et du Plan.

With the end in view, it proved to be necessary to reorganize the national statistical apparatus and carry out useful studies with a view to establishing development projects on a coherent and factual basis. The identification of production structures, the analyses of inter-regional links, the infrastructure and the equipment conditions, the demographic and social content of the regions are essential elements for the conception of national and regional development policies.

Madagascar is administratively divided into six provinces (faritany). The provinces are further divided into 111 districts (fivondronana). Fivondronana are divided into 1,253 firaisana. Firaisana consist of 13,476 fokontany. The following map (Figure 1-4-1) shows the fivondronana in each province with their respective geographical codes. The land use in Madagascar is shown in Table 1-4-1.

The area of the arable land for agriculture is 29,353 square kilometers whose share in the territory is five percent. The average annual growth rate is 1.6 percent. The occupied percentage of the arable land is not so high. The area of the arable land in each provice is shown in Table 1-4-2.

The area of permanent pasture is a vast expanse of grassland and reaches 340,490 square kilometers. The share of the area of permanent pasture is 58 percent which is more than half of the territory. Many cattle, pigs and sheep graze are throughout the area though the number of heads is not great when compared to the vast amount of land available.

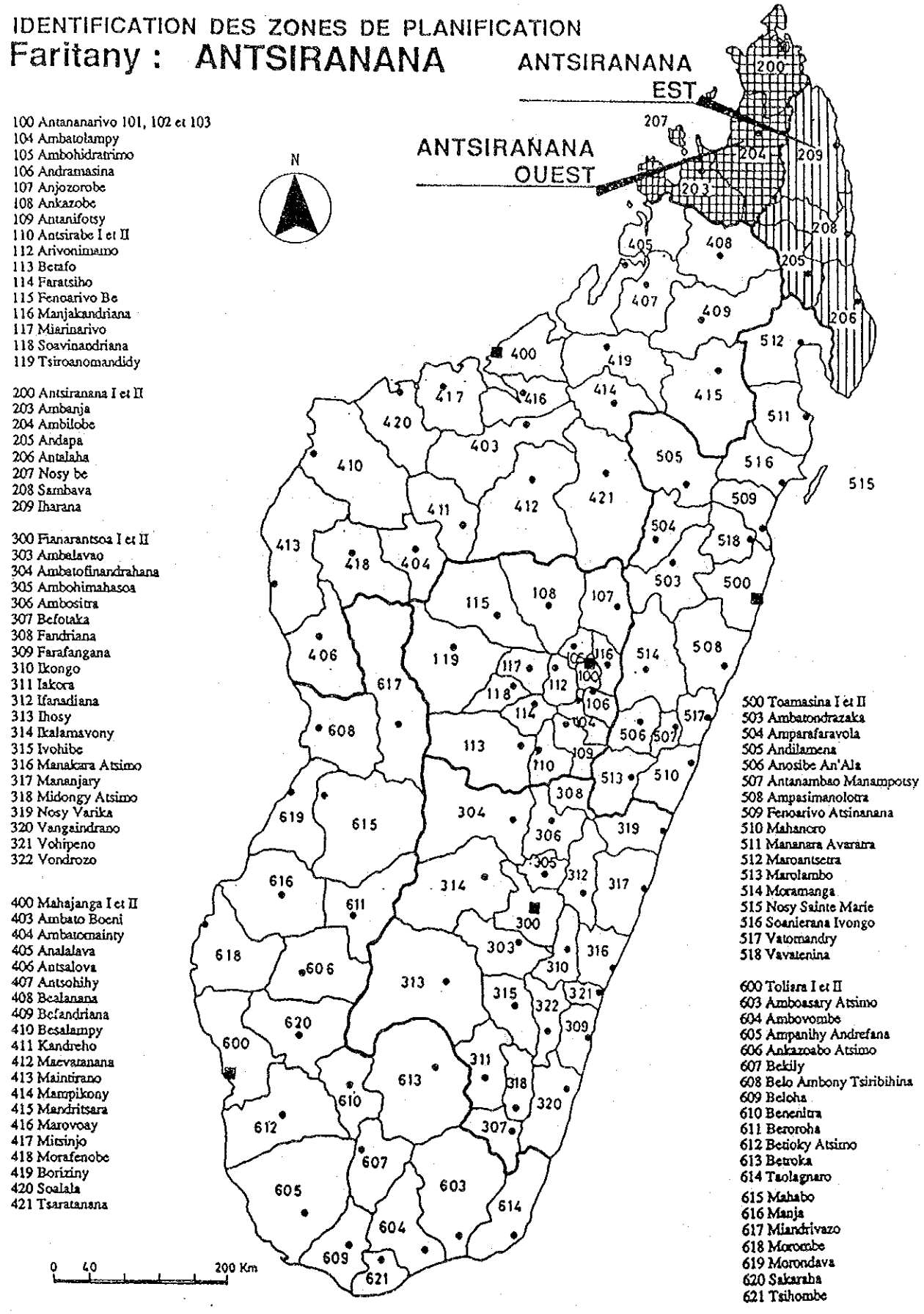

Figure 1-4-1 Provinces and Districts of Madagascar

Table 1-4-1 Land Use in Madagascar

Category	Items	Unit	Value	Remarks
Agricultural	Land area	km^2	29,353	1989
	Share of total land area	(%)	5	
	Average annual growth rate	(%)	1.6	1965-1989
Permanent Pasture	Land area	km^2	340,490	1989
	Share of total land area	(%)	58	
	Average annual growth rate	(%)	0.0	1965-1989
Forest and Woodland	Land area	km^2	158,504	1989
	Share of total land area	(%)	27	
	Average annual growth rate	(%)	-0.9	1965-1989
Other	Land area	km^2	52,835	1989
	Share of total land area	(%)	9	
	Average annual growth rate	(%)	2.8	1965-1989
TOTAL		km^2	587,051	

<Source:World Development Report 1992>

Table 1-4-2 The Area of Arable Land in Each Province

(Unit:km^2)

PROVINCE	1 Antananarivo	2 Fianarantsoa	3 Toamasina	4 Mahajanga	5 Toliara	6 Antsiranana	TOTAL
Surfaces of Provinc	58,283.00	102,373.00	71,911.00	150,023.00	161,405.00	43,056.00	587,051.00
Area of arable land							
A Paddy	2,435.75	2,393.15	2,411.25	2,293.00	908.55	1,208.30	11,650.00
B Manioc	527.55	1,608.65	302.15	216.95	685.35	83.35	3,424.00
C Sweet potato	285.35	253.50	47.40	24.05	285.15	16.55	912.00
D Potato	338.75	44.45	2.85	1.20	0.70	1.05	389.00
E Groundnut	102.05	76.75	22.80	53.00	68.80	10.30	333.70
F Maize	770.15	177.55	122.90	153.70	244.35	45.25	1,513.90
G Bean	205.75	181.90	25.10	12.55	32.80	3.90	462.00
H Pea	—	—	—	0.50	63.45	—	63.95
I Sugar cane	30.30	103.85	103.85	122.70	99.80	153.50	614.00
J Pepper	—	27.00	7.45	5.50	—	24.75	64.70
K Sisal	—	—	—	—	184.70	—	184.70
L Cacao	—	—	—	—	—	78.00	78.00
M Coffee	10.53	1,066.16	737.21	53.28	30.05	483.77	2,381.00
N Vanilla	—	—	45.95	1.95	—	238.10	286.00
O Cotton	0.07	4.31	—	103.91	170.24	11.67	290.13
P Clove	—	9.70	787.40	1.30	—	6.80	805.20
Sub-total	4,706.25	5,946.97	4,616.31	3,043.59	2,773.94	2,365.29	23,452.28
Share(%)	8.07	5.81	6.42	2.03	1.72	5.49	3.99

Note: Above figures come from date of 1989 (Source:Ministry of Agriculture)

The area of the forest and woodland is 158,504 square kilometers whose share in the territory is 27 percent. The average annual growth rate is minus(-) 0.9 percent and thus creating is a trouble to Madagascar. An enormous quantity of the cut wood is about 7,856,000 cubic meters and 90 percent of them are used for fuel every year in Madagascar (Table 1-4-3).

Table 1-4-3 Area of Forest and Cut Volume of Wood

	Unit	Value	Share (%)
Area of Territory	1000 ha	58,705	100.0
Area of Forest	1000 ha	14,580	24.8
Cut Volume of Wood	1000 c.m	7,856	100.0
for Lumber	1000 c.m	807	10.3
for Fuel	1000 c.m	7,049	89.7

The area used for urban activity, road, industry etc. is 52,835 square kilometers and or nine percent of the total. The average annual growth rate is 2.8 percent. This growth rate is comparatively high for the low-income countries.

On the other hand, the area of the province of Antsiranana is 43,056 square kilometers whose share is 7.3 percent of the total area of Madagascar. The arable land of the province of Antsiranana is 2,365 square kilometers whose share is 5.5 percent. This percentage exceed slightly the average percentage in Madagascar.

The area of Antsiranana's arable land for paddy is 1,208 square kilometers whose share is over 50 percent of the total arable land of the province. The share next to paddy is that of coffee whose area is 484 square kilometers representing the share of 20.5 percent. The share next to paddy and coffee is the share of Vanilla (10.1 %), and then sugar cane (6.5 %). The shares of the other products are not so important.

However, the share of cacao in the province of Antsiranana is nearly 100 percent of the total production of Madagascar. And that of pepper is relatively large, respecting 38 percent of Madagascar's total production.

The province of Antsiranana (Faritany;Antsiranana) has a plenty of forest in its south area. The forest area spreads across five districts (Fivondronana) namely Ambanja, Ambilobe, Andapa, Antalaha and Sambava. In this area, a great variety of species of woods, ivies and grasses are wildly growing.

On the other hand, the area of permanent pasture is spreading in the province, where cattle, pigs and sheep etc. are abundant.

1.5 Socioeconomic Activities

Madagascar is faced with a deficit in the balance of payments. To remedy this situation, the Madagascan government has appealed to the IMF and World Bank several times to assist in the reformation or restructuring of its economy. Several structural adjustment programs have been executed but these have generally failed to yield the desired results. The major programs are shown in Appendix A-1.5.

1.5.1 Population

According to the estimation of the Madagascar Government based on the 1975 Census, the total population of Madagascar in 1992 was 11.8 million. The average annual growth rate of population from 1984 to 1992 is 2.6 %, relatively high compared to those of other low-income countries. These data are shown in Table 1-5-1.

Table 1-5-2 shows the population by sex and age group in 1991. As shown in the table, the population from 0 to 19 accounts for about 54 %,in fact, the number of children aged 0 to 4 is about the same as that of all people over 40.

Among the provinces, Antananarivo province where the capital city is located has the largest population, about 3.739 million or about 33 % of the total. On the other hand, Antsiranana province where the port of Antsiranana is located has the smallest population, 870 thousand or about 8 % of the total. These data are shown in Table 1-5-3.

Table 1-5-1 Trend of Madagascan Population

YEAR	POPULATION
1984	9,607,800
1985	9,855,000
1986	10,108,500
1987	10,368,500
1988	10,635,300
1989	10,908,900
1990	11,197,200
1991	11,493,100
1992	11,796,900

Source: "Madagascar in figures 1992"
;Banque des Donnes de l'Etat

Table 1-5-2 Population by Sex and Age Group 1991

Age	Sex M	(%)	Sex W	(%)	Total	(%)
0- 4	961,958	16.9	935,351	16.1	1,897,309	16.5
5- 9	785,398	13.8	774,576	13.3	1,559,974	13.6
10-14	714,309	12.6	710,257	12.2	1,424,583	12.4
15-19	650,624	11.5	646,231	11.1	1,296,855	11.3
20-24	532,254	9.4	540,262	9.3	1,072,513	9.3
25-29	437,391	7.7	467,610	8.0	905,002	7.9
30-34	361,568	6.4	400,127	6.9	761,696	6.6
35-39	295,533	5.2	320,687	5.5	616,221	5.3
40-44	220,234	3.9	240,625	4.1	460,857	4.0
45-49	163,201	2.9	183,405	3.2	346,606	3.0
50-54	139,518	2.4	159,323	2.7	298,843	2.6
55-59	124,165	2.2	138,166	2.4	262,332	2.3
60-64	102,148	1.8	105,781	1.8	207,929	1.8
65-69	78,479	1.4	78,359	1.4	156,838	1.4
70-74	55,835	1.0	58,218	1.0	114,055	1.0
75-79	30,717	0.5	33,872	0.6	64,589	0.6
80-	23,429	0.4	23,495	0.4	46,923	0.4
Total	5,676,759	100.0	5,816,366	100.0	11,493,125	100.0

Source: "Madagascar in figures 1992"
; Banque des Donnees de l'Etat

Table 1-5-3 Population in Each Province

PROVINCE	1991	PERCENTAGE (%)
ANTANANARIVO	3,739,378	32.5
ANTSIRANANA	869,934	7.6
FIANARANTSOA	2,527,499	22.0
MAHAJANGA	1,178,084	10.2
TOAMASINA	1,696,057	14.8
TOLIARY	1,482,173	12.9
TOTAL	11,493,125	100.0

Source:"Madagascar in figures 1992"
;Banque des Donnees de l'Ltat

1.5.2 National Income

The general trend of the Gross Domestic Product by industrial sector in Madagascar is shown in Table 1-5-4 and Figure 1-5-1. As shown in the table, the GDP at constant 1984 prices slowly increased from 1984 to 1990 with an average growth rate of 2.5 %. In 1991, when political confusion reigned due to the change of political power, GDP sharply fell. The GDP began to grow again, but even in 1992 it remained at about 1,853 billion FMG at constant prices and had not recovered the same level as in 1989.

Among the industrial sectors, the agriculture sector has a large share, about 34 % and its growth rate, 2.3 % from 1984 to 1992, is the highest. On the other hand, the secondary industrial sector is generally weak and its growth rate, 1.0 % from 1984 to 1992, is the lowest. The low level of industrial development is clearly reflected in the structure of foreign trade : agricultural and fishery products are exported, while industrial products are imported.

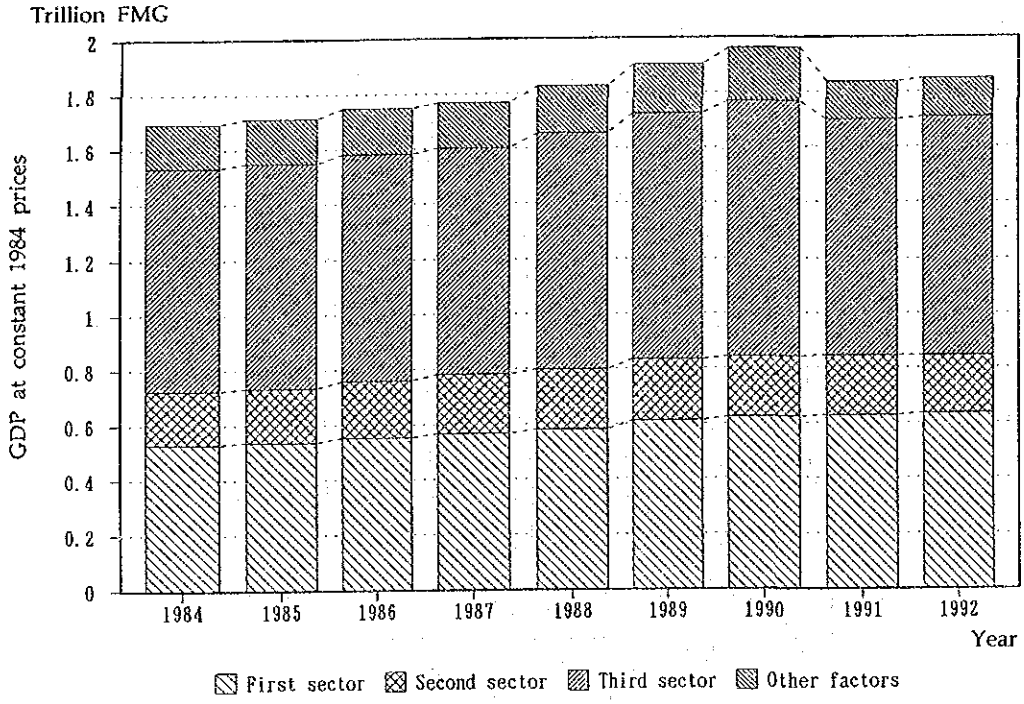

Figure 1-5-1 Trend of GDP at Constant 1984 Prices

Table 1-5-4 Trend of GDP at Constant 1984 Prices

(Unit:Billions FMG, %)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	Ave. annual growth rates 92/84	90/84
GDP(Current prices)	1,695.0	1,893.1	2,203.7	2,743.2	3,436.8	4,005.3	4,601.6	4,906.4	5,584.5	18.1	16.1
GDP(1984 Prices)	1,695.0	1,714.4	1,748.1	1,768.9	1,828.9	1,903.6	1,962.3	1,837.0	1,852.7	1.1	2.5
Secteur Agricultures	531.0	536.9	554.3	568.2	580.6	610.9	623.6	626.8	635.3	2.3	2.7
Secteur Industries	195.0	197.5	205.0	214.8	218.6	221.3	219.1	216.8	211.8	1.0	2.0
Secteur Services	808.1	815.1	820.7	819.3	855.6	890.7	925.8	854.3	863.8	2.2	2.3
public sector	107.8	108.7	109.4	109.5	109.6	109.6	110.9	110.6	109.1	0.1	0.4
Imputed charges(banks)	-29.5	-27.7	-28.2	-32.0	-31.3	-33.2	-33.6	-25.1	-25.2		
GDP at factor cost	1,504.6	1,521.8	1,551.8	1,570.2	1,623.5	1,689.8	1,734.7	1,672.8	1,685.7	1.4	2.4
Net indirect taxes	190.4	192.6	196.3	198.7	205.4	213.8	227.6	164.2	167.0	-1.6	3.0
GDP per inhabitant (Thousand FMG)	176.4	174.0	173.0	170.6	172.0	174.5	175.3	159.8	157.0	-1.4	-0.1

Source:"Bulletin d'information et de ststistiques" ; Banque Centrale de Madagascar

GDP per capita at constant prices decreased gradually at an average growth rate of 1.4 % from 1984 to 1992(Figure 1-5-2). This is because the economy failed to catch up with the increase of population. A prime objective of the economic policy is to reduce sensibly the rate of poverty.

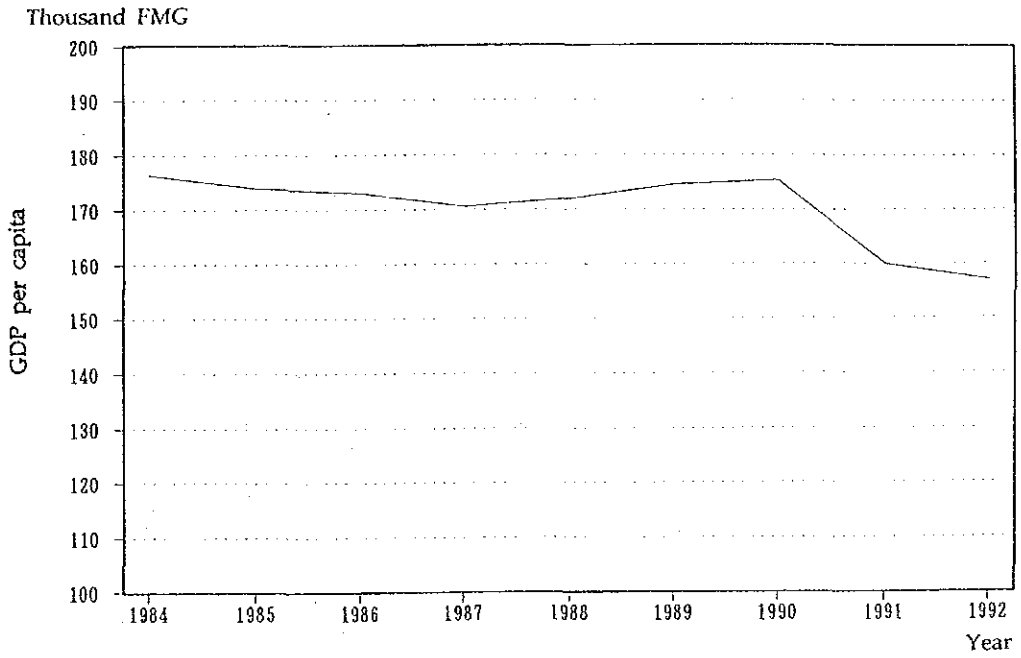

Figure 1-5-2 Trend of GDP per Capita