

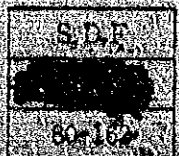
REPUBLIC OF INDONESIA

FEASIBILITY STUDY FOR  
SMALL AND MEDIUM SIZED TOWNS WATER SUPPLY PROJECTS  
IN SULAWESI

FINAL REPORT

NOVEMBER 1980

JAPAN INTERNATIONAL COOPERATION AGENCY



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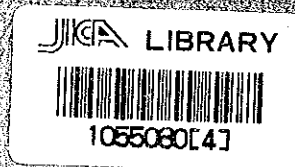
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Vol. 1 : SUMMARY



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## PREFACE

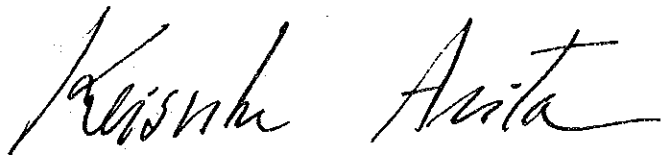
In response to the request of the Government of the Republic of Indonesia, the Japanese Government decided to undertake a feasibility study on the Small and Medium Sized Towns Water Supply Project In Sulawesi and entrusted the Japan International Cooperation Agency (J.I.C.A.) with the study. The J.I.C.A. sent a survey team for the Project headed by Mr. Hideyuki Aoki to the Republic of Indonesia from March to August, 1980.

The present report has been compiled based upon the findings of the team's field survey, discussions with Indonesian officials involved and its subsequent study made in Japan.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

November, 1980

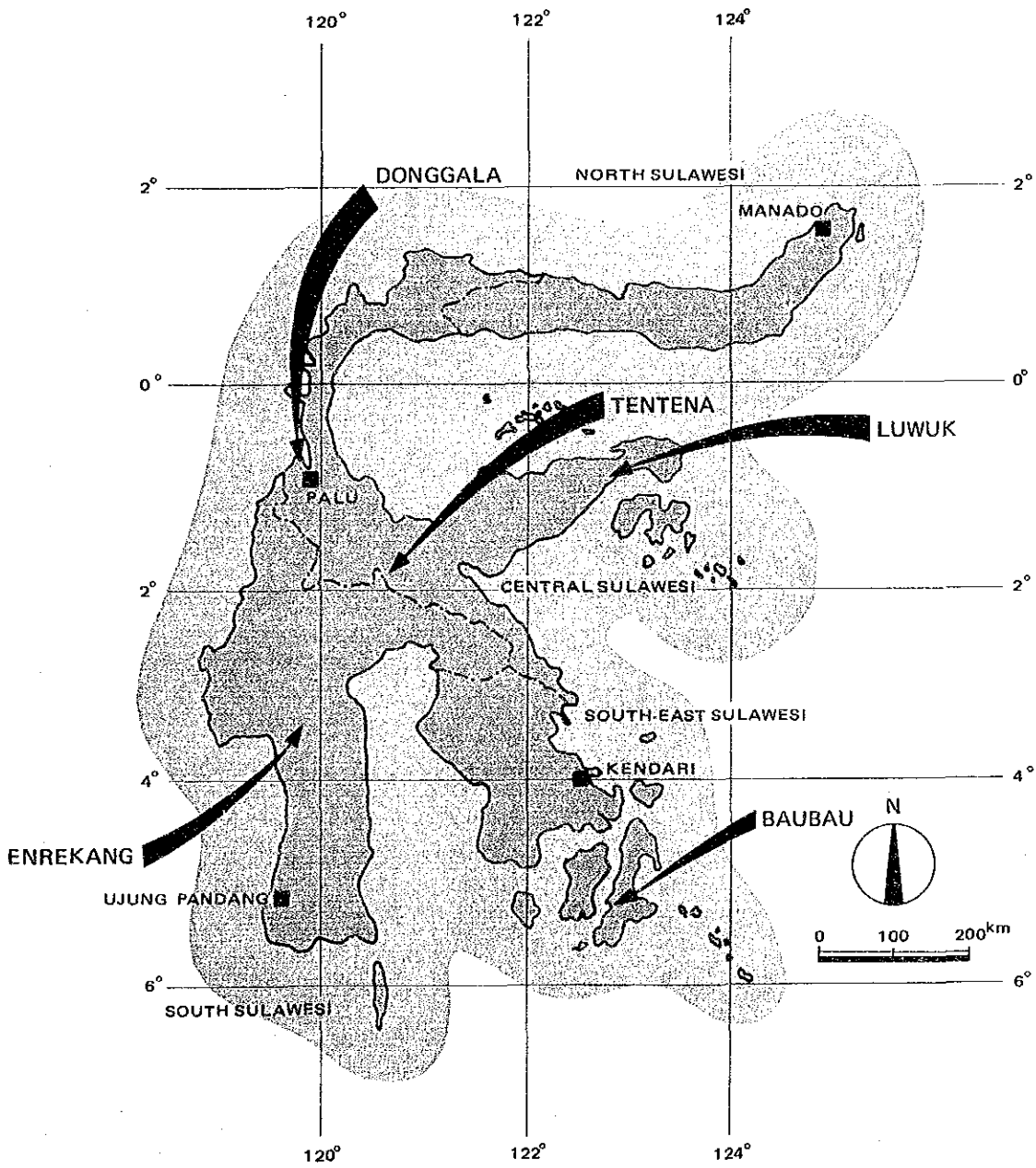
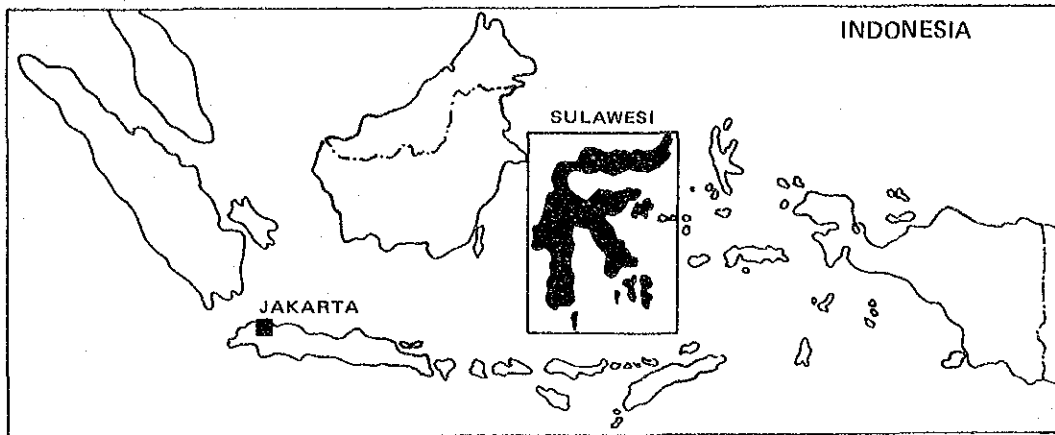


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Keisuke Arita  
President  
Japan International Cooperation Agency







LOCATION MAP OF STUDY AREA



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## I. GENERAL

The Government of the Republic of Indonesia intends to implement the Small and Medium Sized Towns Water Supply Projects in the frame of PELITA III (the Third 5-Year Development Plan 1979 - 1984). Cipta Karya's Directorate of Sanitary Engineering, Ministry of Public Works, is responsible for execution of the project and intends to finance the projects from DIP budget (General Development Budget) and to provide a full grant for construction of water plants and of distribution networks. The Government of the Republic of Indonesia has requested the Government of Japan to implement the feasibility study for the project for five towns in Sulawesi. The target of PELITA III and the Central Government financial projection are described in ANNEX 1.

This summary is to describe the Feasibility Study for Small and Medium Sized Towns Water Supply Projects in Sulawesi in a concise form so as to give an overall picture of the projects. The Feasibility Study has been conducted by means of review, together with supplemental surveys, of the existing feasibility study reports prepared by Cipta Karya for five towns, Donggala, Tentena, Luwuk, Baubau and Enrekang in Sulawesi.

The summary contains I) General, II) Descriptions of Project, including a list of the projects, III) Benefits of the Projects, IV) Estimated Project Cost, and V) Recommendations for implementation of the projects.

## II. DESCRIPTION OF PROJECTS

The description of projects and major results of review work with summary form for each of the five towns is presented below:

### 1. Donggala

Donggala is located in Donggala Regency, Province of Central Sulawesi, 26 km northwest of Palu city. The town is located near the sea and has a harbour for transportation of local products. It had a total population of 17,556 in 1978.

A small scale water supply system in Donggala started in 1920, using only one source of spring, Maleni I spring. Later in 1973, one more spring source, Maleni II was added. Served population at present is only four percent of the total population. A great number of people are still obliged to drink unhealthy water.

A new water supply system taking riverbed water of the Donggala river is proposed to be constructed with target year of 1985. For water treatment, slow sand filtration without sedimentation is recommended.

### 2. Tentena

Tentena is located in Poso Regency, Province of Central Sulawesi. The town is situated at 56 km south of Poso city with 500 - 550 meters above sea level and is surrounded with scenic mountains. In 1979, the town had a total population of 6,475.

There is no public water supply system at present. Most of the inhabitants rely on the surface water of the Poso river and other streams for their domestic use. Due to insufficiency of public health facilities, many people suffer from several kinds of disease including an endemic disease.

For the target year of 1985, a new water supply system with a capacity of 20 l/sec is proposed which will take water from the Latea river.

### 3. Luwuk

Luwuk is located in Banggai Regency, Province of Central Sulawesi, and can only be reached by air route from either Ujung Pandang or Palu enroute from Poso. The town has a scenic view of the sea and mountains. It had a total population of 18,019 in 1979.

A small scale water supply system came into operation with water from the spring Mangkio in 1926, which is still operating, distributing spring water directly from the intake to consumers. The existing distribution pipelines are, however, insufficient to distribute the available water at the spring; most of the existing pipelines are deteriorated with years of use.

For the target year of 1985, it is recommended to improve the existing water supply system with following works:

- i) Extension of pipelines,
- ii) Water treatment by aeration to remove CO<sub>2</sub>,
- iii) Replacement of transmission pipes.

### 4. Baubau

Baubau is located in Buton Regency, Province of Southeast Sulawesi, at a distance of 30 minutes by plane or 18 hours by boat from Kendari. As is located on the coastside and hilly place, the town has a fine view of the bay and islands. It had a total population of 35,498 in 1977.

A water supply system came into operation in 1928, with three water sources from springs scattered in the town. This system, however, covers only a part of the town, and other most parts of the newly developed area left inaccessible to public water supply.

The existing Wamembe and Wakonti water supply systems are proposed to be utilized with radical improvement of pipelines to meet the demand in 1985, the target year.

#### 5. Enrekang

Enrekang is located in Enrekang Regency, Province of South Sulawesi. The town is 230 km north of Ujung Pandang and is close to Tana Toraja, well-known for its cultural traits. The town had a population of 13,804 in 1977.

There is a primitive water supply system consisting of halved-bamboo pipes for distribution of water to houses. Presently only two percent of the population is benefited from this water supply systems. Majority of people are obliged to drink unsanitary water from rivers and streams.

The water supply system taking water from two springs of Galonta, the existing, and Lewaja, newly proposed, is recommended to be constructed by 1985. Both water sources are clear and can be directly distributed by gravity without any treatment.

Major description of project for each of the five towns in a summary form is presented in a list of project.



## D O N G G A L A

1. Location : Donggala Regency, Province of Central Sulawesi.
2. Topographic features, etc. : 5 m - 115 m above sea level, geology characterized by lime-stone and marl.
3. Socio-economic feature : Port city adjacent to capital city Palu of Central Sulawesi.
4. Population : 17,556 in 1978. Projected population 20,800 in 1985.
5. Existing water supply system : Maleni I system constructed in 1920 and Maleni II in 1973.
  - Water source : Maleni I and Maleni II springs
  - Spring yield : Maleni I 1.5 l/sec  
Maleni II 1.0 l/sec
  - Served water quantity : 2.5 l/sec
  - Pipes :  $\emptyset$  4" x 487 m, GSP  
 $\emptyset$  2" x 3,225 m, GSP
6. Public health : Improvement of public health condition required, especially water supply.
7. Water supply plan
  - Served population : 12,490, 60%
  - Capacity of system : 20 l/sec
  - water source : Donggala river (riverbed water)
  - Transmission :  $\emptyset$  150 mm x 200 m
  - Treatment : Slow sand filtration
  - Distribution :  $\emptyset$  200 mm x 1,400 m  
 $\emptyset$  150 mm x 2,400 m  
 $\emptyset$  100 mm x 550 m  
 $\emptyset$  75 mm x 1,250 m
  - House connection : 1,010
  - Public hydrant : 38
8. Construction cost
  - Foreign : Rp. 225 million (US. \$ 357,000)
  - Local : Rp. 384 million (US. \$ 611,000)
9. Status of implementation : Feasibility study by Cipta Karya in 1979.  
Review of the above study by JICA in 1980.  
Foreign loan for execution applied for in 1980.  
Completion of the project envisaged in 1982.

## T E N T E N A

1. Location : North Pamona Ward, Poso Regency,  
Province of Central Sulawesi.
2. Topographic features, etc. : 500 - 550 m above sea level, scenic  
place surrounded with the Poso lake  
and mountains.
3. Socio-economic feature : A center of Christian missionary in  
Central Sulawesi.
4. Population : 6,475 in 1979. Projected population  
7,440 in 1985.
5. Existing water supply  
system : Two systems for limited numbers of  
houses.
6. Public health : Some endemic disease due to unsanitary  
drinking water.
7. Water supply plan
  - Served population : 4,790, 64 %
  - Capacity of system : 20 l/sec
  - Water source : Upstream of the Latea river.
  - Transmission : Ø 150 mm x 2,150 m
  - Treatment : Grit chamber and rough filtration.
  - Distribution : Ø 150 mm x 3,400 m  
Ø 100 mm x 3,200 m  
Ø 75 mm x 4,750 m  
Ø 50 mm x 600 m
  - House connection : 370
  - Public hydrant : 10
8. Construction cost
  - Foreign : Rp. 258 million (US.\$ 411,000)
  - Local : Rp. 236 million (US.\$ 374,000)
9. Status of implementation : Feasibility study by Cipta Karya in 1979.  
Review of the above study by JICA in  
1980.  
Foreign loan for execution applied for  
in 1980.  
Completion of the project envisaged in  
1982.

L U W U K

1. Location : Banggai Regency, Province of Central Sulawesi.
2. Topographic features, etc. : 0 m - 50 m above sea level, geology characterized by lime-stone.
3. Socio-economic feature : Junction of air route, Ujung Pandang, Manado, Kendari and Poso.
4. Population : 18,019 in 1977. Projected population 26,700 in 1985.
5. Existing water supply system : System constructed in 1926
  - Water source : Mangkio spring
  - Spring yield : 250 - 300 l/sec
  - Served water quantity : 30 - 35 l/sec
  - Pipes :  $\emptyset$  6" x 1,900 m, CIP  
 $\emptyset$  4" x 1,950 m, CIP  
 $\emptyset$  3" x 6,380 m, CIP  
 $\emptyset$  2.5" x 3,180 m, CIP
6. Public health : Many incidences of malaria, respiratory disease and gastroenteritis.
7. Water supply plan : 22,700, 85 %
  - Served population : 40 l/sec
  - Capacity of system : Mangkio spring
  - Water source :  $\emptyset$  300 mm x 100 m
  - Transmission : Aeration
  - Treatment :  $\emptyset$  300 mm x 300 m  
 $\emptyset$  200 mm x 3,200 m  
 $\emptyset$  150 mm x 1,800 m  
 $\emptyset$  100 mm x 1,200 m  
 $\emptyset$  75 mm x 750 m
  - Distribution : 2,500
  - House connection : 33
  - Public hydrant
8. Construction cost : Rp. 287 million (US.\$ 456,000)
  - Foreign : Rp. 154 million (US.\$ 245,000)
  - Local
9. Status of implementation : Feasibility study by Cipta Karya in 1979. Review of the above study by JICA in 1980. Foreign loan for execution applied for in 1980. Completion of the project envisaged in 1982.

B A U B A U

1. Location : Buton Regency, Province of South-east Sulawesi.
2. Topographic features, etc. : 2 m - 160 m above sea level and hilly area.
3. Socio-economic feature : Center of commerce and administration in Buton Regency.
4. Population : 35,500 in 1977. Projected population 44,200 in 1985.
5. Existing water supply system : Wamembe and Wakonti systems constructed in 1928.
  - Water source : Wamembe, Wakonti and Matapu springs
  - Total spring yield : 62 l/sec
  - Served water quantity : 44 l/sec
  - Transmission : Wamembe  $\emptyset$  125 mm x 2,950 m, GSP  
Wakonti  $\emptyset$  125 mm x 4,370 m, CIP
  - Distribution : Wamembe  $\emptyset$  400 mm x 2,500 m  
Wakonti  $\emptyset$  100 mm x 2,250 m
6. Public health : Good sanitary condition is generally maintained, however water supply is extremely unsatisfactory.
7. Water supply plan
  - Served population : 31,000, 70 %
  - Capacity of system : 60 l/sec
  - Water source : Wamembe and Wakonti springs
  - Transmission : Wamembe  $\emptyset$  250 mm x 3,000 m  
Wakonti  $\emptyset$  150 mm x 4,400 m
  - Distribution :  $\emptyset$  300 mm x 1,600 m  
 $\emptyset$  250 mm x 1,300 m  
 $\emptyset$  200 mm x 1,350 m  
 $\emptyset$  150 mm x 4,150 m  
 $\emptyset$  75 mm x 6,350 m
  - House connection : 3,200
  - Public hydrant : 55
8. Construction cost
  - Foreign : Rp. 682 million (US.\$ 1,084,000)
  - Local : Rp. 377 million (US.\$ 600,000)
9. Status of implementation : Feasibility study by Cipta Karya in 1979. Review of the above study by JICA in 1980. Foreign loan for execution applied for in 1980. Completion of the project envisaged in 1982.

## E N R E K A N G

1. Location : Capital city of Kabupaten of Enrekang, Province of South Sulawesi.
2. Topographic features, etc. : Mountainous inland city located at the northern end of South Sulawesi
3. Socio-economic feature : A center of local commerce and transportation. Close to the boundary of Tana Toraja.
4. Population : 13,804 in 1979. Projected population 16,300 in 1985.
5. Existing water supply system : Galonta spring system constructed in 1918.
  - Water source : Galonta spring
  - Spring yield : 4 l/sec
  - Served water quantity : 4 l/sec
  - Pipes : 2.5" x 1,000 m, steel  
Halved-bamboo pipes
6. Public health : Majority of people are obliged to drink unsanitary water.
7. Water supply plan
  - Served population : 9,800, 60 %
  - Capacity of system : 20 l/sec
  - Water source : Galonta and Lewaja springs
  - Transmission : Galonta  $\emptyset$  100 mm x 500 m  
Lewaja  $\emptyset$  100 mm x 400 m  
 $\emptyset$  200 mm x 5,000 m
  - Distribution : Galonta  $\emptyset$  100 mm x 2,500 m  
Lewaja  $\emptyset$  200 mm x 700 m  
 $\emptyset$  150 mm x 2,250 m  
 $\emptyset$  100 mm x 1,250 m  
 $\emptyset$  75 mm x 1,100 m
  - House connection : 815
  - Public hydrant : 25
8. Construction cost
  - Foreign : Rp. 351 million (US.\$ 558,000)
  - Local : Rp. 275 million (US.\$ 438,000)
9. Status of implementation : Feasibility study by Cipta Karya in 1979. Review of the above study by JICA in 1980. Foreign loan for execution applied for in 1980. Completion of the project envisaged in 1982.

### III. BENEFITS OF THE PROJECTS

The benefits to be derived from the project will be as follows:

- i) The provision or expansion of the public water supply will become a motivation for overall improvement in not only public health but also all other public utilities.
- ii) Many kinds of diseases including gastroenterities are prominent due to usage of unsanitary water because of insufficient water supply. However, once the present project is completed and people are able to drink safe water, these disease will decrease and eventually be eliminated.
- iii) Water carrying is the task of women and children. They will be liberated from the hard labor of water carrying. And the time and energy spent for such work can be utilized for other useful purposes.

#### IV. ESTIMATED PROJECT COST

The total cost of project for each of the five towns is summarized as follows:

Town	Project Cost		Rupiahs million
	Foreign	Local	US.\$ 1,000
1. Donggala	<u>225</u> 357	<u>384</u> 611	<u>609</u> 968
2. Tentena	<u>258</u> 411	<u>236</u> 374	<u>494</u> 785
3. Luwuk	<u>287</u> 456	<u>154</u> 245	<u>441</u> 701
4. Baubau	<u>682</u> 1,084	<u>377</u> 600	<u>1,059</u> 1,684
5. Enrekang	<u>351</u> 558	<u>275</u> 438	<u>626</u> 996
T o t a l	<u>1,803</u> 2,866	<u>1,426</u> 2,268	<u>3,229</u> 5,134

Note : (1) Currency equivalent : US.\$ 1 = Rp. 629

(2) The figure includes 15 % of annual escalation for 1981 and 1982, 20 % of contingencies, and 8 % of engineering services.

## V. RECOMMENDATIONS

### 1. Measure to ensure the safety of drinking water

If the supply water by the water system should contain pathogenic germs, the results would be disastrous, uncomparable with the case of shallow wells or streams. To prevent such a disaster, a regular, if possible constant, surveillance is essential on water quality. As this is almost beyond power of small scale water supply systems, establishment of a regional water quality surveillance agency is desired.

### 2. Measure for emergency

Routine small repair work can be done by each small scale water supply, but some serious damage such as destruction of reservoirs, pipe bridges, intake facilities, etc. may be beyond the control of such water supply. To speedily repair such damage within as short a time as possible, a special emergency organization is required in each kabupaten or province.

### 3. Technical guidance

To acquire well-qualified engineers is very difficult in the remote areas, and the operation and maintenance of small scale water supply may not be conducted properly. Therefore, appropriate guidance is desirable for such water supply systems to be established in numerous numbers in the very near future.

### 4. Managerial guidance

Small water supply is meant to be self-independent after completion of each project. Management of such small scale enterprise is always very difficult. From this standpoint, expert services for the management is strongly recommendable.



## ANNEX 1

### TARGET OF PELITA III AND CENTRAL GOVERNMENT FINANCIAL PROJECTION

#### 1. Target of PELITA III

The main target to be achieved during PELITA III is to provide 60% of the estimated 1985 population at a minimum average level of 60 liters per capita per day, which is considered "basic needs".

#### 2. Financing

(i) The Central Government's financial projection of PELITA III for urban water supply is:

- Rp. 113 billion: Rupiah budget through DIP - budget
- Rp. 20 billion: Rupiah budget through PMP (Loan) - budget
- Rp. 191 billion: Foreign Aid (Expected)

(ii) The spending of the DIP and PMP budget has tentatively been allocated as follows:

- Rp. 10 billion: Continuation of PELITA II - projects
- Rp. 8 billion: 10 big cities at an average of Rp. 800 million/  
city
- Rp. 16 billion: 40 medium sized cities at an average of Rp. 400  
million per city
- Rp. 60 billion: 150 towns with standardized packages at an average  
unit cost of Rp. 400 million per town
- Rp. 29 billion: Matching costs for Foreign aid.

#### 3. Financing Scheme

All finance for local investments in water supply is in principle channeled to the Kota Madya and Kobupaten through the Central Government. The financing scheme, however, is changed as follows:

(i) Funds necessary to finance the "immediate phase" (of 60% coverage with 60 l/sec/day) still come from DIP-budget of CIPTA KARYA in the form of grant. When a water enterprise is established, its account will show the assets created through these DIP-funds as the assets of the enterprise.

(ii) If a municipality or local authority responsible, decides to expand its water supply system beyond the 60 l/sec/day and coverage of 60% urban population, the water enterprise concerned can get funds in the form of equity from local government, and (soft) loans from the Central Government up to a level of 125 l/sec/day capacity.

(iii) Any expansion of the system by the water enterprise beyond 125 l/sec/day has to be financed only through commercial loans, the enterprise can borrow from the banking through the Central Government.

ANNEX 2

LIST OF OFFICIALS FROM INDONESIAN GOVERNMENT AND MEMBERS OF STUDY TEAM

Officials from the Government of the Republic of Indonesia and members of the Study Team for the Feasibility Study for Small and Medium Sized Towns Water Supply Projects in Sulawesi are listed below:

Officials from the Government of the Republic of Indonesia:

- Mr. Radinal Mochtar, Director General for Housing, Building, Planning and Urban Development (Cipta Karya), Ministry of Public Works
- Mr. Susanto Mertodiningrat, Director of Sanitary Engineering, Cipta Karya, Ministry of Public Works
- Mr. Suratmo Notodipuro, Head, Sub-Directorate of Planning Directorate of Sanitary Engineering, Cipta Karya, Ministry of Public Works
- Mr. Darmawan Saleh, Chief, Planning and Programme Section, Directorate of Sanitary Engineering, Cipta Karya, Ministry of Public Works
- Mr. Natzir Baski, Sanitary Engineer, Planning and Programme Section, Directorate of Sanitary Engineering, Cipta Karya, Ministry of Public Works
- Mr. Suhardoyo, Sanitary Engineer, Planning and Programme Section, Directorate of Sanitary Engineering, Cipta Karya, Ministry of Public Works

Member of the Study Team:

- Mr. Hideyuki Aoki, Team Leader  
Director, Planning Division, Kanagawa Water Supply Authority
- Mr. Shinzo Kitamura, Member  
Technical Advisor, Overseas Services Department, Nihon Suido Consultants Co., Ltd.
- Mr. Hiroyasu Yoda, Member,  
Assistant Chief, Planning Section, Water Works Department,  
Nihon Suido Consultants Co., Ltd.
- Mr. Hideki Asada, Member,  
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Nihon Suido Consultants Co., Ltd.

- Mr. Hideki Hayashi, Member,  
Section Chief, Central Laboratory, Nihon Suido  
Consultants Co., Ltd.
- Mr. Yoshio Mitsuhashi, Member,  
Assistant Manager, Overseas Services Department, Nihon  
Suido Consultants Co., Ltd.
- Mr. Yushi Saito, Project Coordinator,  
Development Survey Division, Social Development Cooperation  
Department, Japan International Cooperation Agency







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NO. 7

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THE REPUBLIC OF INDONESIA

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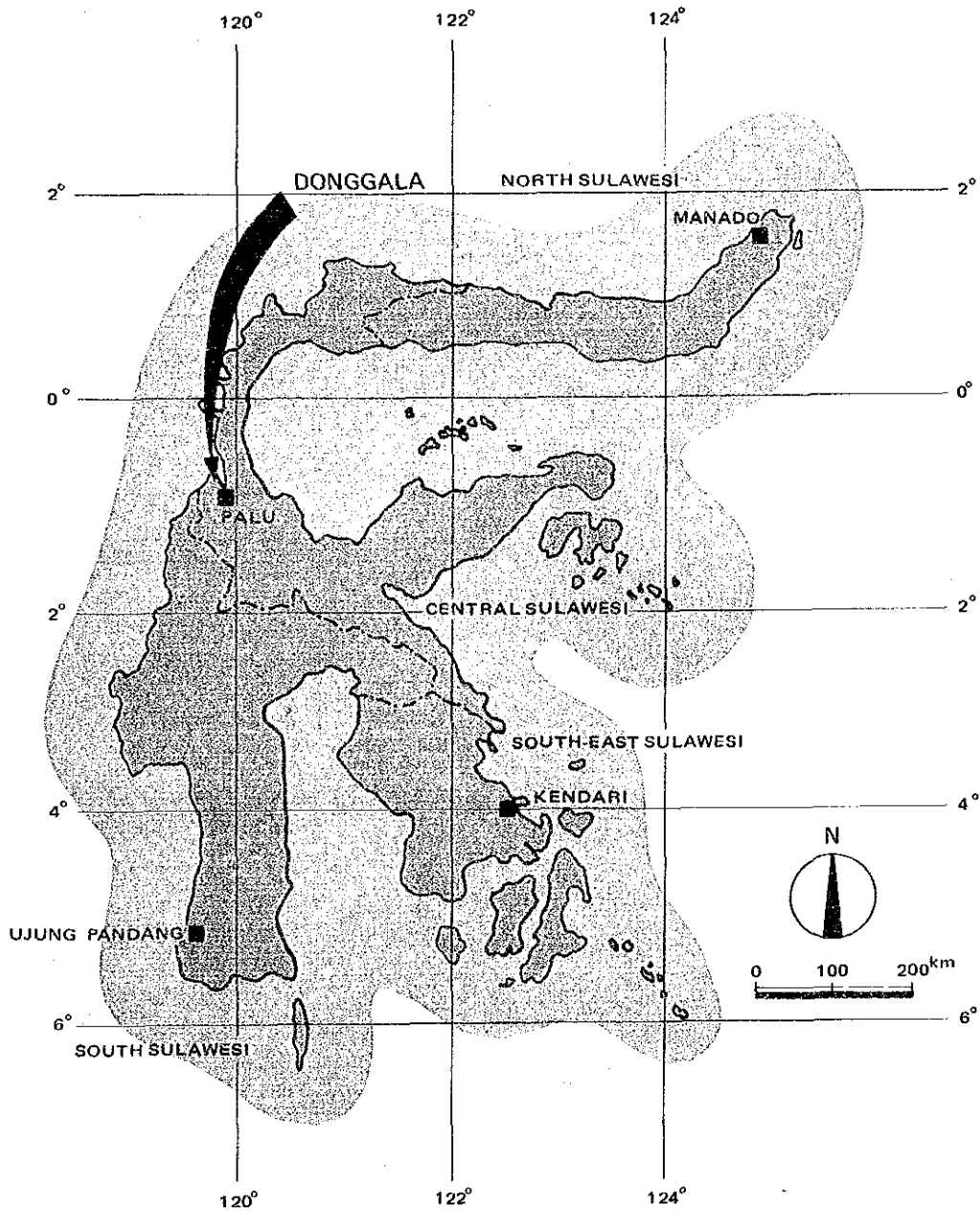
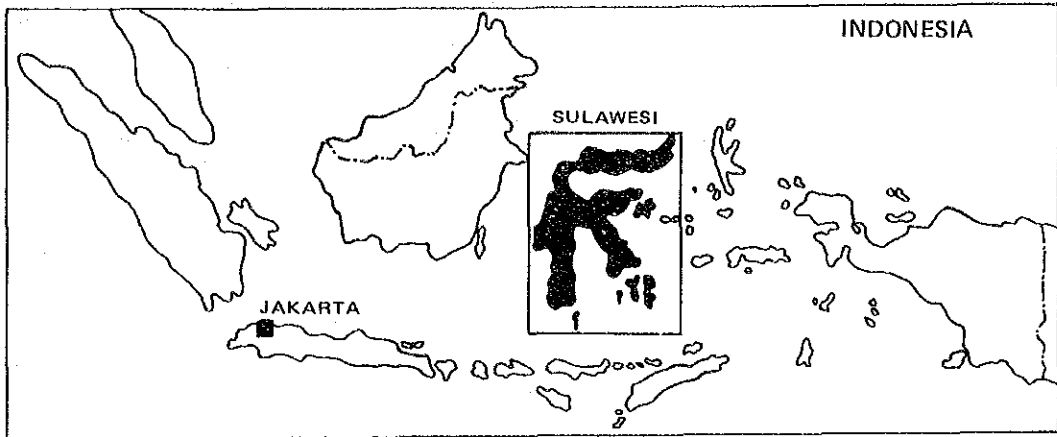
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LIST OF ABBREVIATIONS

CIPTA KARYA	- the Directorate General of Housing, Building, Planning and Urban Development
DSE	- the Directorate of Sanitary Engineering, CIPTA KARYA
JICA	- the Japan International Cooperation Agency
The existing Report or the Report	- "Feasibility Study, Master Plan & Study Ekonomi Penyediaan Air Minum for Donggala" prepared by P.T. Deserco Development Services
sq km	- square kilometer
kg/sq cm	- kilogram per square centimeter
ha	- hectare
%	- percentage
°C	- degree centigrade
l/sec	- liter per second
l/c/d	- liter per capita per day
cu m/d	- cubic meter per day
cu m/m	- cubic meter per month
ppm	- parts per million by weight
mg/l	- miligram per liter
pH	- potential of Hydrogen
FTU	- function turbidity unit
ACP	- asbestos cement pipe
PVC	- polyvinyl chloride pipe
CIP	- cast iron pipe
DCIP	- ductile cast iron pipe
GSP	- galvanized steel pipe
SP	- steel pipe



LOCATION MAP OF STUDY AREA





## I. GENERAL

### 1-1 Introduction

The Government of the Republic of Indonesia intends to implement the Small and Medium Sized Towns Water Supply Projects in the frame of PELITA III, and has requested the Government of Japan to carry out a Feasibility Study for five towns in Sulawesi. In response to the request, the Government of Japan has decided to conduct the Feasibility Study for the projects, and the Study Team has been dispatched to carry out the study, covering a period from March to August 1980, by the Japan International Cooperation Agency (JICA), the official agency responsible for implementation of the Technical Cooperation Program of the Government of Japan.

This report, the Feasibility Study for the Donggala Water Supply System, has been prepared based on a review of the existing Feasibility Study Report (the existing Report) by the Directorate of Sanitary Engineering, Cipta Karya, Ministry of Public Works, and on the Team's own surveys conducted during the study period for the above mentioned project. The report describes the result of the review and presents a recommended system to be constructed with a target year of 1985, together with an estimated cost of the project and an implementation schedule thereof, all based on the said review.

The report also deals with necessary funds required for the construction of the proposed system, with potential sources of financing, and the financial feasibility of the project. Considerations are given to establishing a suitable organization, which will perform the operation and maintenance of the system after completion. This organization is to be established along the basic policy lines of Cipta Karya.

It is to be noted that this report does not contradict the above mentioned existing Report, but replenishes it with additional studies and analyses, on the basis of supplemental data and information. In compiling the report, quotations or reproductions from the existing Report have been

minimized in so far as the context of the present report is not obscured. In case, however, any necessary data of the previous study happens not to be quoted in this report, it is wished the original Report be referred to.

#### 1-2 Objective of the Study

The objective of this study is conduct a Feasibility Study Report based on the review of the existing Report including preliminary engineering designs prepared by Cipta Karya. To attain the above purpose, the study also covers some supplemental studies on the engineering and financial requirements.

#### 1-3 Scope of Work

The Operation Program signed between Cipta Karya and the Study Team, defines the scope of work for the Small and Medium Sized Towns Water Supply Projects in Sulawesi.

The scope of work is as follows :

- 1) To review the existing feasibility reports and data;
- 2) To undertake field survey and investigation based on the existing reports;
- 3) To carry out supplemental studies on each of cities/towns;
- 4) To carry out analysis of data and information;
- 5) To study construction materials, labor force, and construction ability of local contractor;
- 6) To study a water supply organization;
- 7) To prepare financial planning;
- 8) To study benefits of the Project;
- 9) To prepare an implementation schedule.

#### 1-4 Study Area

The study area for the present project is a part, the congested part, of Donggala Sub-regency, Donggala Regency, Province of Central Sulawesi. In the following paragraphs, major features of geography and socioeconomic aspects of Donggala related to the present study will be described. They are mostly quoted from the existing Report.

##### 1-4-1 Geography

Donggala is located 119°45' east longitude and 0°36' south latitude. The town stands at the tip of a small peninsula containing Palu bay, and at 26 km northwest of Palu city which is located at the innermost point of the bay. The peninsula is hilly with few flat coastal lands. Due to the topographical condition of the peninsula, there are no sizable rivers with perennial flow in this district, except for the Donggala river.

Kota Donggala has developed from a small community formed at the river mouth of Donggala, where a few small springs, essential for living, were available within quite a short distance. At the river mouth there is narrow alluvial land, contained by low hills on both sides of the river. Presently, this narrow flat area has been almost filled up with the built-up town Donggala.

##### 1-4-2 Socioeconomic Conditions

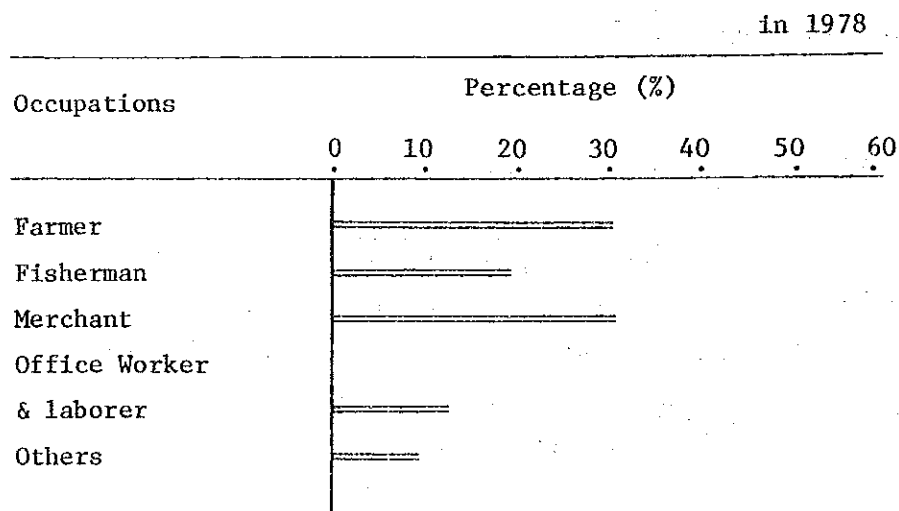
In the densely populated part of Donggala, the study area, there are a number of shops and public facilities, such as schools, hospitals, banks, telephone office, etc. Some of these buildings remain since the days of the East Indian Company established by the Netherlands. As will be supposed from the name of the Regency, Donggala used to be the capital of the Regency, and such remains tell vividly the old status and importance of the town. Presently, the capital city is Palu, and Donggala is linked with Palu by a good road along the coast of the bay. Further, Donggala has a harbor for local transportation of commodities and coastal fishery, and quite a few ships call at this harbor, with ice factories nearby serving for storing fish.

Table 1-4-1, taken from the existing Report, shows the distribution of occupations in the study area. As is seen in the table, the town is characterized by farming and fishing. The two occupations account for half of the population. Next comes the figure of merchants, which shows that the urban commercial activities are fairly high. Another Table 1-4-2, also taken from the Report, shows the number of facilities in Donggala, which may support to some extent the above explanation.

As for the monthly income of the people, the Report has a table of classified income in 1978. The average monthly income per household calculated by the Study Team from this information is Rp 32,000, which is not much different from other small cities in Central Sulawesi. In the present field survey, it was told by the local government that the present average monthly income in Donggala is presumed to be about same as the above.

Donggala has an area of about 7,800 ha, and is administratively divided into nine districts, as shown in Table 1-4-3. Out of these nine districts, parts of five districts form Kota Donggala, the study area. They are Boya, Labuan Bayo, Maleni, Gunung Bale and Tanjung Batu.

Table 1-4-1 Distribution of Occupations



Source : the existing Report

Table 1-4-2 Number of Facilities

		in 1978
Category	Facility	Number
Education	Kindergarten	6
	Elementary School	18
	High School	7
Economic	Market	2
	Factory	15
	Office	15
Sanitary	Hospital	3

Source : the existing Report

Table 1-4-3 Districtwise Population

(quoted from the Report)		
District	Population	No. of Households
1. Boya	4,353	806
2. Labuan Bayo	1,678	186
3. Maleni	1,750	301
4. Bone Oge	1,590	250
5. Ganti	1,736	250
6. Kobanga Kecil	1,595	293
7. Gunung Bale	1,080	218
8. Kobanga Besar	1,660	260
9. Tg. Batu	2,114	427
T o t a l	17,556	2,991

Source : Office of Kecamatan Banawa in 1978

