REPORT ON
RIVER AND SABO STUDY MISSION
TO INDONESIA

February, 1976

JAPAN INTERNATIONAL COOPERATION AGENCY
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INTRODUCTION

The Japan International Cooperation Agency despatched River and Sabo Study Mission from December 2 to 14, 1975 to Indonesia. As is generally known, the technical cooperation for Indonesia in this field by our country extends over more than 13 years, mainly through the despatch of experts, and the extent of cooperation is enlarged year after year.

At present, Indonesia is in the period of the second 5-year development plan, and considering that it was useful to evaluate the cooperation made so far and to discuss the direction of cooperation in future through the interchange of executives of the authorities concerned from both the countries, the mission was despatched.

The actual states of cooperation were investigated based on the above viewpoint and were discussed between the mission and the Indonesian authorities concerned. This report is the compilation of the result of the investigation and the discussion, made with the hope to be of any use in the future.

For the despatch of the Mission to Indonesia, they were favored with considerable cooperation of the Ministry of Public Works and Electric Power and other persons concerned, and wish to express their gratitude at this opportunity.

February 6, 1976

Yoshio Hitomi
Executive Director
Japan International Cooperation Agency

CONTENTS

I. PREFACE

Purpose:

Through the Colombo Plan Scheme, the Japanese Government has been cooperating with the Directorate of Water Resources Development, Ministry of Public Works and Electric Power, in technical assistance by means of providing experts, despatching survey teams and accepting trainees. Thirteen years have already passed since the first expert was despatched to the Directorate, involving the rapid expansion of technical cooperation since then. The number of experts despatched already reaches about 40. However, there is another fact that according to the expansion of technical cooperation, various problems have arisen to hamper the effective execution of the technical cooperation.

On the other hand, the Indonesian Government completed the first 5-year development plan and is now in the 2nd year of the second 5-year development plan, and for effective promotion of the second 5-year development plan, they have reformed their organization and are asking the Japanese Government to further expand the technical cooperation.

Under these circumstances, a technical cooperation survey team was despatched to Indonesia.

to review the past technical cooperation,
to identify the present problems, and seek the solutions,
and
to discuss the orientation of the technical cooperation in future.

Because of the shortage of time, the survey was limited only to the projects in central Java, East Java and Bali Island, where technical cooperation has been preferentially executed.

The study was conducted from December 2 to December 14, 1975. And some problems concerning technical cooperation were pointed out, and to settle these problems, frank opinions were exchanged about how the technical cooperation in future should be.

The study could be successfully completed with sincere cooperation of Indonesian Government and Japanese experts.

The mission expresses their gratitude for Director General Ir. Suyono and other persons concerned for their cooperation extended to the mission.

The mission believes the result of this study will be a useful guide for technical cooperation between two countries in the field of river and sabo in future.

Member List of the Study Mission:

Name	Designation
Mr. Yasuyuki Togano	Director of River Planning Division, River Bureau, Ministry of Construction
Mr. Jiro Nakamura	Director of Sabo Division, Sabo Dep., River Bureau, Ministry of Construction
Mr. Hidetomi Oi	Deputy Director of River Planning Division, River Bureau, Ministry of Construction
Mr. Tsuguo Yashima	Deputy Chief of First Experts, Assignment Division Experts, Assignment Dep., JICA

Itinerary of the Study Mission:

Dec. 2 (Tue.) Tokyo – Hongkong – Singapore – Jakarta

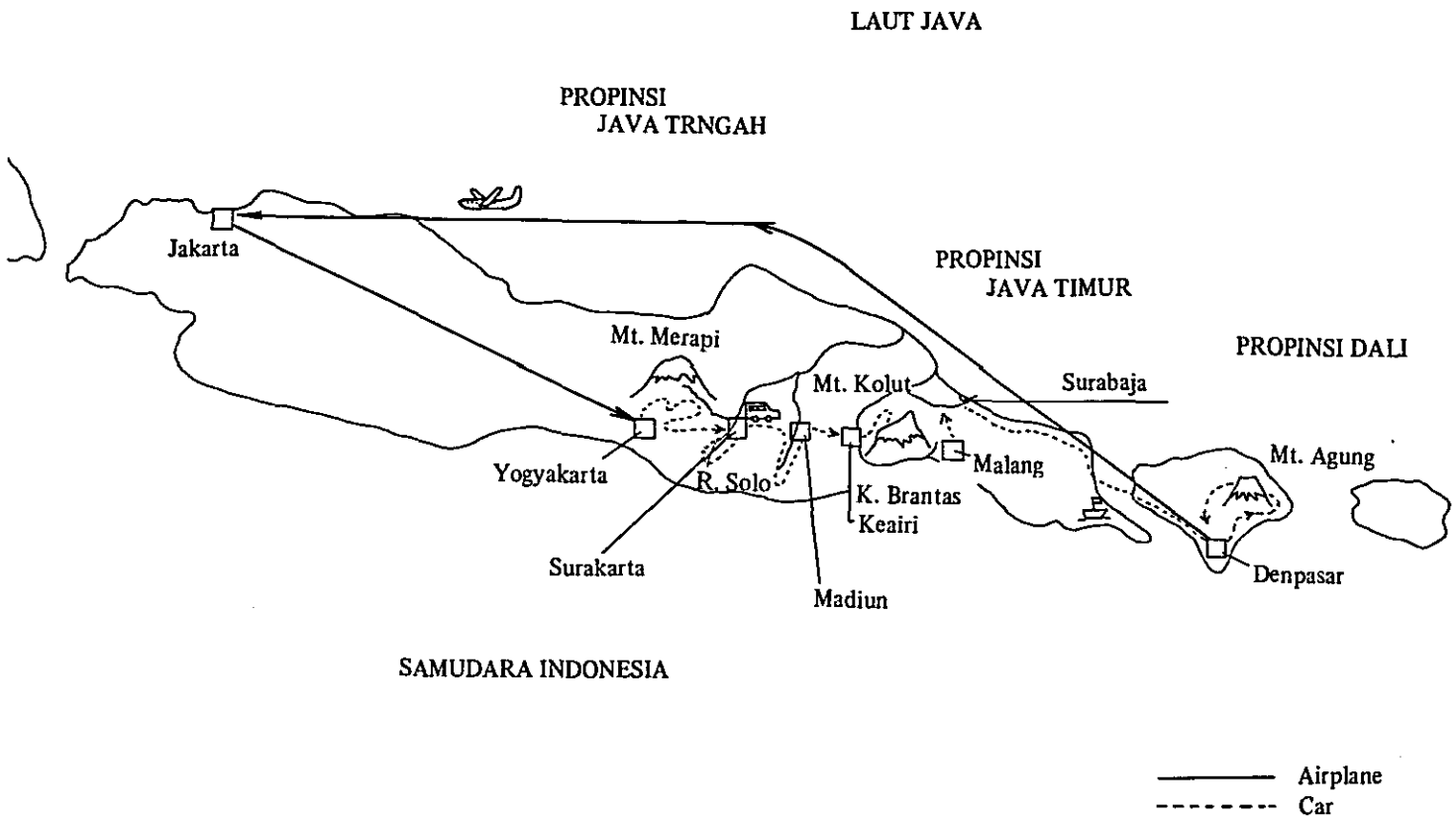
3 (Wed.) Embassy of Japan, JICA office
General explanation on technical cooperation, by experts in Jakarta (Mr. R. Kamiya, Mr. T. Matsushita and Mr. M. Nakahiro) and Mr. T. Tomaru, First Secretary of Embassy of Japan.

4 (Thu.) Courtesy call to Directorate General of Water Resources Development (9:00 – 9:20)
Jakarta – Yogyakarta by GA 640 (10:30 – 11:35)
Survey at Mt. Merapi Project Area (K. Putin and K. Krasak)

5 (Fri.) Survey at Mt. Merapi Project area (K. Wore)
Yogya – Surakarta by car
Explanation on improvement of the Solo River by Mr. Suminto, Chief of the Project, at Bengawa Solo Project Office
Inspection of Model Test Laboratory

6 (Sat.)	Survey at Wonogiri Dam site, Colo weir site, upper part of B. Solo and K. Madiun
	Surakarta – Sarangan by car
7 (Sun.)	Sarangan – Madiun – Kediri – Malang by car
	Survey at Mt. Kelut Project Area, K. Brantas Basin and Wlingi Dam
8 (Mon.)	Survey at Lahore Dam and Karangkates Dam
	Study of the Development Programme of K. Brantas and opinion exchange on how to promote technical cooperation
	Malang – Mojokerto – Porong by car
	Survey at Kali Surabaya, Kali Porong and Lengkong Dam
	Porong – Probolinggo – Situbondo – Banyuwangi – Gilimanuk – Denpasar – Sanur (17:30 Monday – 7:00 Tuesday)
9 (Tue.)	Study of damage caused by the eruption of Mr. Agung, 1963, and Survey at Mr. Agung Project Area
	Impressions on field project surveys stated
10 (Wed.)	Survey of coastal erosion at Kuta Beach
	Denpasar – Jakarta by GA 683 (10:30 – 12:05)
11 (Thu.)	Meeting with Director General Ir. Suyono and his staff (Ir. Nainggolan and Drs. Attamimi) on the problems of technical cooperation and the direction in future
	Farewell buffet party by the Mission at Hotel Indonesia
12 (Fri.)	Meeting with Director of Rivers Ir. Sudaryoko and his staff (Ir. Sarbini and Ir. Kusdaryono)
	Farewell Luncheon by Ir. Suyono
13 (Sat.)	National Holiday of Indonesia
14 (Sun.)	Jakarta – Hongkong – Tokyo by GA 874 and Pan AM

FIELD SURVEY COURSE



II. MAIN REPORT

1. Foreword

The duties of the mission are to review the technical cooperation provided by the Japanese Government to the Directorate of Water Resources Development, Ministry of Public Works and Electric Power, Indonesia, mainly by way of despatching experts in the fields of river and sabo for these ten odd years. In addition, the mission has taken this opportunity to give as much advice as possible on the technical problems in which the respective experts now despatched in these fields are involved.

The study has been made on the technical cooperation on 3 major viewpoints of (1) evaluation the past results, (2) identifying the present problems and seeking the solutions, and (3) discussing the orientation of the technical cooperation in future in these fields.

Especially in this survey, emphasis has been placed on deepening the mutual understanding through the interchange of executives of both countries who are executing technical cooperation in these fields, and particularly from the viewpoint of Japan, on searching the effective ways of technical cooperation including the ways the experts should be, considering the past results of cooperation and the administrative system of Indonesia in these fields, etc., in order to execute effective technical cooperation in future by using limited capacity, and further on searching the way the supporting activities of our country should be for effective and smooth execution of technical cooperation in future.

2. Result of Study

Although Indonesia is originally an old country having a long history of her own culture, the Republic of Indonesia as a modern nation is a young and developing nation. The year 1975 is the second year of the second 5-year development plan. The requirements for water resources development are very strong, ranging over many fields of flood control, sabo, irrigation, drainage, industrial and domestic water supply, etc. The mission show their respect to the efforts which have been made in the field of water resources development by the authorities concerned in spite of various kinds of difficulties.

Through the Colombo Plan Scheme, the Japanese Government has

been cooperating based on the demand of the Indonesian Government, in the field of water resources development by means of sending experts, despatching survey teams, assisting in technical training and supplying necessary equipment. The cooperation has contributed not only to promoting the projects of water resources development and transferring techniques, but also to improving friendship between Indonesia and Japan.

The mission's general impressions of the present technical cooperation between the two countries are as follows. Concerning the cooperation in the field of river engineering, steady efforts are being continued in planning river improvement works of several rivers, in assisting technical training of engineers, in preparing maintenance and management system of rivers, in making manuals concerning several items of river engineering, and in giving technical advice as occasion demands, which contribute much to promoting projects of water resources development or flood control. The fact that some important projects have come to be executed one after another is spectacular, and this apparently means that the techniques have planted their roots owing to the technical cooperation.

As for the technical cooperation in the field of Sabo engineering, the Mission has been deeply impressed and convinced that the technical cooperation to Indonesia from Japan has considerably contributed to the progress of Sabo technology in Indoneisa.

The completion of a technical standard manual of Sabo Engineering written in English has allowed Sabo Technology introduced widely to whole Indonesia from Sumatra to Irian Java. And Sabo Technology, covering not only Volcanic Debris Control but also Erosion and Debris Control of rivers and Soil Conservation has been planting its root as an important field of civil engineering in this country under the technical guidance of the experts assigned throughout the country. It is strongly desired that this technical standard Manual would be translated into Indonesian language, to be more suitable for the actual situations of Indonesia.

Positive technical guidance has been given not only for Sabo of active volcanoes (Mt. Merapi, Mt. Kelut, Mt. Agung and Mt. Semeru) in the densely populated areas of Java island and Bali island, but also for Sabo centered on soil conservation in Bengawan Solo and Sabo of many main rivers, contributing to disaster prevention measures in these areas. As regards the problems and future policy of Sabo in Java island and Bali island, a Sabo study mission was despatched in June, 1974 for one month and made a report. Based on the report, survey of

going to be executed to make Master Plan for disaster prevention measures of Mt. Merapi, and simultaneously, 'Joint study concerning Sabo techniques in volcanic areas' by both Japan and Indonesia is going to be started in 1975, to make the disaster prevention technical manual for volcanic mudflow. It can be said that Sabo in Indonesia advances slowly but steadily.

Next, the mission's impressions of individual field projects are as follows.

Regarding the hydraulic model test laboratory at the Bengawan Solo Project Office, the facilities and organization have been prepared already to some extent, with Indonesian engineers to be in charge being trained, and several model tests were executed, allowing the results to be applied in fields. The expansion of the facilities is planned and being carried out, and the development of the tests not only for Solo river but also widely for other rivers, dams and Sabo works in future will greatly contribute to the improvement of engineering concerned with rivers. For this purpose, in addition to the expansion of experimental facilities, the enlargement and strengthening of the organization will be necessary.

In the field of surveying and mapping, cooperation is provided at the moment for supervision and planning with respect to the mapping required by the Bengawan Solo Project, and at the same time, preparation is being made to draft a technical cooperation plan concerning the training of survey engineers and the establishment of survey system.

As for the river improvement works in the Kali Brantas Multipurpose Project, basic survey is executed to make the river improvement plan for the middle reach of the Kali Brantas river (K. Ngrowo confluence to K. Surabaya separation). At present, the works in Kali Brantas water system are covered by the Kali Brantas Multipurpose Project, Division of Public Works of East Java Province and G. Kelud project. The river engineering experts assigned to Kali Brantas Multipurpose Project are expected to cooperate not only in making the river improvement plan fo the middle reach of the Kali Brantas river but also in the consistent river management problem of the river system as a whole, considering the comprehensive relations of the entire river system including upper and lower reaches, tributaries and diversions.

Concerning Sabo engineering, though the history of technical cooperation is rather short, the cooperation progresses rather satisfactorily, and it is expected that the intensification of Sabo facilities will be further promoted,

greatly serving the regional disaster prevention and the river improvement of the downstream.

As mentioned above, the Japanese technical cooperation has generally provided satisfactory results, and in order to make the results more effective and to develop technical cooperation further in future, the following points can be pointed out.

1) First of all, it is necessary to promote better mutual understanding between Indonesia and Japan. For this purpose, it is very important to station an excellent senior expert in Jakarta.

2) The plans of dams, Sabo, river improvement, etc. are not individually isolated, but are parts of a consistent and comprehensive plan of water system. In planning, engineers including experts should see the river system as a whole without being seized with the respective special fields or the areas only they are in charge of, and must cooperate with each other.

3) The Master Plan for controlling volcanic debrisflow of each volcanic area – Mt. Merapi, Mt. Kelut. Mt. Agung, Mt. Semeru and so on should be made as early as practicable. However, aside from several main rivers, as seen in the case of south-west slope of Mt. Merapi for instance, the works made so far have been made as temporary and urgent countermeasures without having Master Plan, as with many other water control works. This is due to the natural characteristic of volcanic Sabo, in other words, one major cause is considered to be that making the Master Plan is very difficult even with the efforts of an expert since the phenomenon is too enormous and the mechanism is not well known. In this sense, the "Joint study concerning Sabo techniques in volcanic areas" by Indonesia and Japan to solve the movement mechanism and generation of volcanic Lahar flow will be greatly useful for making the Master Plan.

4) Generally speaking, the processing capacity of one expert is limited, partly because the favorite subjects of the expert are limited, and because River Engineering or Sabo Engineering is a very comprehensive field of technology, mostly requiring the judgement based on superior experience and broad viewpoints. In order to solve this point, in Japan, the discussion of an expert with other experts and

if necessary, the consultation with superior experts are practised habitually, as indispensable factors for proper achievement of projects, etc. Therefore, also in Indonesia, all the Japanese experts staying in Indoneisa, including those assigned to projects (their conditions are disadvantageous, due to the scarcity of members, etc.) can be made to function as one group in mutual cooperation for full demonstration of their abilities, and this is considered to result in further improving the effects of technical cooperation.
As a matter of course, since they are assigned to different tasks and their main duties are different, formalities and adjustment are required accordingly. However, mutual understanding and cooperation, if effected, are expected to allow the respective experts to demonstrate their maximum abilities.

5) The duties of the river and Sabo expert team attached to the River Bureau are various and comprise the promotion of projects, making river improvement plans, making manuals, assistance in technical training, river management problems, etc. All of these are necessary, but since the jobs which can be performed by several experts are limited in volume, random execution of all the jobs threatens to reduce the effect of technical cooperation on the contrary. Therefore, it is desirable to set the long-term objective and the short-term objective of the team, for periodical evaluation, etc., accumulating results steadily.

6) It is often said that the shortage of Indonesian engineers hampers effective execution of projects. One aim of technical cooperation is to cultivate many excellent engineers by transferring techniques. For this purpose, it is desirable to establish a systematic cultivation plan based on long-term prospect.

7) Basic data, for instance, hydrological data such as rainfall, water level and discharge of rivers, maps, and results of cross and longitudinal sectional river survey, are essential factors for planning and execution of water resources development projects. Not only the quantity but also the quality is an important factor of the data for effective utilization of them. The effort to collect these precise basic data has to be continued more strongly. For this purpose, it is desirable that the improvement of hydrological observation facilities and the training of engineers concerning the collection of the basic data are carried

out intentionally and systematically.

8) Generally speaking, Japanese engineers are not excellent in English, and there are not so many experts who have experiences in international cooperation, because Japan has only a short history in this field. Therefore, experts who are not quite satisfactory in English may be despatched, and in this case, they must deepen mutual understanding by enterprising spirit, covering this disadvantage.

9) Japanese experts are apt to be embarrassed at the beginning of their stay in Indonesia, because technical circumstances in Indonesia are very different from those in Japan, as seen in lack of basic data, different technical level in general, and different flow system of jobs. In order to overcome this problem, experts should make incessant efforts to recognize the actual circumstances in Indonesia and to find what are the true needs, and what should be done for them. The close communication between Indonesian people and Japanese experts obtained after overcoming the embarrassement is desired to be acquired by all means.

3. Conclusion

Foreword:

As the study was conducted only within a short time of about two weeks, and the field study was limited to the areas in and around Mt. Merapi, in the basin of Solo River, in and around Mt. Kulud, in the basin of Brantas River, and in and around Mt. Agung where our country has provided economic and technical cooperation in various forms very often so far, the conclusion on the nationwide viewpoint cannot be made. However, as many data as possible were collected from Japanese experts and Indonesian staffs, and several times of discussion were made in the mission, obtaining the conclusion as given below which is submitted as the proposals of the mission.

1) The technical cooperation aims at not only transferring the techniques possessed by Japan to Indonesia, but also promoting the understanding and friendship of both the countries by the human relations obtained in the process.
The study mission could see the actual scenes of cooperation and discussed in a very friendly atmosphere, and as a result, has recon-

firmed the importance and necessity of technical cooperation.

2) Needless to say, making this technical cooperation more effective requires the closer communication, cooperation and assistance between the ministries and directorates general concerned of both the governments.
This time, the study mission grasped the actual situations of the technical cooperation by despatched experts, and had the opportunities to have friendly talks with leaders in the Indonesian government, and recognized that these are very significant for effective execution of technical cooperation. So far, there have been very few chances like this, and the study mission has recognized that it is necessary to have a chance of interchange and a place for exchanging opinions freely, as periodically and as often as possible.

3) The experts now despatched can be classified into two major groups. One group belongs to the headquarter, to provide cooperation on river administration in general and river technology in general, and the other group belongs to a local project or programme, to provide cooperation on one specific purpose. The former is required to continue cooperation for a relatively long period because of its nature, and the latter would be required to set the cooperation schedule for each object.
For this reason, the study mission considers it desirable that as for the experts belonging to the central government, the present scale is to be maintained for the time being though the contents may be changed to some extent, and that for the latter, a preliminary study team (including experts), etc. is despatched for each project or programme case by case, to make an experts or study mission despatching plan, to cope with each situation.

4) In view of shortage of engineers in Indonesia at present, it is considered necessary to make a long term engineer training programme and to implement it as soon as possible.
Conceivable concrete methods are, for example, a) to cultivate Indonesia lecturers for the training as soon as possible and to increase the chances to open training courses, b) to make the techniques received from experts be transfered systematically by counterparts to lower technicians, and c) to allow experts to have chances to transfer their techniques to as many people as possible (for example, group

training by experts). The study mission considers that the technical cooperation from various other countries should be utilized more effectively from this point of view.

5) Basic data such as hydrological data (rainfall, water-level, flow rate), sedimentation data, topographycal maps, geological data and various kinds of statistics are not sufficiently available even for important rivers, and therefore it is necessary to immediately start collecting and arranging these data for important rivers.
Whether or not any project planning is proper depends upon sufficient availability of accurate basic data. Even if advanced formulae and analytical methods are used, the planning cannot be correct without sufficient basic data. Rather before learning advanced formulae and analytical methods, engineers must have sufficient knowledge on how to accurately and correctly obtain, observe or collect these basic data. Furthermore, they must recognize the importance of basic data.
Throughout the investigation of this time in general, the study mission had a deep impression that the technical cooperation should be preferably made with this matter included for making development plans.

6) For prompt and effective transfer of techniques which is the main purpose of the technical cooperation, it is important to nominate a fixed and exclusive counterpart for each expert for consistent and comprehensive absorption of the techniques of the expert.

7) The history of Japanese technical cooperation is short —Japan joint in the Colombo Plan Scheme in 1954— and there are generally not many experienced persons as experts. Therefore, in some cased, experts who are not proficient in English are despatched, and to make the technical cooperation more effective, the engineers of Indonesia and Japan must make efforts to deeply understand each other by positive attitude to make up for otherwise insufficient technical transmission due to the shortage of language ability.

8) The problems which experts face locally are various, and in most cases require judgement based on sufficient experience and broad viewpoint. For this reason, since the individual ability is limited, it is important that all the experts function as a group to demonstrate integrated power by complementing the technical abilities each other,

in order to sufficiently carry out the duties as experts. The experts must enhance such a function under the understanding and cooperation of Indonesian side, in addition to their individual activities.

9) Based on the result of the mission of this time, the study mission considers it necessary that the follow-up mission is despatched periodically (say, annually) from now, in the effort to investigate the review, improvement, future prospect, etc. of despatching plans, and to provide technical advice to the experts.

10) The study mission considers it preferable that the technical standards – manual, handbook – for rivers, Sabo, etc. which Indonesia requires are translated from Japanese into English, to be of any help to the Indonesian engineers with a view to assisting the local activities of experts and transfering our excellent engineers in short time.

III. SUPPORTING REPORT

1. Foreward

The study mission visited the Republic of Indonesia during the period from December 2 to 14, 1975, and exchanged opinions with the staffs concerned with Directorate General of Water Resources Development and Japanese experts despatched to the Directorate General, taking an inspection trip to project sites in Java island and Bali island.

This is a supporting report that presents the background of the "Main Report" and involves some information and introduction on the present situation of River, Sabo and Topographical Survey works in connection with the Water Resources Development Program in Indonesia.

2. River Engineering

1) The swamp areas such as lower parts of the Kali Ngrowo river and the Kali Widas river in the Kali Brantas river basin have a natural function to retard floods. Therefore, when a swampy area is going to be reclaimed, the influence which the reclamation will exert on the other parts of the basin, especially the increase of flood flow in the downstream must be sufficiently estimated and corresponding countermeasures must be taken, before executing the reclamation. A shortsighted reclamation aiming at the effects for that moment only may cause troubles later.

2) The bed of the Kali Konto river greatly rises, bringing about many problems in the past, and the dredging work executed at the lower reach of the Kali Konto river seems to be very effective.

3) The river channel of the middle reach of the Kali Brantas is in a very critical condition. The necessity has been strongly felt to plan and execute as soon as possible the works to lower the entire river bed.
The problem to remove the inner water in Kediri City should be ultimately settled by lowering the bed of the Kali Brantas river, but as regards the countermeasure for the time being, the improvement of drainage channels, or newly connecting the ends of water

channels to the lower reaches of the Brantas river will have to be discussed.

4) We found that the river maintenance structures such as dikes including Sabo areas become dangerous at many positions by scouring and sliding of slope, etc. A little big flood will easily destroy them. The costs for maintenance of the structures is far cheaper than the expenses for reconstruction after destruction.
Futher sufficient attention should be paid to the maintenance and administration of the structures to prevent damage by flood and also to lower the entire cost.

5) The Wlingi Dam project is now in the stage of construction. In order to sufficiently demonstrate the effect of Wlingi Dam, it is necessary to promote furthermore the Sabo works (debris control) in the tributaries coming in the upper part of the Dam.

3. Sabo Engineering

- Land Erosion and Volcanic Debris Control Works -

(1) As regards the Sabo countermeasures in volcanic Sabo area, the final target of improvement or development in the area concerned must be clarified before establishing the Master Plan of the area. What was particulary noticed on the south west slope of Mt. Merapi extending over K. Krasak and K. Putih was that the works executed so far were no more than the temporary recovering and emergency countermesures.

(2) For establishing an improvement plan for one river basin, it is basically necessary to make a coordinating improvement plan consistent in river system from lower to upper reaches, with river engineering and Sabo engineering integrated perfectly, under the full function of the new organization of the Directorate general of Water Resources Development. It provides sufficiently functional arrangement that Sub-Directorate of Planning and Design, Directorate of Rivers has 3 sections of Survey Section, River Section and Sabo (Erosion and Debris Control) Section. Individual and separate planning and execution little allow effective water utilization, flood control and reasonable erosion and debris control.

(3) Soil conservation of mountain slopes and lands is the basis of the national land conservation. This problem must be seriously tackled in Indonesia, especially in Java Island. It is considered quite proper that the Sabo Survey Mission (Mr. Hirao and Mr. Tomomatsu) despatched to Indonesia in June, 1974 pointed out and provoked attention in this regard, particularly regarding the improvement of cultivation method of mountain slopes, etc.

(4) For futher promotion of Sabo works, it is important to make people of public and private sectors widely recogneze that Sabo works including soil conservation is important works to form the basis of national land conservation.

(5) The status quo, and problems of Sabo works, and the way to face it in future in this country (though limited to Java Island and Bali Island) were indicated in detail by the above mentioned Sabo Survey Mission, and while the contents can be summarized as given below, the study mission of this time has confirmed that their indication and problem propounding are proper even in the field survey and discussions of this time.

1) Establishment of a disaster prevention plan around Mt. Merapi

2) Establishment of a forecasting and warning system on volcanic activities and a drainage plan of water of crater lake in G. Kelut region

3) Making a land utilization plan around Mt. Agung

4) Positive employment of sand pocket and necessity of experiment and study for fulfilling its function

4. Topographical Survey

As regard the technical cooperation for survey, efforts are being made to improve the survey technique including topographical map drafting by air-photo, relating to the Solo river projects at present. However, there are following problems.

(1) Shortage of engineers who have basic survey techniques and precise

control point survey techniques

(2) Lack of engineers who can plan and superintend the consistent work from control point survey to photogrammetry and map preparation.

Based on these problems, it is necessary to make a time schedule between the Indonesian parties concerned and the experts and to list up the equipment necessary for it, for establishing a schedule of technical cooperation as soon as possible.

It is to be desired that the technical cooperation for survey be developed into the cultivation of engineers by study and training, and the establishment of standard operating procedures, etc not only in the Solo river projects but also widely in the nation as a whole.