

**JAPAN INTERNATIONAL COOPERATION AGENCY
THE GOVERNMENT OF THE REPUBLIC OF INDONESIA**

**THE STUDY ON FLOOD CONTROL AND WATER MANAGEMENT
IN
LIMBOTO-BOLANGO-BONE BASIN
IN THE REPUBLIC OF INDONESIA**

FINAL REPORT

**VOLUME-VI SUPPORTING REPORT: PART-D
EXECUTION OF STUDY**

DECEMBER 2002

**NIKKEN CONSULTANTS, INC.
AND
NIPPON KOEI CO., LTD.**

**THE STUDY ON FLOOD CONTROL AND WATER MANAGEMENT
IN
LIMBOTO-BOLANGO-BONE BASIN**

FINAL REPORT

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GLOSSARY

(ENGLISH ABBREVIATION)

ADB	Badan Pembangunan Asia	Asian Development Bank
ASTM		American Standards for Testing Materials
BCR, B/C	Rasio Harga dan Keuntungan	Benefit Cost Ratio
BOD		Biochemical Oxygen Demand
CEA	Badan Pelaksana Kanada	Canadian Executing Agency
CIDA	Badan Penyandang Dana Kanada	Canadian International Development Agency
COD		Chemical Oxygen Demand
DD, D/D	Disain Teknis/Rencana Teknis	Detailed Design
DGWR	Direktorat Jenderal Sumber Daya Air	Directorate General of Water Resources
DGWRD	Direktorat Jenderal Pengairan	Dir. General of Water Resources Development
DO		Dissolved Oxygen
EIA	Analisa/Penelitian Lingkungan	Environmental Impact Assessment
EIRR	Tingkat Pengembalian Modal Internal Ekonomi	Economic Internal Rate of Return
FAO	Organisasi Pangan Dunia	Food and Agriculture Organization of the United Nations.
FS, F/S	Studi Kelayakan	Feasibility Study
FY	Tahun Anggaran	Fiscal Year
GDP	Produk Domestik Bruto	Gross Domestic Product
GIS	Sistem Informasi Geografi	Geographical Information System
GOI	Pemerintah Indonesia	Government of Indonesia
GPS	Penentuan Posisi Global	Global Positioning System
GRDP	Produk Domestik regional Bruto	Gross Regional Domestic Product
IBRD	Bank Dunia	International Bank for Reconstruction and Development (World Bank)
IEE		Initial Environmental Examination

JBIC		Japan Bank for International Cooperation (Former OECF)
JICA		Japan International Cooperation Agency
LAN	Jaringan Komputer Lokal	Local Area Network (Computer)
MCM	Juta Meter Kubik	Million Cubic Meters
MP, M/P	Rencana Induk	Master Plan
MSL	Tinggi Muka Air Laut Rata-rata	Mean Sea Level
NGO	Lembaga Swadaya Masyarakat	Non-Governmental Organization
NPV	Nilai Sekarang Neto	Net Present Value
O&M	Operasi dan Pemeliharaan	Operations and Maintenance
OECF	Badan Penyandang Dana Jepang	Overseas Economic Cooperation Fund (Japan), Now reorganized JBIC
OJT	Latihan di Lapangan	On-the-Job Training
PCM	Pertemuan Konsultasi Masyarakat	Public Consultation Meeting
R	Sungai	River
S/W		Scope of Works
TIU	Unit Pelaksana Teknis Dinas	Technical Implementation Unit
UNESCO	Badan Pendidikan, Ilmu Pengetahuan dan Kebudayaan, P.B.B	United Nations Educational, Scientific, and Cultural Organization
USAID	Badan Penyandang Dana Amerika Serikat	United States Agency for International Development
VAT		Value Added Tax
WATSAL	Wanita dalam Pembangunan	Water Sector Adjustment Loan
WID	Pengembangan Sumber Daya Air	Women in Development
WUA	Federasi Petani Pemakai Air	Water Users Association

(INDONESIAN ABBREVIATION)

AMDAL	Analisis mengenai Dampak Lingkungan	Environmental Impact Analysis
ANDAL	Analisis Dampak Lingkungan	Environment Impact Statement
APBD	Anggaran Pendapatan dan Belanja Daerah	Regional Income and Expenditure
APBN	Anggaran Pendapatan dan Belanja Nasional	National Income and Expenditure
Ass.	Asisten	Assistant
BAKORNAS PBP	Badan Koordinasi Nasional Penanggulangan Bencana dan Penanganan Pengungsian	National Coordination Board of Disaster and Evacuation
BAPEDAL	Badan Pengendali Dampak Lingkungan	Environmental Impact Management Board
BAPEDALDA	Badan Pengendali Dampak Lingkungan Daerah	Regional Environmental Impact Management Agency
Bappeda	Badan Perencanaan Pembangunan Daerah	Provincial Development Planning Board
Bappenas	Badan Perencanaan Pembangunan Nasional	National Development Planning Board
Binlak	Pembinaan & Pelaksanaan	Construction Management
BMG	Badan Meteorologi dan Geofisika	Meteorological and Geophysical Institute
BPS	Badan Pusat Statistik	National Statistics Office
Bupati	Kepala Daerah Tingkat II/Kabupaten	Head of District (Regency)
CD, Cabdin	Cabang Dinas	Branch of Dinas
DATI I	Daerah Tingkat I	Regional Level I (Province)
DATI II	Daerah Tingkat II	Regional Level II (District)
DI	Daerah Irigasi	Irrigation Schemes
DinasPU, DPU	Dinas Pekerjaan Umum	Public Works Services
DIP	Daftar Isian Proyek	List of Project Budget
DPR	Dewan Perwakilan Rakyat	National Parliament
DPRD	Dewan Perwakilan Rakyat Daerah	Regional Parliament
DPU	Departemen Pekerjaan Umum	Ministry of Public Works

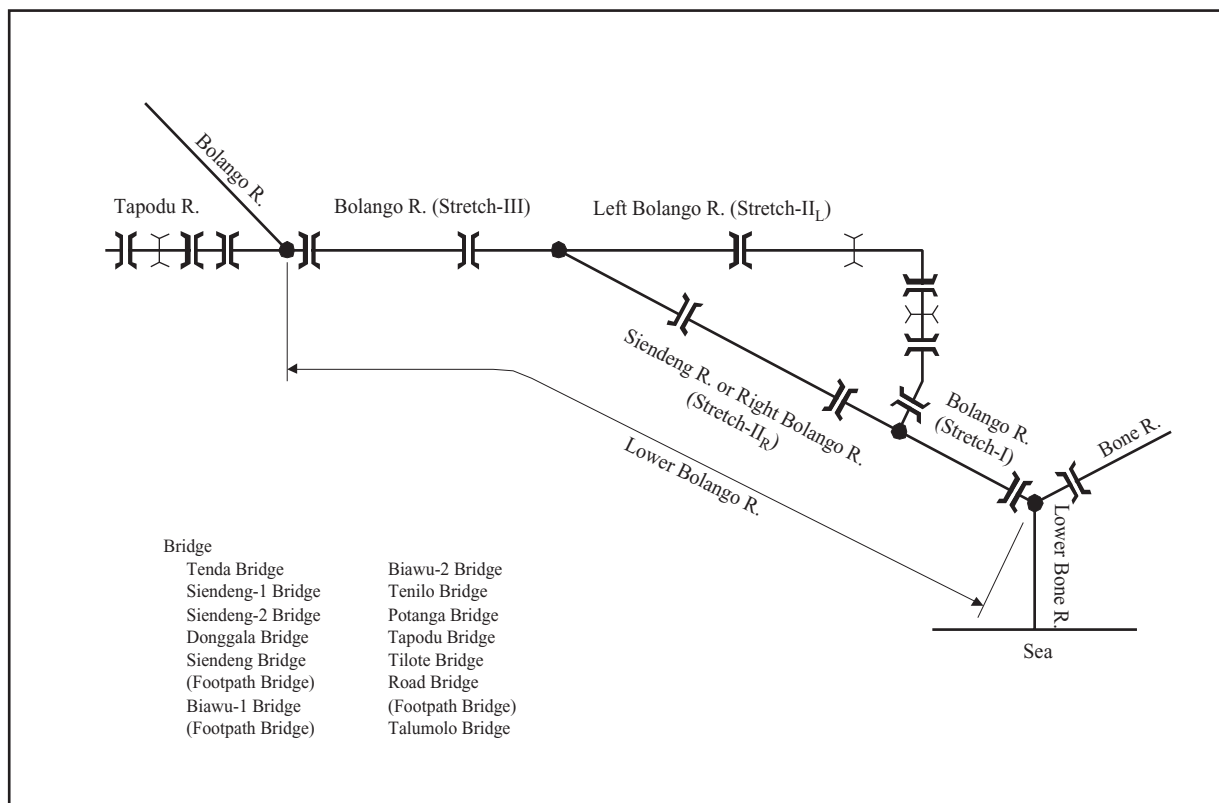
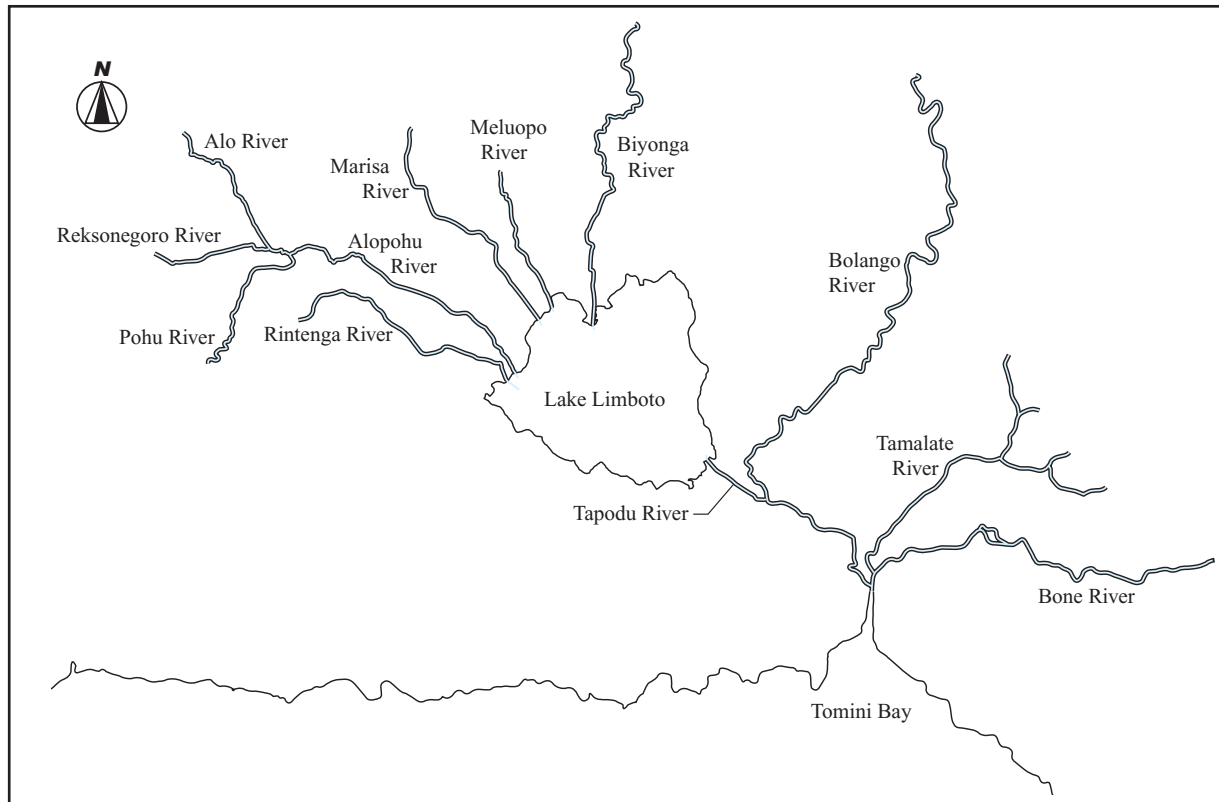
DPUP	Dinas Pekerjaan Umum Propinsi	Provincial Public Works Services
DTP	Dinas Tanaman Pangan	Office of Food Crops
Kanwil	Kantor Wilayah	Regional Office (of a Department)
Kaur	Kepala Urusan	Head of Sub Section
KDH	Kepala Daerah	Head of Regional Government
KDPP	Kepala Daerah Pengamatan Pengairan	Head of Water Resources Sub District
Kepmen	Keputusan Menteri	Minister's Decree
Keppres	Keputusan Presiden	Presidential Decree
KIMPRASWIL	Departemen Permukiman dan Prasarana Wilayah	Ministry of Settlement and Regional Infrastructure (MSRI)
KSDP	Kepala Sub Dinas Pengairan	Head of Provincial Water Resources Service
KTL	Kegiatan Tindak Lanjut	Follow-up Activity
KUD	Koperasi Unit Desa	Village Cooperative Unit
LBB	Limboto-Bolango-Bone	Limboto-Bolango-Bone
LSM	Lembaga Swadaya Masyarakat	Non-Governmental Organization
MONEV	Monitoring & Evaluasi	Monitoring & Evaluation
O&P	Operasi dan Pemeliharaan	Operations and Maintenance
P3A	Perkumpulan Petani Pemakai Air	Water Users' Association (WUA)
P3SU	Proyek Pembinaan Pengairan Sulawesi Utara	North Sulawesi Water Resources Institutional Development Project
PDAM	Perusahaan Daerah Air Minum	Regional Water Company
PDSA	Pengumpulan Data Sumber Air	Water Resources Data Collection
PEMDA	Pemerintah Daerah	Regional Government
PERDA	Peraturan Daerah	Regional Regulation
Pimpro	Pemimpin Proyek	Project Manager
Pinbagpro	Pemimpin Bagian Proyek	Sub Project Manager
PJP	Program Jangka Panjang	Long Term National Dev. Program
PLN	Perusahaan Listrik Negara	State Electricity Company
PPTPA	Panitia Pelaksanaan Tata Pengaturan Air	Basin Water Management Committee

PSDA	Pengamanan Sumber Daya Air	Water Resources Conservation
PTPA	Panitia Tata Pengaturan Air	Provincial Water Resources Committee
PU	Pekerjaan Umum	Public Works
Puslitbang	Pusat Penelitian dan Pengembangan Pengairan PU	Institute of Hydraulic Engineering Center (Bandung)
PWS	Pengembangan Wilayah Sungai	River Basin Development
RKL	Rencana Pengelolaan Lingkungan	Environmental Management Plan
RPL	Rencana Pemantauan Lingkungan	Environmental Monitoring Plan
SATKORLAK PBP	Satuan Koordinasi Pelaksanaan Penanggulangan Bencana dan Penanganan Pengungsian	Implementation Coordination Unit of Disaster Mitigation and Evacuation
SATLAK PBP	Satuan Pelaksanaan Penanggulangan Bencana dan Penanganan Pengungsian	Implementation Unit of Disaster Mitigation and Evacuation
SDA	Sumber Daya Air	Water Resources
Sulut	Sulawesi Utara	North Sulawesi
Tkt. I	Tingkat I	Level I Administration (Province)
Tkt. II	Tingkat II	Level II Administration (Region)
UNSRAT	Universitas Sam Ratulangi	Sam Ratulangi University
UPTD	Unit Pelaksana Teknis Dinas	Technical Implementation Unit

(SOME INDONESIAN WORDS)

Desa	Village (rural area), The Lowest Administrative Unit, Headed by Kepala Desa or Kades who is elected by the residents
Kabupaten, Kab.	Administrative District Headed by Bupati (regency)
Kecamatan, Kec.	Administrative Sub District within the Kabupaten
Kelurahan	Village (urban area), The Lowest Administrative Unit, Headed by Lurah who is Appointed
Kota	Municipality, Administrative District Headed by the Walikota
Kotamadya	Municipality, Administrative District Headed by the Walikota
Propinsi	Province
Ribu	thousand = 1,000
Juta	million = 1,000,000
Milyar	billion = 1,000,000,000
Trilyun	trillion = 1,000,000,000,000

NAME OF RIVER



D1. GENERAL

D1.1 Background of Study

Gorontalo City, located in the lower portion of the Limboto-Bolango-Bone basin (hereinafter referred to as the LBB basin), is the provincial capital of Gorontalo Province and an economic and trade center of the province connecting with the Central and Southern Sulawesi, Ambon, Jakarta, etc. Gorontalo Province was separated from North Sulawesi as the 32th province of Indonesia with population of about 800,000 and a total area of 12,215 km².

Gorontalo City, Limboto City and areas around Lake Limboto have been suffering from frequent floods, since these areas are located on the flood plain formed by flood flows of the rivers. The flood damages constrain the economic activities of the region. Especially in the southern part of Gorontalo City near the confluence of the Bone and Bolango rivers, flood damages are more serious associated with its low-lying flat topography.

Coping with these flood damages, Directorate General of Water Resources of the Indonesian Government (DGWR) has been executing urgent dike works since 1999 with financial assistance of Japan Bank for International Cooperation (JBIC). The work, however, remains at the level of remedial measures. In the meantime, a water management master plan for the LBB basin was formulated in December 1999 under the technical assistance of Canadian International Development Agency (CIDA). The plan presents basic policy for the water management of the basin and points out the importance and urgency of flood control including flood mitigation measures, sediment control, conservation of river basin, etc. The plan does not discuss concrete flood control measures, since the flood control was not the main objectives of the plan.

Under such circumstances, it is a pressing need to formulate a concrete flood control plan that conforms to region's actual situation and economic conditions of the LBB basin. The plan will direct flood mitigation activities to be undertaken by various entities linked with the water management master plan. Under the recent decentralization policy of the government and separation of new Gorontalo Province, it becomes more important to adopt sustainable flood mitigation measures clarifying the rolls of relevant government agencies and communities.

To cope with the above situations, the Government of Indonesia requested the Government of Japan to conduct the Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin in the Republic of Indonesia (hereinafter referred to as “the Study”). The Government of Japan had decided to accept the request to conduct the Study in accordance with the relevant laws and regulations in force in Japan. The Preparatory Study Team of Japan International Cooperation Agency (JICA) headed by Mr. K. INOUE visited the site from 31 January to 24 February 2001 to discuss and finalize the scope of work with the authorities concerned of the Government of Indonesia. Both parties discussed the operation of the Study and scope of work for the Study was agreed upon between the JICA and the Ministry of Settlement & Regional Infrastructure on 22 February 2001 (D5.1 and D5.2).

JICA, who is responsible for the implementation of the technical cooperation of the Government of Japan, has entrusted the Study work to the joint venture of NIKKEN Consultants, Inc. and Nippon Koei Co., Ltd. (hereinafter referred to as “the Study Team”) in June 2001.

The study period is about 19 months from June 2001 until December 2002. This Inception Report presents the basic approach to study, plan of operation, study reports, work schedule, Study Team members and other necessary arrangement for the Study in accordance with the Scope of Work.

D1.2 Scope of Study

(1) Objective of Study

The objectives of the Study are:

- 1) To formulate a master plan of sustainable flood control and water management plan in Limboto-Bolango-Bone basin,
- 2) To conduct the feasibility study on the priority project(s), and
- 3) To transfer technology to counterpart personnel in the course of the Study.

In the Study, flood control aspects are mainly discussed, and water management plan is studied only in relation with the flood control planning, since the water management master plan has already been formulated.

(2) Study Area

The Study will cover the areas in Limboto-Bolango-Bone (LBB) basin in Sulawesi Island as shown in Figure D1.2.1. The LBB basin has a total catchment area of about 2700 km², consisting of the Lake Limboto basin (890 km²), the Bolango river basin (490 km²) and the Bone river basin (1,320 km²).

Administratively the LBB basin extends mostly in the south-eastern part of Gorontalo Province (2,400 km²) covering 11 Kecamatan and small portion in the south-western part of North Sulawesi Province (300 km²).

D1.3 Execution of Study

(1) Study Schedule and Progress

Schedule of the Study and its work flow are shown in Figure D1.3.1. The Study consists of mainly four (4) work divisions and the major work items of each work division are as follows:

- 1) Work Div. A: Preparatory works in Japan to prepare Inception Report;
- 2) Work Div. B: Works in Indonesia (Phase-I) to conduct data collection, field reconnaissance and basic field survey, to formulate Flood Mitigation Master Plan, and to select priority project(s);
- 3) Work Div. C: Works in Indonesia (Phase-II) to conduct Feasibility Study for the selected priority project(s); and
- 4) Work Div. D: Works in Japan to finalize Final Report of the Study.

The Study was conducted on schedule basically in line with the Inception Report. Two offices were prepare in Manado, North Sulawesi Province (Manado Office) and Gorontalo, Gorontalo Province (Gorontalo Office). During the Work Div. B, the Study Team mainly stationed in the Manado Office and the Gorontalo Office was used as field office for the field survey and investigation, since most of the data and information required for the formulation of flood mitigation master plan were available in Manado. However, during the Work Div. C, the Team stationed in the Gorontalo Office, mainly to promote technology transfer to Gorontalo counterparts who would implement the priority flood mitigation projects.

(2) Organization for Study

For the implementation of the Study, JICA organized a Study Team and an Advisory Committee as shown in Table D1.3.1, while Government of Indonesia organized a Steering Committee and Counterpart Staff as shown in Table D1.3.2.

(3) Explanation and Discussions with Counterpart Agency

In order to have common understanding on flood mitigation plan to be formulated the Counterpart Team and the Study Team had technical meetings regularly. At the time of important decision, competent officials in charge of water resources from Gorontalo Province and North Sulawesi Province were invited to have joint meeting with the Study Team.

In the course of the Study, progress and interim results were compiled as reports, and the reports were explained to the Steering Committee organized by Gorontalo Province, North Sulawesi Province and Kimpraswil Jakarta as presented in the following paragraphs. Results of discussion in the above Steering Committee were recorded in Minutes of Meeting attached as Chapter D5 (Basic Documents) of this report.

Inception Report: At the commencement of the Study, the Study Team submitted and explained the Inception Report to the Steering Committee organized by Gorontalo province, North Sulawesi province and central government (Kimpraswil) of the Government of Indonesia, and the principal matters for the smooth implementation of the Study were discussed.

Progress Report: In the middle of the Master Plan Study period, Progress Report for the Study was prepared covering the finding on the existing conditions and issues of the Study Area and the concept of Flood Mitigation Master Plan. The Progress Report was explained and discussed in the Steering Committee held in Manado. The Progress Report was also explained in Kimpraswil, Jakarta.

Interim Report: At the end of the Master Plan Study period, Interim Report for the Study was prepared including study results of Flood Mitigation Master Plan and selection of Priority Projects to be subject to Feasibility Study in the 2nd Stage Study. The Interim Report was explained and discussed in the Steering Committee held in Gorontalo. The committee as attended by the Governor of Gorontalo Province and

relevant provincial official beside the committees members.

Implementation of 2nd Stage Study: At the beginning of the 2nd Stage Study, the Study Team explained the program of Feasibility Study to the Steering Committee, and basic matters to carry out study works in Gorontalo were discussed.

Draft Final Report: At the end of the Feasibility Study period, Draft Final Report was prepared covering whole study results. The Draft Final Report was explained and discussed in the Steering Committee held in Gorontalo.

D1.4 Acknowledgement

The Study was carried out in collaboration with the counterpart personnel and cooperation of various agencies, offices and individuals. We would like to express sincere gratitude to all of those who extended invaluable advices and warmhearted cooperation to the Study Team.

**Table D1.3.1 ADVISORY COMMITTEE OF JICA AND
STUDY TEAM MEMBER**

A. ADVISORY COMMITTEE

ASSIGNMENT	NAME
Chairman	Mr. Katsuhiko INOUE
Deputy	Dr. Akira NIWA

B. STUDY TEAM MEMBERS

ASSIGNMENT	NAME
Team Leader / Flood Control Planner	Mr. Noboru JITSUHIRO
Co Team Leader / River Engineer / Flood Analyst	Mr. Hideki ARAKI
Hydrologist	Mr. Masayuki SHIRAISHI
Sediment / GIS Engineer	Mr. Makoto KODAMA
Social Environmentalist	Mr. Kazuchiyo KUSUDA
Natural Environmentalist	Mr. Hitoshi SAKAI
Organization / Management Planner	Mr. SUPARMAN
Geologist / Dam Planner	Mr. Kimihiko KOTOO
Mapping / Topo-Survey Engineer	Mr. Isao IKESHIMA
Structure Design Engineer	Mr. Yukio AZEGAMI
Metal Engineer	Mr. Kenji SETO
Project Economist	Mr. Tatsuo TASHINO
Coordinator	Mr. Hiroaki KONO

Table 1.3.2 STEERING COMMITTEE MEMBER AND COUNTERPART STAFF (1/2)
Steering Committee Member and Coordinator/Supervisor (Master Plan)

No.	Nama	Jabatan/Instansi	Kedudukan
A. Tim Pengarah			
1.	Dr.Ir.Roestam Syarief,MNRM	Direktur PSDA	Ketua merangkap Anggota
2.	Dr. Ir. Nelson Pomalinggo, MTc.	Ketua BAPPEDA, Propinsi Gorontalo	Wakil Ketua I/ merangkap Anggota
3.	Dr.Ir.Lucky Sondakh, M.Ec	Ketua BAPPEDA, Prop. Sulawesi Utara	Wakil Ketua II/ merangkap Anggota
4.	Ir.A.Raymond Kemur, M.Sc	Kasubdit. Perencanaan Wilayah Sungai	Sekretaris merangkap Anggota
5.	JICA Representatives	JICA	Anggota
6.	Ir. Moelyono, MSc.	Kepala Dinas PU / Kimpraswil. Prop. Gorontalo	Anggota
7.	Ir.F.B. Najoan	Kepala Dinas SDA, Propinsi Sulawesi Utara	Anggota
B. Tim Koordinator/Supervisi			
1.	Ir. A. Raymond Kemur, MSc	Kasubdit. Perencanaan Wilayah Sungai	Ketua
2.	Ir. Judi Widagdo, Msi	Kasubdin. Sungai, Rawa dan Pantai Dinas SDA, Prop. Sulawesi Utara	Anggota
3.	Ir. Sugiarto, Dipl. HE	Kasubdin. Pengembangan SDA, Dinas PU/ Kimpraswil Prop. Gorontalo	Anggota
4.	Ir. Bambang Hargono, M.Eng	Kasubdit. Air Baku, Sungai, Waduk dan Danau, Dit. BinteK SDA	Anggota
5.	Ir. Imam Nugroho, Dipl. HE	Kasubdit. Cantek, Dit SDA, Wilayah Timur	Anggota

Counterparting Staff (Master Plan)

No.	Nama	Instansi
1.	Ir. Silvana Pangau	Staf Dinas SDA, Propinsi Sulawesi Utara
2.	Rini Harun, ST, Sp.1	Staf Sub-Dinas PSDA, Dinas PU/Kimpraswil, Propinsi Gorontalo
3.	Dave Muchaimin, ST	Staf Dinas SDA, Propinsi Sulawesi Utara
4.	Ir. Hendrik Wauran	Staf Dinas SDA, Propinsi Sulawesi Utara
5.	J. Toha, ST, Sp.1	Staf Dinas SDA, Propinsi Sulawesi Utara
6.	Haris Jafar, ST	Staf Sub-Dinas PSDA, Dinas PU/Kimpraswil, Propinsi Gorontalo
7.	Fatmawati Dangkoa, ST	Staf Sub-Dinas PSDA, Dinas PU/Kimpraswil, Propinsi Gorontalo
8.	Jane Mamoto, ST	Staf Dinas SDA, Propinsi Sulawesi Utara
9.	Ir. Danny Karouw	Staf Dinas SDA, Propinsi Sulawesi Utara
10.	Ir. Jane Wagey, Sp.1	Staf Dinas SDA, Propinsi Sulawesi Utara
11.	Farid Mahmud, ST	Staf Sub-Dinas PSDA, Dinas PU/Kimpraswil, Propinsi Gorontalo

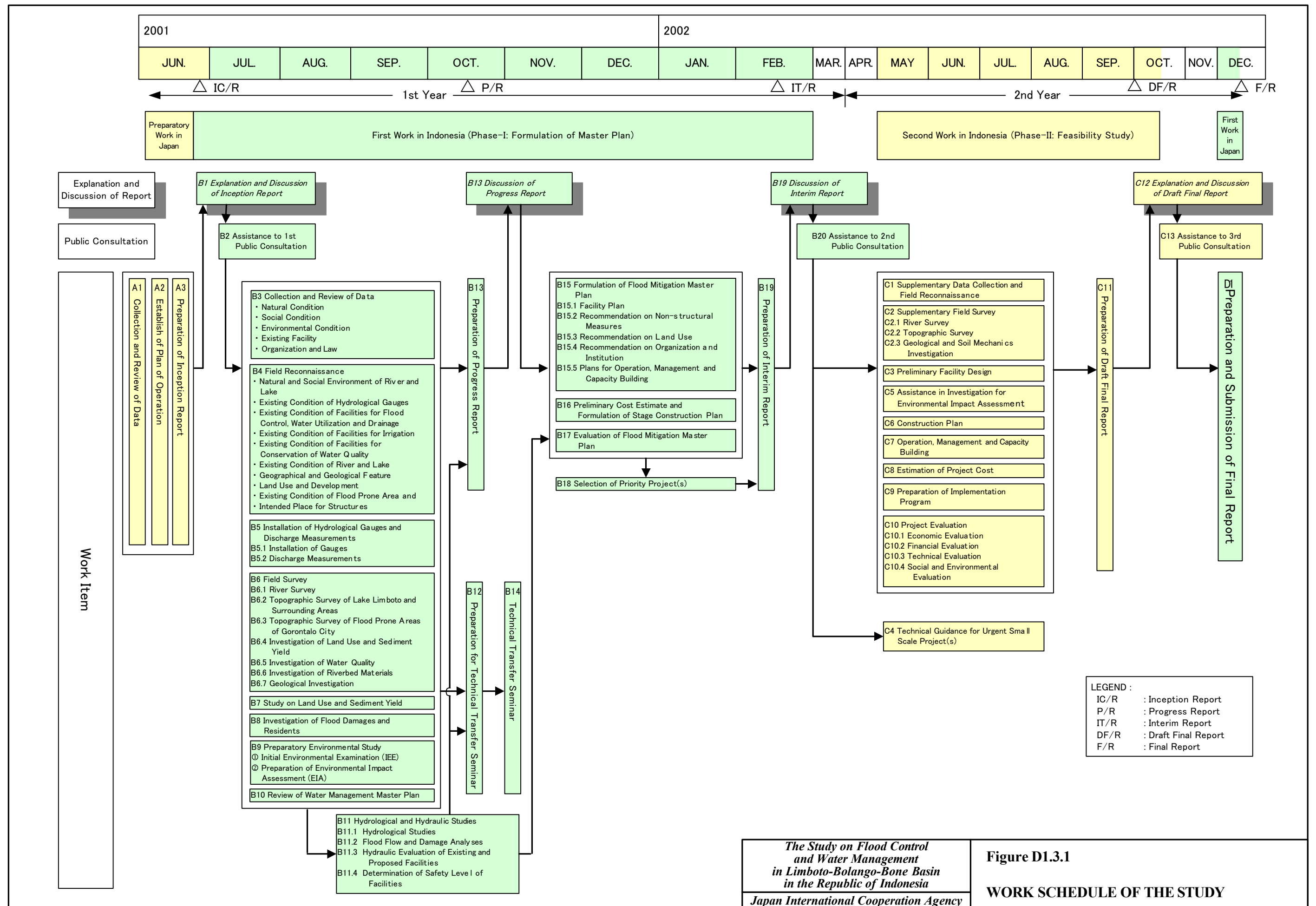
Table 1.3.2 STEERING COMMITTEE MEMBER AND COUNTERPART STAFF (2/2)
Steering Committee Member and Coordinator/Supervisor (Feasibility Study)

No.	Nama	Jabatan/Instansi	Kedudukan
A. Tim Pengarah			
1.	Ir. Adi Sarwoko, Dipl.HE	Direktur PSDA	Ketua merangkap Anggota
2.	Ir. Sudirman Habibie	Ketua BAPPEDA, Propinsi Gorontalo	Wakil Ketua I/ merangkap Anggota
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Japan International Cooperation Agency

Figure D1.3.1

WORK SCHEDULE OF THE STUDY