

Japan International Cooperation Agency
Ministry of Agriculture and Rural Development
The Socialist Republic of Vietnam

**The Study
on
Nationwide Water Resources
Development and Management
in
the Socialist Republic of Vietnam**

Final Report

Volume V

Supporting Report

**Phase 1: Master Plan for Nationwide Water
Resources Development and
Management in 14 Major River Basins**

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COMPOSITION OF FINAL REPORT

Volume I	Executive Summary
Volume II	Phase 1, Main Report
Volume III	Phase 2-1, Main Report
Volume IV	Phase 2-2, 2-3, Main Report
Volume V	Phase 1, Supporting Report
Volume VI	Phase 2-1, Supporting Report
Volume VII	Phase 2-2, 2-3, Supporting Report
Volume VIII	Data Book

Exchange Rates

US\$ 1 = Vietnamese Dong 15,068
Yen 100 = Vietnamese Dong 12,212

As of December 3, 2001



Location Map of Study Area

THE STUDY
ON
NATIONWIDE WATER RESOURCES DEVELOPMENT AND MANAGEMENT
IN
THE SOCIALIST REPUBLIC OF VIETNAM

FINAL REPORT

Phase 1: Supporting Report

Composition

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Abbreviations

1. Organization

ADB	: Asian Development Bank
AFD	: Agence Française de Développement
AusAID	: Australian Agency for International Development
BARD	: Bank of Agriculture and Rural Development
CWRET	: Center of Water Resources and Environment Technology
DANIDA	: Danish International Development Assistance
DARD	: Department of Agriculture and Rural Development
DOSTE	: Department of Science, Technology and Environment
DSI	: Development Strategy Institute
EPRI	: Electric Power Research Institute
EVN	: Electricity of Vietnam
ESCAP	: United Nations Economic and Social Commission for Asia and the Pacific
FAO	: Food and Agriculture Organization
FPD	: Forest Protection Department
GSO	: General Statistical Office
HEC 1	: Hydraulic Engineering Consultants Corp. No.1
HMS	: Hydro Meteorological Service
IBRD	: International Bank for Reconstruction and Development
ICD	: International Cooperation Department
IUCN	: International Union for Conservation of Nature and National Resources/ World Conservation Union
ISG	: International Support Group
IFEP	: Institute of Fishery Economics and Planning
IWRP	: Institute of Water Resources Planning
IWRR	: Institute of Water Resources Research
JBIC	: Japan Bank for International Cooperation
JICA	: Japan International Cooperation Agency
MABR	: Man and the Biosphere Reserve
MARD	: Ministry of Agriculture and Rural Development
MOF	: Ministry of Fishery
MOH	: Ministry of Health
MONRE	: Ministry of Natural Resources and Environment
MOSTE	: Ministry of Science, Technology and Environment
MOTC	: Ministry of Transport and Communication
MPI	: Ministry of Planning and Investment
NEA	: National Environmental Agency
NGO	: Non-governmental Organization
NIAPP	: National Institute of Agricultural Planning and Projection
NWRC	: National Water Resources Council
PC	: People's Committee

PECC2	: Power Engineering and Consulting Company No.2
SBV	: State Bank of Vietnam
UN	: United Nations
UNDP	: United Nations Development Programme
UNESCO	: United Nation Educational, Scientific and Cultural Organization
USDA	: United States Department of Agriculture
VNMC	: Vietnam National Mekong Committee
WB	: World Bank (International Bank for Reconstruction and Development)
WHO	: World Health Organization
WWF	: World Wide Fund for Nature

2. Unit

MW	: mega-watt	km	: kilometer
kW	: kilo-watt	km ²	: square kilometer
MWh	: mega-watt hour	ha	: hectare
kWh	: kilo-watt hour	mile ²	: square mile
GWh	: giga-watt hour	m ³	: cubic meter
GWh/yr	: giga-watt hour per year	m ³ /year	: cubic meter per year
kV	: kilo volt	m ³ /sec, m ³ /s	: cubic meter per second
MVA	: mega-volt ampere	m ³ /sec/km ²	: cubic meter per second per square kilometer
mm	: millimeter	feet ³ /sec/miles ²	: cubic feet per second per square mile
mm/day	: millimeter per day	g	: gram
mm/year	: millimeter per year	mg/l	: milligram per liter
m	: meter	Mm ³	: million cubic meter
m/s or m/sec	: meter per second	MCM	: million cubic meters
m/sec ²	: meter per square second		

3. Currency

VND	: Vietnamese Dong
US\$: US Dollar
JPY	: Japanese Yen

4. Others

AC	: Alternating Current
BOD	: Biochemical Oxygen Demand
C.A.	: Catchment Area
C-Cycle	: Combined Cycle
CHES	: Cultural and Historical Environmental Site
COD	: Chemical Oxygen Demand
CPI	: Consumer Price Index
DO	: Dissolved Oxygen
DP	: Dynamic Programming
EGEAS	: Electric Generation Expansion Analysis System
EIA	: Environmental Impact Assessment

EIRR	: Economic Internal Rate of Return
FC	: Foreign Currency
FDI	: Foreign Direct Investment
F.M.	: Finess Modulus
FIRR	: Financial Internal Rate of Return
FSL	: Full Supply Level
FWL	: Flood Water Level
GDP	: Gross Domestic Products
GNP	: Gross National Products
GRDP	: Gross Regional Domestic Products
HCM	: Ho Chi Minh
HCMC	: Ho Chi Minh City
HPP	: Hydropower Project
ICB	: International Competitive Bid
IEE	: Initial Environmental Examination
IPP	: Independent Power Producer
LC	: Local Currency
LCB	: Local Competitive Bid
LEP	: Law on Environmental Protection
LOLP	: Loss of Load Probability
LRMC	: Long Run Marginal Cost
MDD	: Maximum Dry Density
MIT	: Massachusetts Institute of Technology
MOL	: Minimum Operation Level
NGO	: Non-Governmental Organization
ODA	: Official Development Aid
OMC	: Optimum Moisture Content
PMP	: Probable Maximum Precipitation
RAC	: Resettlement Action Committee
RAP	: Resettlement Action Plan
RBO	: River Basin Organization
ROE	: Return on Equity
SCF	: Standard Conversion Factor
SGS	: Streamflow Gauging Station
SME	: Small and Medium Enterprises
SRMC	: Short-Run Marginal Cost
SS	: Suspended Solids
UFW	: Unaccounted For Water
VAT	: Value Added Tax
WASP	: Wien Automatic System Planning Package

Appendix A

Present Situation of the Study Area

Appendix A

Present Situation of the Study Area

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Appendix A Present Situation of the Study Area

1 TOPOGRAPHY

1.1 General

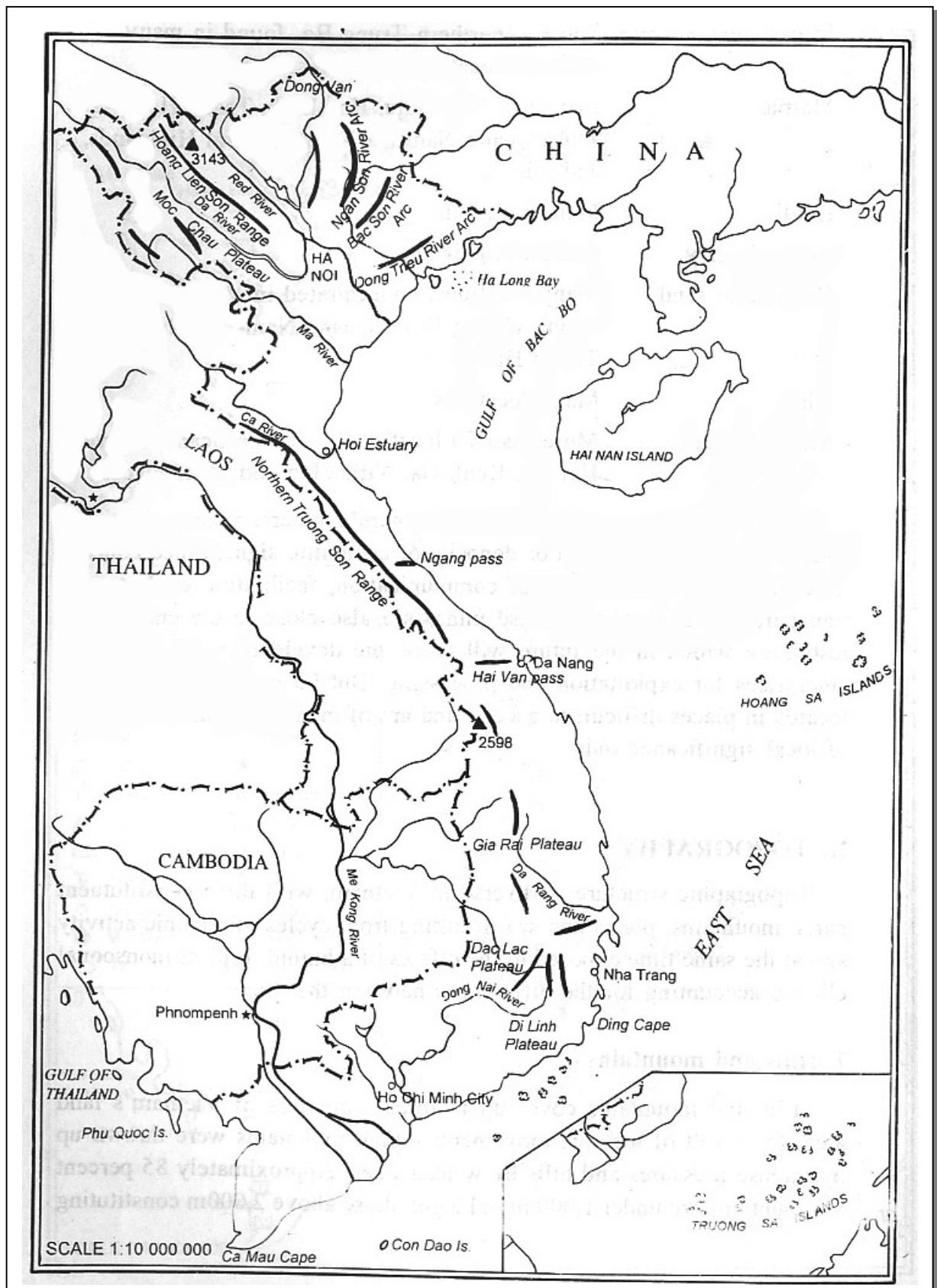
Topographic structure is diverse in Vietnam, with three constituent parts; mountains, plains and sea, resulting from cycles of tectonic activity and at the same time exposed to the effects of a humid monsoon climate. Each of the constituent parts is characterized as described hereunder.

1.2 Hills and Mountains

Hills and mountains cover up to three – quarters of Vietnam's land area, the result of tectonic movements. Approximately 85% of mountains are under 1,000m in height, those above 2,000m constituting only 1%. The mountain system in Vietnam appears as a continuation of the Van Quy plateau running in the southeasterly direction for 1,400km from Don Van plateau to eastern Nam Bo and is derived into two inclines running in a straight line along the Red River valley.

The mountain system is divided into regions, namely northeast, northwest and northern and southern Truong Son Range.

The succeeding maps and explanations present further details of the mountain system of Vietnam.



Topography

Source: Geography of Vietnam

1.2.1 Mountain System (1) in Northeast Region

In the Northeast is an area of low mountains mostly 600-700m high, the highest peak being Tay Con Linh at 2,419m, and the lowest being the area of coastal plain in Mong Cai. High mountain ranges are generally concentrated along the Sino-Vietnamese border and the altitude decreases gradually as one move towards the sea.

A feature of the orographic structure of the northeast is that the mountain range forms an arc with its convex edge facing eastwards at Tam Dao and the other opening on to the territory of South China. Between the plateau (mainly limestone) and the sea areas formed by the Gam, Ngan Son, Bac Son, and Dong Trieu Rivers, flowing in the same directions as the Paleozoic and Mesozoic formations of the region. Between the mountain ranges are valleys dotted along rivers flowing in the same direction (Chay, Lo and Gam Rivers) and in some small plains. In the waters off Vietnam thousands of islands also form an arc parallel to the Dong Trieu.

