

*Moving decisively towards  
more regional projects*



**THE  
INTERIM MEKONG  
COMMITTEE  
in 1990**

**An Annual Report  
of Activities and Initiatives**

**Accomplishments to date, plus improving regional relations,  
are ushering in a new era of cooperation and coordination.**

**(Interim Committee for Coordination of Investigations of the Lower Mekong Basin)**



# COURSE OF THE MEKONG



# **The Interim Committee's Annual Report**

The purpose of this document is to present in a concise manner a review of the Interim Mekong Committee's (IMC) activities during the year 1990. Interested parties will gain an understanding of the IMC's organization, resources, and activities and under what policies and programmes the institution operates.

This document is not a complete compendium of all information about or generated by the IMC. Anyone wishing further information about specific matters should consult the Annexes or contact the Secretariat.

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# The Interim Mekong Committee: Its Role and Activities

*The institution's full name is "The Interim Committee for Coordination of Investigations of the Lower Mekong Basin". The commonly used form is the Interim Mekong Committee (IMC).*

IMC is an independent, regional organization established by the governments of Cambodia, Laos, Thailand, and the Republic of Viet Nam in September 1957. It serves as a permanent, supra-national structure for cooperation and coordination in the use and development of the water resources of the lower Mekong basin.

IMC's purpose is to work with the people of the member countries to achieve the maximum social and economic benefits through the development of the Mekong's water resources for use in the areas of agriculture, energy, flood control, and navigation.

Support for IMC's activities, both financial and technical, comes from the member

countries themselves and international sources, including governments and key United Nations organizations.

IMC uses the Secretariat to oversee the implementation of its policies and to provide administrative support with a staff of professionals drawn from member countries and supplemented by regional and international experts. In addition, the Secretariat serves as a repository of physical data and studies conducted under IMC auspices.

The Mekong Secretariat's programme areas include:

- Planning Studies and Policy
- Data and Information Systems
- Resources Development

## Membership

The Interim Mekong Committee has three member countries:

- The Lao People's Democratic Republic
- The Kingdom of Thailand
- The Socialist Republic of Viet Nam

Each member country appoints a representative to the Interim Mekong Committee:

The Lao People's Democratic Republic

HE Mr Kithong Vongsay (from 1989)



CHAIRMAN  
INTERIM MEKONG

Chairman  
Lao National Mekong Committee  
Vice Minister  
Ministry of Commerce and External Relations  
Vientiane, Lao PDR

The Kingdom of Thailand

Mr Prapath Premmani (from 1983)



Chairman  
Thai National Mekong Committee  
Secretary General  
National Energy Administration  
Pibultham Villa  
Bangkok, Thailand

The Socialist Republic of Viet Nam

HE Mr Dinh Gia Khanh (from 1978-90)



Chairman  
Vietnamese National Mekong Committee  
Vice Minister  
Ministry of Water Resources  
Hanoi, Viet Nam

The member for Viet Nam, HE Mr Dinh Gia Khanh, announced his retirement at the IMC's 32nd session (28-30 November 1990) at the conclusion of a twelve-year appointment. The IMC, through its Executive Agent Chuck Lankester, recorded its special appreciation to Mr Khanh for his long, valued, and dedicated service, especially during several terms, including 1990, as Chairman of the IMC.

# An Overview of 1990

## *Improving political conditions enhance the prospects for region-wide projects*

The year 1990 presented a welcome combination of challenges and opportunities for the Committee and its Secretariat. The improving political climate in the region is making it possible for us to refocus the Committee's attention on basinwide activities that lead to the development of complementary mainstream and tributary projects. We intend to continue our efforts to sustain this positive trend.

This process has contributed to the reinforcement of the Committee's role as a unique regional framework within which to achieve common development aims.

### **Adapting to positive trends**

To accommodate these changing circumstances, we have initiated a process of adapting the Secretariat's structure to the new directions. A key component in this effort has been the preparation of the 146-page Mekong Work Programme document. It necessitated a major overhaul and rationalization by the Secretariat in collaboration with the national Mekong committees and associated agencies of work priorities and a shift to greater reliance on programme, rather than project, funding.

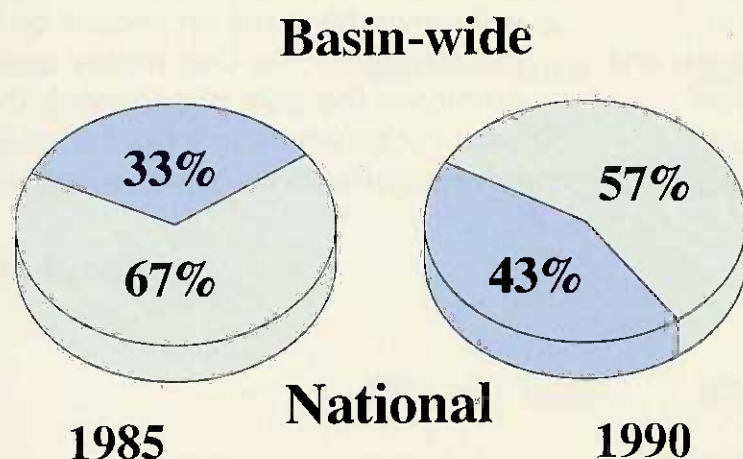
Relying as we do on the international community to fund our work, the higher level of financial commitments given this year demonstrates a continued recognition that the Committee plays a leading role and is the most cost-effective mechanism for developing water resources in the region.

### **Income rose appreciably**

The Committee's funding in cash and in kind for programmes and Secretariat operations reached US\$12.3 million in 1990. These funds came from 18 sources, including new initiatives by the World Bank and the Asian Development Bank, as well as renewed support from Germany. Their contributions underwrote activities in 79 projects, plus Secretariat operations.

The Committee is a primary resource for information and expertise that members can draw on to develop their water resources projects. The Committee has accumulated knowledge and experience over 30 years of operations, and developed capabilities that member countries can use to realize the full potential of the Mekong in the context of regional cooperation and, in this way, to improve the quality of life of the peoples dependent on it.

### **A clear shift toward regional projects** The basin-wide approach promises more benefits



The Committee maintains a constant optimism that Cambodia will soon rejoin and participate in development of the Mekong basin. Preparatory activities in this regard are continuing. The Committee has also encouraged the non-member riparian countries — China and Myanmar — to become more involved in its activities. Some initial steps include exchanging data and providing a structure for project



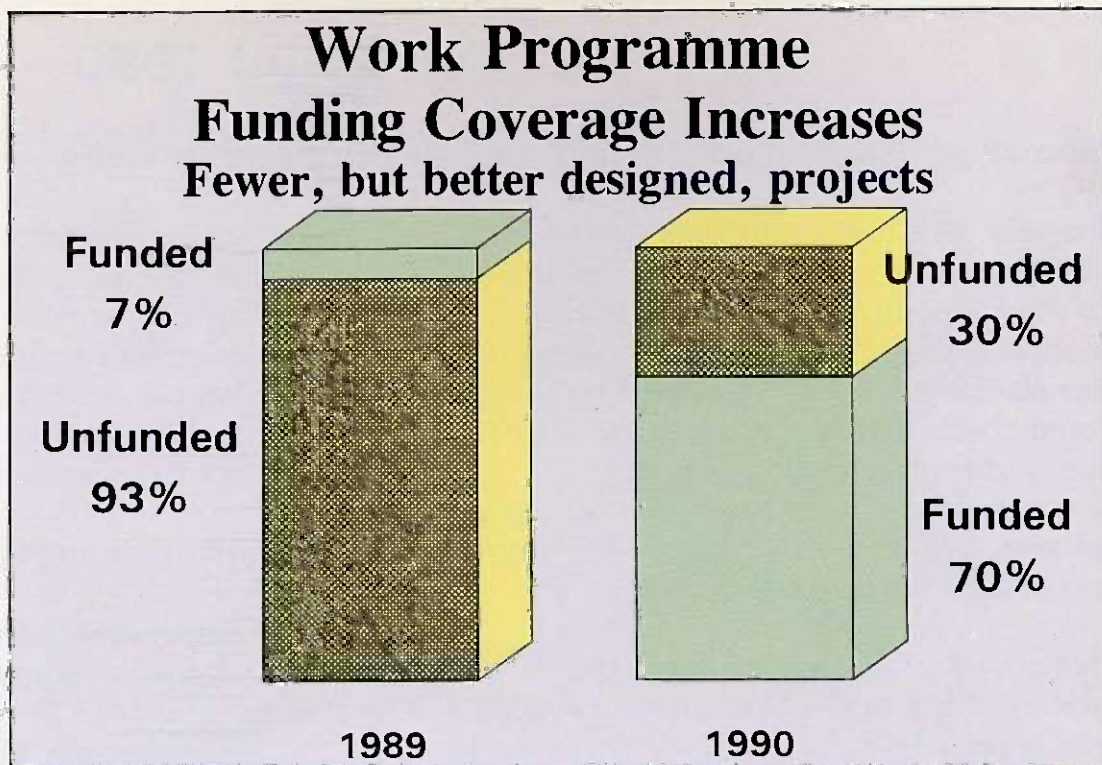
coordination. The economic and social benefits expected will be greater if the development process applies over the entire Mekong basin, both upstream and downstream. The Committee continues to play a critical role in monitoring and assessing water resources development activities for their potential adverse social and environmental effects.

China has already initiated a dialogue with its downstream neighbours to improve navigation with the expectation that it will lead to more trade and commerce. In May 1990, an exploratory trade mission from Yunnan Province in China travelled down the Mekong to Luang Prabang, the former royal capital of Laos. The success of this mission led to a second mission in October 1990 comprising five, 60-ton vessels. This time they reached Vientiane, the administrative capital of Laos, thus, opening up further scope for cooperation.

### Building a legal framework

The Committee has initiated a training project in legal and organizational studies to facilitate the further evolution of regionalism related to the Mekong's water resources.

This is a crucial component in the Committee's human resources development programme and an indispensable step in equipping the member countries to absorb and apply international financial and technical assistance.



Another critical factor in this process is the strengthening of the national Mekong committees.

### Environmental concerns

Environmental considerations continued to rank as an area of major concern during 1990 and the Committee took steps to strengthen the role of environmental planning in its development projects. Committee member countries acknowledge the twin need of ensuring a secure food supply and raising the standard of living of their people, and doing so while preventing the over-exploitation and abuse of their resources.

The Secretariat continues to attract professional expertise in environmental matters to serve as a resource to member countries. Continued improvement in the quality of life of people in the Mekong region will inevitably have an impact on the environment. The Committee consistently promotes the goal of achieving the optimum balance between benefits for people and adverse effects on the environment.



Social aspirations are changing rapidly in the member countries. Economic development is advancing rapidly, albeit, at differing rates. These factors together are already straining available resources and necessitating careful planning studies now.

We are pleased and optimistic that the degree of basinwide participation and cooperation is continuing to grow as riparian neighbours discover how much they have in common. The Committee will continue to serve as the major resource and a catalyst for sustainable development in the region.



**Chuck Lankester**  
**Executive Agent**

### Programme activities and funding

The accompanying table demonstrates a significant shift during the period from 1985 to 1990 to a majority of basinwide — rather than national — projects, both ongoing and proposed (57 per cent of projects; 51 per cent of funding).

This reorientation to a more traditional interpretation of the IMC's mandate as a regional entity has helped consolidate our

efforts. Our primary focus is on applying our expertise to multilateral activities that cannot be undertaken by any single nation. This has made us a more compact organization and infused our staff with a renewed sense of purpose. Our unique capabilities can help ensure delivery of a valuable, relevant service in a cost-effective way.

#### Ongoing projects

Year	Basin-wide		National		Total
	No.	% Total	No.	% Total	
1985	37	33	75	67	112
1990	45	57	34	43	79

#### Programme funding

	Basin-wide		National		Total
	US\$ mil	% Total	US\$ mil	% Total	
1985	30.0	9	287.4	91	317.4
1990	52.2	51	55.3	49	107.8

# Highlights of Events and Activities

## Meetings

- January** 30th Session - Bangkok 8-10
- April** 31st Session (plenary) Ho Chi Minh City 24-27
- October** Pre-advisory panel meeting at IMC Secretariat Jim Elston, Tainglim Khy, Robert Rangeley, and Bill Smith
- November** 32nd Session - Bangkok 27-30

## Projects initiated

- January** Tam Phuong (Viet Nam) Water Control Project inauguration
- February** Cooperation agreement with the University of Colorado to study the impact of climatic change on the water resources of the lower Mekong basin

## Projects completed

- March** Construction of flood protection and reclamation of swamp and marshlands in the Vientiane (Lao PDR) plain
- April** Mekong Secretariat Local Area Network (LAN) links 50 PCs
- August** Bank Protection Phase I, Tha Deua (Vientiane, Lao PDR)
- September** Capital Development Fund ferry boat delivered to Tha Deua (Sayaboury Province, Lao PDR) Pak Beng (Lao PDR) river port
- December** Yasothon (NE Thailand) fish seed production centre  
Southern Lao-Thai bridge study

## Other

- June** Highest water level in 70-year Mekong flood records at Vientiane (Lao PDR)
- July** Executive Agent Jan Kamp succeeded by Chuck Lankester
- August** First training course in Environmental Impact Assessment (EIA) of water resources projects



# The Mekong Integrated Development Programme

## Integrated basin plan studies

### Preliminary study on long-term sequential dam and reservoir configuration

Under the programme of studies recommended in the revised Indicative Basin Plan 1987, Perspectives for Mekong development, the Secretariat undertook the preparation of the Preliminary study on long-term sequential dam and reservoir configuration. The study was completed and a draft report was forwarded to the riparian countries for comments in December 1988.

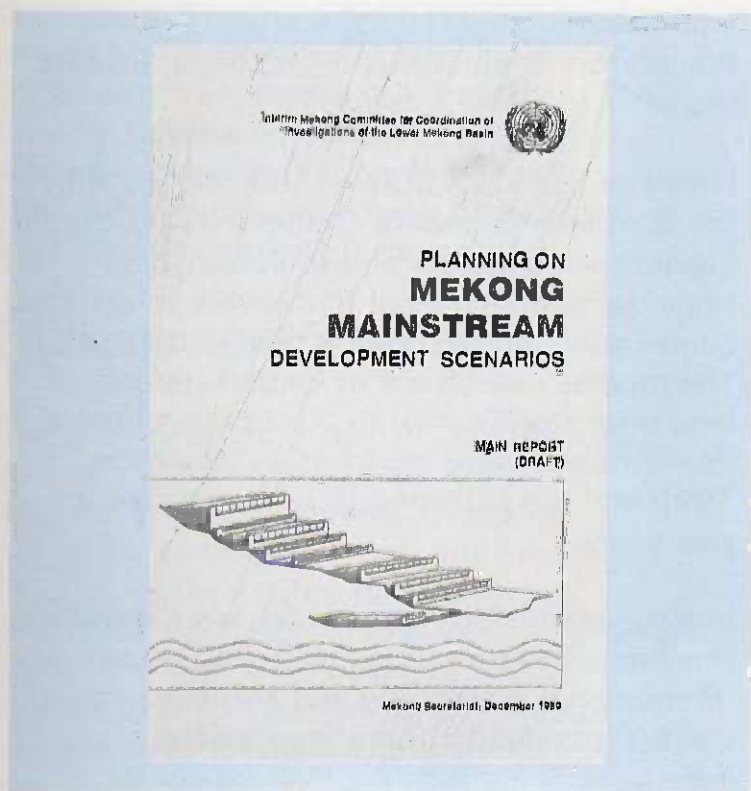
In 1990, following consultations with the national agencies concerned in the member countries, additional studies were carried out. The draft was subsequently revised and a summary report, Mekong Mainstream Development Possibilities, was submitted to the Committee at the thirty-second session in November 1990.

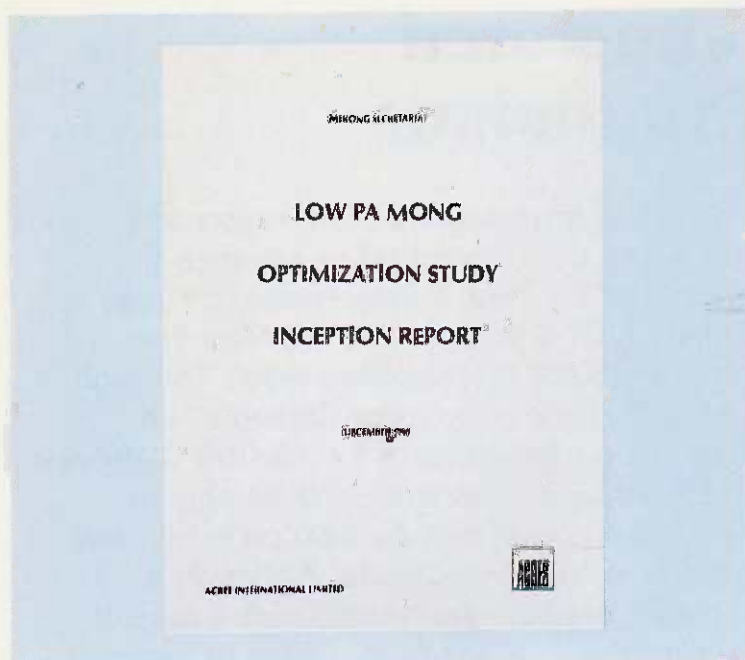
The Committee endorsed the report and requested the Secretariat to advance the studies of the High Luang Prabang, Upper Chiang Khan/Pak Lay, and the Nam Theun 1 projects to the prefeasibility level. The High Luang Prabang and Upper Chiang Khan projects would generate 14-16,000 GWh/year and 8-13,000 Gwh/year, and be able to increase the low flow by 850 cu m/sec and 400 cu m/sec respectively. Although a tributary project, the Nam Theun 1 project would offer benefits comparable to those of mainstream projects (generate 7,000-9,000 Gwh/year and increase dry season flow by 800 cu m/sec).

The Committee requested the Secretariat to build links with Cambodia in preparation for that country's return to the Committee and participation in mainstream activities. In view of the potential downstream effects of development projects, planned or under way on the Mekong river in China, the Lancang Jiang (river), the Committee also requested the Secretariat to establish contact with China and Myanmar. The Committee will need information related to upstream development on the Lancang river, and will seek ways of extending cooperation to the upstream states in the study and development of the whole Mekong basin.

### Optimization Study of the Low Pa Mong multipurpose project

In November 1990, the Secretariat began work on a one-year study entitled the Optimization of the Low Pa Mong multipurpose project. The study, which is expected to be completed within one year, is being funded (US\$550,000) by the Government of Canada, through its Canadian Project Preparation Facilities (CPPF) programme administered by the Canadian International Development Agency (CIDA). A Canadian firm of consultants started work on the study in December 1990.





The study aims to cover key aspects governing the size of the project and full supply level of the reservoir, the most important elements of which are resettlement and environmental issues, irrigation possibilities and technical matters. An Inception Report was prepared in December 1990 in consultation with the national agencies concerned.

### Parallel studies

Parallel studies on resettlement, irrigation, sedimentation and environment were being carried out to provide essential inputs for the optimization study.

#### 1. Resettlement

- Update resettlement information  
By: Thai/Lao consultant  
Study period: Nov 89-Jun 91 (ongoing)  
Financing: Sweden (US\$190,000)

#### 2. Sedimentation

- Evaluate reservoir sediment deposit, increased flood level upstream, due to backwater effects and sedimentation, as well as river erosion and water fluctuation downstream  
By: Asian Institute of Technology (AIT)  
Study period: Apr 90-Aug 90 (completed)  
Financing: UNDP (US\$20,000)

#### 3. Irrigation

- Investigate the irrigation potential and phasing possibilities  
By: Thai/Lao consultant  
Study period: Jun 90-Jul 91 (ongoing)  
Financing: UNDP (US\$200,000)

#### 4. Environmental

- Conduct a preparatory environmental study  
By: Thai/Lao consultant  
Study period: Feb 91-Dec 91  
Financing: Japan (US\$200,000 pledged)

#### 5. Power system

- Conduct a power system study  
By: Mekong Secretariat/Thai and Lao agencies concerned  
Study period: Mar 91-Jul 91  
Financing: Mekong Secretariat and EGAT

### Preparatory Organizational and Legal Studies project

Following up on another major recommendation of the 1987 Revised Indicative Basin Plan, the Committee approved a proposal in June 1990, to initiate the Preparatory Organizational and Legal Studies project.

Financed (US\$720,000 = 600,000 ECU) by the European Economic Community (EEC), the Legal Studies project aim to establish an organizational and legal framework to enhance cooperation among the member countries. The studies, which are of immediate and long-term significance to the Committee and its members, were launched in December 1990 and are expected to be completed in two years.

In November 1990, seven Mekong Committee representatives attended a training course on International Water Law and Management, in Delft (Netherlands), organized by the International Institute for Hydraulic and Environmental Engineering, and sponsored by the European Economic Community.



## **Delta Master Plan project**

The project document for the Delta Master Plan project was signed by the Government of Viet Nam, the United Nations Development Programme (UNDP) and the International Bank for Reconstruction and Development (IBRD or World Bank) in Hanoi on 23 February 1990. The agreement between the World Bank and the successful consultant firm was signed in July. The Mekong Secretariat is the Associate Executing Agency.

Activities carried out in 1990 by the consultant were focused on the preparation of a detailed work programme. By December 1990, the physical, administrative, financial and logistical set up was operational. The project is expected to be completed in 36 months.

## **Economic and social studies**

### **Project evaluation programme**

The Mekong Secretariat completed the preparation of a new project evaluation programme (January 1990 to December 1991) in January 1990 to ensure the continuation of this important function of the Committee. Funding (US\$177,000) has been provided by Australia, Switzerland and the United Kingdom among other sources. The Mekong Secretariat's internal project evaluation programme, for the period 1987-89, was operated with funds drawn from UNDP's general allocation.

## **Environment studies**

The Mekong Secretariat has continued to build up the basis of an environmental programme during the year. There is admittedly some way to go, but the initial steps are already being felt in a more responsible approach to development projects. One of the main aims of the Mekong Secretariat is to establish environmental concern in all development sectors through awareness campaigns and training of staff. Integration of environmental concern into water resources development projects both in the member countries and at the Secretariat is

a top priority and will ensure that development is sustainable.

## **Strategy for Water Quality Control in the Lower Mekong Basin**

In 1990, in response to changing circumstances and economic growth, the Mekong Secretariat initiated a study called Strategy for Water Quality Control in the Lower Mekong Basin. This study aims to review the existing and potential water pollution situation caused by point sources and to formulate a programme of action.

## **Water Quality Monitoring Network**

In 1990, work continued under Phase II (October 1988 to June 1992) of the Water Quality Monitoring Network (WQMN) project with funds (US\$1.8 million) provided by the Government of Sweden.

Activities carried out under Phase II included the identification of comprehensive water quality guidelines and warning systems for early recognition of potential water quality problems arising from current and future development activities. Work also focused on the development of predictive tools and ameliorative strategies for complex water-related environmental problems of natural and anthropogenic origin in the lower Mekong basin.

Activities on the project — Ecologically sound development of water and land resources in the Mekong delta — were ended in 1990. The implementation of this project had experienced difficulties and it was decided to halt activities.

In 1987 the Mekong Secretariat identified environmental problems caused by irrigation in the Korat plateau as a constraint to further irrigation activities in the area. The problems identified related to soil salinization, the potential increase of waterborne diseases, and the negative impact on fishery development.

## **Environmental assessment of the Mekong Irrigation Programme**

The project 1.3.18 - Environmental assessment of Mekong irrigation (Lao PDR)



Thailand) was formulated in 1989. A local consultant was engaged in 1990 by the Secretariat with financial assistance (US\$168,000) provided by the Government of the Netherlands.

Activities carried out under this 9-month project (August 1990 to April 1991), included a survey of the problems to be completed in April/May 1991, and environmental studies of two pilot irrigation areas. The recommendations from this assessment are intended for use in the planning and implementation of the Sustainable Irrigated Agriculture project.

### **Control of soil erosion, sedimentation and flash flood hazards**

Initial work on the project 1.3.03 - Control of soil erosion, sedimentation and flash flood hazards (basinwide) was started in March with assistance (US\$631,000) from Sweden. A project formulation mission to the Lao PDR and Thailand was carried out by a consultant in March-April 1990 to prepare a work plan and to define priority areas for detailed investigations.

A three-week training course for Thai and Lao participants was conducted in Khon Kaen, NE Thailand, in cooperation with the Department of Land Development and the Agricultural Development Research Centre. In the Lao PDR, further preparations to map out detailed studies continued in October-November with the assistance of a technical consultant. A follow-up course on data base development was organized in the Lao PDR in July.

In the next phase, field activities are scheduled, involving detailed investigations of sediment transport and deposition, annual variation of transport load, quality and origin of sediment.

### **Study to formulate plans for the management of the wetlands in the lower Mekong basin**

The project 1.3.13 - Study to formulate plans for the management of the wetlands in the lower Mekong basin started in February. A consultant from the University of Lund, Sweden, provided technical assistance to the

member countries in March-April, in the preparation of detailed project plans and an outline of a strategy for the proposed activities.

In August, representatives of the member countries participated in a planning workshop during which they formulated the project activities in detail. It was agreed that priority should be given to the wetlands areas close to the mainstream.

Two training activities were organized during the period October-November: training on fish assessment in wetlands in Viet Nam, and a training course in general biology and limnology, in the Lao PDR.

In November-December, the Mekong Secretariat engaged a consultant to assist the Lao PDR in improving internal coordination of the two projects above and the ongoing water quality monitoring project. The preliminary findings indicated that if the projects were merged the resources made available could be used more effectively.

### **Coordination of environmental planning project and the integration of environmental management aspects into Mekong resource development projects**

Phase I of the project Expert system for environmental screening, was finalized during the year. A tentative set of rules, screening levels and methodology were presented to the Mekong Secretariat in March-April 1990. Training for users was included. The initial results of the project indicated that the Mekong Secretariat requires more time to commit itself to the use of this high-tech level of environmental screening procedures. Lack of data, lack of sufficiently trained staff members will limit the use of the system.

### **Adaptive environmental assessment and management project**

The Mekong Secretariat actively assisted Viet Nam to continue the project on Adaptive environmental assessment and management being carried out with bilateral assistance. An agreement was signed between a Canadian



consultant and Viet Nam to study impacts in the delta that could result from planned water resources development projects. Activities related to the project started in 1990 with a two-day workshop held in Bangkok. Participants exchanged information and views on efforts to date related to watershed assessment in the member countries.

### **Study on waterborne diseases**

Activities under this project, which started in 1989 supported by the Government of Belgium, continued in 1990 with site selection for the detailed studies and with the training of riparian staff.

Sites for pilot projects were chosen at two potential hydropower sites in the Lao PDR

(Nam Theun 2 and Se Done); at one hydropower site and one irrigation area in the Mekong delta, in Viet Nam, and in Thailand one site (Pak Moon).

A three week training course for 18 technicians, six from each member country, was held in Khon Kaen in May 1990. The aims of the course were to update the field staff in techniques to be used during the surveys, promote standardization for analysis and diagnosis, and identify specific needs related to the proposed activities.

The project coordinators from the Lao PDR and Viet Nam attended the International Congress of Parasitology in Paris, France, in August to gain firsthand information on on-going research in this field.

# Data and information systems

## Information Systems, Data Bases, and Modelling

In 1990, the Mekong Secretariat restructured its computerized Information System by introducing a Local Area Network (LAN) connecting 50 Pcs. The linkages created will vastly facilitate access and use of data in such applications as planning, forecasting, and project studies. It will also enhance modelling capabilities to include flood forecasting, low-flow and salinity forecasting, compilation and production of the Mekong Hydrologic Yearbook (1988) with the assistance of the Government of New Zealand.

In related activities, work on the Improvement of the hydro-met data base management system, network and mathematical model project (1988-91) continued, supported by the Government of the Netherlands.

Under the network optimization component, an instrument engineer from the Netherlands provided training programmes on the use of sediment samplers for technicians in the member countries in February and July/August. A report entitled "Network density" was completed and submitted to the Secretariat in November. Consultants from the Netherlands also helped develop data base management and data processing.

The first component of a master model, covering the Mekong river from Chiang Saen to the sea, was completed in 1990.

## Socio-economic data base

Macro-economic studies of three regions, NE Thailand, the Lao PDR and the Mekong delta in Viet Nam, were carried out by a Thai consultant under the Integrated development of the lower Mekong basin project, funded (US\$40,000) by the United Nations Development Programme. Econometric models were developed for each region and installed on the Secretariat's Socio-Economic Data Base (SEDB) for use in planning and analyzing development projects. An Input-Output Table

(I/O Table) for NE Thailand was also prepared.

## Bibliographic data base

A new initiative in 1990 was the transfer of a copy of part of the Mekong Bibliographic Data Base (MBDB) to the UNDP office in Vientiane making it possible to conduct a search of the MBDB for reference titles related to the Lao PDR before sending a request for copies of documents to the Mekong Secretariat. The Delta Master Plan project office, in Ho Chi Minh City, was equipped with a similar system containing references related to the Mekong delta in Viet Nam. In August, a training course, on the use of the CDS/ISIS software developed by UNESCO, was held in Ho Chi Minh City for staff involved in the project.

## Data collection

### Hydrology

#### Flow

Flow measurements during 1990 were average. The flow started to rise above the long-term mean during the second half of May and remained considerably above the mean until early August. Then it dropped rapidly below the mean, almost to the minimum level, until October and rose to the mean level by the end of the year.

The low flow at Chiang Saen has been increasing since 1985. This suggests that more rainfall was confined in the upper basin and/or due to the regulation of the Manwan dam in China. For Vientiane, the low flow is declining. For Pakse, the low flow continues to increase mainly from the regulation of the Nam Ngum dam in the Lao PDR and partly to the regulation of dams in NE Thailand. For tributary stations discharge measurements were conducted at 26 hydrologic stations on major tributaries in the Lao PDR, at 74 stations in Thailand, and at 8 stations in Viet Nam. Water levels were observed at all hydrologic stations, sediment and water



samples were collected and analyzed.



*Sediment measurements at 108 stations in the three member countries constitute an important part of the basic hydrologic data collection that helps ensure valid planning.*

## **Economic and social data collection**

### **Survey of waterborne transport in the Mekong delta, Viet Nam project**

The Committee carried out a survey of waterborne transport in Viet Nam in response to the growing interest in the transportation potential of the Mekong.

The Survey of waterborne transport in the Mekong delta, Viet Nam, was completed in January. The survey, conducted in 1989, was funded by the United Nations Development Programme (UNDP). The data were made available as a statistical publication, *Statistics on inland waterborne transport in the Mekong delta in Viet Nam*.

### **Thematic mapping programme**

Establishment of the Mekong Geographic Information System using remote sensing techniques.

Mapping activities carried out during the year under this project include collaboration with the following Vietnamese agencies: the National Institute of Agricultural Planning and

Projection, Forest Inventory and Projection Institute, and the Institute for Water Resources Planning and Management, to compile an agro-ecological map, forest map and surface hydrology map.

A workshop was organized in connection with this activity in Hanoi, in July, for personnel from the agencies concerned. In addition, four Vietnamese technicians were given on-the-job training in Bangkok to finalize the maps. Two Vietnamese technicians were given on-the-job training at the Secretariat in remote sensing.

During the year work continued on the production of an agro-ecological map for the Borikhamsay and Se Bang Fai plains (Lao PDR). Following the completion of field work and preliminary mapping, two Lao technicians worked at the Secretariat to finalize the maps.

Under the project, three Vietnamese and two Lao technicians participated in a workshop on forest inventory using remote sensing and GIS organized by the Food and Agriculture Organization (FAO) in February.

### **Digitization**

Mekong Secretariat staff intensified their activities in carrying out mapping of the Pa Mong resettlement study. Reports on village profiles and resources were finalized.

A land use map of Cambodia on a scale of 1:250,000 was digitized and some data on forest cover were provided on request to the FAO for use in their Global Tropical Forestry Action Plan analysis.

The Secretariat also completed digitization of the administrative boundaries of all provinces, districts and subdistricts in NE Thailand, and of soil salinity maps of the same area.

A pilot study on land suitability mapping was carried out. A draft report was prepared and submitted to the member countries for comments before finalization.

### **Applied hydrology**

#### **Flood forecasting**

Minor floods occurred in the Mekong delta in



1990, while elsewhere there were no floods or overbank flows along the Mekong mainstream.

The Mekong Secretariat's annual flood forecasting service, from 25 May to 18 November, covered 14 stations on the mainstream in the Lao PDR, Thailand and Viet

Nam. Of particular note in 1990, werewarnings about rising water levels issued to workers on the construction of the bank protection project at Tha Deua, in the Lao PDR. Water levels rose rapidly to the highest level in 70 years for the time of year (in June), but then dropped to a very low level by the end of the month.

## ***Salinity Intrusion Forecasting and Studies Project***

### ***Forecasting***

*Salinity intrusion forecasting continued into a second stage, covering 12 stations, during the 1990 dry season (Jan-Jun) with financial assistance (US\$140,000) provided by the Government of Australia.*

*The area bordering the Co Chien branch of the Mekong estuarine system was selected as the pilot project in Stage II of the salinity intrusion forecasting programme. This made it possible to maximize the benefits of two water control projects, Tam Phuong (completed in 1990) (See p. for more details.) and Huong My (completed in 1986) implemented under the auspices of the Committee in the Mekong delta.*

*Responsibility for running the forecasting operation was shared by the Mekong Secretariat and the Mekong Delta Hydrological Forecasting Centre in Ho Chi Minh City. The*

*Secretariat was responsible for monitoring reference stations along the main river channels, and the Mekong Delta Hydrological Forecasting Centre, in collaboration with related provincial offices, was responsible for monitoring the stations on the canal systems and updated the forecasts on a daily basis. For the first time, long-term (up to three and four months) forecasts of salinity intrusion were issued in January at the beginning of the 1990 dry season to*

*improve the efficiency of water utilization for agricultural production.*

*Short-term forecasting operations started at the beginning of March and ended on 15 June 1990. Forecasts were provided every 10 days for the period March to June and disseminated to the Hydrological and Meteorological Centre, in Ho Chi Minh City, and to specialized agencies in the two provinces bordering the Co Chien branch.*



*The Committee provides technical assistance to local and national officials to help them cope with a major factor affecting agricultural productivity.*



*Training in forecasting techniques was organized by the Mekong Secretariat in January, in Ho Chi Minh City, for technical staff at provincial forecasting centres in the Mekong delta. Subsequently, training in the application of these forecasting techniques was conducted by the local project authorities for secondary forecasting.*

*A seminar concluding Stage II of the salinity intrusion forecasting programme was held in Vinh Long, in the Mekong delta, from 5 to 8*

*November 1990. The seminar assessed the achievements and discussed measures to improve the effectiveness of forecasting operations and identify future activities. The seminar recommended that Stage II be extended to cover the next 1991 dry season. Support for this programme would enable the forecasting programme to strengthen the technical expertise of local technical staff, and to continue into Stage III in priority areas. Stage III is scheduled to commence in late 1991.*

### **Delta salinity intrusion studies project**

The ongoing Phase III of the Delta salinity intrusion studies project, covering all areas affected by salinity intrusion in the Mekong delta, is the final phase of the programme. The Government of Australia has provided support (US\$457,000) over a four-year period, from 1988 to 1991, for the implementation of Phase III.

Salinity intrusion monitoring in the Mekong delta was carried out at 43 stations during the 1990 dry season (January - June). Three intensive measurement campaigns were carried out to collect data for calibration of models for sub-areas of the delta. Monitoring of stratification was also continued in 1990.

Data collection activities of this project were coordinated with those of other projects of the Committee: Water quality monitoring

network project, Phase II (1.3.17/88); Improvement of the hydro-meteorological network project (2.1.05/90) and the Mekong delta salinity intrusion forecasting project, Stage II (2.4.06/88).

The data were analyzed to provide information useful to farmers planning to take fresh water during the dry season to prolong the cropping season, and for their longer-term crop planning.

Work continued on the development of the enlarged model covering the mainstream (Phase II area), and all simplified sub-areas, including the Ca Mau peninsula (Phase I area), were tested. Further tests were carried out in December at the Mekong Secretariat in Bangkok using the larger computer facilities.

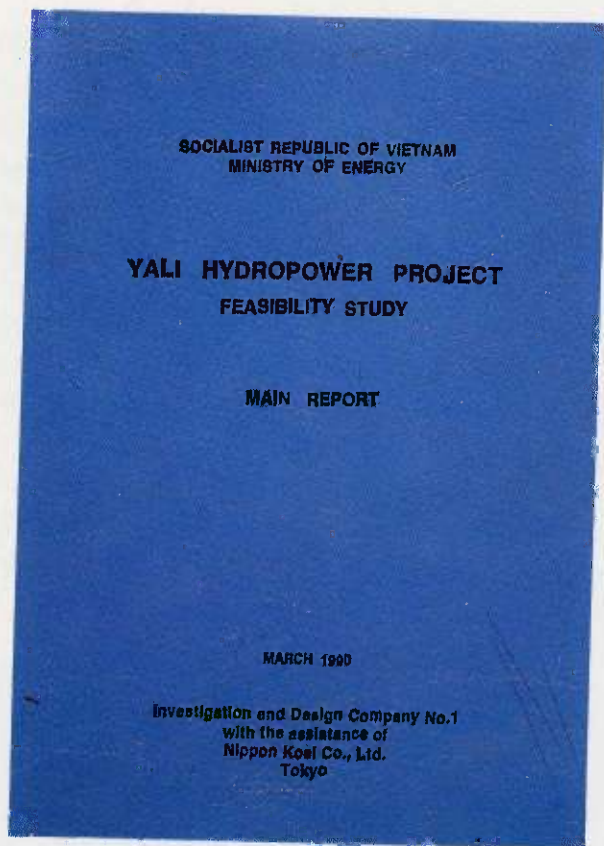
# Natural Resources Development

## Hydropower studies

### Nam Theun 1 hydropower project

The Nam Theun 1 hydropower project is a major tributary project which has power generation potential of between 7,000 and 9,000 Gwh/year, and could increase dry season flow by 800 cu m/sec which are figures comparable to mainstream projects.

A new proposal to update the 1985 prefeasibility study of Nam Theun 1 was included in the 1991 Work Programme.



### Yali Falls large scheme hydropower project

Work on a feasibility study of the Yali Falls large scheme hydropower project (690-MW), was completed in early 1990 by the Government of Viet Nam. A report (the Yali Hydropower Project Feasibility Study Main Report) was published in March 1990 which indicated that the project was attractive and further studies were recommended.

While recognizing the Government of Viet Nam's urgent necessity to continue this project, the Committee recommended a more complete environmental impact assessment (EIA), since this aspect was not in the feasibility report. A financing study was also recommended by the Committee.

The Yali Falls project will play a critical role in the economic development of central and southern Viet Nam, where energy shortages exist and are expected to become more prominent in future. A delay in the implementation of the project would cause considerable loss in opportunity costs to the economy of Viet Nam.

The regulatory effect of the Yali Falls project reservoir would contribute some seven per cent low flow increase during the dry season of the Mekong for downstream use. It therefore has a basinwide implication in nature and multipurpose characteristics.





*The Mekong Irrigation Programme helps people make better use of existing facilities and infrastructure.*

## **Irrigation and drainage**

### ***Mekong Irrigation Programme project***

*The Mekong Irrigation Programme (MIP) project, launched in 1988, provided some very useful assistance to Thailand and the Lao PDR by developing and testing a package of support activities required to bring irrigation schemes to their full potential. This project builds links between government agencies and farmers.*

*The support package generated by the project included irrigation, water management, organization of farmers' groups, agricultural extension, and credit and marketing facilities. The project was jointly implemented by Thai and Lao government agencies, assisted by a team of consultants from the Netherlands, Thailand and the Lao PDR.*

*Under the project, new pump stations with headworks were constructed along the Mekong river south of Vientiane, in the Lao PDR. Detailed design of irrigation systems and canal layout were prepared with the assistance of farmers. Agricultural extension work carried out under the project provided help with seasonal crop planning and included trials which were evaluated with farmers*

*involvement. The Vientiane Municipality was given assistance in formulating a plan for the completion of irrigation infrastructure and organization in all new systems.*

*At Pak Cheng, a better understanding of the prospects and limitations affecting irrigation development in the area resulted from the preparation of a land use plan, socio-economic studies, and a medium-term investment plan.*

### ***Training and exchange visits***

*A notable feature of the MIP training programme was the organization of visits of Lao farmers to Thailand. Agricultural extension work and crop trials were also carried out. These inputs contributed significantly to the improvement of water management.*

### ***NE Thailand***

*In NE Thailand, a new water management method was developed for pump irrigation schemes. Modifications to the standard design were proposed. Farmers were encouraged to participate in the digging of farm ditches using simple tools. Training courses were held to disseminate the results to other provinces in NE Thailand.*



## **Credit facilities**

*An agreement was signed between the Mekong Secretariat and the Bank for Agriculture and Agricultural Cooperatives (Thailand) to implement a pilot credit scheme for small water user cooperatives under the project, with the aim of increasing the bank's lending volume to small farmers in irrigated areas. The progress of this scheme was carefully monitored. Agreement was reached with the Department of Cooperative Promotion on the development of a simplified set of regulations for these small cooperatives. Work on a revised agricultural extension system to service irrigation areas also commenced with the Department of Agricultural Extension.*

## **Agro-economic study**

*The results of an agro-economic study into the feasibility of irrigated agriculture in NE Thailand and the Lao PDR, completed in 1990, indicated that acceptable economic returns from such schemes in both countries will require additional government and external investment in support programmes. The study focused on present and potential development of pump irrigation schemes, using data from the project area.*

## **Thai-Lao cooperation**

*Under the project, Thai-Lao cooperation has increased through many joint review meetings, technical advisory missions, exchange visits for farmers, and training courses.*

*A Netherlands/Thai/Lao review mission in May 1990 recommended that a second phase of the project be conceived following a full evaluation. This would make it possible to finalize and disseminate the project's results in support of sustainable irrigated agriculture in Thailand and the Lao PDR, and possibly to other areas of the basin. A project proposal, Sustainable Irrigated Agriculture (MIP 2), was prepared and approved by the Committee during its 32nd session.*

## **Complementary studies to assess project impact on the environment and on the status of women also commenced in 1990.**

*The programme includes five components: (i) Development of pump irrigation on the Mekong, Phase II (Lao PDR); (ii) Follow-up support to the Pak Cheng agricultural development, Phase III (Lao PDR); (iii) Water management support programme, Stage II (Thailand); (iv) Study on investment support and credit facilities for irrigated agriculture in NE Thailand; and (v) Study on a water resources development plan for NE Thailand.*

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## **Tam Phuong Water Control project**

An inauguration ceremony was organized in January 1990 to mark the completion, on schedule (in December 1989), of all the major features of Phase I of the Tam Phuong Water Control project. Project implementation started in 1985 with financial assistance provided by the Government of Australia.

The Tam Phuong project was carried out as a pilot project on tidal irrigation in the Mekong delta, by improving drainage of flood water, and controlling salinity intrusion to enable farmers to cultivate two paddy crops per year on some 5,900 ha.

In 1990, the project established close contact with the Mekong delta regional river

forecasting centre which enabled it to receive regular forecasts of flood and salinity intrusion. In this way farmers were able to improve the efficiency of water control management of the scheme, and improve storage of freshwater for irrigation. During October-November, two warnings were issued for extremely high tides which enabled farmers to take action to avoid flood damage to paddy lands.

## **Multipurpose development**

### **Huai Bang Sai multipurpose project**

In October/November 1990, the Mekong Secretariat conducted a mission to NE Thailand to assess the Huai Bang Sai



multipurpose project. The project could irrigate 23,550 ha and generate 5.6 MW of hydropower.

The Secretariat, in response to a request from the National Energy Administration, Thailand, also reviewed desk studies and preliminary investigations carried out earlier. The project was first identified in the 1960s.

A new project proposal for a prefeasibility study was prepared by the Secretariat and approved by the Committee at its 32nd session (28-30 November 1990). The proposed prefeasibility study is intended to reassess the viability of the Huai Bang Sai multipurpose project. The project components envisaged include: 3 storage dams, 2 diversion dams, a hydroelectric power plant and irrigation facilities on the Huai Bang Sai and its main tributaries for irrigation, electricity generation, fisheries and recreation purposes.

### **Huai Pa Thao multipurpose project**

Construction work continued during the year on the Huai Pa Thao multipurpose project (NE Thailand). Using funds provided by the Government of Switzerland, the Secretariat had completed a feasibility study and detailed design for the project in 1987-88.

Construction started in 1989 funded by the Government of Thailand. The Committee provided advisory services to the National Energy Administration (NEA). Swiss funded consultants mobilized on site late in 1989 and provided construction supervision of the project throughout 1990, including advice on construction quality and project management.

Located in Chaiyaphum province (NE Thailand), this project will eventually provide 4.6 MW of electricity, 2,400 ha of new and 1,820 ha of supplementary irrigation, and water supply for Chaiyaphum province. The project components include 2 earthfill dams, 3,500 m of headrace channel, conduit tunnel and penstock, powerhouse, transmission lines, 13 km of raw water supply pipeline and other associated works.

The project, some 30 km north of the provincial capital, Chaiyaphum, is located on the Huai Pa Thao river, a tributary of the Nam

Chi river which is itself a tributary of the Mekong. Initial studies carried out by the Mekong Secretariat indicated the need to produce, from an installed capacity of 4.6 MW, 18 Gwh of energy annually for local consumption. The project is scheduled to be completed in 1991. It is envisaged that an irrigation system will be constructed downstream to provide water for 2,400 ha to grow rice and other crops.

### **Nam Mang multipurpose project**

A project proposal was prepared in 1990 for a feasibility study of the Nam Mang multipurpose project, located in the Vientiane plain (Lao PDR). Activities to be carried out include project investigations, engineering, resettlement and environmental impact assessment, and economic evaluation.

The project would generate about 20 MW and provide irrigation for an area of about 1,900 ha. The power from the project would be transmitted to the Nam Ngum grid system to compensate for the decline in electricity export earnings caused by an expansion in domestic consumption.

## **Flood control and bank protection**

### **Construction of flood protection and reclamation of swamp and marshlands in the Vientiane plain Lao PDR)**

Work was completed on the project. Construction of flood protection and reclamation of swamp and marshlands in the Vientiane plain (Lao PDR) in March 1990. The project, which started in 1979, was financed (ECU 2,400,000 = US\$2,800,000) by the European Community. A completion ceremony was held in Vientiane on 5 May 1990.

The Mekong Secretariat prepared the final report in July, and also conducted a project evaluation during the period June-August 1990. The main socio-economic impacts of the project included: improved access to irrigation water, improved water storage



capabilities with flood control gates, increased crop production (double rice cropping with yields up from 2-2.5 to 3-3.5 tonnes/ha), access to all weather roads and public transportation on upgraded road/dike, improved government services and increased income and general prosperity.

Although no serious floods have occurred during the last 10 years, the region (Nong Khai/Vientiane) is undergoing rapid economic development, and there is an increasing number of new development projects, including a bridge across the Mekong river to be completed in 1994. Such projects influence future flood protection needs in the Vientiane plain. A flood beyond the present design of the dike (10-year flood) could have disastrous consequences.

To safeguard social infrastructure and rural projects, further dike construction and upgrading of existing dikes should be considered. The Secretariat has therefore prepared terms of reference for a phase II project for consideration by the European Community.

### ***Mekong river bank protection pilot project***

*Under Stage II of the Mekong river bank protection pilot project, preparatory work on bank protection at Tha Deua began late in 1989 with funds (US\$320,000) provided by the Government of Australia.*

*Vientiane Municipality provided the equivalent of US\$35,000 for the construction and proved commitment with timely payments to the contractors.*

*The A3 Asian Highway to Vientiane from the Tha Deua crossing point was being eroded by the Mekong river which seriously threatened the road and nearby houses. Monitoring of the erosion process had been carried out since 1987 under the basinwide bank protection project.*

*Soil testing was carried out and a bank protection design developed making use of rock-filled galvanized wire basket mattresses and retaining walls. This made it possible to make considerable savings in transporting the volume of rock which would otherwise have been required. The nearest quarries being some 160-200 km away at Vang Vieng and Phanalieng, north and south of Vientiane respectively.*

*Tenders were called from private and government enterprise construction companies for the rock supply and construction works.*

*Construction started in March 1990, and the critical section of rock mattress at the toe banks below water was laid during the lowest water levels in April. Work continued in earnest but was interrupted in late May/early June by rapidly rising water levels. The records, which go back some 70 years, in*



*Rock-filled galvanized wire basket mattresses and retaining walls provide an excellent and durable means of bank integrity protection.*



*licated that this was the highest level reached for the time of year. The water level dropped later, however, and work continued and the top baskets were completed in August 1990.*

*Finishing works such as road reinstatement were carried out in the drier soil conditions of November-December 1990, and the project was handed over to Vientiane Municipality on 20 December.*

*On-the-job training provided by the Australian supervising consultant was supplemented by*

*special short training seminars on design, project management and river training. Such training will help to ensure competent local staff for future bank protection works.*

*The project demonstrated new economical protection techniques, competitive tendering and modern construction project management techniques, improved human resources, financial commitment and the reliability of funding from a local source and the Government of Australia.*

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## **Agriculture, watershed management, and agro-industry**

### **Mekong Watershed Assessment and Management Programme (basinwide) project**

The project Mekong Watershed Assessment for Elaboration of a Management Programme (basinwide) project started in June 1990 with a two-day workshop at the Mekong Secretariat. Views were exchanged on past and ongoing efforts related to watershed assessment in the Mekong Committee countries.

Under the project documents, data and maps related to watershed assessment were reviewed with the assistance of a consultant from Kasetsart University (Thailand). The results of this review will provide inputs for the formulation of a watershed classification of the lower Mekong basin to be coordinated by the Mekong Secretariat. Basinwide mapping will be carried out following the preparation of the final design of the classification system in 1992.

The project aims to a) design a basinwide watershed classification system and produce maps b) focus on a number of critically affected areas - degraded or with high degradation risk, c) analyze the causes and processes of degradation, and d) draw up guidelines and practical proposals for watershed planning and management.

Information generated by the project will contribute to a better understanding of the hydrological cycle and of the interrelationships between soils, land use, forest cover, and water quality. The results of project will also serve as a valuable planning tool.

### **Seed Multiplication Farms (Lao PDR) project**

The Seed Multiplication Farms (Lao PDR) project, which was established with financial support (US\$2,013,530) provided by the European Community, was completed in December and is scheduled to be handed over to the Government of the Lao PDR in March 1991. The Mekong Secretariat provided technical coordination.

Three seed farms have been established at Hat Dok Keo (near Vientiane), Tha Sano (near Savannakhet) and Ban Phone Ngam (near Pakse). These farms are now fully operational and engaged in seed multiplication, production, processing and distribution on a routine basis.

Seed production, principally of rice, has increased to 750 tonnes/year; crop yields in 1990 were as follows: rice (4.0 tonnes/ha), maize (3.0 tonnes/ha), and leguminous seed crops (1.1 tonnes/ha).

The Mekong Secretariat provided technical training on seed production and processing, and special training courses and a workshop on water management, O&M of irrigation schemes and on-farm facilities, extension techniques and marketing for seed distribution.

The Hat Dok Keo station produced seed crop yields averaging 4.5 tonnes/ha in rice, 3.6 tonnes/ha in maize and 1.5 tonnes/ha in other legumes. The total annual amount of seed produced in 1990 was 83 tonnes. Seeds produced at Hat Dok Keo were distributed in Vientiane municipality and province and throughout other provinces in the northern and central part of the Lao PDR.

The Tha Sano (Savannakhet) station produced 94.2 tonnes on a cropping area of 21.50 ha in 1990. At Ban Phone Ngam (Pakse) station, the rainy season seed production programme for 1990 produced 66 tonnes on 22.50 ha, including 3 ha from contracted outgrowers.

The foundations have been built on which a successful seed multiplication and production programme can grow in the future. There is an urgent need for the Government of the Lao PDR to fully integrate the seed multiplication and production programme into the overall planning and reorganization now taking in place in the agricultural research, development and extension sectors of the Ministry of Agriculture.

### **Study on sandy soils for development and conservation project**

The Mekong Secretariat is the executing agency for this project which is being carried out (1989-91) by the Department of Land Development (Thailand) with support provided by the United Kingdom (US\$294,000).

Implementation of the project started in February 1989, with the services of a consultant from the United Kingdom, to determine ways to improve the agricultural productivity of the sandy soils in the lower

Mekong basin. Initial activities focused on the sandy soils of NE Thailand, in particular the "Ubon series" used for rice crops, and the "Nam Pong series" used for upland crops, mainly cassava and kenaf.

A mid-term review of the project was conducted by the Mekong Secretariat in September and recommendations on improving project implementation were submitted in a report to the project steering committee in October.

## **River works and transport**

### **Study and recommendations on operation of river craft on the Mekong river in the Lao PDR**

A project entitled Study and recommendations on operation of river craft on the Mekong river in the Lao PDR was undertaken during the period December 1989-May 1990, with financial assistance (US\$40,000) provided by the Government of France. The results of the study were presented in the final report, published in May 1990. The study analyzed waterborne transport on the Mekong, particularly on the stretch from Luang Prabang to Savannakhet, in the territory of the Lao PDR. It also identified river transport needs in the medium and the longer term up to the year 2000.

The study considered the existing capacity of river transport, and determined the need for river craft best suited to face the navigation constraints and transport demand. Recommendations were given with regard to the operation of river craft.



## *Reconnaissance study on the role of the Mekong river in regional and sub-regional transport development*

*Recent social and economic changes in the Committee's member countries, and the complexity of problems relating to transportation on the Mekong river, induced the Secretariat to undertake a thorough review of the river's development perspectives.*

*For this reason, a Reconnaissance study on the role of the Mekong river in regional and sub-regional transport development was*

*formulated in late 1990. Work on the study started in December with financial support (US\$60,000) provided by the Government of France. International experts were recruited to carry out the study which is scheduled to be completed in May 1991.*

*The study is expected to examine and report on the role of the Mekong river and the Mekong Committee in developing transport facilities in the region. An examination will be made of the intermodal infrastructure relating to river transport in the lower Mekong basin in the context of regional and sub-regional development in the short-term (1991-1995), medium-term (1991-2000) and long-term (1991-2020).*

*Desk studies carried out during the period March-December 1990 established the feasibility of a second bridge on the lower Mekong - the Southern Lao-Thai Mekong Bridge. The project had been approved by*

*The report is expected to generate recommendations on priority projects and activities in navigation and transport sectors and development options that respond to the different economic development needs of the member countries.*

## *Southern Lao-Thai Mekong Bridge project*



*A critical preliminary step prior to any river construction is geotechnical drilling.*

*the Committee in May 1989. Five sites were investigated in the Nakhon Phanom/Thakhek - Mukdahan/ Savannakhet area. The rapidly increasing volume of trade between Thailand, the Lao PDR and Viet Nam, at Mukdahan and Savannakhet (total annual trade 200,000 tonnes in 1990), has rendered the cross-river ferry service there inadequate. The Asian Development Bank (ADB) approved the use of French funds (US\$650,000) for jointly executing with the Committee a reconnaissance and feasibility study. This project was described as the first of future joint projects to be implemented by these partners.*

*Five alternative sites were identified and the Mekong Secretariat commissioned geotechnical drillings at each site during the low water levels of March-May 1990. Traffic surveys and further geophysical surveys were carried out.*

*ADB selected consultants who mobilized in Mukdahan in August and provided an interim report in December 1990. The report recommended one of the sites as the best option.*



## **Nong Khai-Thanaleng bridge**

Design of the first bridge on the lower Mekong, the Nong Khai-Thanaleng bridge, based on studies made by the Mekong Committee in the 1960s and 1970s, is expected to be completed during 1991 with the foundation laying ceremony planned for November. Construction is expected to be completed in 1994. Both design and construction are funded by the Government of Australia.

With regard to the Construction of concrete ramps at Pak Beng, Ban Houei Say, and Pak Lay (Lao PDR) project, the small river port at Pak Beng was completed in September. This port will help to open up the hinterland in the northern part of the Lao PDR and connect with road transport linking southern China.

## **Human resources development**

### **Training activities**

Training is one of the most important parts of the Committee's development programme and is aimed at enhancing the absorptive capacity of the member countries and at facilitating the transfer of appropriate technology in disciplines related to water resources development.

Various training activities have been organized by the Committee and its Secretariat to meet specific needs and to enable staff in the member countries and at the Secretariat to collaborate more effectively in the Committee's development programme. Staff are encouraged to participate in training activities, including workshops and seminars, as well as on-the-job and project-related training organized by the Committee and by other institutions.

### ***Mekong-Australian Fellowship Programme***

*The Mekong-Australian Fellowship Programme, covering the period 1988 to mid-1990, has provided long-term and medium-term post-graduate training in*

*Australia and in the member countries. In 1990 this programme included the following activities:*

### ***Training in Australia***

- # *Graduate programme in Hydrology at the University of New South Wales from October 1989 to July 1990 for four Vietnamese engineers.*
- # *Postgraduate programme in Information System Analysis at the University of New England (Australia) from February to July 1990 for one Thai engineer.*
- # *Graduate diploma programme in International Law at the Australian National University from March to December 1990 for one Vietnamese government civil servant.*
- # *Master's degree in Applied Science at Queensland University of Technology for one Thai engineer from April 1990 to July 1992.*

### ***In-country training***

*A training course on Watershed Planning and Management was organized for 31 Lao participants in Vientiane, Lao PDR, from 22 January to 17 February 1990.*

### ***New development***

*The Mekong-Australian Fellowship Programme will be superseded by a new programme entitled the "Water Resources Training Programme" over a three-year period to support postgraduate education and training of riparian professionals.*

### ***Sweden's Environmental Training Programme***

*Human activities along the Mekong mainstream contributing to pollution have increased during the last decade. These include domestic waste water from towns and cities, discharge from industries and waste due to inland navigation. The Mekong Committee's ongoing Water Quality Monitoring Network project was established to detect and analyze the various sources of*



pollution, especially those deriving from activities to increase agricultural production.

### **Collaboration with CEFIGRE**

A special training course on Environmental impact of hydropower and irrigation projects was held in August 1990 with 15 participants from the member countries. The course was held in Bangkok by the Centre de Formation Internationale a la Gestion des Ressources en Eau, or International Training Centre for Water Resources Management (CEFIGRE). The course was the first planned attempt to introduce the methodology of impact assessments to the institutions/



### **Environmental Training Fund**

With support provided by the project departments involved in the Committee's work in the member countries. Follow-up activities showed that more extensive training is needed to ensure an environmentally sound development of the water resources, especially in the Lao PDR and Viet Nam.

3.8.02 - Environmental Training Fund, representatives of the Committee's member countries and Mekong Secretariat staff were able to attend environmental conferences/meetings outside the region.

#### **Major international meetings attended:**

- \* *Globe '90 in Canada (5 participants)*
- \* *International Soil Science Meeting in Japan (1 participant)*
- \* *Ramsar Convention Meeting in*

*Switzerland (4 participants)*

- \* *Asian Conference on Sediment Transport in China (2 participants)*
- \* *Agrosystem and Environment Seminar in Indonesia (3 participants)*
- \* *International Conference on Waterborne Diseases in France (3 participants)*
- \* *International Seminar on Biology and Rare Fish in the United Kingdom (2 participants).*

*Mekong Secretariat staff members have also attended meetings held in the region concerned with the sustainable use of natural resources.*

*In recent years, the environment has become one of the main topics in development agencies providing financial and technical assistance to developing countries.*

*"Sustainable development" or "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", as defined in 1987 in the publication "Our Common Future", has become the aim of development cooperation. The establishment of the Environmental Training Fund will help achieve this important goal.*

*Under the project Coordination of environmental planning and Integration of environmental management aspects into Mekong resource development projects, six Vietnamese technicians were trained in the use of the methodology known as "Adaptive Environmental Assessment and Management" with a view to its continued use as a planning tool.*

### **Other training courses**

#### **Hydrographic equipment and surveying techniques**

Under Phase II of the Water Quality Monitoring Network project, the Royal Institute of Technology of Sweden sponsored post-graduate training in Sweden from October to December 1989, for the head of the Water Quality laboratory in Viet Nam.

"On-the-job" training related to the Updating of the hydrographic atlas project was given to



32 Lao, Thai and Vietnamese surveyors, during the period October to November 1989, in the use of equipment and surveying techniques. The training was aimed at developing competence that would permit each member of the survey team to carry out assignments with a minimum of supervision.

Under the Improvement of the hydro-met data base management system network and mathematical model project, a training workshop for senior hydrologists was conducted by two consultants from Delft Hydraulics (Netherlands), in Nong Khai, Thailand, from 7-22 March 1989, and was attended by fifteen participants (four each from the Lao PDR, Thailand and Viet Nam and three from the Mekong Secretariat). Training courses in hydro-met data base management were also conducted by two consultants from Delft Hydraulics in Thailand from 7-15 February 1989 for 14 participants (7 Thai participants and 7 Mekong Secretariat staff members); in Viet Nam from 18-28 February 1989 for 22 Vietnamese participants; and in the Lao PDR from 27 March-6 April 1989 for nine Lao participants. A workshop on the master model was conducted by three consultants from Delft Hydraulics at the Mekong Secretariat from 26 September-6 October 1989 for 17 participants (three each from Lao PDR, Thailand and Viet Nam and two Mekong Secretariat staff members).

### **Photo Interpretation and Map Preparation training**

In connection with the Thematic Mapping Programme, on-the-job training in photo interpretation and map preparation was provided for four Vietnamese technicians at the Secretariat.

Training in the use of GIS (ARC/INFO) was given to five Vietnamese technicians at the Mekong Secretariat and at the Department of Survey Engineering, Chulalongkorn University, Bangkok, Thailand.

A three-day training course in ARC/INFO was held at the Mekong Secretariat for the staff of the Remote Sensing and Mapping Unit.

In December 1990, two project engineers completed their studies at the University of

New South Wales, Sydney, Australia. The engineers had enrolled for a master's degree course on optimization techniques in water resources planning and hydraulic studies in deltas under Phase III of the Delta salinity studies project.

### **Development of models for Salinity Intrusion Forecasting**

A workshop on the development of forecasting models for the Salinity Intrusion Forecasting in the Mekong delta project was organized in Bangkok, in December 1989, to strengthen the technical capability of national staff responsible for the secondary forecasting operation. Follow-up training courses in application of these models were conducted by the local project authorities.

### **Water Management training course**

Under the Mekong Irrigation Programme project, a water management training course and a study tour were organized in NE Thailand, in November 1989, for 20 Lao irrigation field staff and farmers' representatives, and 200 farmers, members of Water Users' Cooperatives, and other Government staff attended workshops.

### **International Water Law and Management course**

The Economic Commission of the European Communities (EEC) granted seven fellowships (two from each of the riparian countries and one from the Mekong Secretariat) to the Mekong Committee. These fellowships enabled participants from the Mekong riparian countries to attend the course "International Water Law and Management" organized by the International Institute of Hydraulic and Environmental Engineering in Delft, the Netherlands, from 12 to 30 November 1990.

The course was designed for participants from South and Southeast Asia with the aim of providing a means of transferring and exchanging knowledge and experience from these countries. Representatives of the Mekong Committee presented a case study of international river basin organization which drew the attention of participants from other regions. The participants acknowledged that



the strong political will to cooperate among the Mekong member countries had been one of the main factors contributing to the success of the Mekong Committee.

The course was aimed at transferring and exchanging knowledge, experience and approaches on bilateral and multilateral arrangements and subsequent legislation and regulation with regard to optimal use and conservation of the resources of international rivers. Experience gained by the participants will contribute significantly to the Committee's planned studies on organizational and legal aspects, as recommended in the 1987 Revised Indicative Basin Plan.

Visits were organized to EEC Headquarters, the Rhine "Delta Work", Antwerp river port and the Albert Canal in Belgium, the Meuse, which flows from Belgium to the Netherlands, the Rhine river, and the International Court of

Justice in the Hague.

## **Water Quality Monitoring**

The Mekong Secretariat sent a delegation of six (two staff members and four technicians from the member countries) to a regional seminar on water quality monitoring in the Asia-Pacific region, held in Beijing, in September 1989. Organized by the Economic and Social Commission for Asia and the Pacific (ESCAP) and hosted by the Government of the People's Republic of China, the seminar drew participants from 17 countries. The Mekong delegation presented four papers: one paper on the lower Mekong basin and three country papers. Several delegates expressed interest in the Mekong Committee's water quality monitoring programme and also in the ongoing cooperation between the member countries of the Committee.

# Administration

## Staff

The day-to-day work of the Committee and its administration is carried out in Bangkok by the Mekong Secretariat. In 1990, there were 105 staff working at the Secretariat, including 49 professional staff and 46 general service staff, as well as 10 full-time trainees or "riparians on stipend" from the member countries.

During the year, two training courses were organized for project staff to explain and further refine the Secretariat's Project Manual. The aim of these courses was to standardize the management of a project's identification, formulation, appraisal/ approval, implementation and evaluation.

An innovative two-day workshop was held for 40 of the Secretariat's professional staff 2-3 June. The workshop addressed internal issues related to structure, office communications, personnel, and career development.

With the acquisition of an additional 20 computers to make the total 80 machines, The Secretariat has further enhanced personnel efficiency and productivity for applications related to project and administrative operations. The most important acquisition was a Local Area Network (LAN) system to provide an effective link in communications among staff. Work continued in 1990 to expand the uses of this system. A major impact of the LAN was the on-line access to the Financial Monitoring System (FMS) a useful support function prepared by the Computer Services Unit for the Finance Unit of the Division of Finance and Administration.

Work on the development of the FMS started in 1986. Since then, it has become an effective funds monitoring device throughout project implementation.



# Financial Review

## Programme income and expenditures

### Income

The actual cash contributions for programme activities received during 1990 amounted to US\$9,539,822. These funds were contributions paid to the Committee by cooperating countries and agencies in support of its development programme during 1990. The Committee continued to operate on a fully-funded basis whereby all project commitments were covered by firm undertakings given by the governments of cooperating countries.

Annex II shows both the actual cash and

in-kind contributions for programme activities received by the Secretariat during the years 1986 to 1990.

### Expenditures

Programme expenditures for 1990 amounted to US\$8,670,743. Total expenditures during 1990 amounted to US\$10,471,752. These funds were used for the procurement of goods and services in support of the Committee's development programme. As illustrated by the following table, this represents an increase from previous years.

Year	Total Programme Cash Contributions US\$	Total Programme Expenditures US\$
1986	6,402,293	3,980,144
1987	6,347,071	7,323,872
1988	8,737,442	6,472,464
1989	6,595,696	7,701,579
1990	<u>9,539,882</u>	<u>8,670,743</u>
Total	US\$37,622,384	US\$34,148,802

## Secretariat income and expenditures

### Income

In addition to cash contributions that fund programme activities, the Secretariat has also generated income for the actual operations of the organisation. The primary income sources include annual contributions from each of the three member countries, support cost charges for project implementation, and other income related to project services and treasury management.

The Secretariat is developing its own income base to cover operational

expenditures. Such financial autonomy will enhance the long-term sustainability of the Secretariat.

### Expenditures

The administrative expenditures for the Secretariat during 1990 amounted to US\$1,801,007. The primary components of these expenditures include costs related to staff, premises, supplies, equipment, and travel. The Secretariat strives to keep administrative costs to a minimum in order to maximize resources going to projects.

# Annexes

- I Main Committee Development Projects**
- II Cash Contributions by Donor: 1986 - 1990**
- III Donor Programme Support by Source**
- IV Mekong Secretariat Organization Chart**
- V General characteristics of the Mekong river basin**



# *Annex I*

## **Main Committee Development Projects**

### **during 1990 by funding source and in chronological order**

#### **Australia**

- Prawn hatchery in the Mekong delta
- Salinity intrusion studies, phase II
- Salinity intrusion studies, phase III
- Tam Phuong water control, Viet Nam
- Lam Dom Noi resettlement, Thailand
- Establishment of ports at Tha Deua and Pak Khone
- Salinity intrusion forecasting, stage I
- Salinity intrusion forecasting, stage II
- Mekong fellowship programme
- Technical assistance (Senior adviser, river basin planning)
- Economic analysis and appraisal of irrigation projects
- Bank protection at Tha Deua, Lao PDR
- Ramps at Pak Beng, Pak Lay, Lao PDR
- Development of forestry in Long Xuyen

#### **Belgium**

- Study of waterborne diseases, phase II

#### **Finland**

- Updating of the hydrographic atlas
- Expert services on navigation activities

#### **France**

- Thematic mapping through remote sensing techniques
- Equipment for French language instructor
- PEPS programme
- Thematic mapping in Lao PDR and Viet Nam
- Mapping and study of projects (Draftsman)
- Barge fleet operation, Lao PDR
- Study on Mekong river transport development

#### **Italy**

- Nam Houm irrigation system

#### **Japan**

- Application of reforestation to soil management

#### **Netherlands**

- Environmental assessment of irrigation projects
- Improvement of the hydro-meteorology and mathematical modelling
- Mekong irrigation programme
- Fish seed production centre, north-east Thailand

#### **New Zealand**

- Printing of hydrologic yearbooks
- Micro-hydropower components
- Improvement of hydro-meteorological network

#### **Sweden**

- Water quality monitoring network, phase I
- Control of soil erosion
- Management of acid sulphate soils
- Management of wetlands
- Ground-water investigation programme

Resettlement studies for low Pa Mong  
Environmental training  
Xeset hydropower environmental studies  
Water quality monitoring network, phase II  
Thematic mapping  
Pre-requisites for common works hydropower  
Technical assistance experts  
Research co-operation on acid and grey soils  
Mekong geographic information system  
Integration of environmental components in projects  
Mission costs for Yali Falls hydropower

#### **Switzerland**

Fishermen communities development, Nam Ngum basin, Phase I  
Construction supervision of Huai Pa Thao project  
Mekong watershed assessment  
Fishery development in Nam Souang reservoir  
Fishermen communities development, Nam Ngum basin, Phase II

#### **United Kingdom**

Study of sandy soils

#### **ADB**

Feasibility study for southern Lao-Thai Mekong bridge

#### **ESCAP**

Pilot study on remote sensing

#### **European communities**

Irrigation and flood control, Vientiane Plain (technical assistance and construction materials)  
Seed multiplication centres, Lao PDR  
Watershed management project  
Technical assistance to Mekong Secretariat  
Legal studies

#### **UNDP**

Indicative Basin Plan  
Hydrologic and meteorologic data acquisition  
Lower Mekong basin information system  
Co-ordination of basinwide environmental planning  
Application of remote sensing techniques  
Basinwide bank protection  
Integration of environmental management aspects  
Integrated development planning  
Hydro-meteorological network  
Low Pa Mong multi-purpose

#### **UNDP/OPS**

Feasibility study: Selabam hydropower rehabilitation project

#### **UNDP/World bank**

Mekong delta master plan

#### **UNEP**

Environmental assessment of Quan Lo-Phung Hiep Development  
Ecologically sound development of water and land resources



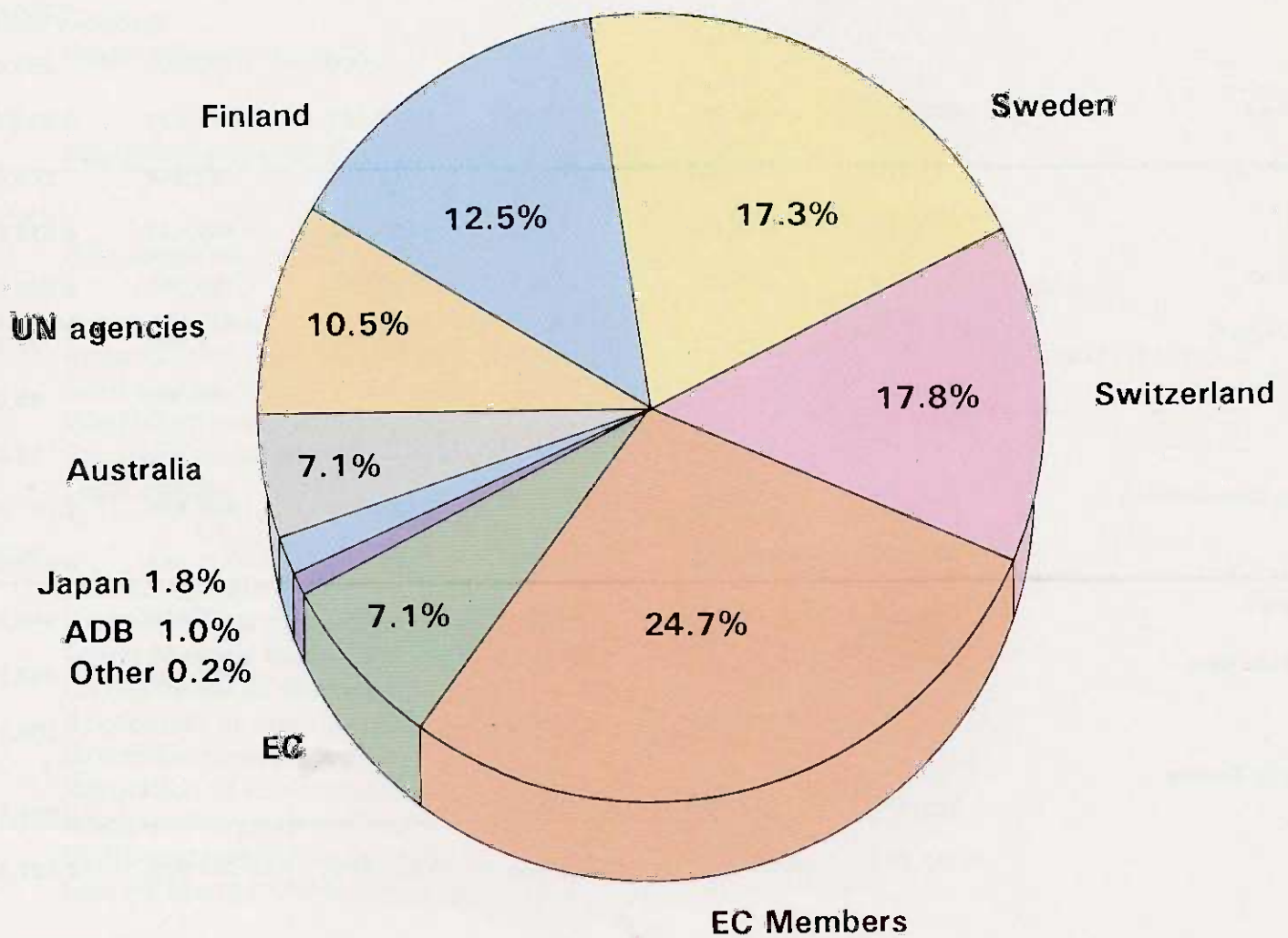
## *Annex II*

### Cash contributions received for programme activities From 1 January 1986 to 31 December 1990 (In U.S. Dollars)

DONOR	1986	1987	1988	1989	1990	Total
Australia	2,893,912	2,292,154	3,190,310	924,186	672,596	9,973,158
Belgium	11,000	-	-	400,000	-	411,000
Finland	-	-	373,434	262,084	1,192,284	1,827,502
France	58,821	48,725	105,668	-	56,092	269,306
Germany	-	-	-	-	212,041	212,041
Italy	-	-	1,250,000	-	-	1,250,000
Japan	-	-	50,000	75,000	172,000	297,000
Netherlands	829,775	498,675	854,144	2,272,407	2,077,876	6,532,877
New Zealand	21,777	36,827	47,137	77,693	22,519	205,953
Sweden	456,196	609,022	917,447	946,393	1,649,542	4,578,600
Switzerland	273,710	450,000	145,000	18,000	1,700,000	2,586,710
United Kingdom	-	-	-	27,704	5,590	33,294
ADB	-	-	-	-	95,000	95,000
ESCAP	-	12,424	-	3,106	-	15,530
European Communities	847,101	573,610	393,104	293,696	684,376	2,791,887
UNDP	581,900	1,474,895	1,133,393	1,205,276	521,644	4,917,108
UNDP/OPS	256,500	78,145	88,105	10,000	15,500	448,250
UNDP/World Bank	-	-	-	-	462,762	462,762
UNEP	-	8,000	120,000	80,151	-	208,151
Programme Reserve Fund	171,601	264,594	70,000	-	-	506,195
<b>TOTAL</b>	<b>6,402,293</b>	<b>6,347,071</b>	<b>8,737,442</b>	<b>6,595,696</b>	<b>9,539,822</b>	<b>37,622,324</b>

### *Annex III*

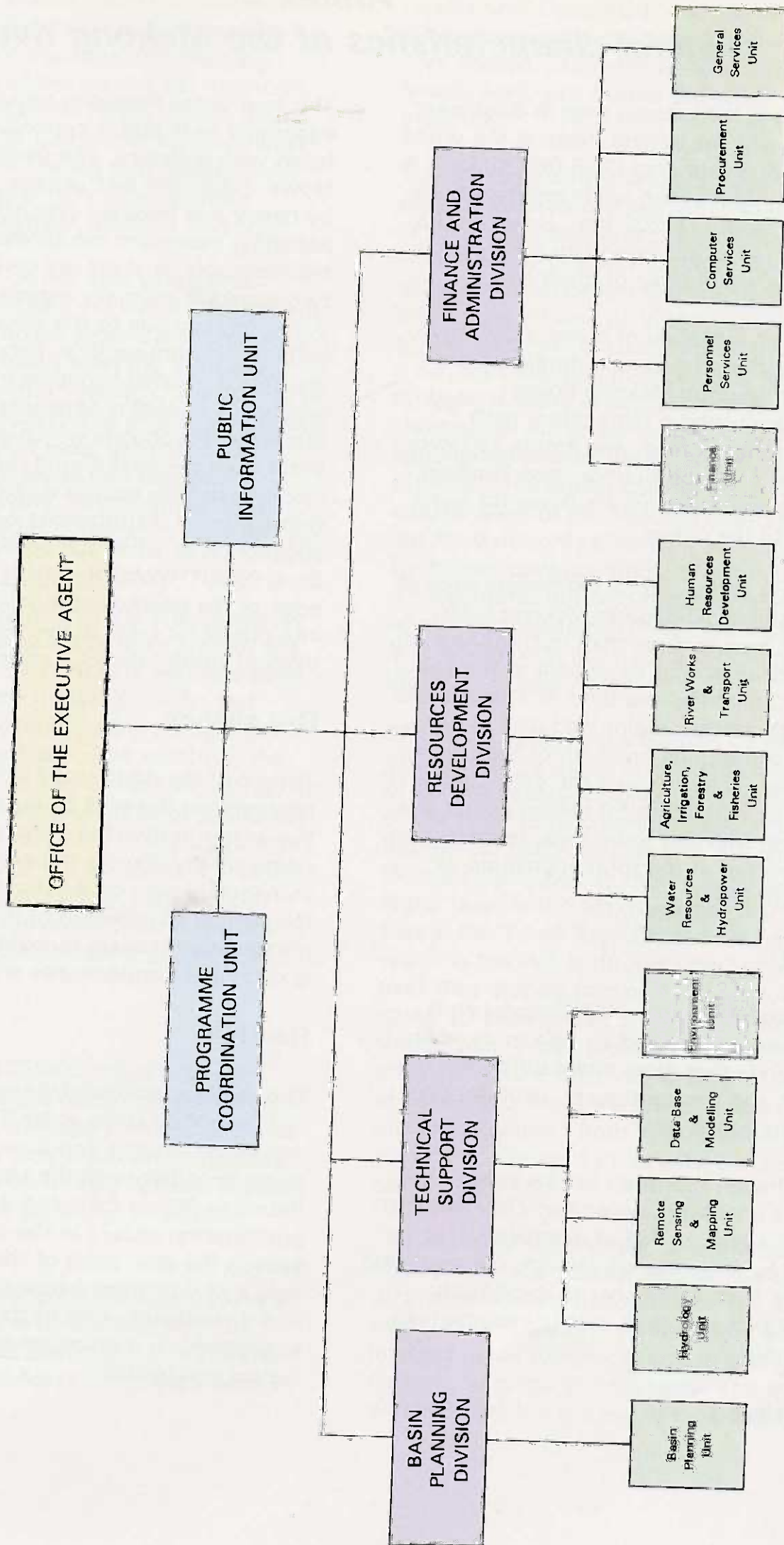
## **Donor Programme Support Growing with improving opportunities 1990 Cash Contributions: US\$9.5 million**





# Annex IV

## MEKONG SECRETARIAT ORGANIZATION CHART



## **Annex V**

### **General characteristics of the Mekong river basin**

The Mekong is the longest river in Southeast Asia and one of the largest rivers in the world. In terms of drainage area (795,000 sq km), it ranks twenty-first in the world and twelfth in terms of its length (4,200 km). However, its large runoff (475,000 million cu m) places it eighth in the world table of great rivers.

Starting at an elevation of some 5,000 m in the Tanghla Shan (mountain range) on the Tibetan plateau, the Mekong flows southwards, cutting a fairly direct path through southern China, and enters its lower basin at the common Burma- Laos-Thailand boundary point. From here it flows for some 2,400 km to the ocean.

The Mekong drains a total catchment area of 795,000 sq km. The lower Mekong basin catchment area is more than 600,000 sq km, and comprises almost the whole of the Lao PDR and Cambodia, one third of Thailand (its entire north-eastern region and part of its northern region), and one fifth of Viet Nam (the Central Highlands and the delta region). It is estimated that some 50 million people live in the lower Mekong basin area, representing about one third of the total population of these countries.

#### **Climate**

The climate of the lower Mekong basin is tropical and is governed by two monsoons: steady winds that blow alternately from the northeast and the southwest, each for about six months of the year.

The southwest monsoon begins in May and continues until late September/ October; then following a brief period of instability, it is replaced by a reverse air stream, the northeast monsoon, from November to mid-March. During March and April, winds become light and variable.

#### **Wet season**

The southwest monsoon passes over warm equatorial seas and is consequently heavily laden with moisture. The period in which it blows, called the wet season, is characterized by heavy and frequent precipitation, high humidity, maximum cloudiness and tropical temperatures. A short dry period of one to two weeks is normally experienced between June and July due to the influence of high-altitude anticyclonic circulation. After the dry period, rainfall becomes more frequent, and heavy rainfall is experienced in tropical storms and typhoons which enter the Mekong basin from the east during the wet season. Flooding usually occurs when two or more of these tropical disturbances occur in rapid succession or when the Equatorial Trough Zone (SOUTHWARD), which is the forward edge of the southwest monsoon, has passed into one of its more active stages and a tropical storm follows shortly thereafter.

#### **Dry season**

The air of the northeast monsoon, which originates in the cold air masses occurring in the winter in China and the polar region, is relatively dry. During the period when this monsoon blows, called the dry season (November to mid-March), very little precipitation occurs, humidity is low, the sky is clear and temperatures are relatively low.

#### **Rainfall**

The mean annual rainfall ranges from 1,000 mm near the centre of NE Thailand, to 4,000 mm in the Truong Son (Long Chain) mountain range lying between the Laos and Viet Nam. Between 80 per cent and 90 per cent of the precipitation occurs in the wet season. In that season the dew-point of the atmosphere is only a few degrees below the air temperature and a moderate uplift of the air caused by topography or convection is sufficient to induce precipitation.



The effect of the topography is clearly seen in the rainfall distribution over the basin and adjacent areas. Rainfall is highest on the windward side of mountain ranges lying across the path of the southwest monsoon, such as the Cardamom range, which runs along the coast of Cambodia and southeast Thailand, and the Truong Son (Long Chain) range which runs across Laos, eastern Cambodia and adjacent areas in Viet Nam.

The high rainfall on the east side of the Truong Son mountains in central Viet Nam is caused by the tropical storms and typhoons which enter the basin from the east, most frequently via central Viet Nam. The rainfall is lowest on the leeward side of those mountain ranges, in the Great Lake basin and NE Thailand. In these areas rain falls mainly during thunderstorms, which cause often intense rain for short durations, normally over limited areas.

On average, the rainfall in the wet season is sufficient to grow rice, the main crop of the basin. However, the rainfall is very unevenly distributed over the growing season and drought damage occurs nearly every year at all locations in the basin. The extent of the damage depends on the amount of rainfall; at locations with an annual rainfall of 2,000 mm and more there is very little drought damage. However, in most of the agricultural areas in the basin, the rainfall is only 1,000-1,200 mm/year and the provision of an adequate water supply could double the paddy yields.

## Flow

Each year about 475,000 million cu m of water empties into the ocean off the delta. At Paksé, where the drainage area accounts for 69 per cent of the total area, the maximum discharge (57,800 cu m/sec) is more than 50 times the minimum discharge (1,600 cu m/sec).

The flow of the Mekong and its tributaries is closely related to the rainfall pattern. The water level starts to rise at the onset of the "wet season" (April-May), reaching a peak in

August, September or October. It then falls rapidly until December, and afterward recedes slowly during the dry period of the year, or "dry season", to reach its lowest level in March/April, just before the onset of the monsoon.

The Mekong carries an enormous volume of excess water during the wet season, resulting in severe flooding and substantial damage almost every year in the fertile floodplains along the mainstream and the major tributaries, as well as in the vast floodplains of the delta. In contrast, during the dry season a serious reduction in flow often leads to drought in many areas, with a resultant shortage of water for domestic use and agricultural development. The most seriously affected area during the dry season is the coastal plain of the Mekong delta, where the low flow not only creates a shortage of water for human consumption and agricultural development, but also results in deep intrusion of salt water into the delta. An area of some 2.1 million ha is normally affected by the intrusion of salt water.

The Great Lake (Tonlé Sap) in Cambodia attenuates the flows in the delta downstream of Phnom Penh considerably by storing a part of the flood flow in July, August and September and releasing it in the period October-April. During the flood season, the water level in the Mekong rises faster than that in the Tonlé Sap (Great Lake) and excess water is fed into it through the Tonlé Sap river thus storing part of its flood volume in some 70 billion cu m of natural storage of the Great Lake. When the Mekong water level goes down, the flow in the Tonlé Sap reverses and the Great Lake releases water into the Mekong - both stored Mekong flood water and the yield of its own catchment area.

The seasonal flood of the Mekong comes chiefly from the tributaries that join the mainstream along its lower course. At a flood peak, there is generally extensive flooding in lowland areas which can cause considerable damage to crops and property. The lack of water during the dry season imposes severe

constraints upon crop production and also limits the navigable depth in the mainstream.

The Mekong finally distributes its waters through eight branches in the delta, in Viet Nam, into the ocean. Tidal influence contributes significantly to the extent of salinity intrusion; tidal range varies from 2-4 m. The role of tidal forces is more prominent during the dry season when the river discharge is normally about 2,000 cu m/sec.

Acidity of water is normally high (pH is low) at the beginning of the rainy season when the first rain storms leach the highly acid soil. When rain becomes more and more regular, the soils become more permanently saturated and thus less subject to oxidation and less acid, and the water becomes less acidic. However, the acidity of water may vary rapidly along the course of the river depending on the soil conditions of each reach and local inflow and is therefore sometimes difficult to monitor.

### **The basin's water resources development potential**

The amount of water that each year flows down through the lower Mekong basin and into the ocean is vast (475,000 million cu m).

If this water was used to generate power, the resources of the lower Mekong basin could supply electricity (505,000 Gwh per year) to all the countries in Southeast Asia, and possibly beyond, through an interconnected grid. There is also the possibility of using the water to irrigate some 6,000,000 ha of cultivable land for rice and other crops and raising agricultural production in general. Ancillary work associated with the development of these water resources, includes flood control and the improvement of navigation.

### **The need to develop**

While the water resources potential of the lower Mekong basin is immense, the river runs through one of the poorest regions of the world. Annual per capita income in most basin areas is in the neighbourhood of US\$190-540.

It was as a result of efforts made by the Economic and Social Commission for Asia and the Pacific (ESCAP then ECAFE), in the period 1951-1956, to encourage the governments of the riparian countries of the lower Mekong to cooperate in developing the large water resources to improve living standards that the Committee for Coordination of Investigations of the Lower Mekong Basin came into being.