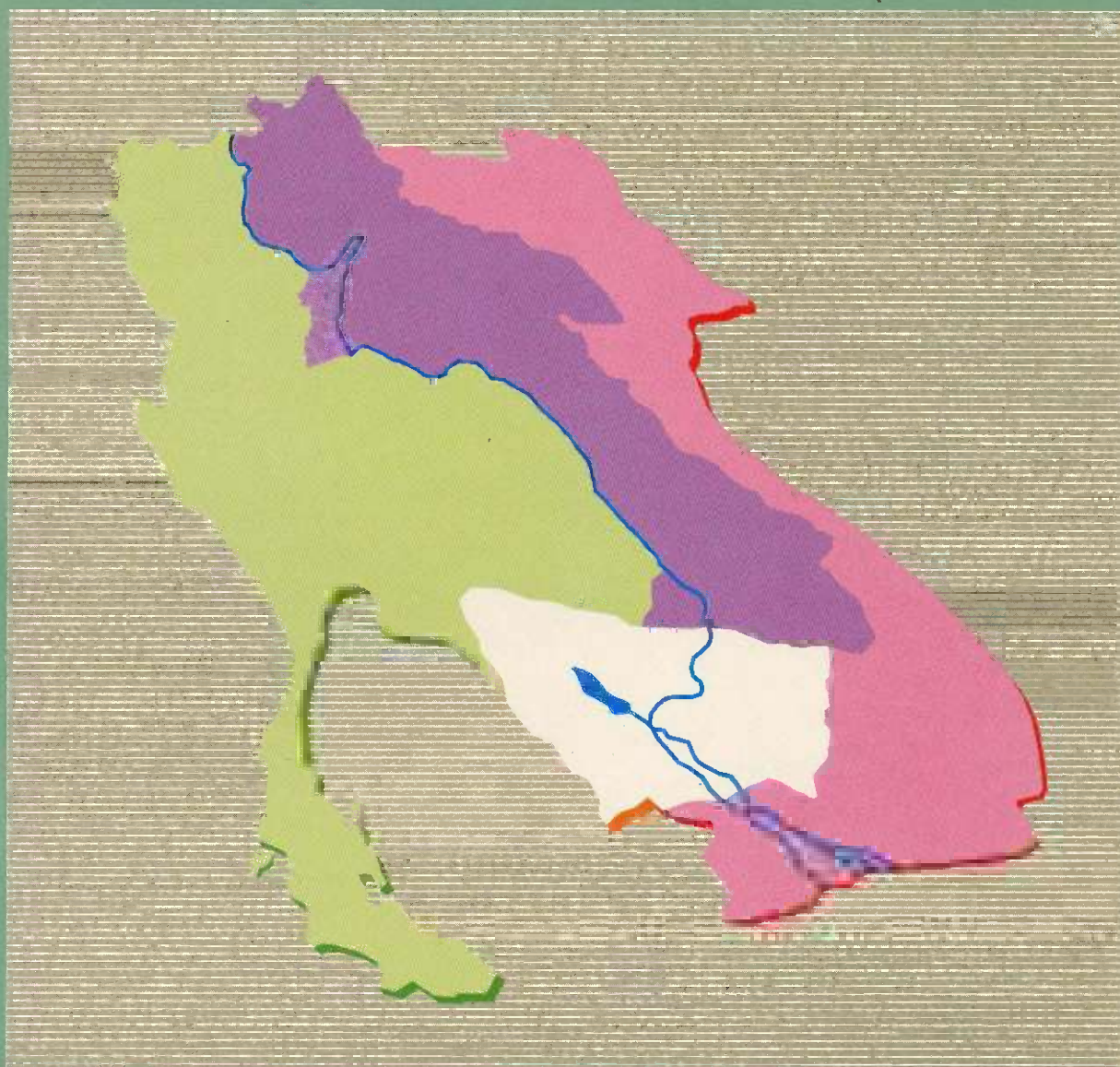




INTERIM COMMITTEE FOR COORDINATION OF INVESTIGATIONS OF THE LOWER MEKONG BASIN



*(Lao People's Democratic Republic, Kingdom of Thailand,
Socialist Republic of Viet Nam)*

IS2
C-Ann
589
1989



INTERIM COMMITTEE FOR
COORDINATION OF
INVESTIGATIONS OF THE
LOWER MEKONG BASIN

1989 Annual Report

(Lao People's Democratic Republic,
Kingdom of Thailand
and Socialist Republic of Viet Nam)

PREFACE

This report presents the progress made in 1989 in the water resources development projects in the lower Mekong basin that are included in the Work Programme of the Interim Mekong Committee.

The report leads off with information about the establishment of the Mekong Committee. This is followed by an account of the progress made in the programme areas of the Committee's Work Programme: "Basin Planning", "Data Collection and Information System", and "Resources Development" which this year includes a section on "Human Resources Development" dealing with the training activities of the Committee's development programme. The report concludes with a brief account of the Committee's financial, administrative and institutional matters for 1989.

In 1989 there were further indications of improved relations in the region and especially between the member countries. Such regional harmony can create the conditions for the resumption and expansion of the Committee's large-scale development activities, and the Committee therefore took appropriate steps to strengthen its Secretariat and reorganize its programme to take on the tasks that presently face it and the tasks that lie ahead. The Committee continued to receive the active support of cooperating countries and agencies which maintain their strong interest in the regional cooperation fostered by the Committee's work.

CONTENTS

Preface	i
BACKGROUND	1
The Mekong Committee	1
Some of the Committee's achievements to date	4
Characteristics of the Mekong river basin	6
The basin's water resources development potential	9
THE MEKONG DEVELOPMENT PROGRAMME	10
Basin Planning	11
Integrated basin plan studies	11
Economic and social studies	14
Environmental impact assessment and planning	14
Data Collection and Information System	16
Meteorological, hydrologic and hydrographic data collection	16
Economic and social data collection	18
Thematic mapping programme	18
Information system	19
Applied hydrology	20
Resources Development	23
Hydropower development	23
Irrigation and drainage	24
Multipurpose development	27
Flood control and bank protection	28
Agriculture, watershed management and agro-industry	29
Fisheries	30
River works and transport	31
Human resources development (Training activities)	32
Finance and Administration	37
Financial information	37
Administration	37
Institutional matters	38
ANNEXES	
Completed projects of the Committee	
Cash and in-kind contributions received (1989)	

BACKGROUND



◆ *Mekong Committee established 1957*

The Mekong Committee

Establishment

1. The Committee for Coordination of Investigations of the Lower Mekong Basin (Mekong Committee) was set up in 1957, as an intergovernmental organization with plenipotentiary representatives, by the governments of Cambodia, Laos, Thailand and the Republic of Viet-Nam (the participating governments) during the 13th session of the Economic and Social Commission for Asia and the Pacific (ESCAP then ECAFE). The participating governments had expressed the wish to continue the studies related to the development of the lower Mekong basin, jointly, with assistance provided by international experts.

The Interim Mekong Committee

2. The Interim Committee for Coordination of Investigations of the Lower Mekong Basin (Interim Mekong Committee) was formally established by the declaration signed, in 1978, by representatives of the Lao People's Democratic Republic, the Kingdom of Thailand and the Socialist Republic of Viet Nam.

Purpose

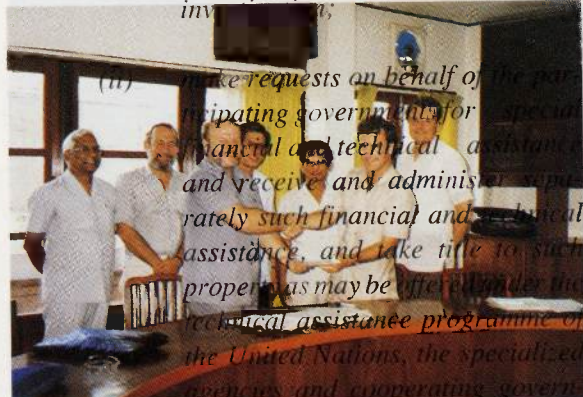
3. The Committee aims to develop the water and related land resources of the lower Mekong basin to generate social and economic benefits for the people in the riparian countries (the countries on the Mekong river) through the active cooperation

of the participating governments in the development of hydropower, irrigation, flood control, drainage, navigation improvement, watershed management and water supply.

Activities

4. To attain its aims the Committee may ...

(i) *prepare and submit to participating governments plans for carrying out coordinated research, study and investigations;*



(ii) *make requests on behalf of the participating governments for special financial and technical assistance and receive and administer separately such financial and technical assistance, and take title to such properties may be offered under the technical assistance programme of the United Nations, the specialized agencies and cooperating governments, or other organizations;*

(iii) *draw up and recommend to participating governments criteria for the use of the water of the main river for the purpose of water resources development; and*

(iv) *employ, on behalf of the participating governments, personnel to assist the Committee in the performance of its functions.*

Organization

The Committee has provided an appropriate institutional framework for planning and managing the basin's integrated development which requires the kind of expertise and know-how not available at present in the basin countries. Apart from providing support through the services of international experts and consultants, the Committee provides a framework for the

equitable sharing of the water resources of this international river.

6. Each participating government appoints one member with plenipotentiary authority and such alternates, experts and advisers as it desires. Chairmanship is assumed in turn by the members of the Committee, each for a period of one year. The Committee's *Statute* also provides for the adoption of its own rules of procedure. Meetings are to be attended by all participating governments and decisions are to be unanimous.

Cooperation

7. The establishment of the Committee has helped to develop and maintain regional cooperation among the member countries. Efforts are made to implement joint projects with a regional emphasis and activities aimed at strengthening such cooperation on a long-term basis. Through participation in the Committee, the member states have a channel of communication through which they are able to consult each other. This can contribute to better economic cooperation, the resolution of potential conflicts of interest and improved regional understanding. The spirit of cooperation among the member states has prevailed since the early days and with it the hope that the Committee will continue its efforts to attain its long-term development objectives.

Links with the United Nations

8. Throughout its existence, the Committee has enjoyed the indispensable support of the United Nations and its agencies. Of special note is the support of the United Nations Development Programme (UNDP), and the Economic and Social Commission for Asia and the Pacific (ESCAP). It is through these agencies that the Committee has established and maintains close relations with the international community of nations that

have provided crucial support to the Committee's development programme.

Mekong Secretariat

9. In 1963, the Committee established an independent secretariat headed by an Executive Agent, to plan, direct and coordinate the studies, investigations and other activities included in its development programme. As the member countries could not themselves bear the costs of supporting the Mekong Secretariat, financial assistance was provided by the United Nations, through the United Nations Development Programme, which, with its worldwide interest in helping promote regional cooperation, its development-oriented international assistance programme and its access to international sources of funding, was able to provide institutional support to the Committee from 1964 to 1986. UNDP continues to provide programme support to the Committee.

Indicative Basin Plan

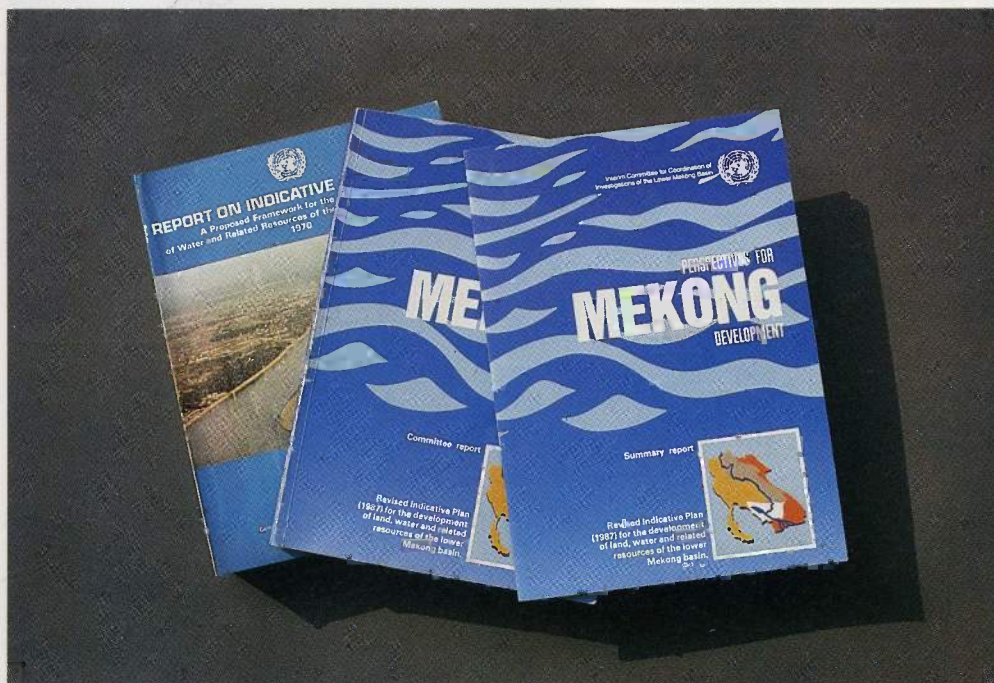
10. To pursue its goal in an effective manner, the Committee published, in 1970, an Indicative Basin Plan, which presented

possible mainstream and tributary projects and a full spectrum of ancillary activities. Serving as a comprehensive inventory and providing a framework and guidelines for the development of the lower Mekong basin's water resources, the Indicative Basin Plan has also been used by the Committee as a basis for selecting projects for funding and implementation.

11. Updated in 1987, the Indicative Basin Plan now includes a framework for projects that could be required in the more distant future. The updated *Indicative Basin Plan*, entitled "*Perspectives for Mekong development*" was approved by the Committee in April 1988.

Work Programme

12. The Committee's Work Programme is an active file of priority projects (basinwide, mainstream and tributary projects) that have been formulated to increase food production and hydropower generation, improve navigation and carry out other ancillary works, within the broad and flexible framework of the Indicative Basin Plan.



◆ *Indicative Basin Plan*

Some of the Committee's achievements to date

13. As part of its basinwide activities, the Committee has set up an extensive network of hydrological and meteorological stations, spanning a large part of the lower Mekong basin, to collect basic field data. Readings from key stations in the network are relayed by radio to the Mekong Secretariat, during the flood season and dry season, for flood and low-flow forecasting. Daily records are kept and subsequently transmitted to the Secretariat for storage and use in support of project planning throughout the basin.

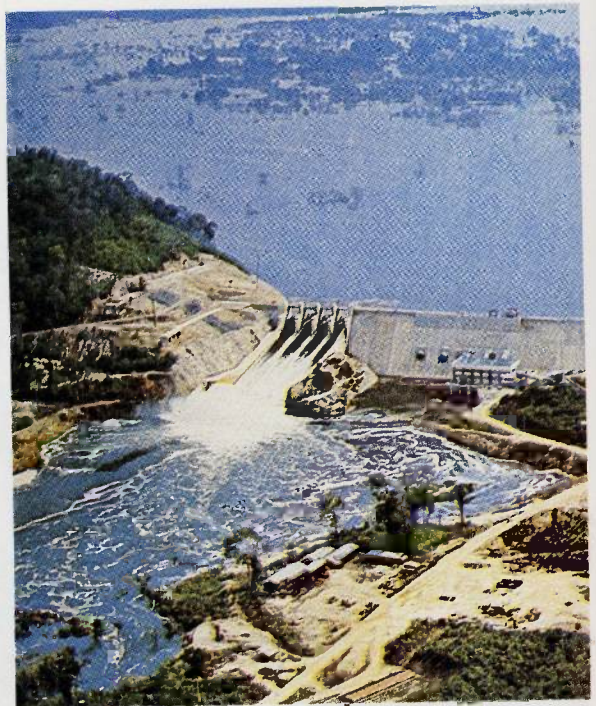
14. Systematic data collection began in 1960 and the data collected over almost 30 years are stored in an information system. These data have been used to prepare an inventory of lower Mekong basin water resources which is stored in a computerized information system that serves as an effective tool in programme planning, project formulation and revision of the Indicative Basin Plan.

15. Studies of the environmental impact of water resources development have included a basinwide survey of waterborne diseases to identify changes in environmental parameters engendered by water resources development that could foster the growth of certain disease vectors and add new vectors to the existing mass. Changes in basinwide water quality and water balance are being assessed and monitoring systems set up. Surveys, aerial photographs and satellite imagery have all been used to prepare land use, crop suitability and pedo-geomorphological maps (issued in 1975) which have added to the Committee's knowledge of the basin and its river system. Thematic mapping activities are being intensified with the use of remotely-sensed images coming from SPOT, a high-resolution satellite, launched in 1986. An effort is also being made to assess the impact on the Indicative Basin Plan of development projects

and the availability of new data.

16. On the mainstream, investigations have so far led to the identification of a number of possible projects which have been the subject of studies, in terms of their potential, with respect to power generation, irrigation, flood control, navigation improvement and low-flow augmentation. Dikes have been built to provide flood protection in the Vientiane plain; problems of salinity intrusion in the delta in Viet Nam have been tackled by carrying out operational studies, including those on salinity intrusion and environmental investigations of its water and land resources; the ongoing Huong My water control project in the delta in Viet Nam has been supplemented by work on Tam Phuong; the main ferry channel at the Nong Khai/Thanaleng crossing and the expansion and equipping of the ports at Thanaleng, Lak Si and Keng Kabao, in the Lao PDR, have enhanced transit capability on the Mekong mainstream.

17. As far as tributary development is concerned, the largest single investment has been for the Nam Ngum hydropower dam



▲ Nam Ngum dam

(capacity 150 MW) in the Lao PDR. An interconnected power grid has, for some years, enhanced regional cooperation by enabling surplus power from Nam Ngum to be exported from the Lao PDR to Thailand. Construction of a similar export-oriented dam, with up to 1,200 MW of installed capacity, is being investigated on the Nam Theun (Lao PDR). Feasibility studies, for Nam Ngiou and Nam Khan in Luang Prabang and Xieng Khouang provinces, in the Lao PDR, and an appraisal of the Yali Falls project, in Viet Nam, have been undertaken. Work on the Huai Mong multipurpose project, which involved the introduction of intensive irrigation on a large area, has been completed, and preparations for similar development in the Nam Songkhram area will eventually result in the elimination or reduction of flooding of a substantial area in NE Thailand.

18. Several projects for fishery development, including pilot fish farms at Nong Teng and at Tha Ngone (Lao PDR), at Lam Pao and Yasothon (Thailand) and a prawn hatchery at Vung Tau in Viet Nam, have been implemented to launch aquaculture (fish farming) to compensate for losses caused by dam construction and intensive irrigation.



◆ *Tha Ngone fish farm*

A fishery station, on the Nam Ngum reservoir, was constructed (1978-82), as part of the Nam Ngum fishery management project.

19. The completed Phase I of the water management support programme in NE Thailand and the ongoing Mekong Irrigation Programme in the Lao PDR and Thailand will help to boost agricultural development in irrigation schemes on the Mekong and its tributaries. The seed multiplication project, the Pak Cheng agricultural development project, and the watershed management project, in the Lao PDR, have helped to make more crop seeds available and to improve watershed management. At Nam Souang and Nam Houm, in the Lao PDR, the construction of irrigation systems to utilize water from the reservoirs created by two completed dams will enhance their utility.

20. Cooperating countries and organizations have given much support to the Committee's programme of training for riparian personnel, and this support of human resources development parallels the financial and technical assistance provided to the Committee's water resources development programme and is regarded as a crucial part of their regional assistance programmes. Thus through the Committee, the member governments are able to upgrade the skills and knowledge of riparian technicians and to facilitate the transfer of appropriate technology in water resources development. The training programme, including seminars,



*Fishery station,
Nam Ngum reservoir* ◆

workshops and training courses, meets both the specific needs of the Committee as well as those of the individual member countries.

Characteristics of the Mekong river basin

21. 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.



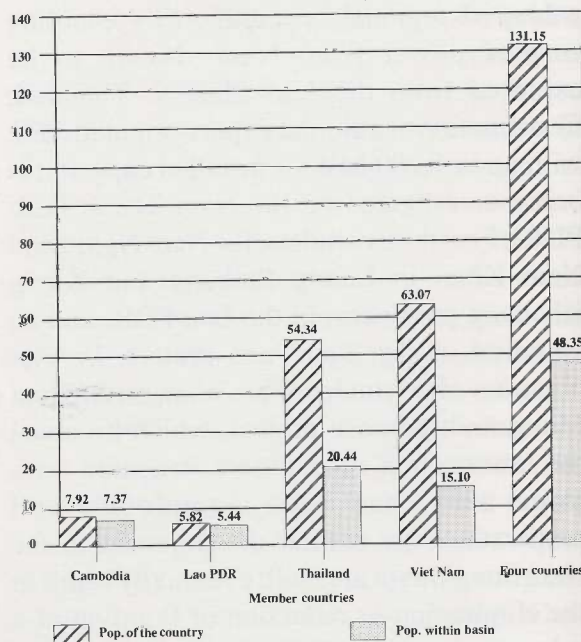
◆ Mekong at Pak Beng, Lao PDR

22. Rising 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.

23. 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 northeastern 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.

POPULATION IN THE LOWER MEKONG BASIN

— An estimate, 1988 figures —



Climate

24. 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.

25. 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

26. 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 (ETZ), 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

27. 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

28. 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 Laos and Viet Nam. Some 80-90 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.

29. 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 range which runs across Laos, eastern Cambodia and adjacent areas in Viet Nam.

30. 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 often cause intense rain for short durations, normally over limited areas.

31. 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 is experienced 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 or more there is very little drought damage. However, in most of the agricultural areas in the basin, rainfall is only 1,000-1,200 mm/year and the provision of an adequate water supply could double the paddy yields.

Flow

32. Each year about 475,000 million cu m of water empties into the ocean off the delta. At Pakse, 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).

33. 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 afterwards 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.

34. 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.

35. The Great Lake (Tonlé Sap) in Cambodia helps regulate the flow 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



▲ "The Great Lake" (Tonlé Sap) in Cambodia

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.

36. 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.

37. 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.

38. 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 rainfall becomes more and more regular, the soils are saturated, 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

39. The amount of water that flows down through the lower Mekong basin each year 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

40. 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.

41. 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.



THE MEKONG DEVELOPMENT PROGRAMME

Work Programme

42. The Committee's *Work Programme* describes the current status of the priority projects and defines the needs in the region as delineated in the overall strategy for the integrated development of the basin's resources presented in the *Indicative Basin Plan*.

43. The *Work Programme* is prepared by the *Mekong Secretariat* with the collaboration

of the national Mekong committees and agencies concerned in the member countries. It serves as a plan of operations for the coordinated implementation of activities at the preinvestment stage, such as planning, data collection, surveys, and feasibility studies, and at the investment stage, such as the construction of infrastructure, including dams, ports and ferry facilities, irrigation works, training centres and related public works.

PROGRAMME ACTIVITIES		
ONGOING PROJECTS:		45
PLANNED PROJECTS (AWAITING FUNDS):		<u>42</u>
	TOTAL:	<u>87</u>
PROGRAMME FUNDING		
		(IN US\$ MILLION)
		REQUIRED AVAILABLE
BASIN PLANNING	21.1	9.8
INFORMATION SYSTEM/DATA COLLECTION	8.4	6.4
RESOURCES DEVELOPMENT	<u>111.9</u>	<u>37.0</u>
	TOTAL:	<u>141.4</u> <u>53.2</u>

BASIN PLANNING

Integrated basin plan studies

44. In the Basin Planning programme area, studies were undertaken as part of the process to update the Committee's *Indicative Basin Plan*. A major revision of the Plan was carried out in 1987 and the updated *Indicative Basin Plan*, "*Perspectives for Mekong Development*", was approved by the Committee in April 1988. The updated Plan reassessed needs in terms of food demand and energy requirements, re-estimated the basin's potential, and formulated an investment plan for the period 1988-2000. It also reappraised two international or "common works" projects (the Low Pa Mong and the Nam Theun 2) for which investment would be required beyond the year 2000, a number of national projects, and a proposal on the reinforcement of the Mekong Secretariat to cope with the envisaged future work load. The Plan included recommendations for further investigations aimed at filling data gaps in the short-term project possibilities, and on required studies that would have to be started in the next 5-10 years to permit implementation of projects in the more distant future. It also recommended regular updating of the *Indicative Basin Plan* to take into account anticipated social and political developments in the region.

45. To follow up the recommendations, a number of studies and other activities were initiated, or were under way or completed during 1989 as part of the hierarchy of studies recommended by the revised Plan. These included the *Prerequisites for common works*

hydropower projects, namely Pa Mong and Nam Theun 2 (dealt with more fully under the section on Multipurpose development), a *Preliminary study on long-term sequential dam and reservoir configuration*, a *Delta master plan study*, initiation of *Organizational and legal studies*, a *Study on a water resources plan for NE Thailand* and a *Study on a water resources plan for the Lao PDR*, and an *Agricultural diversification study*.

46. A one-year preliminary study on an agricultural diversification programme for the lower Mekong basin was completed in October 1989. The report identified crops of high economic and nutritious value that could be substituted for the traditional rice crop currently affected by low prices on the international market. The report recommended follow-up activities including: (i) the establishment of crop diversification research and experimentation; (ii) further studies on farming systems in the member countries; and (iii) selection of suitable areas for introduction of appropriate agricultural crops.

47. A project proposal was prepared in 1989 for a *Study on a water resources development plan for the Lao PDR* to be included in the Committee's *Work Programme*. Activities planned under the proposed project include an assessment of the irrigation and hydropower potential in the Lao PDR that would enable an inventory of water resources development projects to be

prepared, and the formulation of a short-term plan (1991-1995) and a long-term plan (1991-2010), as components of a major water resources development plan, to meet the growing needs for food and power in the Lao PDR. The plan would also incorporate provision for the export of energy to Thailand.

48. One of the most important recommendations in the 1987 revised *Indicative Basin Plan* was for a study to establish an organizational and legal framework to enhance the cooperation between the member countries. The planned *Organizational and legal studies* would include analyses of the following: (i) relevant aspects of the legal system in each member country; (ii) agreements and rights established in the basin either formally or informally; (iii) legal problems and solutions in similar conditions elsewhere in the world; (iv) possible organizational models compatible with the administrative structures in the member countries; (v) organizational and legal models in similar situations elsewhere in the world; and (vi) technical, economic and political aspects of various possible organizational and legal models.

49. Preparatory work for such studies started, in October 1989, with the assistance of a legal adviser from the United Nations Technical Cooperation Department (UNTCO), with the drawing up of the terms of reference and a project proposal. Work on the studies is scheduled to begin in 1990.

50. The two-part *Study on a water resources development plan for NE Thailand* is one of the components of the Mekong Irrigation Programme (dealt with more fully under the section on Irrigation and drainage), and is being carried out by a Netherlands-Thai consultant association, in collaboration with the National Energy Administration (NEA), the Royal Irrigation Department (RID), and (for Part II) the provincial authorities in Surin and Buriram.

51. Part I of the study included the preparation of an inventory and a review of water resources development projects and studies that will contribute to the formulation of a water resources master plan for NE Thailand. A draft final report was prepared in 1989 for discussions between the agencies concerned. The report, which is to be finalized in 1990, provides information on the water needs in the region, possible diversion schemes that could be implemented to make use of mainstream Mekong water, and defines the role of the Mekong Committee in coordinating such activities.

52. Part II concerns the planning and decision-making process with respect to small-scale water resources development projects in hardship areas and is aimed at increasing the role of provincial authorities in this process. Guidelines were prepared for provincial administrators to help them assume a greater role in project identification in priority areas, and the ranking and selection of projects proposed at village and district levels.

53. The use of standardized technical designs and simple appraisal check-lists for small-scale village water resources projects (small weirs and reservoirs, dredging and the improvement of existing irrigation canals and multipurpose community ponds) is expected to improve the quality and timeliness of the decision-making process which at present places a heavy burden on the agencies' staff at the central level. The guidelines also identify environmentally hazardous areas where development projects should be treated with caution.

54. The *Master plan for the integrated development of the Mekong delta in Viet Nam* (Delta master plan study) was formulated to determine how the delta in Viet Nam may be developed in a sustainable way while ensuring that adverse effects on the environment are minimized.



▲ *Mekong delta in Viet Nam*

55. Efforts to increase food production are expected to remain the principal development thrust in the delta for some time, and it is important that such development is balanced with the development of other resources. The *Delta master plan study* addresses Viet Nam's severe financial constraints by helping to prepare projects in such a way that they will attract international funding. The project was also designed to help strengthen institutional capabilities in Viet Nam through the formation of an interdisciplinary body that will participate in the preparation of a master plan.

56. In 1989 the State Planning Committee was appointed by the Government of Viet Nam as the *Government Implementing Agency*. The main task of the *Implementing Agency* will be to coordinate the participation of agencies concerned and to represent the Government of Viet Nam in all matters relating to the implementation of this project. Periodic reviews will be carried out and a steering committee, comprising representatives of all participating institutions and of the nine provincial authorities in the delta, will provide guidance in project implementation.

57. The International Bank for Reconstruction and Development (IBRD or World Bank) will be the *Executing Agency* for the *Delta master plan study* and will be responsible to the United Nations Development Programme (UNDP) for overall project execution. The project will be

implemented under the overall coordination of the State Planning Committee with the assistance of an international consultant and a Vietnamese counterpart team.

58. As the *Associated Agency*, the Mekong Secretariat will assist the World Bank in monitoring and supervising project activities, in reviewing project documents and in procuring equipment and material for the project. The Mekong Secretariat will make available mathematical models and documents in its library for use in the project, provide technical and administrative inputs, and organize and participate in workshops and seminars on specific themes.

59. In July 1989, the draft project document and the terms of reference for the consultant were submitted to the Government of Viet Nam. A short list of five consulting firms was proposed and approved by the Government of Viet Nam and UNDP. Approval of the project was being processed by the Government of Viet Nam and UNDP headquarters.

60. Several studies, which were started in September 1988, in connection with the *Preliminary study on long-term sequential dam and reservoir configuration* project, were completed at the end of 1989. The results of these studies were documented and provide information on the following: (i) preliminary geotechnical assessment of Mekong mainstream dams; (ii) geological interpretation of SPOT imagery for the Luang Prabang area (Lao PDR); (iii) hydrological analysis, including streamflows, rating curves, design floods, and sedimentation; (iv) an irrigation study in the Lao PDR; (v) preliminary design and cost estimates; (vi) a power system study; (vii) systems simulations of mainstream reservoirs; and (viii) economic analysis using the MIT Simulation Model (MITSIM) and economic models.

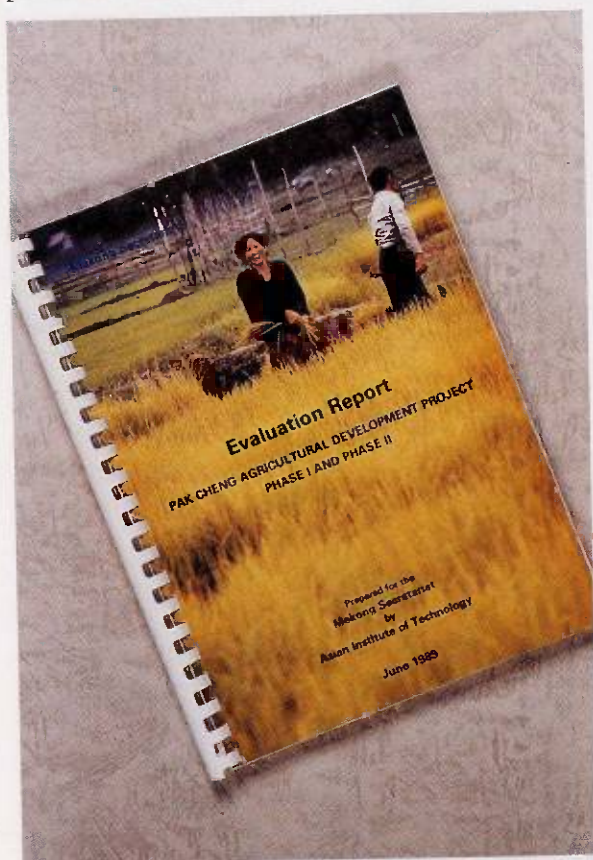
61. The studies were carried out by the Mekong Secretariat with the full collaboration

of the member countries. Engineers from the Lao PDR, Thailand and Viet Nam were seconded by their respective governments to assist the Mekong Secretariat in Bangkok in completing these studies.

62. A comprehensive draft report on the *Preliminary study on long-term sequential dam and reservoir configuration project*, under preparation, will be discussed with the agencies concerned in the member countries and it is expected that a final report will be completed in early 1990.

Economic and social studies

63. A major evaluation of the *Pak Cheng agricultural development project* in the Lao PDR was carried out during the year, in cooperation with the Asian Institute of Technology (AIT), and the results were published in a report in June 1989. Other



➤ *Pak Cheng agricultural development evaluation report*

activities in the Project appraisal and evaluation programme included the collection and analyses of baseline data (two surveys) in preparation for a terminal evaluation of the *Tam Phuong water control project* in Viet Nam, scheduled for early 1990, and an analysis of baseline data for the *Nam Houm irrigation system project* in the Lao PDR.

64. Project evaluation activities provide feedback on project implementation to the Committee and to cooperating countries and agencies and contribute to an increasingly efficient use of available financial and human resources. The Mekong Secretariat's internal project evaluation programme was funded by UNDP for the period 1987-89. With the end of this funding cycle, the Mekong Secretariat has planned a new evaluation programme (1990-91) to ensure that this important function of the Committee is continued.

Project	1988	1990	1991
Pak Cheng Agricultural Development (Lao PDR)	█		
Tam Phuong Water Control (Viet Nam)	█	█	
Vung Tau Prawn Hatchery (Viet Nam)		█	
Construction of Flood Protection in the Vientiane Plain (Lao PDR)			█
Development of Fishermen's Communities in the Nam Ngum Basin (Lao PDR)			█
Mekong Irrigation Programme (Lao PDR and Thailand)			█
Yasothon Fish Seed Production Centre (Thailand)			█
Nam Houm Irrigation System (Lao PDR)	█		█

Legend: █ Baseline survey █ Terminal evaluation

Environmental impact assessment and planning

65. Two major activities were carried out with regard to the Committee's *Coordination of environmental planning project* and the *Integration of environmental management aspects into Mekong resource development project* during the year.

66. First, the Committee approved a proposal to acquire an "Expert System on Environmental Screening" - which was adapted for use in the lower Mekong basin. Activities carried out under this project,

including modelling, the establishment of environmental rules, screening levels and training of users, started in July and are expected to be completed by February 1990.

67. Second, the Committee's Secretariat adopted a method, called "Adaptive Environmental Assessment and Management", which will be used to assess physical, biological, social and economic issues. A pilot project site in the Quan Lo-Phung Hiep area of the Mekong delta was selected because of the ongoing elaboration of different development alternatives there which, if implemented without corrective measures, could cause significant environmental impacts. Training in the use of this approach is dealt with in the Human resources development section.

68. Work continued during the year on the design of the two pilot farms to be set up under the *Ecologically sound development of water and land resources in the Mekong delta* project in Viet Nam. Preparatory work started in October to set up a data base and to prepare guidelines for ecologically-sound development.

69. In 1989, work continued under Phase II (October 1988 to September 1991) of the *Water Quality Monitoring Network (WQMN)* project with funds provided by the Government of Sweden. Phase I of the project started in 1985 and was completed in September 1988.



Water Quality Monitoring Network laboratory, Viet Nam

70. 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.

71. During the year, sampling activities and sample analysis work continued. Thirteen new stations were added to the network in the Ca Mau peninsula in Viet Nam, and two new stations on the Korat plateau in NE Thailand. Preparatory work for monitoring rain-water quality in Viet Nam was carried out and plans made to extend the monitoring of rain-water quality to the Lao PDR and Thailand in 1990.

72. It was decided to incorporate analyses of pesticides in fish into the monitoring programme as a component part of Phase II. Three pesticide laboratories, one in each country, were planned and the first was set up at the Office of the National Environment Board (NEB) in Thailand, in February 1989.

73. The Mekong Secretariat engaged the services of a consultant to make an inventory of equipment needs in the Lao PDR and Viet Nam, and to plan and organize training courses for technical staff working on the *WQMN* project in those countries. Instruments and equipment in the water quality laboratories need to be constantly upgraded and an additional atomic absorption spectrophotometer (AAS) was delivered to the laboratory in Thailand, in May, and another to the laboratory in the Lao PDR, in November 1989. Training activities and participation in international conferences relating to water quality monitoring are reported in the Human resources development section.

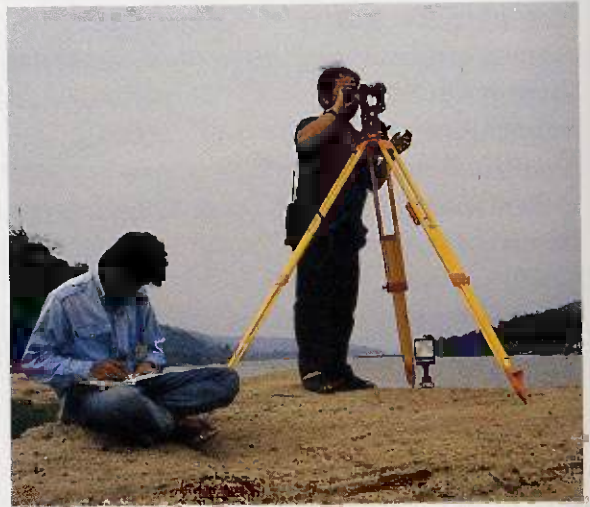
DATA COLLECTION AND INFORMATION SYSTEM

Data collection

Meteorological, hydrologic and hydrographic data collection

74. The main activities on the *Development and maintenance of the hydrologic and meteorological network* project in 1989 comprised the rehabilitation of 12 hydrologic stations and the installation of 17 new stations. Water levels were observed at all hydrologic stations and sediment and water samples were collected and analysed. Discharge measurements were carried out at 6 key stations on the mainstream, as planned, and at 26 stations on major tributaries in the Lao PDR, where data were most needed. Discharge measurements were carried out at 74 hydrologic stations in Thailand, and at 8 stations in Viet Nam. All data were sent to Bangkok for processing before being published in the Committee's Hydrologic Yearbook and, at the same time, transferred to the Mekong Secretariat's hydrologic and meteorological data base (HMDB).

75. In August 1989, the hydrographic survey from Vientiane/Nong Khai to Savannakhet/Mukdahan was completed under the *Updating of the hydrographic atlas* project. The main project activities completed to date include the establishment of a ground control network between Vientiane and Savannakhet, cross-river sounding operations using a computerized echo-sounding boat, and training of project personnel in modern surveying techniques.



◀ Data collection for hydrographic atlas

76. A topographic survey to collect information for updating the hydrographic atlas for the Vientiane-Luang Prabang stretch of the river continued upstream of Vientiane with a reconnaissance survey, carried out in June 1989, to ascertain the condition and location of the existing ground control network on the part of the river that flows inside the territory of the Lao PDR. The survey revealed that about 30 per cent of the ground control monuments built in 1960 were in good condition. Training activities related to the project are reported in the Human resources development section.

77. Work was carried out in December 1989, in conjunction with a team of Finnish experts using the satellite-based "Global Positioning System" (GPS), to locate new ground control monuments which are needed for accurate data collection.



◆ Ground control point

78. In December 1989, the Government of Finland approved further assistance to cover the costs of expert services, surveying equipment, transportation and related expenditures. The scope of the *Updating of the hydrographic atlas* project was extended to cover the stretch of the river from the Burmese, Thai and Lao border, downstream to the Lao-Cambodian border, and, in addition, the Mekong river in the delta in Viet Nam.

79. The Mekong hydrographic atlas was first produced during the period 1960-65 and, as natural changes have occurred in the river's profile, is no longer accurate. One of the main benefits of the updating of the Mekong atlas will be improved navigation safety on the river.

80. The *Improvement of the hydro-met data base management system, network and mathematical model* project (1988-90), supported by the Government of the Netherlands, consists of three components: (i) network optimization; (ii) data base management and data processing; and (iii) master model.

81. Under the network optimization component of the project, an instrument engineer from the Netherlands visited 5 hydrological centres, 18 hydrological stations

and 2 meteorological stations in Thailand from 18 April to 11 May; four hydrological centres, 13 hydrological stations and 2 meteorological stations in the Lao PDR from 13 May to 8 June; and 6 hydro-met centres 18 hydrological stations in Viet Nam from 19 September to 11 October 1989. During the visit, a review was made of the condition of equipment and measuring sites with the heads of the various centres.

82. Under the second component, data base management and data processing, technical staff in hydro-meteorological departments of the Lao PDR, Thailand and Viet Nam, and the Mekong Secretariat, were provided with software packages (HYMOS) and training in their use.

83. The main purpose of the third component of the project is to develop a master model covering the Mekong river from Chiang Saen in Thailand to the sea, using SAFLOW software, and the provision of training in its use. In April, a hydraulic engineer from Delft Hydraulics set up and calibrated the master model; two short-term consultants from Delft Hydraulics supported the development of the model. Training activities and workshops organized under these components are reported in the Human resources development section.

Economic and social data collection

84. In 1989 the Mekong Secretariat carried out further data collection activities, under the *Surveys of waterborne transport* project, to provide information on the volume and type of river craft using the Mekong waterway in Viet Nam. The data and information produced are intended for use in the Committee's planning activities.



► *Waterborne transport in Viet Nam*

85. Surveys of waterborne transport were carried out in the Lao PDR and Thailand in 1985-86. The survey in Viet Nam was carried out by the Mekong Secretariat in close collaboration with the Ministry of Transport and Communications, in January and February 1989. Project activities included the compilation of data provided by government agencies, and a field survey to collect supplementary data on waterborne transport on the Mekong waterway in the delta. Data on cargo and passenger flows and other information about navigation in the Mekong delta were obtained from the Ministry of Construction, the Ministry of Material Supply, and the Ministry of Transport and Communications.

86. The field survey resulted in a total number of 1,997 completed questionnaires which were processed and analysed by the Mekong Secretariat. The results were sent for review to the Ministry of Transport and Communications of Viet Nam, and a statistical publication, "Statistics on inland waterborne

transport in the Mekong delta in Viet Nam", will be produced early in 1990.

Thematic mapping programme

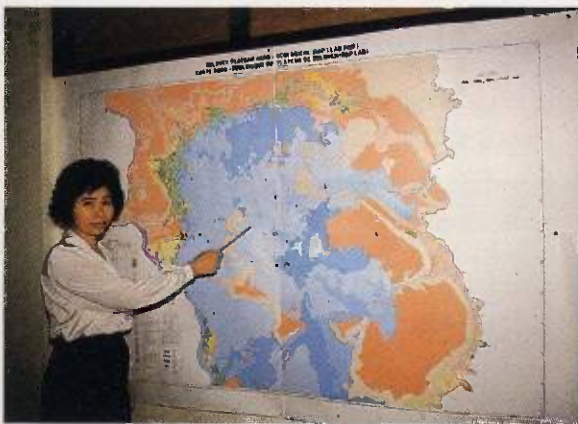
87. Topographic and thematic maps (spatial information) are important tools in planning the development of the lower Mekong basin. The importance attached to the production of these planning tools was acknowledged by the Committee at its 28th session when it adopted the draft programme for the *Establishment of the Mekong Geographic Information System using remote sensing techniques*. The programme represents a logical continuation of the Committee's efforts to map the natural resources of the lower Mekong basin using satellite imagery.

88. Activities in 1989 comprised the digitization and preparation of digital maps including the following: (a) topographic map on a scale of 1:20,000 of the reservoir area for a Pa Mong resettlement study; (b) digitization of the soil salinity maps of NE Thailand on a scale of 1:250,000; (c) digitization of maps showing administrative boundaries from "changwat" (province) down to "muuban" (village) levels in cooperation with the National Economic and Social Development Board (NESDB) of Thailand, and the Thai-Australian NE Village Water Research project (NEVWRP); and (d) final preparation of digital maps covering the whole basin on a scale of 1:1,000,000 (based on maps prepared by the Committee in 1976), showing land use, pedogeomorphology and crop suitability. The Committee purchased a small image processing system to carry out interpretation of remote sensing data more efficiently.

89. Two main activities were carried out during the year under the *Thematic mapping programme* - map compilation and training in remote sensing and GIS technology - with funds provided by UNDP, the Government of

France, the Government of Japan, and the Government of Sweden (through the Swedish International Development Authority [SIDA]).

90. Map compilation activities resulted in the production of land-use maps (500 copies) and agro-ecological maps (1,000 copies) of the Bolovens plateau in the Lao PDR, on a scale of 1:100,000 based on interpretation of SPOT imagery. A similar mapping project was under way in 1989 for the Borikhamxay and Se Bang Fai plains in the Lao PDR.



▲ Satellite image of Bolovens plateau

◄ Agro-ecological map

91. Agro-ecological mapping of the An Giang province, in the delta in Viet Nam, and Buon Me Thuot pilot area, in the Central Highlands in Viet Nam, was completed in December 1989. Similar mapping work continued for the remaining part of the Central Highlands.

92. As a component activity of the *Preparatory studies of the Low Pa Mong multipurpose development* project, a land-use map of the proposed reservoir area was prepared, based on interpretation of SPOT imagery. The map was produced on a scale of 1:100,000 and indicates infrastructure, such as human settlements, road networks, and irrigation canals, as well as different types of cultivation, and forest cover.

93. Training activities in connection with this project are covered under the section on Human resources development.

Information system

94. In 1989, progress made in the *Development of the lower Mekong basin information system* project included improvement of the hydrologic and meteorological data base (HMDB) which now includes menu-driven, user-friendly functions in storing, updating and retrieving data. More than 1,500 station-years of data records were stored in the data base in 1989 bringing the total number of station-years stored to 12,500. Computer programmes were prepared to print out the data from the data base and to plot hydrographs for the 1987 Mekong Hydrologic Yearbook. In addition, the HYMOS software, installed at the Mekong Secretariat by a Netherlands consultant, was used to improve the processing of hydro-meteorological data.

95. With the assistance of the Centre for Water Resources, Anna University (India), the MIT River Basin Simulation Model (MITSIM) was modified to take into account the fluctuations of tailwater levels of power-plants, efficiency variation of turbines, and scheduling and stage development of water resources projects. In addition, two auxiliary computer programmes were prepared for cashflow analysis of the projects. Modelling programmes were improved in connection with the *Preliminary study of the long-term sequential dam and reservoir configuration project*.

96. To improve its data-handling function, the Streamflow Synthesis and Reservoir Regulation (SSARR) programme was modified and directly linked to the HMDB for hydro-meteorological data and use in water balance studies.

97. The Mekong Bibliographic Data Base (MBDB), a component of the Information System, was further updated and improved throughout the year. To date, about 5,000 titles of documents have been entered into the MBDB. A new version of UNESCO's CDS/ISIS software (version 2.3) was acquired to facilitate the updating and retrieval of references in the MBDB.

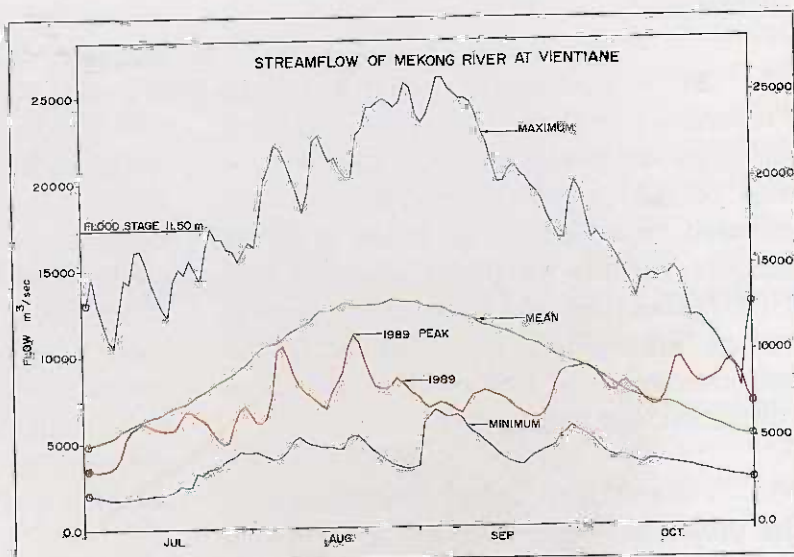
98. Work on the development of the Mekong Secretariat's Socio-economic Data Base (MSEDB), which started in 1987, continued through 1989 and the data base was improved and expanded. Macro-economic data for the Lao PDR and Viet Nam were processed and added to the data base, and the total number of data variables increased from 215 in 1988 to 370 in 1989. The number of records increased from some 4,500 to 5,100.

99. To optimize the use of the data from the existing socio-economic data base, and to reflect prevailing social and economic conditions of potential and actual beneficiaries (inhabitants of the lower Mekong basin) from development projects, a pilot study to develop econometric models for the lower Mekong basin was initiated during the reporting period. A team of local consultants was recruited in December 1989 to carry out the study expected to take about seven months to complete.

Applied hydrology

100. In 1989, river forecasting services continued to provide warnings about impending floods, droughts and, in the delta, about salinity intrusion. While these services are an interim measure, pending more substantial development measures, such as mainstream dam construction to control such problems, the member countries place great importance on continuing the river forecasting operation.

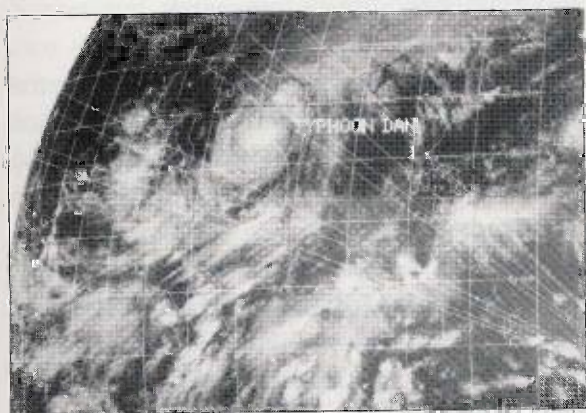
101. The records show that 1989 was another very dry year in the lower Mekong basin. During the wet season (July-October), water levels in the basin, in general, were well below the mean levels. In the middle reach, from



▲ Hydrograph

Vientiane to Savannakhet, the highest peaks of the year were all registered at well below the mean levels. A hydrograph showing the streamflow at Vientiane, during the period July-October, is shown below with its maximum, minimum and mean.

102. There were several major factors giving rise to this situation: the "monsoon trough", the primary cause of rainfall over the region, was very weak, particularly during the period when it was located over the upper reach of the basin in July and August; tropical storms ("FAYE" [9-11 July], and "IRVING" [21-24 July]), and typhoons ("ANGELA" [8-10 October] and "DAN" [12-14 October]) from the west affected the basin only at the beginning and the end of the flood season.



▲ "Typhoon Dan" hit Viet Nam 13 Oct 89

103. No floods or overbank flows occurred along the Mekong mainstream or in the delta during the year. Rainfall levels recorded at precipitation stations were below normal.

104. Annual low flow forecasting activities, which indicate how low the water level is likely to reach during the dry season, were carried out during the critical period, from 16 March to 31 May, at four key stations: Tan Chau, Chau Doc, My Thuan, and Can Tho in the Mekong delta in Viet Nam. Forecasts were issued ten days in advance for daily water levels and daily mean discharges.

105. The Mekong Secretariat provided the annual flood forecasting service, from 20 July

to 20 October, for 13 key stations on the mainstream: five in the Lao PDR, four in Thailand, and four in Viet Nam. The forecasting operation continued until mid-November for four stations in the delta in Viet Nam.

106. Daily forecasts were issued five days in advance and disseminated to the authorities concerned in Thailand, and to the Lao PDR and Viet Nam via the Mekong radio network.

107. A river simulation study, a component of the *Water balance study, Phase III* project, was undertaken to establish procedures for monitoring and assessing the effects upstream developments would have on the downstream flow regime. The study simulated the behaviour of the sequential development of mainstream projects and revealed that appropriate techniques could be developed, using existing models at the Secretariat, to assess the impact of planned and existing development projects on the downstream flow regime.

108. A national workshop on the water balance of the lower Mekong basin, hosted by the Government of Viet Nam, was held in Hanoi, from 30 August to 1 September 1989. The meeting provided an opportunity for Vietnamese planners, hydrologists, engineers and technicians, and staff members of the Mekong Secretariat to exchange views, review the results of previous phases of the study, discuss problems related to the planning of water resources, and agree on topics to be included in the agenda for a regional workshop.

109. Activities carried out in 1989 under Phase III of the *Delta salinity studies* project, with funds provided by the Government of Australia over a 4-year period (1988-91), included the establishment of a network of 34 stations to monitor salinity intrusion in the Mekong delta. Four of the 34 stations were constructed as permanent stations and were

equipped with water level recorders for long-term monitoring. The project covers all areas in the Mekong delta affected by salinity intrusion.

110. Two detailed measurement campaigns, carried out during the dry season, indicated no stratification in February 1989, but significant vertical variation of salinity in June. These data will be analysed to provide information to farmers, and others planning cropping schedules, on the most appropriate time to take fresh water.

111. Modelling work on the first large-scale model, covering the mainstream (Phase II area) and the Ca Mau peninsula (Phase I area), was tested. After improvement in the results of simulation by this first large-scale model, further extension was continued and the work is expected to be completed in June 1990.

112. Efforts to increase food production in the Mekong delta in Viet Nam, to meet the demands of the rapidly growing population of the country, have been hampered by the intrusion of sea water. To help solve this problem the *Salinity intrusion forecasting in the Mekong delta* project, which was started in 1988, continued into a second stage, in 1989, with financial assistance provided by the Government of Australia.

113. The area bordering the Co Chien branch of the Mekong was selected as the location for a pilot project in Stage II of the project to maximize the benefits of the Tam Phuong and Huong My water control projects implemented under the auspices of

the Committee in the Mekong delta in Viet Nam. A network of 12 stations, including 4 stations on the irrigation/drainage canals of the Mekong, was established at the beginning of the 1989 low-flow period. The forecasting operation started on 15 March and ended on 15 June 1989.

114. Responsibility for the forecasting operation was shared by the Mekong Secretariat (which was concerned with the primary forecasting operation for reference stations along the main river channels), the Mekong Delta Hydrological Forecasting Centre in Ho Chi Minh City, and the provincial offices (which are responsible for the secondary forecasting operation involving stations in the canal tributaries and daily updating of long-term forecasts).

115. Weekly forecasts were made by the Mekong Secretariat for a ten-day period starting in March 1989 and sent to the Mekong Delta Hydrological Forecasting Centre in Ho Chi Minh City, for subsequent dissemination to specialized agencies in the two provinces bordering the Co Chien branch of the Mekong. Long-term forecasts of salinity intrusion up to three months in advance were made on 1 December 1989 to enhance the contribution of the salinity forecasting operation in improving the efficiency of water utilization for agricultural production. Users of these forecasts were also encouraged to participate in the forecasting operation and, for the first time, contributed to the running cost. Stage II of the salinity intrusion forecasting programme is scheduled to be completed in December 1990.



RESOURCES DEVELOPMENT

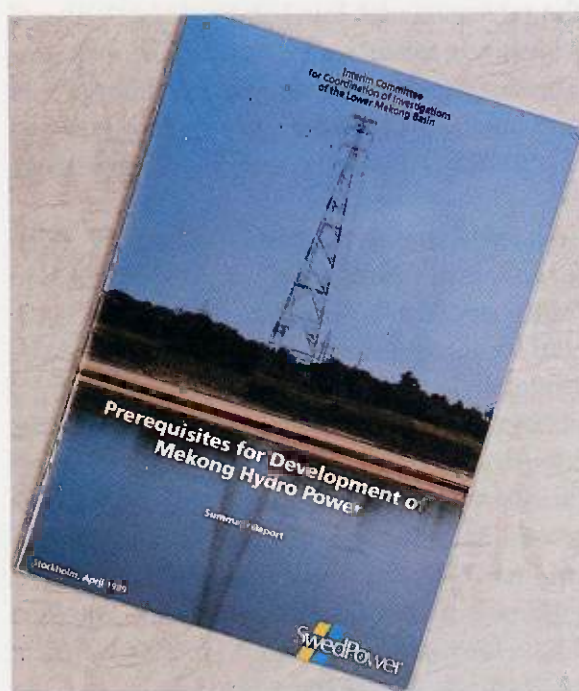
Hydropower development

116. Activities in the hydropower development sub-programme in 1989 focused on two major projects: *Prerequisites for common works hydropower projects in the lower Mekong basin* and a *Feasibility study of the Yali Falls large-scheme hydropower project*, described below. The Mekong Secretariat also monitored developments on two other projects: the *Construction of the transmission line from Nam Ngum to Luang Prabang*, and a *Feasibility study of the Nam Theun 2 hydropower project* in the Lao PDR.

117. A feasibility study of the Nam Ngum-Luang Prabang transmission line project was completed by the Secretariat in 1988, and implementation of the project was started with financial assistance provided by the Asian Development Bank (ADB). Technical consultants have been engaged to carry out the engineering studies and to prepare tender documents for the construction work. The engineering studies are expected to take about one year and will be followed by a two-year construction period. The project is a joint venture between consultants from Switzerland and Sweden.

118. A feasibility study on the Nam Theun 2 hydropower project in the Lao PDR started in August 1989 and is being executed by the World Bank with funds provided under the UNDP country programme. The size of the project is primarily focused on 140 MW with a possible expansion up to 280 MW. The power potential of the site is estimated at about

1,000 MW. The Mekong Secretariat will participate in periodical reviews of the Nam Theun 2 project as part of an expert panel.



► Summary report on Mekong hydro projects

119. A study of *Prerequisites for common works hydropower projects in the lower Mekong basin*, which was started in January 1988, was carried out and completed in May 1989, by a Swedish consultant, with funds provided by SIDA. On the basis of an extensive survey of international power projects shared by two or more countries, and studies of specific conditions in Thailand and the Lao PDR, in particular, and the region in general, possible scenarios for implementing the Nam Theun 2 and the Low Pa Mong projects were identified and examined.

120. The report emphasized the need for a political accord as a prerequisite for co-operation, and an evaluation was made of various joint arrangements for realizing these projects. One of the most important arrangements proposed was for the creation of a joint power authority for general supervision of the projects and establishment of joint venture enterprises or independent companies for their execution. International participation was also taken into account.

121. The report, which was received positively by the Committee and discussed at the governmental level in the Lao PDR and Thailand, covers financial possibilities, aspects of sharing the benefits from the project, concessional arrangements and recommendations on power supply contracts.

122. A *Feasibility study of the Yali Falls large scheme hydropower project*, included in the revised Indicative Basin Plan of 1987, was started in 1988 and was scheduled to be completed in January 1990. The study, carried out by the Investigation and Design Company, Ministry of Energy, Viet Nam, considered a 690-MW alternative scheme aimed at providing power supply to the central and southern parts of Viet Nam. Transmission lines are planned for connections with Da Nang, Quy Nhon and Buon Me Thuot and, at a later stage, Da Nihm and Ho Chi Minh City. The project is located in the Upper Se San basin, a sub-basin of the lower Mekong, in the Central Highlands of Viet Nam.

123. Studies of the Upper Se San basin were also carried out to rank the potential sites and assess appropriate sequential development.

Irrigation and drainage

124. The *Mekong Irrigation Programme* (MIP) was launched in November 1988, and its activities were jointly implemented by Thai and Lao government agencies, assisted

by a team of Netherlands/Thai/Lao consultants. The MIP provides assistance to the Lao PDR and NE Thailand in irrigation, water management, farmers' organization, investment support and credit facilities, and water resources planning.

125. 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*.

126. During 1989 project offices were established in Khon Kaen (NE Thailand) and Vientiane (Lao PDR), agro-socio-economic surveys were made of project areas, work on the design and construction of 8 new pump stations along the Mekong river was initiated, water users' cooperatives were set up, dry-season field crop demonstrations were given, a training needs survey was undertaken, and training workshops in irrigated agriculture, water management, crop husbandry and agricultural cooperatives were held.

127. One of the most important aspects of the MIP is that it promotes the exchange of experience and cooperation across the



◆ Meeting of Thai and Lao farmers

Mekong. MIP cooperation started with two Thai-Lao joint review meetings. Training activities related to this umbrella project are reported in the Human resources development section.

128. Funds were provided by the Government of Italy, over a 3-year period (1989-91), for the *Construction of the Nam Houm irrigation system* (Lao PDR) project. A contractor was engaged and started work on reviewing and updating the design work, preparing tender and contract documents, supervising the construction works, and providing advice on agricultural extension, farmers' organizations, and agricultural support.

129. Work at the project site started in November 1989 with the arrival of the contractor's team leader and is expected to be completed by May 1992. The main aim of the project is to expand the area under irrigation in the Vientiane plain in support of efforts to increase food production to meet the needs of Vientiane municipality.

130. Activities carried out by the Mekong Secretariat in connection with the *Pilot scheme for Sarai groundwater irrigation development* (Viet Nam) project in 1989 included the analysis of 13 well logs (data profiles) provided by the Dong Thap Provincial Water Resources Service and the Sub-Institute of Water Resources Planning and Management of Viet Nam. These agencies used government funds to investigate 7 existing wells and drill 6 new ones.

131. The results of the analysis were presented in the second internal progress report of July 1989, which concluded that all wells shared certain characteristics and groundwater from two aquifer layers, at a depth of some 40 metres, could be used for irrigation and other purposes. A third sand layer, at a depth of 65-90 metres, contains salt water. The report recommended that further

pumping tests be carried out and estimates made of the costs involved in developing these resources.

132. In Viet Nam, the authorities concerned were requested to carry out a comprehensive economic analysis to determine the comparative advantage of developing groundwater and surface water for irrigation and domestic use in the Sarai area.

133. The data collected and analysed from the 13 wells in the area were fed into the data bases of the Lower Mekong Basin Information System (LMBIS) for use in other Mekong projects, including the hydrogeological studies and assessment of the groundwater potential and the *Water Quality Monitoring Network* project.

134. In January 1989, an appraisal mission visited the pilot project site of Phase I of the *Construction of the North Vam Nao (Than Nong) irrigation* project, which extends over 4,721 ha in the upper part of the Mekong delta in Viet Nam. Two consultants, financed by the Mekong Secretariat, reviewed the project implementation schedule and requirements for external assistance. In their mission report, the consultants proposed two financing schemes: a 3-year and a 5-year construction programme. The consultants also recommended the implementation of an agricultural development programme to run concurrently with the construction plan to maximize the project's benefits.

135. All work on Phase I of the *Construction of the Tam Phuong water control* project, an irrigation and drainage project in the Mekong delta in Viet Nam, which started in 1985, was completed on schedule by the end of 1989. The Government of Australia provided financial assistance to the Mekong Committee to implement this project to support the efforts of the Government of Viet Nam to increase food production in the delta and to improve living standards for the people living there.

*Tam Phuong sluice
& people* ▶



136. Work completed in 1989 included the construction of the on-farm system, internal access roads and bridges, and three major sluices: the Da Loc sluice, started in 1987; the Hiep Hoa sluice, started in November 1988; and the Bac Phen sluice, started in March

1989. The Da Loc sluice was completed and became operational in March 1989, the Bac Phen sluice in October 1989, and the Hiep Hoa sluice in November 1989. On-farm work was also completed in 1989. The farm canal system consists of 49 secondary and 361 tertiary canals, and the farm sluice system comprises 49 secondary and 550 tertiary sluices.



*Inauguration
of Da Loc
sluice,
Mar 89* ▶



137. The project was carried out as a pilot project on tidal irrigation in the Mekong delta to improve drainage of flood water and control of salinity intrusion to make it possible to cultivate two paddy crops per year on some 5,400 ha of agricultural land. Though fertile, the delta suffers from problems of poor drainage (which gives rise to waterlogging), and low flow (which permits the intrusion of sea water into agricultural land).

138. The project experienced a severe test when it was inundated by extremely high tides and heavy rainfall in October-November 1989. Although construction work on the Bac Phen sluice and secondary sluices was still being carried out at that stage, damage was negligible.

139. The project area, before implementation of the project, was subject to flooding almost every year during the rainy

season (May-December) and seriously affected by salt water intrusion during the dry season (January-April).

140. Agricultural production in the project area has been increased by the completion of the project, especially the main canal system and Tam Phuong sluice components, which permit a greater degree of water control. For the cropping season of 1988/89, production reached nearly 22,000 tons of paddy as compared with production of 10,500 tons in 1985. To ensure that the annual production reaches the target set in the original project proposal, an agricultural development programme has been developed to encourage more farmers to plant two paddy crops and invest more farm inputs to achieve the best yields.

141. During the year a *Prefeasibility study of the Mekong/Udon Thani reservoir pump irrigation* (Thailand) project was carried out by a consultant financed by the Mekong Committee. The project, proposed by the National Energy Administration of Thailand (NEA), would involve conveying water from the Mekong mainstream to the watersheds of its tributaries via pumping stations, pipelines, booster stations, intermediate storage reservoirs, and open channels to irrigate over 50,000 ha around Udon Thani, in NE Thailand.

142. Three alternative routes for the pumped irrigation main canals were compared and the most advantageous route was identified. The proposed project would require the construction of a pump station on the Mekong, at Ban Khok Pa Fang, a main canal to the middle reaches of Huai Luang (water would also be diverted to the left bank of the Nam Suai), and a weir and booster pumps and canals to both banks of the lower reaches of the Huai Luang.

143. The area to be irrigated by this scheme was estimated at 68,000 ha in the wet season

and 22,000 ha in the dry season. The total project cost was estimated at US\$240 million or US\$3,500/ha, and the economic rate of return was calculated at 19 per cent. Water would be pumped from the Mekong at a rate of 83 cu m/sec maximum (July), and 40 cu m/sec in the dry season or some 3 per cent of the mean Mekong flow during the period.

Multipurpose development

144. In March 1989 the Mekong Secretariat commenced work on the *Construction supervision of the Huai Pa Thao multipurpose project* (Thailand). By the end of the year, it was estimated that some 20 per cent of the Phase I work was completed, including construction of a 22-m high earth dam and appurtenant structures, power waterway, water tunnel, penstock, powerhouse and tail-race channel.



◆ Excavation of diversion channel Huai Pa Thao

145. The project, some 30 km north of the provincial capital, Chaiyaphum, in NE Thailand, 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.

146. The Government of Switzerland financed the final design of the project and provided the services of an international consultant to give technical advice to the National Energy Administration (NEA) on the construction of the project. The Government of Thailand is financing the construction of the project.

147. An optimization study, a component of the *Preparatory studies of the Low Pa Mong multipurpose development* project, was initiated by the Mekong Secretariat, in September 1989, with funds provided by the Swedish International Development Authority (SIDA) and by the United Nations Development Programme (UNDP). The optimization study will take into account the following: resettlement of people now living in the proposed reservoir area, irrigation possibilities, and reservoir sedimentation; an analysis, currently being made, to assess how Low Pa Mong would be integrated into the power system of Thailand; and a review of the

project design. The impact of ongoing and planned development projects in the upper Mekong basin (Lancang river basin) will also be studied. The results of the study will provide a basis for further studies before a full feasibility study is carried out. The World Bank is providing in-house consultancy services for the study and will review the terms of reference and reports.

Flood control and bank protection

148. In 1989, financial assistance was provided by the Government of Australia for the construction of bank protection work at Tha Deua, near Vientiane, in the Lao PDR, under the *Stage II, of the Mekong river bank protection pilot project*. A consultant was engaged for construction design and supervision, and contractors were appointed to supply rocks and carry out construction work which started in December and is expected to be completed in June 1990.



◆ Bank collapse at Sithantai near Vientiane



◆ Dike construction at Sithantai

149. Morphological investigations were carried out in the rainy season of 1989 (June-September), to provide flood warnings to people living near sections of the river bank that are not yet protected. These investigations included regular monitoring of the river morphology at ten sites along the Vientiane-Nong Khai reach and at four sites in the Mekong delta. In July 1989, three long profiles of the river bed in the Vientiane-Nong Khai reach were measured to monitor bed formation under high-flow conditions when severe erosion normally takes place. Data collected over the 3-year period of the project (1987-1989) were compiled and an overall assessment of the data resulted in development of a long-term bank protection strategy for those areas. These data and the results of the morphological analysis are useful not only in the continuing monitoring of bank erosion in the river reaches, but also in planning and designing structures on the Mekong, including the Vientiane-Nong Khai bridge. Information is currently being gathered to prepare a new river management strategy with special reference to the lower Mekong's banks and channels.

150. By December 1989, nearly 95 per cent of the work on the *Construction of flood protection and reclamation of swamp and marshland in the Vientiane plain* (Lao PDR) project was completed. The project aims to protect about 3,000 ha of rice-farming land from damage by flooding along the Mekong river, near Vientiane, by raising the level of existing road dikes from Chinaimo to Nong Heo, a distance of 26.5 km. To date, earthfill work (334,400 cu m), has been carried out over 25.1 km of the existing road dikes.

151. The project's components include improvement of drainage gate structures, reinforcement of critical sections of the existing dikes downstream, and planning work for the reclamation of the That Luang/Salakham swamp project that aims to reclaim some 2,000 ha of swamp and marshland for crop cultivation and fishery development.

152. Construction work on the project, financed by the European Communities, began in 1982. Work on the remaining road dike of 1.4 km, that will connect with the Vientiane-Tha Deua highway, is scheduled for completion early in 1990.

Agriculture, watershed management and agro-industry

153. Seed production at the Hat Dok Keo station under the *Seed multiplication farms, Phase I* (Lao PDR) project reached 150 tons in 1989. Production projections for 1990 and 1991 are 300 tons and 400 tons respectively. Hat Dok Keo now produces seed supplies for various crops at near optimum levels. Overall production in the 1988-89 dry season and 1989 rains crop combined amounted to more than 100 tons per year. Good rice and maize yields were recorded at 4.1 tons and 3.2 tons per ha respectively; yields in leguminous crops were 1.0 to 1.2 tons. The seeds produced at Hat Dok Keo were distributed in Vientiane municipality and throughout the province, and as far away as Luang Prabang, Xieng Khouang, Savannakhet, and Saravane.

154. At Thasano, near Savannakhet, construction work on the irrigation pump system, on-farm development facilities, equipment and staff accommodation was completed in 1989. Seed production commenced during the 1988-89 dry season with 8 ha of rice, soya beans, and mung beans. The crop area was expanded to 30 ha during the 1989 wet season for rice, maize and ground-nut.

155. At Phone Ngam station, near Pakse, all major construction work was completed in 1989 together with some supplementary work. The demand for the rice seed rose dramatically in the 1989 wet season and rice seed production from the 1988-89 dry season crop was above 25 tons. The crop area was expanded to 16 ha: 10 ha for rice, 4 ha for maize, and 2 ha for soya bean.

156. In 1989, a new programme was started under which farmers were contracted to grow seed as follows: Hat Dok Keo 10 ha, Thasano 10-20 ha, Phone Ngam 10-20 ha. Training activities are reported in the Human re-sources development section.

157. The *Study on sandy soils for development and conservation* project was formulated to determine ways to improve the agricultural productivity of the sandy soils in the lower Mekong basin and to promote the welfare of farming families. Initially, project activities focused on the sandy soils of NE Thailand where a series of field trials were started on farms to monitor soil conditions and responses to various treatments, including green manuring. Work also started on the preparation of an extension plan that will make it possible to transfer the technology to other farmers working in similar conditions elsewhere in the lower Mekong basin.

158. The project is being implemented by the Land Development Department, Ministry of Agriculture and Cooperatives, in association with the Department of Agricultural Extension, Thailand. The latter will assume responsibility for operation of the project after completion of the external inputs.

159. In 1989, field trials were organized in Khon Kaen province: 5 on upland farms and 5 on lowland farms. National counterpart staff were appointed and external inputs were provided. Three steering committee meetings were held in 1989 to review progress in the project's implementation. Over the next two years (1990-91) project activities will be expanded and introduced in other provinces. The project is expected to yield information and guidelines on the management of sandy soils elsewhere in the lower Mekong basin.

160. The *Formulation and detailed design for integrated development of the Lam Dom Noi land settlement* project which was started in 1986 with funds provided by the Govern-

ment of Australia, was completed in July 1989, by a joint Australian-Thai consulting team supervised by the Mekong Secretariat.

161. The consultants recommended the construction of additional infrastructure, including a water supply system for domestic and agricultural uses, farm roads and bridges. They also proposed several new income-raising activities, such as cashew-nut shelling, and the production of energy-saving stoves (using local materials, including good quality clay), to help the settlers improve their living standards.

162. The Lam Dom Noi land settlement project was established in 1968 to accommodate about 1,100 families displaced by the construction of the Sirindhorn dam, located some 75 km east of the city of Ubon Ratchathani, in NE Thailand. Development of the project area has received assistance from various sources, both domestic and international, but after nearly twenty years problems remained.

163. Construction work on the infrastructure recommended by the consultants, to be carried out by the Department of Public Welfare, will provide settlers with access to reliable sources of potable and irrigation water. Services to be provided under the project include advice on new farming systems, credit facilities, and training to increase farm productivity.

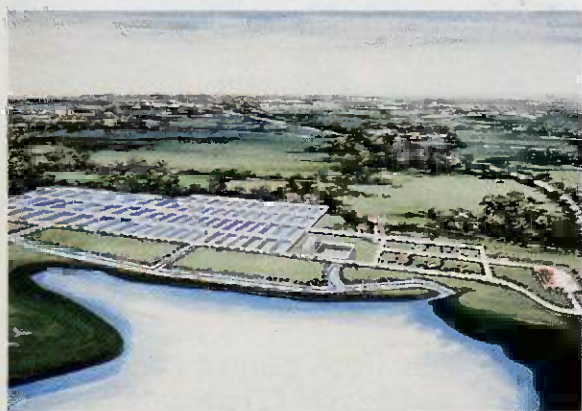
Fisheries

164. The Government of Switzerland pledged support in May 1989 for a *Pilot fishery development project at the Nam Souang reservoir* in the Lao PDR, to demonstrate strategies and means of exploiting the fishery potential of the reservoir. The project is expected to become a forerunner for future fishery development activities in reservoirs constructed on seasonal streams. Project implementation is scheduled to commence in April 1990.

165. The *Development of fishermen communities in the Nam Ngum basin* (Lao PDR) project, which started in March 1988 with financial assistance provided by the Government of Switzerland, is scheduled to be completed in March 1990. The project was formulated to help those people who had been relocated as a result of the construction of the Nam Ngum hydroelectric dam. Advice and guidance were given to settlers living in communities around the Nam Ngum reservoir, on ways of improving fishing techniques that would enable them to obtain a better fish catch from the reservoir.

166. In May 1989, the Government of Switzerland pledged further assistance to implement Phase II of the project. Preparation work on Phase II of the project in 1989 included the planning of appropriate fishery management measures to improve and increase fish stocks that will permit fishermen to take a higher fish catch from the reservoir; reorganization of two cooperatives to secure fuller participation of fishermen in the exploitation of the reservoir, and in the collection, transportation and marketing of fish; provision of health care centres, community centres, and schooling and drinking water facilities to improve social conditions of people living in fishing communities.

167. Clearance of land for work on the *Construction of the fish seed production*



◆ Artist's impression of Yasothon fish seed production centre

centre project, in Yasothon province, NE Thailand, commenced in January 1989 and was completed in July 1989 when construction work started on a hatchery, 40 nursery ponds and 24 brood-stock ponds. The construction phase of the project is expected to be completed in October 1990.

168. The fish seed production centre project was formulated to supply fish fry to replace natural stocks whose numbers have declined due to the development of irrigated agriculture in flood plains in NE Thailand. Flood plains are the natural spawning and nursery grounds for various species of river fish. The project is being carried out with funds provided by the Government of the Netherlands, and with the assistance of a Netherlands/Thai consultant team.

169. The results of ecological studies, which were started in December 1988 and completed in February 1989, provided inputs for the preparation of a fish stocking programme and finalization of plans for technical services on fish hatchery and farm management. A survey of water bodies was carried out in August/September 1989 to select appropriate locations for training and extension activities on stock assessment and the fisheries management programme scheduled for implementation in February 1990.

River works and transport

170. Significant developments in 1989, in the River works and transport sub-programme, included a proposal to study the construction of a second bridge on the lower Mekong. The project proposal was included in the Committee's *Work Programme* for 1990 and was approved by the Committee at its 29th session, held in May, in Khon Kaen, Thailand. A number of sites are being investigated in the Keng Kabao/Mukdahan-Savannakhet area.

171. The Asian Development Bank (ADB) approved funding, in principle, for the reconnaissance feasibility study and a joint ADB/Mekong Committee fact-finding mission was fielded in October 1989. The study is scheduled to take place during the period March-December 1990. If the feasibility of the second bridge is established, design and construction could begin in 1992 and the bridge completed in 1995-6.



◆ Signing of "MOU" on southern Mekong bridge between ADB and Mekong Secretariat

172. Construction of the first bridge on the lower Mekong, based on studies made by the Mekong Committee in the 1960s and 1970s, is expected to be completed by 1994, funded by the Government of Australia which has undertaken to provide a new bridge design.

173. Under the *Construction of ports at Tha Deua and Pak Khone* (Lao PDR) project, new river ports were completed in April 1989, at



◆ Inauguration of Tha Deua/Pak Khone ports. Lao PDR, Apr 89

Tha Deua/Pak Khone, in Sayabouri province, and also at Luang Prabang, with funds provided to the Committee by the Australian International Development Assistance Bureau (AIDAB).

174. Construction work was carried out by a Lao construction company under the supervision of an Australian consultant, with management support provided by the Mekong Secretariat. Concrete ramps, warehouses and access roads were provided together with two engines for the ferry boats operating between the two sister ports at Tha Deua/Pak Khone.

175. The completed facilities at Tha Deua/Pak Khone, some 30 km northeast of the provincial town of Sayabouri, and at Luang Prabang, were officially handed over to the Government of the Lao PDR by the Director-General of AIDAB, Mr Robert Dun, on 6 April 1989. Training activities are reported in the Human resources development section.

176. The construction of these ports will not only facilitate the movement of goods in the Lao PDR, but will also serve to promote the general improvement of combined river/road traffic. However, the full benefit of these projects can only be assessed when such complementary development activities as road construction and the improvement and development of other infrastructure are implemented.

177. In May 1989, the Government of Australia pledged support for the *Construction of concrete ramps at Pak Beng, Ban Houei Say, and Pak Lay* (Lao PDR) project. Construction work started at Pak Beng in September 1989.

international meetings and workshops which emphasize environmental aspects of river basin development. Participation in such meetings would also help the international community to gain access to the knowledge obtained over the years by the Mekong Committee in dealing with the environmental impacts of development.

184. 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.

185. Under the *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.

186. 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.

187. "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 from 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.

188. 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 (3 each from Lao PDR, Thailand and Viet Nam and 2 Mekong Secretariat staff members).



▲ Training course for hydro-met data base management, Feb 89

Training in GIS, remote sensing and thematic mapping

189. In connection with the *Thematic mapping programme*, "on-the-job" training in photo interpretation and map preparation was provided for Vietnamese technicians (4) at the Secretariat.

190. Training in the use of GIS (ARC/INFO) was given to Vietnamese technicians (5) at the Mekong Secretariat and at the Department of Survey Engineering, Chulalongkorn University, Bangkok, Thailand.

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

192. In January 1989, under Phase III of the *Delta salinity studies* project, two project engineers enrolled for a master's degree course on optimization techniques in water resources planning and hydraulic studies in deltas at the University of New South Wales, Sydney, Australia. Technical experts from the riparian countries also participated in a study tour to three states in Australia in April 1989, to gain an insight into the problem of salinity in river basin development planning and organization of research activities into water resources development.

193. 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.

194. Under the *Mekong Irrigation Programme*, 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.

195. Training in connection with the *Construction of the Tam Phuong water control* project was given in 1989 on construction management, design of sluice

gates and foundation work, and operation and maintenance (O&M) management of irrigation projects. While the results of training on O&M management will be applied directly to the operation of the Tam Phuong water control scheme, the results of the other training courses will be applied to other projects carried out by the Committee in the delta in Viet Nam.

196. Within the framework of Phase II of the *Seed multiplication farms* project, a programme of the staff training was carried out in 1989, including training abroad and in-service and "on-the-job" training.

197. Technical training was organized in 1989 as part of the *Construction of ports at Tha Deua and Pak Khone* project to familiarize project personnel with port operation and management and to provide training with respect to the use and control of vehicles and stores systems. Project personnel also participated in study tours to ports in Thailand and Australia in 1989 to learn about management systems.

International water law and management

198. At the invitation of the International Institute of Hydraulic and Environmental Engineering, on behalf of the Economic Commission of the European Communities (EEC), seven representatives of the Mekong Committee, two from each of the riparian countries and one from the Mekong Secretariat, participated in the course "International Water Law and Management" at Delft, the Netherlands, from 11 to 29 September 1989.

199. 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.

200. The course programme included discussions on eight juridical and management subjects, six technical topics and six case studies. The organization and management of the Interim Mekong Committee was considered to be a good model for other groups of states sharing international river basins to adopt. The participants recognized 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.

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

202. 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.

Regional seminar on water quality monitoring

203. 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.



FINANCE AND ADMINISTRATION

Financial information

Income

204. The Committee's total income for 1989 amounted to US\$9,402,859. The major part of these funds (US\$7,927,195) were contributions paid to the Committee by cooperating countries and agencies in support of its development programme during 1989. 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.

205. In addition, the member countries each contributed US\$100,000 during the year (total contribution US\$300,000) to support the Committee's activities. Other income derived from services provided to projects, interest earned and income from the disposal of property and sale of documents, amounted to US\$1,175,664.

Expenditures

206. Total expenditures during 1989 amounted to US\$8,823,363. The major part of these funds (US\$8,153,664) was used for the procurement of goods and services in support of the Committee's development programme. Administrative expenditures from the Mekong Secretariat's administrative reserve fund amounted to US\$669,699. The Secretariat continued to implement cost-cutting measures designed to further

rationalize its operations and maximize its efficiency during the year.

Administration

General

207. The work of the Committee is carried out by the Mekong Secretariat which is located in Bangkok. In 1989, the Secretariat comprised approximately 91 staff, including 44 professional staff and 47 general service staff. During the year there were 9 full-time trainees ("riparians on stipend") from the member countries working at the Mekong Secretariat.

208. During the year, a *Project Manual* was prepared as a working tool for the Secretariat to standardize and codify procedures related to the project cycle. The manual, which provides guidelines on the critical elements of identification, formulation, appraisal, implementation, monitoring and evaluation of projects, now serves as a handbook for all parties concerned with Mekong Committee projects. It was prepared using concepts about project assistance which have evolved from the Secretariat's experience over thirty years and from that of other bilateral and multilateral programmes. Two training courses were organized for project officers related to the steps of the project cycle. A training course on procurement procedures was also held for all project staff.

209. The Secretariat expanded the use of computers in its operations throughout the year. This is helping to increase productivity while keeping the staffing level constant. Professional staff and secretaries are equipped with PCs and have received on-the-job training to ensure that they are kept abreast of the latest systems and applications. Computer hardware and software were procured as needed within available budgets. Plans were drawn up during the year to install a Local Area Network (LAN) during early 1990 to link all terminals within the Secretariat.

210. The Financial Monitoring System (FMS), with its on-line capacity at terminals throughout the Secretariat, was further refined during the year. The FMS has been developed as an effective monitoring device for project implementation and financial developments related to projects.

Institutional matters

Meetings

28th Committee session

211. The 28th session of the Interim Mekong Committee was held in Bangkok from 30 January to 1 February 1989. Mr Prapath Premmani, the Member for Thailand and Chairman of the Committee for 1989, presided over the meeting which was also attended by observers from ESCAP and UNDP.



► 28th session in Bangkok Jan/Feb 89

29th Committee session

212. The 29th (plenary) session of the Interim Mekong Committee was held in Khon Kaen, NE Thailand, from 22 to 25 May 1989, and was attended by representatives of 17 countries and 9 international agencies. The meeting was presided over by Mr Prapath Premmani, Committee Chairman for 1989, and opened by Mr Prachuab Chaiyasan, Minister for Science, Technology and Energy, Thailand. During the meeting priority activities for 1989 were considered and, in this context, 16 project proposals and 5 progress reports were presented by the Committee's Secretariat.



► 29th session in Khon Kaen, Thailand, May 89

213. Some US\$7 million was pledged by cooperating countries and agencies for the activities of the Committee during the 29th session. This included US\$1 million from Finland, US\$1.6 million from Sweden, US\$2.1 from Switzerland, and contributions from Australia, France and Japan.

214. During the meeting, the Executive Agent announced the release and distribution of a publication prepared by the Secretariat entitled *The Mekong Committee and Thailand's development*. The brochure gives an overview of the Committee's role in promoting development in NE Thailand, and indicates ways in which the Committee can help the 19.5 million people living in that part of the country. Similar publications on Laos and Viet Nam were being prepared.

National seminar on the Mekong Committee ("*Mekong Day*")

215. More than 200 officials from different Thai agencies dealing with water resources development participated in a national seminar on the Mekong Committee held in Khon Kaen, 11 August 1989. The seminar, which was organized to inform Thai officials of the range of activities of the Committee, was opened by HE Mr Prachuab Chaiyasan, Minister for Science, Technology and Energy. During the seminar, participants discussed a variety of subjects, including irrigation, flood control, water quality and fisheries.



► *Participants at Mekong Day in Khon Kaen, Aug 89*

ESCAP 45th session

216. The Chairman of the Committee for 1989, Mr Prapath Premmani, and the

Executive Agent, Mr C. Jan Kamp, attended the 45th meeting of the Economic and Social Commission for Asia and the Pacific (ESCAP), held in Bangkok from 27 March to 5 April 1989.



LIST OF MAJOR DEVELOPMENT PROJECTS
UNDER COMMITTEE A-1 (1972)

ANNEXES

Year of Completion	Project Name	Priority	Category	Estimated Cost (Million)	Remarks
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

**LIST OF MAIN DEVELOPMENT PROJECTS
UNDER COMMITTEE AUSPICES**

No.	Project	Country	Purpose	Total cost ^{a/} (US\$ million)	Year of Completion/ Status
1	Nam Pung	T	P	5.4	1965
2	Nam Pong	T	PI	28	1966
3	Lam Phra Plerng	T	I	9	1967
4	Lam Pao	T	I	32	1968
5	Lam Takong	T	I	11.4	1970
6	Lower Se Done (Selabam)	L	P	3	1970
7	Nam Dong	L	P	1	1971
8	Nam Ngum	L	P	93	1971
9	Lam Dom Noi	T	PI	17	1971
10	Nam Phrom	T	P	19	1972
11	Nam Oon	T	I	21	1973
12	Nong Khai Industrial and Boat-building Centre	T	N	1.7	1970-1979
13	Prek Thnot	K	P	27 ^{b/}	interrupted since 1975
14	Huai Luang	T	I		1979
15	Ferry boats Thanaleng/ Nong Khai	LT	N	2.2	1981-1985
16	Nam Houm	L	I	2.8	1981 (dam)
17	Nam Ngum fishery	L	P	1.3	1982
18	Nong Teng fish breeding station	L	P	8.5	1983
19	Improvement of cargo- handling facilities, Laksi + Thanaleng	L	N	0.4	1985

No.	Project	Country	Purpose	Total cost ^{a/} (US\$ million)	Year of Completion/ Status
20	Lam Pao fish farm	T	F	2.8	1985
21	Keng Kabao transit port	L	N	3.3	1986
22	Huai Mong	T	F	2.3	1986
23	Mekong Pump Irrigation	L	L	1.3	1986
24	Huong My	V	L	4.8	1987
25	Vung Tau prawn hatchery	V	F	1.7	1987
26	Tam Phuong	V	I	14.4	ongoing
27	Tha Deua/Pak Khone	L	N	2.3	ongoing
28	Rehabilitation of Thanaleng port	L	N	2.8	ongoing
29	Pak Cheng agriculture development	L	A	1.4	ongoing
30	Lam Dom Noi fishery	T	F	3.5	new project

Notes: L : Lao PDR T : Thailand V : Viet Nam
K : Kampuchea P : Power I : Irrigation
F : Fisheries A : Agriculture N : Navigation

a/ Price level at the construction time

b/ Total estimated

Cash and *in-kind* contributions received
1 January 1985 to 31 December 1989
(US\$)

Donor	1985	1986	1987	1988	1989	Total
Australia	1,187,900	3,006,752	2,398,114	3,190,310	924,186	10,707,262
Belgium	119,000	11,000	-	-	400,000	530,000
Finland	-	-	-	373,134	282,084	655,218
France	94,505	118,821	108,725	105,668	30,000	457,719
Italy	-	-	-	1,250,000	-	1,250,000
Japan	135,000	160,000	170,000	100,000	245,000	810,000
Netherlands	1,796,133	849,775	498,675	854,144	2,332,407	6,331,134
New Zealand	-	21,777	36,827	47,137	77,693	183,434
Sweden	349,768	1,014,796	609,022	1,262,903	1,431,070	4,667,559
Switzerland	132,222	442,210	649,000	170,000	103,000	1,496,432
United Kingdom	-	70,500	127,367	133,000	27,704	358,571
ESCAP/UNDP	20,000	20,000	32,424	20,000	23,106	115,530
European Communities	826,888	847,101	573,610	393,104	293,696	2,934,399
UNDP	1,255,660	2,064,552	1,513,780	1,331,264	2,059,601	8,224,857
UNDP/OPS	3,500	256,500	78,145	88,105	10,000	436,250
UNEP	-	-	8,000	120,000	80,151	208,151
Member Governments	250,000	269,000	240,000	270,000	300,000	1,329,000
Other Income	228,782	352,086	545,429	486,611	966,880	2,579,788
Total	6,399,358	9,504,870	7,589,118	10,195,380	9,586,578	43,275,304

MRC Documentation Centre



0016044

Mekong Secretariat

Pibultham Villa

Kasatsuk Bridge, Rama I Road, Bangkok 10500, Thailand

Tel : 225-0029-Telex : 21322 MEKONG TH-Telefax : 225-2796