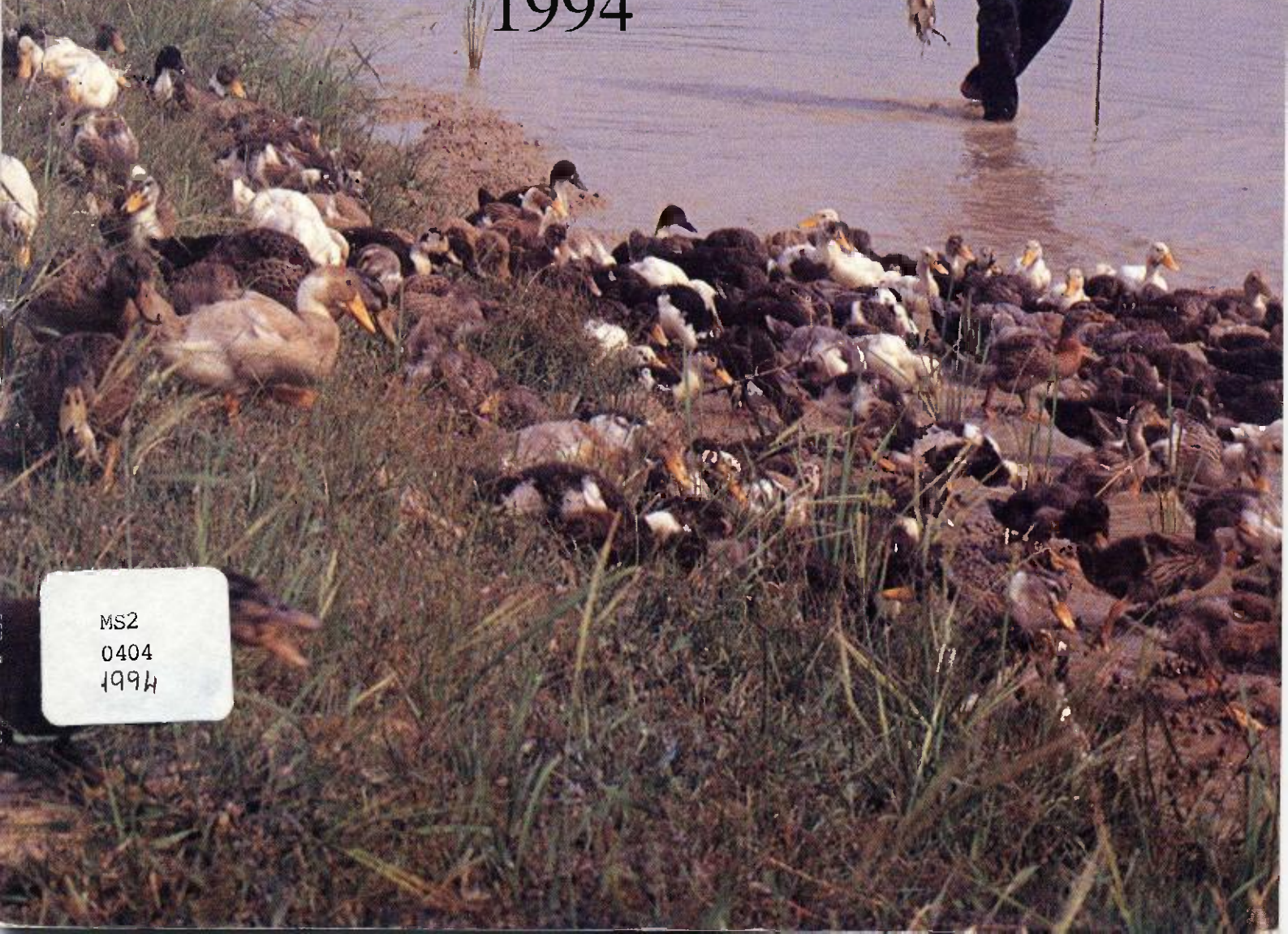




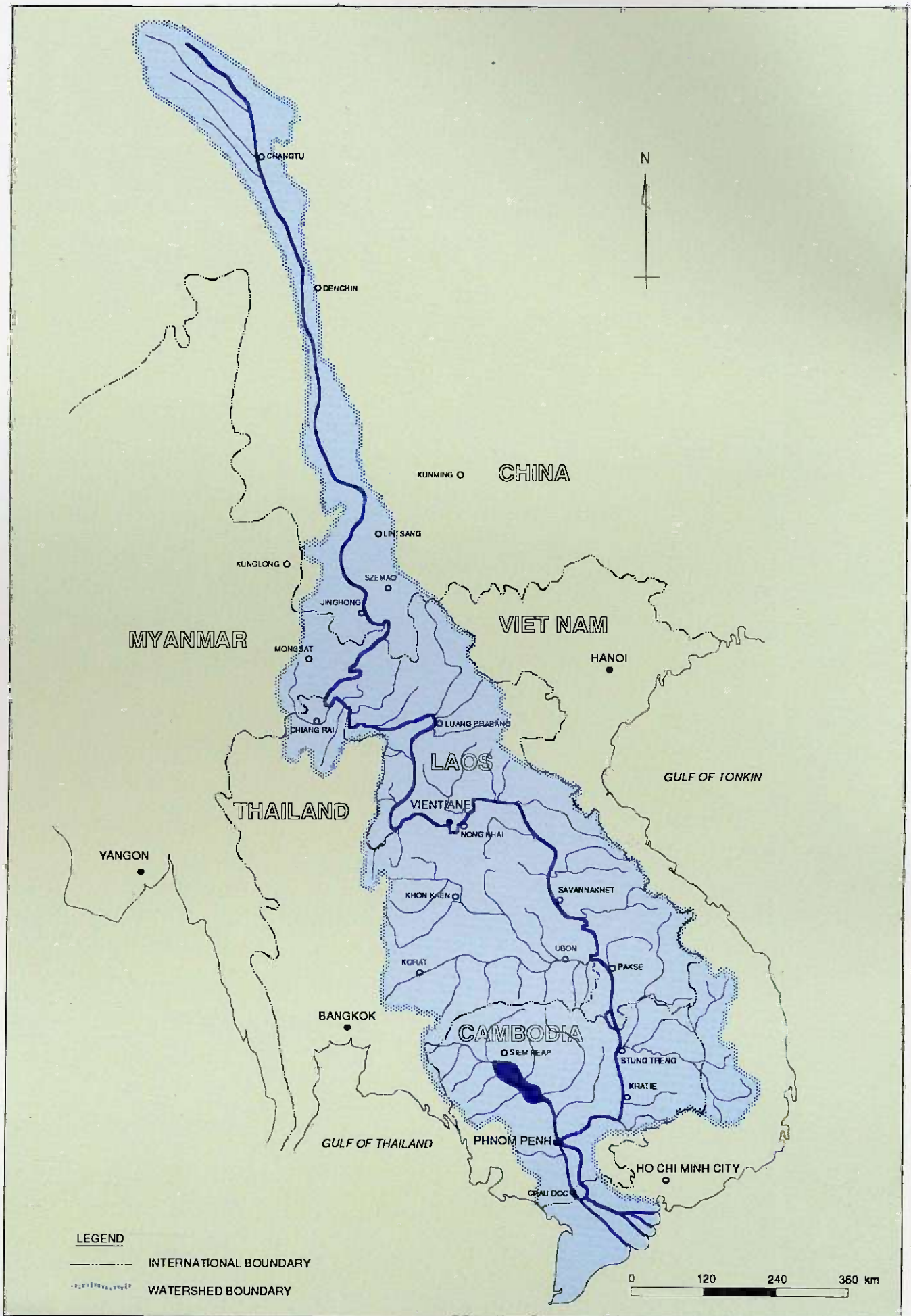
MEKONG SECRETARIAT

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# MAP OF MEKONG BASIN



Cover: A typical rural scene in Cambodia



## NEARLY FOUR DECADES OF MEKONG COOPERATION

The potential of the Mekong River remained virtually unknown until 1951 when the Bureau of Flood Control of the United Nations Economic Commission for Asia and the Far East (ECAFE, the predecessor of ESCAP) made its first studies and investigations. Although conditions in the region were unsettled then, a thorough appraisal of the river's potential could be made through the compilation and analysis of topographic, hydrologic and other data.

With the political situation improving in 1954, interest in the Mekong River revived. In 1955 at its eleventh session, ECAFE reaffirmed the importance of developing international rivers and called for further Mekong River studies. These were carried out by a group of experts who looked into the potential uses of the Mekong River in terms of irrigation, navigation, flood control and hydro-electric power generation. Their report, *Development of Water Resources in the Lower Mekong Basin*, confined its focus on projects which might benefit two or more countries, and recommended close cooperation among the four countries in the lower Mekong basin for data collection, planning and development. Thus the foundation was established for international cooperation in the future. Noting the lack of certain basic data, the report called for more studies to collect these data in a systematic way; it also suggested the construction of several dams and barrages for tapping some of the irrigation and hydro-electric potential of the Mekong River.

Soon after adopting the report of ECAFE's 13th session in March 1957, the four lower Mekong basin countries (Cambodia, Laos, Thailand and Viet Nam) adopted a 'Joint Declaration', expressing the wish that 'studies be continued jointly' in order to determine in more detail how the river's potential could be of use to them. On the basis of the recommendations of a

subsequent meeting of experts of the four countries, and a preparatory meeting assisted by ECAFE, a 'Statute of the Committee for Coordination of Investigations of the Lower Mekong Basin' was adopted in September 1957. This was the beginning of the 'Mekong Committee' and later became the 'Interim Mekong Committee' in 1978.

The Mekong Working Group initiated in Kuala Lumpur, Malaysia in December 1992 was a logical consequence of the new situation in the region, such as the peaceful climate, the increased economic growth due to the changing mechanism from centralized to market-oriented economy, and the needs of the riparian countries, all of which were also the reasons for the evolution of the original Committee. The Mekong Working Group met five times, the last time for the initialling of an 'Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin' in Hanoi on 28 November 1994. The actual Signing Ceremony of this historic document is scheduled to occur on 5 April 1995 in Chiang Rai, Thailand.

The Mekong Working Group's series of discussions focused on principles for sustainable utilization of the water resources of the Mekong River system and institutional, financial and management issues relating to the mechanism of coordination. Agreements on these issues are crucial for the peaceful, sustainable and mutually beneficial development of the lower Mekong basin's natural resources.

Given this dynamic process for future Mekong cooperation, the long-term forecast looks both promising and challenging for the riparian countries and their people, the donor community and the Secretariat. Through the uncertainty of 1994, the renowned 'Mekong Spirit' has proven to be resilient and donor support continued to be strong.

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## RECAPPING 1994

### ~ Mekong Working Group.

It may be recalled that the Mekong Working Group (MWG) comprising of representatives from Cambodia, Laos, Thailand and Viet Nam held a series of meetings during 1993-94 to formulate the new framework for Mekong cooperation. The Mekong Working Group has been supported by a Senior Adviser appointed by UNDP. UNDP has also chaired the Mekong Working Group meetings.

At the fifth and final meeting in Hanoi, the draft Agreement, including the new framework for cooperation, was initialled by representatives of the four riparian countries on 28 November 1994. This framework will serve as a basis for forward and long-term planning to ensure sustainable development of the Mekong River basin. With the formal signing of the Agreement expected in April of 1995, the Mekong River Commission will be established. The Commission will comprise the following bodies: the Council, the Joint Committee and the Secretariat. The Secretariat will enter a new era with new challenges.

### ~ Development Initiatives

As peace, stability and cooperation is being strengthened among the six countries of the Mekong basin (Cambodia, China, Laos, Myanmar, Thailand and Viet Nam), the growth potential has been attracting private and institutional investors, such as the Asian Development Bank (ADB), the World Bank and other national and international organizations. The Mekong Committee's role in coordinating Mekong water resources development and management was recognized to be important for sub-regional development initiatives during several high-level international discussions. The common goal of the new initiatives was to further promote regional cooperation and economic development among the countries along the entire Mekong River.

The Secretariat also participated at the inauguration of the Mekong Friendship Bridge, presided over by HM the King of Thailand and HE the President of the Lao PDR, on 8 April 1994. HE the Prime Minister of Australia, HE the Prime Minister of Laos, HE the Prime Minister of Thailand, high-ranking officials from the two riparian countries and many other representatives of the donor community joined the celebrations.

### ~ Continuous Donor Support

Donor commitments to the Mekong Secretariat

during the 1980s and early 1990s ranged from US\$8 to 10 million a year. Throughout the ongoing discussions among the riparian countries regarding a new framework for future cooperation, donor commitments peaked in 1992 and 1993 with US\$16.2 million and US\$14.9 million respectively. This clearly indicates that the Secretariat has been able to present high quality projects which can effectively compete for donor funding. It shows a growing interest among donors in the development of the Indo-China subregion and the donor community's strong support for the reconstruction of Cambodia; and these figures demonstrate the donors' sincere belief that, in spite of difficulties and delays, a new legal framework for regional cooperation of shared water resources would eventually be established. It is also worth mentioning that over the last two years new donors such as Austria, Israel, the Republic of Korea, and the United Nations Environment Programme (UNEP) have joined the donor community.

During 1994 the Secretariat organized two study tours for Embassy representatives. The first one in May to North-East Thailand and the Xeset and Khone Falls areas in Southern Laos was to provide them with information on project achievements and informally exchange views with the Lao and Thai officials. The second 'donor trip' to the Northern Economic Growth Quadrangle was organized in November/December to visit projects near Chiang Mai, Mae Kok, Mae Sai, Chiang Rai, Chiang Saen, Ban Huai Sai (Laos) and Chiang Khong. The donors were given the opportunity to learn about the problems and prospects of the region and to discuss various Mekong matters.

### ~ Planning for the Future.

The *Mekong Work Programme* is one of the focal planning documents for developing the water and related resources of the lower Mekong basin. Based on an overall strategy for the sustainable and integrated development of the basin's natural, human and financial resources, it gives an annually updated overview of the coordinated implementation of programmes and projects.

The draft *Mekong Work Programme 1994/95* provides comprehensive summaries on planned and ongoing programmes and projects. A list of ongoing projects appears as Annex II. The annual review of the *rolling action plan* ensures that it reflects the development priorities of the riparian countries and is in conformity with their national development plans. It responds to the national political realities on the one hand and the interests and funding priorities of the donor community on the other.

## TECHNICAL COOPERATION

### ~ Background

The main functions of the Mekong Committee have been to promote, coordinate and supervise the planning, investigation and implementation of water resources development projects in the basin. Owing to political upheaval in the region during the 1970s, Cambodia could not participate in the Committee in 1975. Its absence led to the formation of the Interim Mekong Committee (IMC) in 1978. The Committee will be superseded by the Mekong River Commission in 1995.

The purpose of the Committee has been to work with the riparian countries to maximize social and economic benefits by following a course of sustainable and environmentally sound development of the Mekong's water resources. Key sectors covered include irrigated agriculture, flood control, energy, forestry, fisheries and navigation.

Financial and technical support for IMC activities comes from the riparian countries themselves and international sources, including governments and multilateral agencies.

The Bangkok-based Mekong Secretariat oversees the implementation of programmes and projects with professional staff from the riparian countries and international experts. The Secretariat also serves as a repository of data and studies conducted for the development of the lower Mekong basin and as a platform for training riparian personnel. The Mekong activities are organized in the areas of Policy and Planning, Technical Support and Resources Development.

### ~ Three major areas

~ **Policy and Planning** activities include macro level and sectoral studies which are used for policy formulation and decision-making. Strategic studies are made on a variety of macro planning opportunities,

especially concerning the upper and lower Mekong basins, and natural resources issues. The transboundary nature of these issues, and the significant impact that the development of water and related resources of the basin will have on all riparian countries add a dimension of complexity to the planning process. Activities carried out in 1994 included studies on the principles and criteria for the allocation, utilization, conservation and development of the Mekong water resources and reviews of national development issues and policies.

~ **Technical Support** represents several core activities such as database development, surveys, monitoring and analysis of information related to hydrology, remote sensing/Geographic Information System (GIS) and mapping. Computer simulation and modelling, and environmental studies permit the setting of realistic goals and objectives, and provide the means to evaluate the effectiveness of ongoing and completed activities. Continuous operations include the hydrometeorological network, water quality monitoring network, flood and salinity forecasting and studies on problem soils and wetlands in the lower Mekong basin.

~ **Resources Development** activities focus mainly on resources management and pre-investment activities, including reconnaissance, river and sub-basin planning, prefeasibility studies and feasibility studies. Capital investment activities include technical design, supervision, operation and management of construction works. A collaborative planning process results in integrated resource development activities following coordinated, effective and sustainable operations. Essential components of resources development are addressed to ensure that the benefits of programmes and specific projects reach beneficiaries directly and are sustained over the long-term. Ongoing and planned activities include water resources master plans, studies for hydropower, agriculture and fisheries development, watershed management and forestry, river works and transport, and human resources development programmes.

## EVENTS AND ACTIVITIES OF 1994

### Major Meetings

January	Mekong Development Research Network Advisory Committee Meeting in Kunming, China (11-14 January)
March	International Committee on the Reconstruction of Cambodia (ICORC), Tokyo (10-11 March)
April	50th Session of the Economic and Social Commission for Asia and the Pacific (ESCAP), New Delhi (5-13 April); and ADB's 3rd Conference on Subregional Economic Cooperation among Cambodia, China, Laos, Myanmar, Thailand and Viet Nam, Hanoi (20-23 April)
May	27th Annual Meeting of the ADB Board of Governors, Nice, France (3-5 May)
June	ESCAP's 33rd Session of the Task Force on Water for Asia and the Pacific (6 June)
September	ADB's 4th Conference on Subregional Economic Cooperation, Chiang Mai (15-16 September); Francophone International River Basin Network Meeting, Paris (20-21 September); and Round-table of Experts for Master Plan for the Management of the Hydrological Resources of the Angkor Area, Budapest (26-30 September)
October	Quadripartite Meeting on Subregional Transportation and Tourism Linkage, Vientiane (6-13 October); and ESCAP's Expert Group Meeting on Protection of Water Resources, Water Quality and Aquatic Ecosystems, Bangkok (17-21 October)
November	Forum on Greater Mekong Subregion: Investment Opportunities through Economic Cooperation, Bangkok (24 November); organized by Thai-Canada Economic Cooperation Foundation and NESDB, Thailand; and Mekong Working Group V (MKGV), Hanoi (28-29 November)
December	International Symposium on Regional Infrastructure for the Mekong Basin Area, Tokyo (1-2 December); and ESCAP's 34th Session of the Task Force on Water for Asia and the Pacific (16 December)

### Personnel Changes

February	Mr John Harrison, Senior Technical Adviser, retired
July	Mme Phan Do Hong, Assistant Executive Agent for Viet Nam, and Mr Phadej Savasditutr, Director of the Technical Support Division, both retired
October	Mr Minh Le Van appointed as Assistant Executive Agent for Viet Nam
December	Mr Vraluck Chatarupavanich, Assistant Executive Agent for Thailand, retired

### Other Notable Events in 1994

April	Inauguration of the Thai-Lao Mekong Friendship Bridge, Nong Khai (8 April)
May	Donor Field Trip to North-East Thailand and Southern Laos (29 May-2 June)
August	Thailand's 1994 Annual National Science Week (17-21 August)
September	37th Anniversary of the Mekong Committee (17 September)
October	49th Anniversary of the United Nations (24 October)
November	Donor Field Trip to the Northern Economic Growth Quadrangle Area, Northern Thailand and Laos (29 November to 1 December)

## PROJECT OVERVIEWS: A sampling of the Mekong Secretariat's varied achievements

### MEKONG MAINSTREAM RUN-OF-THE-RIVER HYDROPOWER: Screening plans for the future

With financial assistance from the UNDP and the Government of France, the Mekong Secretariat completed in 1994 the study called 'Mekong Mainstream Run-of-the-River Hydropower'. It is a major component of the Draft Hydropower Programme recently formulated in consultation with the riparian countries. The study was conducted by a joint team comprising international/local consultants, riparian engineers and Secretariat staff.

The study aimed at making an inventory of suitable run-of-the-river project options and priorities, which will avoid, to the maximum extent, such factors as environmental impacts, relocation of communities and disturbance of valuable agricultural and other resources. This new approach is completely different from the traditional concept of building huge storages for economic advantage without due attention paid to environmental considerations. Facilities such as navigation locks and fish ladders are planned at these sites to maintain the river's ecology and improve navigation at difficult stretches on the mainstream of the Mekong River. The study identified 12 possible sites on the Mekong mainstream through a careful screening process based mainly on possible environmental effects and preliminary economic evaluation.

Further assessments on socioeconomic, environmental and fisheries aspects were conducted with

new data/information collected during this study and with detailed technical and economic analyses at the evaluation stage. It was found that two of the sites were not feasible and further studies are not recommended for them. The remaining nine sites, except the Stung Treng, are considered to be environmentally compatible and economically attractive with a rate of return varying from 11.7 to 14.6 %. They are classified into five categories based primarily on their possible impacts on the environment, the number of people that might need to be displaced, and the land areas affected by the planned river channel storages.

At the project's regional workshop held in November 1994, the participants from the four riparian countries recommended that the following three priority sites should be investigated further at the prefeasibility level: the Don Sahong located near Khone Falls in Laos (240 MW), the Ban Koum (2,330 MW) on the border between Laos and Thailand, and Sambor in Cambodia (3,300 MW). The planned Don Sahong project would affect neither the population nor agricultural land, while the other two sites would have certain limited effects on a few thousand people and several hundred square kilometres of land. Financial support from the donor community is now required to conduct these prefeasibility studies for consideration by the Mekong River Commission when it is formally established.

### REVIEW OF HYDROPOWER PROJECTS IN CAMBODIA: Determining priorities

Financed by the Government of Austria, this year-long project to identify the priority water resources and hydropower projects in Cambodia commenced in March 1994. The project prepared short and medium-term hydropower development plans for priority geographical areas of Cambodia.

Two workshops are scheduled for the project. The first workshop was held in Phnom Penh on 20-21 July 1994 to discuss the criteria, approach and methodology for screening of hydropower projects, and to select the priority areas. The workshop was chaired by HE Mr Ith Praing, Under-Secretary of State, and attended by more than thirty government decision-makers and senior technicians from various ministries.

The second workshop is planned for February 1995 to discuss the draft Final Report submitted by the end of January 1995. The Final Report will include the proposed hydropower projects for electrification of priority areas of Cambodia. These projects should be studied at reconnaissance level provided that accessibility to the project sites is possible.

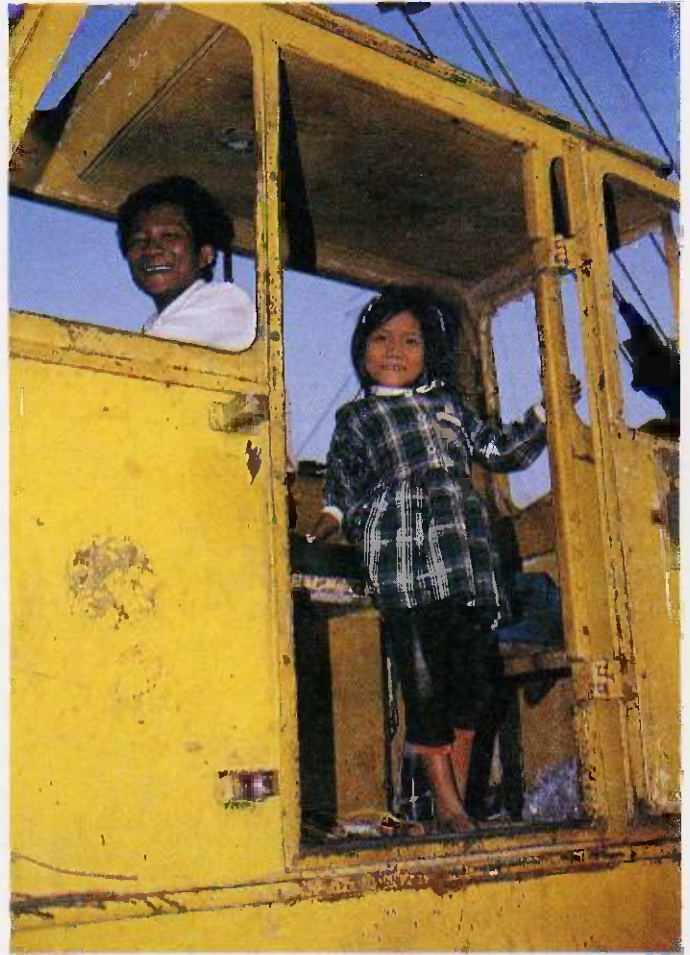
The preliminary findings, as indicated in the inception report, recommend that the priority for electrification would be the area incorporating Phnom Penh, Kampot and Sihanouk-ville, the urban centres of Siem Reap and Battambang. In line with these identified priority areas, the hydropower projects located in the western coastal area outside the Mekong catchment area are the most suitably located for consideration in the short and medium-term hydropower development plans.



## MEKONG INTEGRATED TRANSMISSION SYSTEM: Subregional networking

Energy demand in the Mekong countries, especially Thailand and Viet Nam, is increasing at a steady rate and the interconnection of power would be an important complementary programme to the expansion of the power-generating capacity in meeting the demand. As an indication, a 1978 study showed that an integrated system linking hydropower sources to the load centres would be preferable over two separate regional systems and a considerable investment could be saved as compared to an alternative thermal powerplant.

The main objective of the Mekong integrated transmission system study is to assess the technical and economic viability for identification of possible feasible power linkages for energy exchange between the countries in the lower Mekong basin, for the time being, by joining various sources of electrical supply, such as viable hydropower projects in the basin, to national power grids and major load centres in the region. The scope of this integrated transmission system also includes a prefeasibility study of priority interconnections for consideration by the riparian countries for eventual implementation.

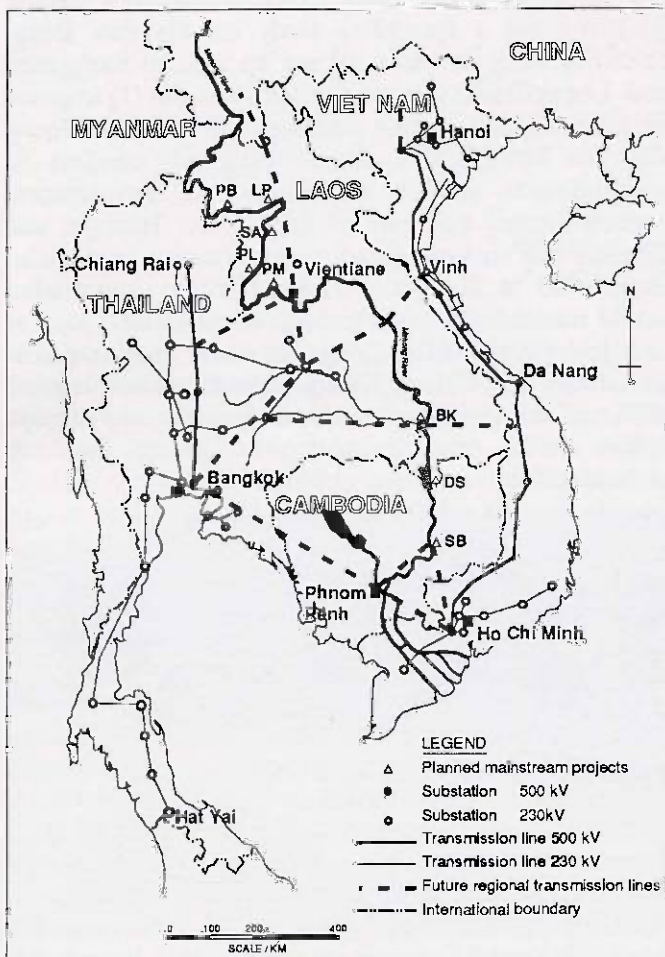


*Construction workers in Cambodia*

Strengthening the capability of technical personnel concerned in the riparian countries and the Mekong Secretariat in various forms on planning and management of the integrated transmission system is another important component of the project. It is hoped that a core team among the riparian countries would be developed to maintain continuity in planning and investment in the subregional grid.

This study was included in the Asian Development Bank's subregional development programme in the energy sector, which was approved at the Fourth Ministerial Conference of Subregional Cooperation held in Chiang Mai, Thailand, in September 1994 by the six Mekong countries (Cambodia, China, Laos, Myanmar, Thailand and Viet Nam).

The study is being financed by the Government of Japan and it will take about one and a half years to complete. Starting from January 1995, a joint study team comprising international/local consultants, riparian engineers and Mekong Secretariat staff will be established to conduct the study, in close consultation with the energy authorities in the riparian countries and ADB.



*Existing and future transmission lines*

## UPPER MEKONG NAVIGATION: A window of opportunity

Despite its potential and advantages, the upper reach of the Mekong River from Luang Prabang of Laos to Jinghong of Yunan province (some 700 km long) has not been much utilized for navigation. Among the many reasons behind this are the difficult natural conditions of the meandering river, narrow rapids and the lack of appropriate means and measures to improve them.

The 'Strategy Study on the Development of Upper Mekong Navigation' was undertaken from December 1993 to January 1994 with financial support from the Government of France in light of the emerging requirements for more social and economic exchanges among the countries in the upper Mekong basin by means of international navigation on the Mekong River. Its immediate objectives included a review of the existing navigation conditions and facilities on the river, assessment of the present and future transport capacity and study of related policy issues and options of the Mekong River Commission in this respect.



*Private passenger boats currently being operated in the upper reach*

Results of the analysis show that the volume of the annual cargo flow in the project area (by every means) could increase from the current level of 98,000 tons to a maximum of 1.98 million tons in the year 2000. The corresponding annual volume of cargo transported on the Mekong River, particularly long-haul traffic, will probably remain rather low throughout the period, that is, less than 150,000 tons/year, which might not be very attractive for a large-scale improvement project. A substantial increase in traffic flow on the Mekong River could be expected only after 2000 and, especially, in the case of the high development scenario, which provides for an early completion of advanced transport infrastructure on the Upper Mekong Corridor (both the river and circular roads).



*One of the many upstream rapids*

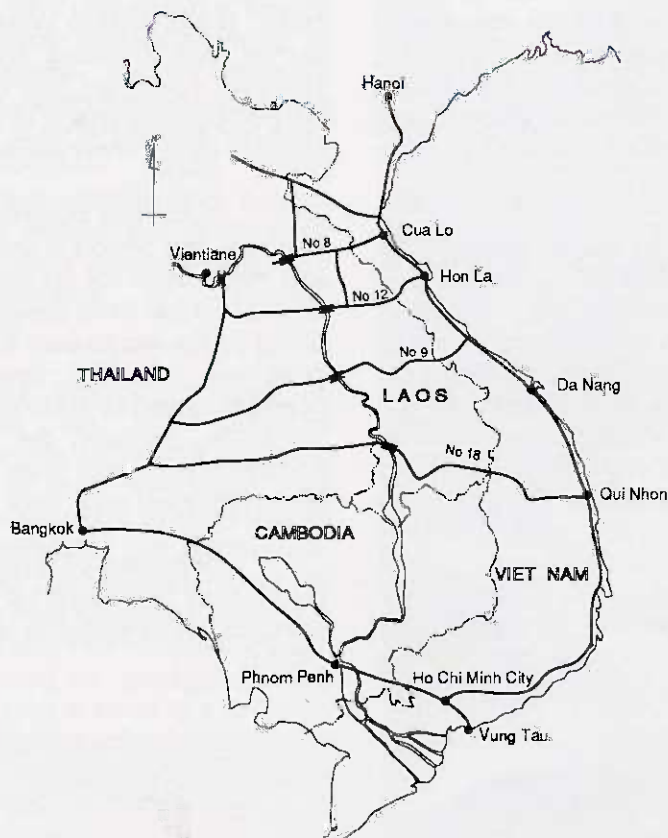
However, the existing waterways of the upper Mekong may be used in the short and medium-terms, without costly major improvement work other than 'aids to navigation' and 'port facilities'. According to the long-term perspective, demands created by new developments in the riparian countries for bulk transportation on the Mekong River could economically justify massive improvement work on the river.

The study recommended that for the period from 1995 to 2000, the Mekong River Commission should: (1) carry out a feasibility study on the Pak Beng-Thaxuang ferry service; (2) set up aids to navigation from Luang Prabang to the Golden Triangle; (3) improve the terminal facilities for passenger ports at Ban Houay Xai, Pak Beng and Luang Prabang; (4) conduct an environmental impact assessment of development projects located upstream of the Golden Triangle; and (5) carry out studies related to international navigation. From 2000 to 2005, the Mekong River Commission should proceed with construction of new river ports at Ban Houay Xai and Pak Beng, and a new ferry station at Ban Houay Xai/Chiang Khong. For the period beyond 2005, an expansion of terminal capacity (up to one million tons) at the port of Chiang Saen is recommended.



*Rapids constitute a major impediment to navigation on the Mekong River*

## EAST-WEST TRANSPORT CORRIDOR: Preparing a sound strategy



*Routes of the East-West Corridor*

The southern part of Laos is endowed with a rich potential for developing agriculture, hydropower, forestry, mining and tourism. It also has potential to transport import and export cargo along the East-West corridor, as well as through seaports of the region. Similarly, goods produced in north-eastern Thailand for export and imported goods could be shipped through Laos and to the ports of Viet Nam. Lao-Thai-Vietnamese trade is also expected to increase, following the construction of an east-west transport facility. This would provide an important stimulus to production and development in the hinterlands area in the southern part of Laos, especially for the development of the agricultural sector and water resources projects. However, the present state of disrepair and poor condition of the existing infrastructure of this corridor make its capacity insufficient. Hence, it could become a constraint to national and regional economic development. The importance of the corridor was reiterated by the riparian countries at the four 'Ministerial Conferences on Greater Mekong Subregion

Cooperation' organized by the Asian Development Bank (ADB) in 1992, 1993 and 1994. ADB has subsequently obtained financial assistance from France for the Mekong Secretariat to carry out the East-West Transport Corridor Study.

The study is intended to prepare a strategy for sound development of the corridor, including investment and action plans for the implementation of the strategy. This needs to be based on the experiences of previous studies undertaken by the Mekong Secretariat, such as the 'Reconnaissance Study on the Role of the Mekong River in Regional and Subregional Transport Development' in 1991, and the ADB-funded 'Feasibility Study on the Southern Thai-Lao Bridge' in 1992. The study includes the feasibility assessment of various components of the corridor and environmental impact assessment of construction works, such as their compatibility with other Mekong basin development plans. The total cost of the study is estimated at US\$1 million, including consultancy services. The project is expected to be completed in 1995.

## SUSTAINABLE MANAGEMENT OF RESOURCES: Our children's heritage

Increased sedimentation of reservoirs for hydro-electrical power generation, more frequent extremes of the high and low flow of the Mekong River, advancing salt water intrusion in the most important rice producing area of Viet Nam, the Mekong Delta: all are attributed to the ever deteriorating conditions of the watersheds in the lower Mekong basin.

The Mekong Secretariat is addressing this problem with a series of watershed management projects. Most recent is the 'Sustainable Management of Resources'. The Government of Germany, through GTZ, is prepared to fund the first 2 year phase of the project (the overall time frame is 8 years). It will complement the two other watershed management related projects currently executed by the Mekong Secretariat ('Watershed Classification', funded by Switzerland and described on the next page, as well as the 'Forest Cover Monitoring', funded by Germany).

The immediate objective of the 'Sustainable Management of Resources' project is to establish feasible and appropriate approaches to manage, protect

and rehabilitate the watersheds in the lower Mekong basin. It will address issues involved in the sustainable use of land regarding both forestry and agriculture. However, it will not only take into account local needs, but also possible effects of the planned land management schemes on the lower reaches of the watersheds.

In contrast to earlier, more engineering-oriented concepts, this project is considering the local population as a major asset for the rehabilitation efforts. A hands-on concept has been designed which assigns the people living in the headwaters of the lower Mekong basin a prominent role in investigating the causes for degradation and in developing remedies to reverse these processes. Initially, the project implementation will concentrate on pilot areas which may be extended or adapted to other areas once they have proven feasible.

Preparations for an agreement between GTZ and the Mekong Secretariat are in the final stage and project activities are expected to take off in the first quarter of 1995.



*Salt water intrusion in the Mekong Delta*

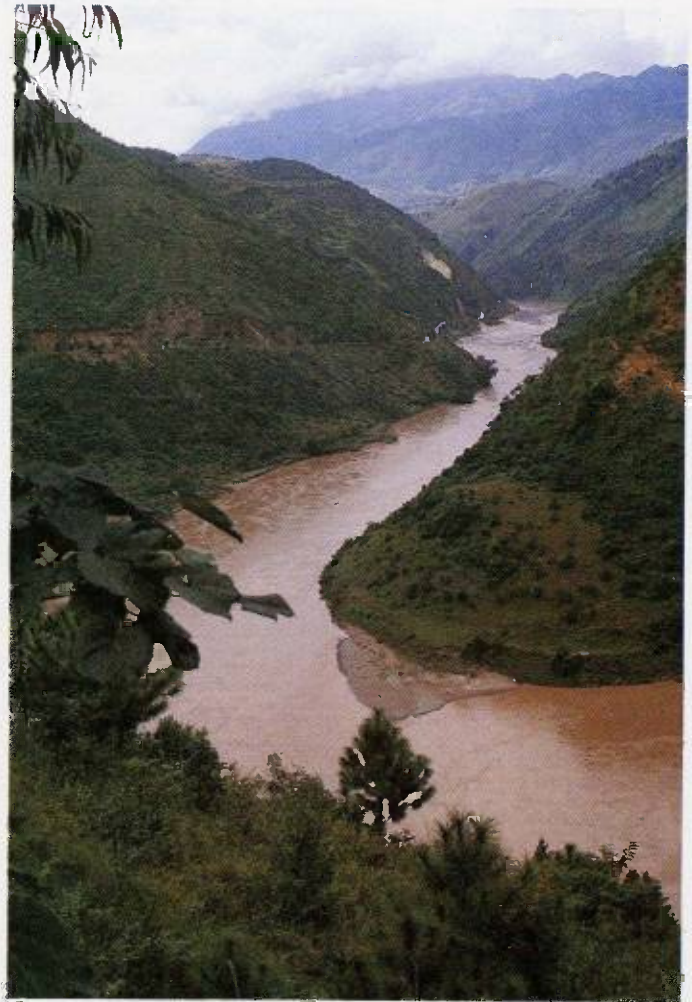
## WATERSHED CLASSIFICATION: A planning tool

Deforestation of the lower Mekong basin has caused serious degradation during the last decade, especially where slopes are steep and soils are easily erodible. Land use practices have contributed to erosion as they have been adopted without land use planning. In the past, many attempts to counteract the ever increasing degradation have been made. Unfortunately, they have met with limited success. This is because, in many cases, the activities themselves lacked proper organization. The watershed classification project, funded by Switzerland, will address this shortcoming and will provide one of the major planning tools for a systematic, basinwide approach to watershed management and rehabilitation.

The concept of the project is based on methodology employed by the Royal Forestry Department of Thailand. Various parameters crucial to degradation processes (such as slope, land forms, soils and geology) are linked in a watershed class prediction equation. It calculates for each land unit the potential degradation risk according to five classes. While the classification in Thailand has been undertaken to support land use legislation, the basinwide concept of the Mekong Secretariat is focusing on management and planning purposes. It is intended to serve as a reference tool for land use policy formulation, selection of priority watersheds for interventions, and allocation of resources on basinwide and national levels.

Initially, the project used the same technology to generate the required data as exercised in Thailand. It soon became apparent, however, that more expeditious and concise technologies are required for a basinwide approach. The nature of the data to be processed and analysed can best be handled by a Geographical Information System (GIS) involving digital terrain modelling for data generation. Because of its tremendous advantages, the project adopted this technology. However, the basinwide digital terrain model will be beneficial to applications far beyond watershed classification. Modelling of hydrological processes, provision of information for environmental impact assessment and planning of transport systems are only a few, among other possibilities.

As mentioned on page 12, the 'Watershed Classification' project is closely linked and coordinated with another Mekong Secretariat project, namely, the 'Forest Cover Assessment and Monitoring' project, funded by Germany. While the former determines the potential risks as given by the physical conditions in the watersheds, the latter provides the actual situation with regard to the conditions of the vegetation cover. An overlay of both types of information will accurately

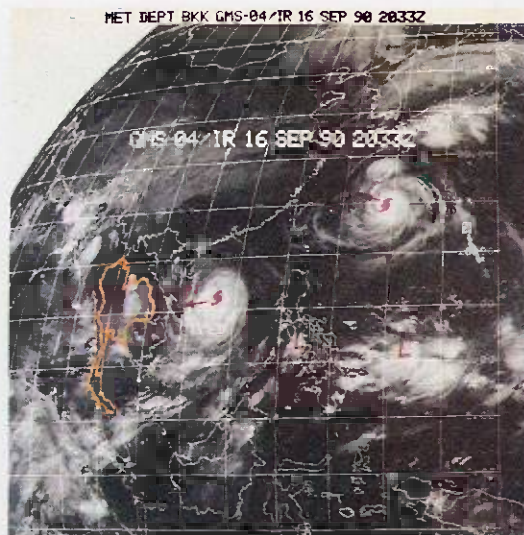


reveal the actual situation in the watersheds of the lower Mekong basin. The riparian countries will then be able to locate the 'hot spots' where action is most urgently required.



*Classification of the Mekong basin's natural resources is being undertaken to prevent further degradation*

## FLOOD FORECASTING AND DAMAGE REDUCTION STUDIES: Preparing for tomorrow



*Geostationary Meteorological Satellite (GMS) imagery used for flood forecasting operations; the map features the Mekong basin*

Normally, flooding in the lower Mekong basin occurs during the wet season from July to October. At this time, the tropical cyclones enter the basin and bring heavy rainfall which gives rise to high water levels in the tributaries and mainstream itself. When the water level in a particular point overtops the river-bank, it inundates the surrounding area and causes damage to human lives and livestock, houses and real estate, and infrastructure and other property.

The scale and extent of flooding depend on local conditions and the distribution of the rainfall. In the upper reach from Chiang Saen to Mukdahan, all stations on the mainstream recorded a maximum flow in 1966, whereas in the middle reach at Kratie and Paksé, the maximum flow was recorded in 1939 and 1978, respectively. In the Delta area, the maximum water level was recorded at Chau Doc in 1961.

One way to reduce the damage caused by flooding is to provide adequate warning to the public and authorities concerned with flood prevention and flood fighting work. The warning is made possible by the Mekong Secretariat's flood forecasting system. The Secretariat has initiated the flood forecasts during the wet season from July to October, for the upper reach from Chiang Saen to Paksé since the 1970s and for the Mekong Delta in Viet Nam since the 1980s. Daily reports of rainfall and river levels from a network of observation stations in the countries are sent to the Secretariat by radio. Much of this information is used in computer models to make forecasts for future flood conditions and these forecasts are immediately dispatched to the riparian countries for further action.

The accuracy of the forecasts derived from the simulated models depends largely on the inputs and models themselves. The improvement of input data can be achieved by increasing the density of the reporting network and upgrading communications and transmission facilities. This activity is long-term, and requires little, but continuous, investment.

The forecasting models which have been used for more than two decades need to be replaced by other well-known and more user-friendly software packages used for forecasting elsewhere. In this connection the Mekong Secretariat prepared a Project Proposal entitled, 'Flood Forecasting and Damage Reduction Studies' with a view to seek financial support for the improvement of the flood forecasting system. It was forwarded to the Government of Denmark for consideration in late 1993.

In March/April 1994, the Danish International Development Agency (DANIDA) dispatched a three-person appraisal team to the Secretariat. The team travelled to the riparian countries for detailed discussions with the authorities concerned. The Appraisal Report recommended that the damage reduction study be carried out during the 1994 flood season. Two consultants funded by DANIDA, together with national experts, undertook the study by collecting information about past and present flooding, together with socioeconomic data in flood prone areas in Laos and Thailand from August to December 1994. The same activities are scheduled to take place in Viet Nam in January 1995.

The funding of other phases of the project, including ways to improve the rainfall forecasts, updating the models, and enhancing the output of the forecasting system, will be decided by DANIDA, depending on the outcome of this damage reduction study.



*Flood in the Delta: damaging more than houses, it drastically affects people's lives*

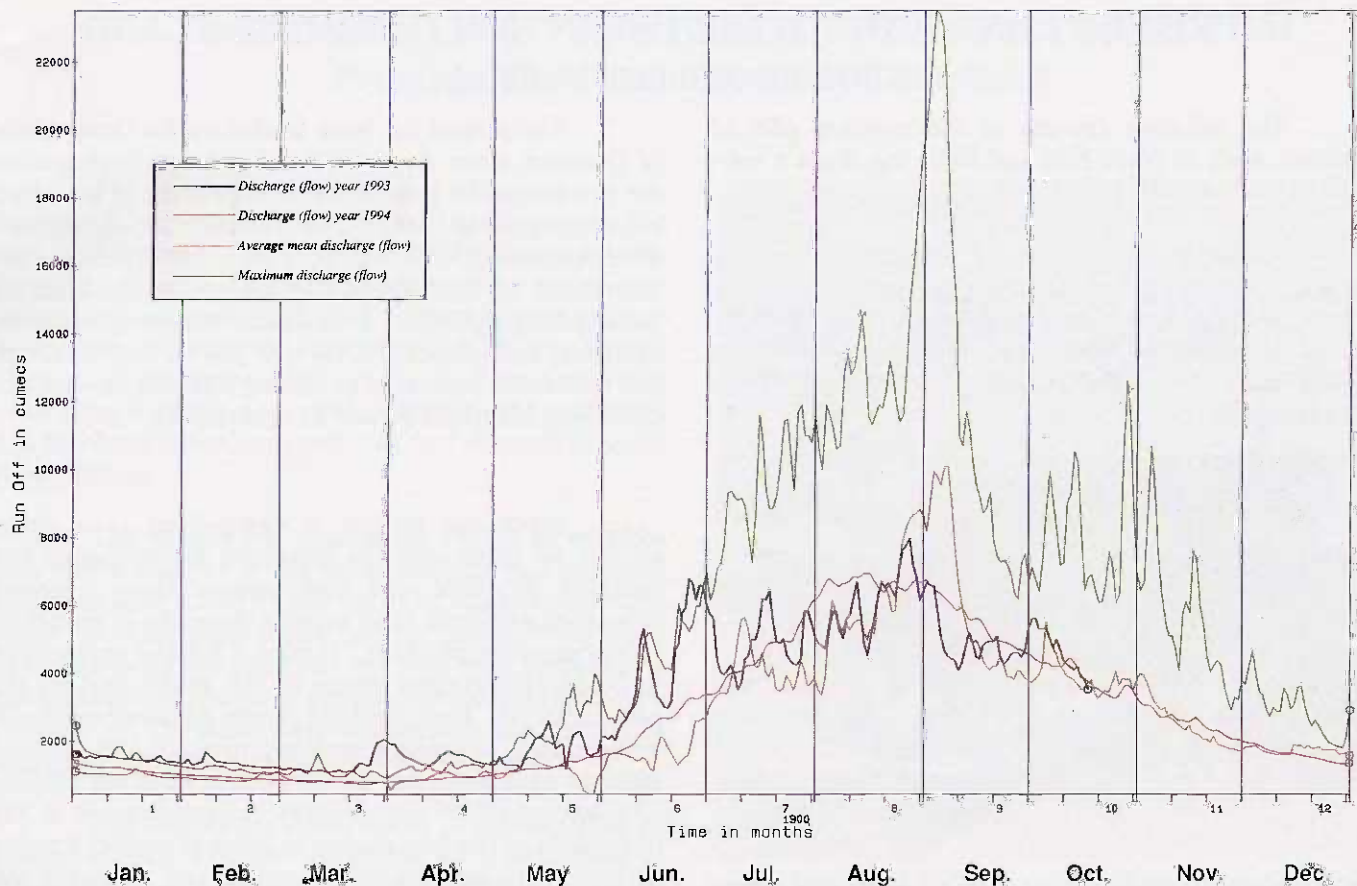


Fig. 1 Mekong run off at Chiang Saen, 1960-94

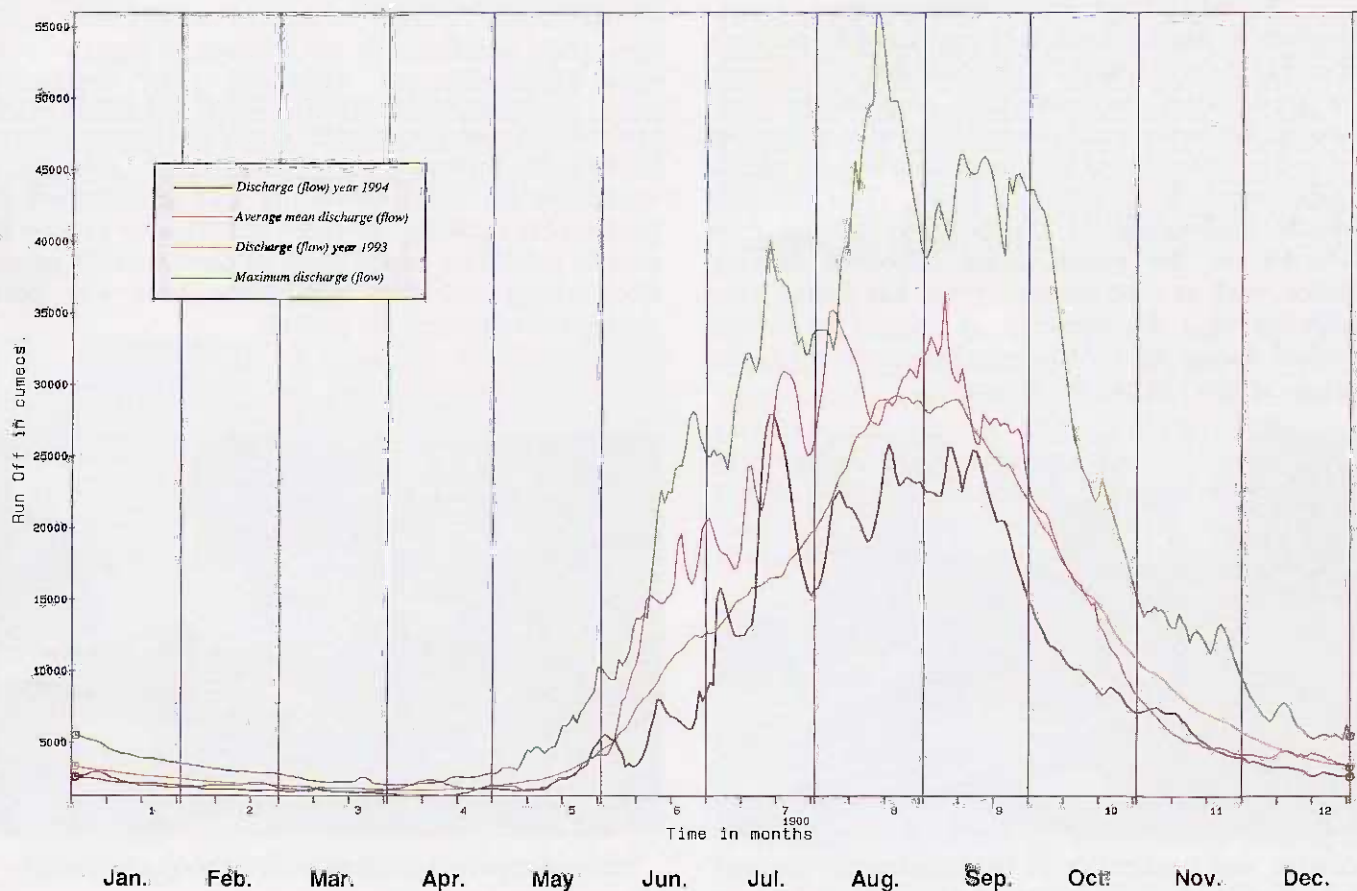


Fig. 2 Mekong run off at Pakse, 1960-94

## IMPROVED LAND AND WATER USE IN NORTHERN THAILAND: An interdisciplinary challenge

The tributary streams in the northern part of Thailand, such as Nam Kok and Nam Ing, form a sub-basin of the lower Mekong basin.

Available water in the tributaries changes markedly between the wet and dry seasons. There is a serious shortage of water resources during the dry season, although the high water level of the Mekong River often diffuses drainage on the lower land of the sub-basin in the rainy season.



*Field survey to make better use of land and water resources*

According to restrictive conditions on the water, agriculture in this sub-basin is characterized by growing rice during the wet season. Cultivated rice still remains to a great extent the subsistence crop in the area. However, the paddy yield has remained at a rather low level and is vulnerable to both inundation and dry spells, as experienced in the past two years. This situation obstructs exploitation of the potential of the crop production of the region, since improved farming methods, such as crop diversification, has gained little confidence from the farmers. A primary bottleneck identified during the field reconnaissance survey is the shortage of water during the dry season.



*Problems and constraints in land and water use are being identified by the counterparts themselves*

The project has been funded by the Government of Denmark since April 1993 and is being implemented for two years. Its immediate objectives are to formulate recommendations on sustainable agricultural development of the region, based on problems and constraints in land and water use to be identified by participating agencies. It involves various government agencies, universities, NGOs and private organizations, and covers the provinces of Chiang Rai, Phayao and part of Chiang Mai (Mae Ai and Fang districts).

Since the project is categorized as a study project, its main activities constitute the collection and analyses of data and information from agencies concerned and from field surveys, focusing in particular on dry season agriculture. It takes a holistic approach in analysing the current status in the initial part of the project period. Four working groups on water resources management, irrigation systems, markets and farming systems have been set up to prepare in-depth studies. The latter half of the project's implementation is the integration of the four studies in order to prepare a series of reports to recommend measures and steps for the sustainable development of the agriculture of the region, as well as to describe the current situation concerning prospects for development.

Corresponding to each subject for the in-depth analysis, four working groups meet from time to time to improve and manage the project's activities. Integration workshops are held periodically with participation of government agencies concerned and resource persons to provide guidelines on the study of each working group. Coordinating and field committees have also been established to manage the project.



*Interdisciplinary workshops are held periodically*



## YA-SOUP MULTIPURPOSE PROJECT IN VIET NAM: Promising Prefeasibility Study Completed

The Ya-Soup, one of the tributaries of the Mekong River, passes through Dac Lac Province. The area has favourable soils and a good climate for rice farming. The Government of Viet Nam gives high priority to such potentially rich food producing areas to cope with the serious food shortage in the Central Highlands. However, although the Ya-Soup area could sustain agricultural and rural development, production has still been underdeveloped, due to a shortage of water for irrigation.

The project site consists of 15,250 ha of gross area and a total of 8,210 ha of existing and proposed irrigation land, 1,540 ha and 6,670 ha, respectively. The water resources master plan and the prefeasibility study of the Ya-Soup multipurpose reservoir were proposed by the Mekong Secretariat to provide the basis for making a decision on the next step, undertaking the feasibility study and implementing the multipurpose project.

The donor, the Government of the Republic of Korea, offered external assistance of US\$400,000 to cover the costs of equipment, some assistance to the national agencies concerned and consultancy services. The project was implemented during 15 months from September 1993 to November 1994. A consulting firm was engaged to conduct the prefeasibility study from December 1993 to July 1994. The prefeasibility report was finalized in September 1994 and a training course was conducted in Hanoi, 7-19 November 1994. The project was operationally complete in January 1995.



*Measuring the river flow near the Ya-Soup dam site*



*Six ladies were included among the Ya-Soup project trainees: they are seen here in the front row amidst other participants and some of the trainers who offered instruction on Project Formulation and Analysis conducted in Hanoi, 7-19 November 1994*

According to the prefeasibility study, the Ya-Soup reservoir can supply water to irrigate 8,210 ha and produce 1,450 kW of hydropower. It will significantly reduce flood damage and improve the surroundings in the project area. Both the central Government of Viet Nam and the provincial government of Dac Lac Province have supported this project which emphasises raising the income from farming activities, and improving the quality of residents' lives through water resources and agricultural development.

In future, it is expected that agricultural extension services, forest protection, electricity, transportation and drinking water will eventually be provided, as well as improvements to the social infrastructure, such as schools, health centres, market places, etc. This multipurpose project will be a good model for other comprehensive agricultural and rural development projects in the Central Highlands.

Based on the results of the prefeasibility study, and to realize the anticipated benefits as soon as possible, an early implementation of the project, including the feasibility study, is recommended to prepare a plan to irrigate 8,210 ha for rural development and hydropower. The budget cost for the next phase of the project is estimated at US\$980,000, with a time frame of 18 months.

## COOPERATION FOR THE MANAGEMENT OF WETLANDS: Needed for a fragile resource

In the lower Mekong basin, the Mekong River and its associated wetlands serve a wide variety of physical, ecological and socioeconomic functions and purposes. People are very dependent upon wetlands resources for their daily subsistence. Despite this, present and foreseeable threats to wetlands of this region are many and varied. Some may abruptly destroy the valuable nature of wetlands and their physical functions, but most of them may trigger serious and long-term ecological and socioeconomic consequences.

In response to these concerns, the wetlands management project for the lower Mekong basin was initiated by the Mekong Secretariat in 1990. The goals of the basinwide wetlands management project are:

- ~ To establish a group of scientists specialising in wetlands ecology and management to advise the government, institutions and local authorities in their respective countries, and serve as links between the riparian countries;
- ~ To compile all available information relating to the project and identify missing components;
- ~ To establish a computerized database to assist with the sound management of the area;
- ~ To conduct surveys of representative wetlands; and
- ~ To formulate management plans for the sustainable use of wetlands in the basin while conserving and enhancing their ecological and socioeconomic functions.

During the first phase of the project (1990-94), priority has been given to the wetlands along and within a 50 kilometre range of the main channel of the Mekong River. Work carried out has focused upon selecting one of the major representative types of the wetlands ecosystem in each riparian country. Three sites are Nong Chanh march/That Luang swamp in Vientiane (Laos), Huai Nam Un in Nakhon Phanom (Thailand), and Tram Chim wetlands crane reserve in the Plain of Reeds (Viet Nam) (see photo).

Intensive surveys have been conducted at all sites. Field experience and data on the main parameters have been exchanged and discussed by wetlands team members of all three countries on several occasions and a database is being developed in order to facilitate regular exchange of data.

Wetlands mapping is one of the important tasks being carried out by all teams. The mutual scales are 1:50,000 for pilot areas and 1:250,000 for wetlands in the Mekong River's corridor.

Several short courses, demonstrations and other training activities have been organized in the field. Cooperation among riparian countries for the management of wetlands in the lower Mekong basin may be continued on a larger scale, including wetlands management in Cambodia. Awareness and consciousness, responsibility and cooperation of all riparian countries to design an integrated management plan for the wise use and conservation of their wetlands will generate significant benefits to their peoples.



*Tram Chim wetlands crane reserve, Plain of Reeds, Viet Nam*

## FRESHWATER CAPTURE FISHERIES IN CAMBODIA: Focus on fish stock assessment and socioeconomics

The objectives of the Cambodian fisheries project, funded by the Government of Denmark, call for: (1) strengthening of the professional capacity in the Department of Fisheries for fish stock assessment and socioeconomic analysis to be used in fisheries management; (2) establishment of a database of the freshwater capture fisheries of the Great Lake and Mekong flood plains; and (3) formulation of a follow-up project (Phase II), including building a new Freshwater Capture Fisheries Institute. The project is part of the Department of Fisheries of the Ministry of Agriculture, Forestry and Fisheries of Cambodia.

It started in April 1994 with the arrival of the Chief Technical Adviser/Fishery Biologist. The National Project Director, two fishery biologists and one socioeconomist arrived at the start. A Human Resources Adviser and a national Socioeconomist joined soon after. Additional counterparts, especially in the provinces, have followed later. Successful implementation will very much depend on the good cooperation among the participatory institutions and on the security situation in the project area.



*Bringing in the harvest in the Great Lake*

Project execution focuses on the provinces around the Great Lake: Kompong Chhang, Pursat, Battambang, Siem Reap and Kompong Thom, and in the Mekong flood plains in the provinces of Kandal (including Phnom Penh), Prey Veng and Kompong Cham. Three other provinces along the Mekong River, Stung Treng, Kratie and Takeo, could be taken into account toward the third year of operation, provided that resources and staff capacity are sufficient.

Primary data needs are being defined and a data collection system established in cooperation with the provincial authorities. Field data collectors have been selected and their training has begun.



*Pictured here are some of the participants in the international stock assessment training course held in Chiang Rai, Thailand in May 1994*

Seven counterparts participated in an international stock assessment training course held in Chiang Rai, Thailand in May 1994. In addition, several training courses have been conducted in Cambodia and Thailand covering stock assessment, collection of data on catches, species composition and length frequencies, socioeconomic methodology, basic management skills and English language courses.

Participation in summer training courses in socioeconomics and information science is being arranged in Manila, the Philippines. Two fishery biologists and one socioeconomist will be enrolled in a M.Sc. programme at the Universiti Pertanian Malaysia, with thesis research carried out in Cambodia under the project.

With the assistance of FAO, a Fish Guide for the identification of commercially important fish of Cambodia is under preparation. This book will also be useful in other areas of the lower Mekong basin.



*Catching fish in holding pens made of bamboo*

## AERIAL PHOTOGRAPHY IN CAMBODIA: Mapping the natural resources

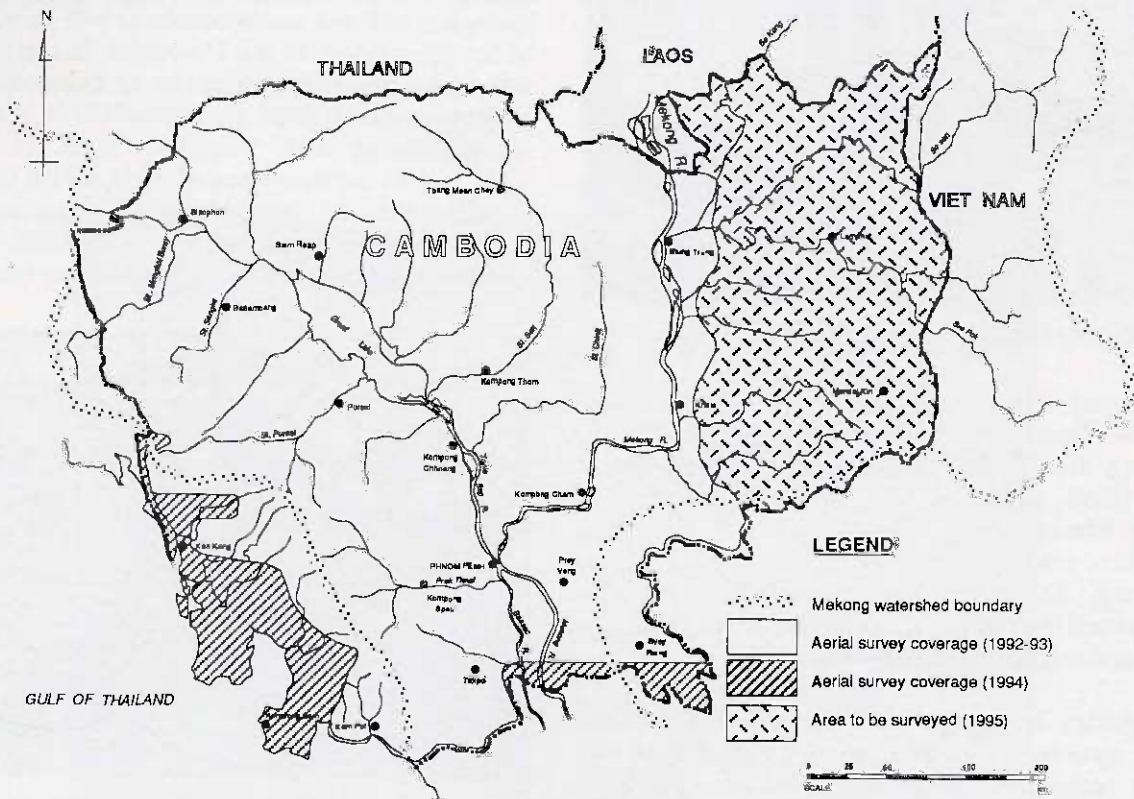
The 'Aerial Photography for Resources Mapping in Cambodia' project, cofunded by Belgium, the European Union and Finland, was initiated in February 1992. With US\$1.2 million made available for Phase I, a survey plane flew over 73 % of the country during 1992-93. In 1994, Belgium, Finland and UNDP agreed to provide an additional US\$464,000 to photograph the remaining parts of the country (Phase II) which include large forested areas in the south-western and eastern parts of Cambodia.

The aerial photographic data, at 1:25,000 scale, provides vital information for various environmental related projects and up-to-date and reliable information on land use and topography.

The first new set of aerial photographs, of priority importance for the land allocation programme of the UNHCR and to the demining teams of the UNAMIC, was completed by March 1992. The Land Use Mapping Office (LUMO) of the Ministry of Agriculture and Forestry, under the supervision of the Mekong Secretariat's Remote Sensing and Mapping Unit (RSMU), has been using the aerial photographs for mapping land use and infrastructure, delineating villages and counting households, etc. The data have served as important inputs for various studies and development projects in Cambodia.

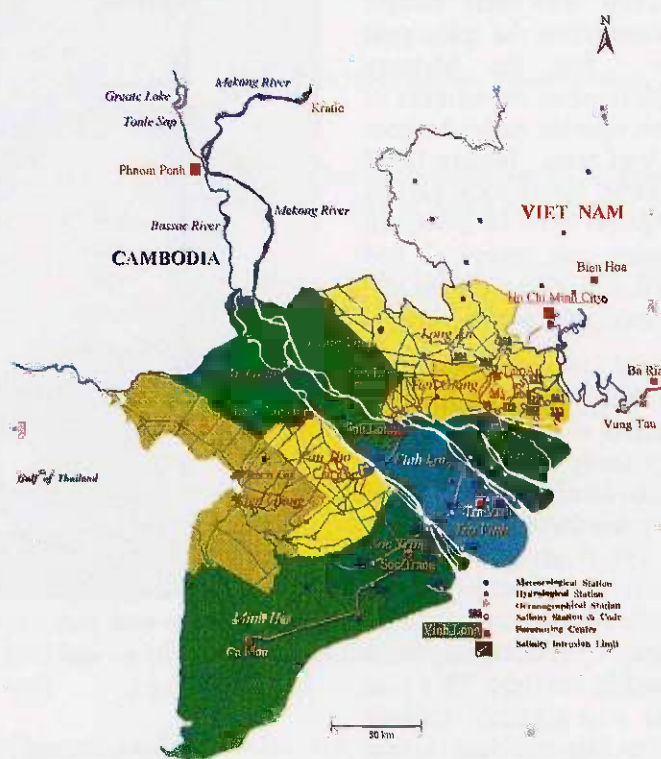
The new aerial photographs have also been used by other projects: for the rehabilitation of irrigation systems, land titling, the conservation of flooded forests at Tonlé Sap, by the UNESCO Zonal Environmental Management Plan for the Angkor Archaeological Park, by the Mekong Secretariat for multi-stage analysis with low resolution satellite imageries in the mapping of updated land cover of Cambodia for FAO/UNDP to improve the utilization of the country's natural resources. Soil maps of Pursat and topographic maps of the Siem Reap area are being compiled from the new set of aerial photographs by various organizations for the Kingdom of Cambodia.

Phase II of the aerial survey project commenced in March 1994, but was hampered by cloud cover during the rainy season. Flying was resumed in November and an additional 21,000 square kilometres have been covered, including the entire south-western part of the country and some areas east of the Mekong River. These aerial photographs will be used by FAO to prepare forest inventories in the Cardamones mountains and parts of the Koh Kong and Kompong Speu provinces. Note the aerial survey coverage undertaken in 1992-93 and 1994, and the area to be surveyed in 1995, as indicated on the map below.



*Map of area photographed in Cambodia*

## SALINITY INTRUSION IN THE DELTA: New horizons for rural prosperity



*Salinity Forecasting Station Network*

The Mekong Delta in Viet Nam covers an area of 3.9 million hectares, of which 2.1 million hectares are affected by salinity intrusion during the dry season. The phenomena impede the agricultural production and fresh water supply. The Government of Viet Nam and the Mekong Secretariat have been cooperating on this problem for more than a decade. Since 1985, with financial assistance from the Government of Australia, three phases of salinity intrusion studies have been carried out. The results of the studies provided important data and tools for development planning of the Mekong Delta, together with strengthening of technical and administrative skills of Vietnamese experts in this field. The findings of the studies were subsequently used for salinity forecasting operations. Stages I and II of the operation were carried out from 1988 to 1991 in the amount of US\$175,000.

To expand the forecasting area and to increase the accuracy of the forecasting procedures, the Government of Australia again contributed US\$460,000, while the Government of Viet Nam provided an additional US\$173,000 (in-kind) to carry out Stage III of the project. The project started in March 1992 and is scheduled for completion in June 1995. The primary aims are: to strengthen the technical capability in salinity forecasting of the Southern Regional Hydro-

Meteorological Centre in Ho Chi Minh City and its five provincial hydrological forecasting centres by expanding the salinity forecasting network to 28 stations; to enhance water resources management and water supply schemes by providing forecasts on saline water intrusion and related hydrometeorological data to users in the Mekong Delta; and to improve the managerial capabilities of project authorities to carry out annual forecasting operations upon completion of the project.

Major activities carried out in 1994 were refinement of the database, the 1993/94 forecasting operation, the improvement of the related software and on-the-job training for regional authorities.

The 1993-94 measurement operation started on 15 November 1993 and ended on 15 June 1994. More than 75,000 samples of saline water were collected and analysed. About 100 engineers, samplers and managerial staff were mobilized to carry out the forecasting operations. Provision of forecasts of salinity intrusion and related hydrometeorological information allows for better planning of cropping schedules and of water control measures to be taken to maximize benefits from the available fresh water supply, thereby raising agricultural production in Cuu Long, Ben Tre, Tien Giang, Hau Giang and Long An provinces featured in the map above.

## HUMAN RESOURCES DEVELOPMENT IN 1994

The recurring theme in several subregional meetings and seminars in 1994 was that human resources development (HRD) constitutes the main goal of subregional development. For the Mekong Secretariat, 1994 witnessed an increase in the number of HRD activities organized for the riparian officials from Cambodia, Laos, Thailand and Viet Nam. Nearly 1,880 officials (an increase over 1,100 in 1993) took part in 131 HRD opportunities (as compared to 83 in 1993), all of which aimed at strengthening the technical and management capabilities, as well as forging the mutual understanding and cooperation among the participants.

For 1994, from among the 131 HRD activities which included formally structured courses, on-the-job training, workshops, seminars or study tours, 58% were mainly country specific, 18% covered all four lower Mekong basin countries and the other 24% were regional or international opportunities. The Riparian-on-stipend programme, where riparian staff are attached to the Mekong Secretariat for a specified time, continued as strongly as ever. The riparians worked closely with Project Officers both in-house and in the field. This year also saw the completion of the post-graduate training programme in Australia with the last riparian official returning after receiving a Master's degree in July 1994. Post-graduate studies on international water law in Canada for four riparians funded by the Asian Development Bank have continued. Several riparians participated in activities organized in nearly ten countries worldwide, for example as far away as the Scandinavian countries and the United States.

The scope of the HRD opportunities offered in 1994 covered a wide spectrum of issues in water and related resources. The main concentration was on the environment, hydrology, agriculture, irrigation and international water law. In tandem with the commonly shared policy of the four riparian countries regarding the promotion of the private sector as an efficient and effective mechanism for national development, a series of workshops focusing on the private participation in hydropower development was organized and high-level riparian officials from the four countries attended.

The year 1994 also witnessed a significant effort in order to establish the HRD strategies for the sustainable development and cooperation of the lower Mekong basin. A series of consultations, discussions and national meetings was conducted to deliberate on the HRD strategies and action programmes.

Organization of all of these HRD activities was carried out primarily in collaboration with the National Mekong Committees of the four countries. Cooperation with other external agencies in hosting some of the



programmes was also successful. A selection of major HRD activities undertaken in 1994 appear on the following page.

Participation of the riparian officials in these training programmes, workshops or seminars would have been impossible without the keen interest of donor agencies in fostering and supporting the development process in the lower Mekong basin through investing in human resources. The main outcome of all of these capacity-building efforts both in the riparian countries and abroad is a continuous improvement in the skill and knowledge base of the riparian countries. Moreover, HRD offers an opportunity to ensure closer regional cooperation among the four countries of the lower Mekong basin and their neighbours.



## MAJOR HRD/TRAINING EFFORTS DURING 1994

### Seminars/Workshops

- \* **Regional Seminar on Private Participation in Hydropower Development**, 10 - 12 January, Bangkok, for 22 riparians and 7 Secretariat staff
- \* **4 National Workshops on Private Participation in Hydropower Development**, 14 - 15 January in Vientiane, 29 June - 2 July in Phnom Penh, 4 - 6 July in Hanoi, for 118 riparians
- \* **2 Workshops on Strategic Planning and Management for Mekong Delta Master Plan Project**, 4 - 8 April, and 28 - 30 July, Ho Chi Minh City, for 67 riparians
- \* **4 National Workshops on Strategic Human Resources Development Planning for Cambodia, Laos, Thailand and Viet Nam**, 25 - 29 January in Hanoi/Ho Chi Minh City, 18 March in Vientiane, 30 March in Bangkok, 5 - 6 July in Phnom Penh, for 140 riparians
- \* **3 National Workshops on the Mekong Environmental Programme**, 21 - 22 November in Ho Chi Minh City, 13 - 14 December in Phnom Penh, and 19 - 20 December in Vientiane, for 80 riparians and 6 Secretariat staff
- \* **Regional Seminar on Fisheries Management and Development Cooperation in the lower Mekong basin**, 9-10 May in Bangkok, for 10 riparians, 8 from international and national agencies and 8 Secretariat staff
- \* **2 Mini-Workshops on the Mekong Project Manual (MPM)**, 22 August and 5 October, Bangkok, for 36 Secretariat staff
- \* **2 Workshops on Project Financial Management**, 20 - 22 June in Vientiane, and 11 November in Phnom Penh, for 54 riparians
- \* **Final Workshop on Run-of-the-River Hydropower Development in the Mekong Mainstream**, 21 - 25 November, Ubon-Ratchathani, for 20 riparians and 5 Secretariat staff

### Study Tours

- \* **2 Study Tours for the Sustainable Irrigated Agriculture Project (SIRAP)**, to the Philippines, 17 - 24 January; to New Zealand, 20 February - 3 March, for 18 riparians and 1 Secretariat staff
- \* **Study Tour to Indonesia on Integrated Water Resources Management**, 24 - 30 April, for 8 riparians and 2 Secretariat staff

### Training

- \* **Regional Training Course on Integrated River Basin Management**, 18 - 29 April, Jakarta, Indonesia, for 8 riparians
- \* **International Course on Water Resources and Irrigation Management**, 13 June - 15 July, Rangsit/Hua Hin, Thailand, for 17 riparians and 2 Secretariat staff
- \* **Regional Training Course on Freshwater Fish Stock Assessment**, 22 August - 16 September, Chiang Rai, for 28 riparians and 2 Secretariat staff
- \* **Training Course on Multipurpose Project Formulation and Analysis**, 7 - 19 November, Hanoi, for 33 riparians and 2 Secretariat staff
- \* **On-the-Job Training on GIS (ARC/INFO)**, 15 December 1994 - 10 January 1995, Phnom Penh, for 10 riparians

## ADMINISTRATION AND FINANCIAL REVIEW

The day-to-day work of the Committee and its administration is carried out in Bangkok by the Mekong Secretariat. In 1994, there were 97 staff from 18 countries working at the Secretariat, of which 11 persons were fully funded by eight (8) donors. The work force consisted of 37 professional staff members, 43 general service staff members, and 17 full-time 'riparians-on-stipend' or 'project fellows' from the riparian countries. Eighty-one (81) per cent of the staff members are riparians.

### Programme income and expenditures

The actual cash contributions for programme activities received during 1994 amounted to US\$8,891,000. These contributions donated to the Committee by cooperating countries and agencies were allocated to support its 1994 development programme. A project that is funded by UNDP includes management support as well. In addition to UNDP, countries such as Belgium, Denmark, Japan, the Republic of Korea, Sweden and Switzerland also contributed toward institutional support.

The organization continued to operate on a fully-funded basis whereby all project commitments are covered by firm support given by the governments of cooperating countries and agencies. From 1992 to 1994 while the Mekong cooperation framework was being negotiated by the four riparian countries, most donors provided programme support for only the ongoing projects. Quite a number of new proposed projects were put on hold pending the outcome of the negotiations on the new framework for cooperation. Consequently, donors' contributions were on the decline in 1994, although over the last two years new donors such as Austria, Israel, the Republic of Korea and the United Nations Environment Programme (UNEP) joined the donor community supporting the Committee. Annex III shows both the actual cash and in-kind contributions for programme activities received by the Secretariat during the years 1990-94.

Programme expenditures for 1994 amounted to US\$7,441,000. These funds were used for the procurement of goods and services in support of the Committee's development programme.

	Total Programme Cash Contributions (US\$)	Total Programme Expenditures (US\$)
1990	9,540,000	8,671,000
1991	7,587,000	8,736,000
1992	11,075,000	10,121,000
1993	9,839,000	10,808,000
1994	8,891,000	7,441,000
<b>Total</b>	<b>US\$46,932,000</b>	<b>US\$45,777,000</b>

### Secretariat income and expenditures

In addition to cash contributions which fund programme activities, the Secretariat has also generated income for the actual operations of the organization. The primary income sources include support cost charges for project implementation, other income related to project services and treasury management.

Since no annual contributions from the member countries were received during 1992 through 1994, the Secretariat has operated on a very tight budget. Several measures have been taken in managing the day-to-day operations, including a freeze on personnel recruitment in order to minimize the operating expenditures. Nevertheless, during this period a sizeable amount of the Administrative Reserve Fund (ARF) has been utilized to cover the cash deficits incurred in 1992 through 1994 as follows:

Fiscal Year	Deficit (US\$)
1992	272,000
1993	155,000
1994	348,000
<b>TOTAL</b>	<b>775,000</b>

Owing to the deficit as mentioned above, the ARF ending balance has dropped from \$3.8 million in 1991 to \$3.0 million in 1994. The Secretariat is expecting a reverse in this trend after the new Agreement of cooperation has been signed by the member countries in early 1995 and their annual contributions have been resumed.

The Secretariat is developing its own income base to cover operational expenditures. Such financial autonomy will enhance the long-term sustainability of the Secretariat. However, the member countries' annual contributions are considered as an indispensable part in defraying the operating expenses. Moreover, such contributions will further demonstrate the riparian countries' confidence and support to the newly established Mekong River Commission which, in turn, will trigger increased donor support, thus providing a financially sound and sustainable basis for the Secretariat.

Administrative expenditures for the Secretariat during 1994 amounted to US\$1,608,000, compared with US\$1,778,000 in 1993. The primary components of these expenditures include costs related to staff, premises, supplies, equipment and travel. The Secretariat strives to keep administrative costs to a minimum in order to maximize resources going to programmes and projects.



## CHARACTERISTICS OF THE MEKONG RIVER BASIN

The Mekong is the longest river in South-East 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 (4,800 km according to a recent survey made by the P.R. of China to locate the source of the Mekong River). However, its annual runoff (above 475,000 million cu m) places it eighth in the world table of great rivers. Starting at an elevation of some 5,000 m in the Tanghla Shan Mountains on the Tibetan plateau, the Mekong flows south, cutting through southern China to the common Myanmar-Laos-Thailand boundary. It then flows a further 2,400 km to the South China Sea. (See the frontispiece).

At Paksé, close to the Cambodian border, where the drainage area accounts for 69% of the total area, the maximum discharge (57,800 cu m/sec) is more than 50 times the minimum discharge (1,600 cu m/sec). The flow of the Mekong and its tributaries is closely related to the rainfall pattern. The water level starts to rise at the onset of the *wet season* (April-May), reaching a peak in August, September or October. It then falls rapidly until December, and afterward recedes slowly during the annual dry period, or *dry season*, to reach its lowest level in March/April, just before the monsoon.

The Mekong carries an enormous volume of excess water during the wet-season, resulting in frequent flooding and substantial damage in the fertile flood plains along the mainstream and the major tributaries, as well as in the vast flood plains of the Delta. In contrast, during the dry season a serious reduction in flow often leads to drought, with a resultant shortage of water for domestic and agricultural use and also limits the navigable depth in the mainstream. Most seriously affected during the dry season is the coastal plain of the Mekong Delta, where low flow not only results in a shortage of water for both people and agriculture, but also leads to intrusion of salt water, mainly affecting an area of some 2.1 million ha.

Illustrative of the Mekong River's run-off at two important stations: Chiang Saen to the north, close to the 'Golden Triangle', and Paksé are shown on page 15. The maximum flow occurred in 1966 at Chiang Saen and in 1978 at Paksé. The average discharge hydrograph at Chiang Saen and Paksé are based on the long records at these stations compared to the flows of 1993 and 1994, respectively.

Tonlé Sap, the Great Lake of Cambodia, buffers water flow in the Delta downstream of Phnom Penh by storing portions of peak flow from July to September and releasing it from October to April. During the flood season, the water level in the Mekong rises faster than in

the Tonlé Sap. Excess water enters the Great Lake through the Tonlé Sap River, storing some 70 billion cu m in this natural reservoir. As the Mekong water level recedes, the Tonlé Sap reverses direction and the Great Lake releases water into the Mekong - both stored Mekong flood water and the yield of its own catchment area. The seasonal flood of the Mekong comes chiefly from the tributaries that join the mainstream along its lower course. In the Vietnamese Delta, the Mekong finally distributes its waters through several branches into the sea. Tidal influence contributes significantly to the extent of salinity intrusion; the tidal range varies from 2-4 m. The role of tidal forces is more prominent during the dry season when the river discharge reduces to about 2,000 cu m/sec.

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

The climate of the lower Mekong basin is tropical and is governed by two monsoons: steady winds blow alternately from the north-east and the south-west, each for about six months. The south-west monsoon begins in May and continues until September/October. Following a brief period of instability, it reverses its air stream, becoming the north-east monsoon, from November to mid-March. During March and April, winds are light and variable.

The south-west monsoon passes over warm equatorial seas and is consequently heavily laden with moisture. This is termed the *wet season*, and is characterised by heavy and frequent rainfall, high humidity, much cloudiness and extremely warm temperatures. A short dry period of one to two weeks is typical in June or July due to high-altitude anticyclonic circulation. After the brief dry spell, rainfall is more frequent, and heavy rainfall occurs as tropical storms and typhoons enter the Mekong basin from the east during the wet season. Flooding usually results when several such tropical storms occur in rapid succession or when the Equatorial Trough Zone, which is the forward edge of the south-west monsoon, has passed into one of its more active stages and a tropical storm follows. The north-east monsoon, originating in cold air masses of the Chinese and polar winters, is relatively dry. Thus the *dry season* (November to mid-March) has little rainfall; humidity is relatively low. The sky is clear and temperatures can be quite cool and pleasant.

The mean annual rainfall ranges from 1,000 mm near central north-eastern Thailand, to 4,000 mm in the Truong Son mountains between Laos and Viet Nam. During the wet season 80 to 90% of rainfall occurs. At that time the atmospheric dew-point is only a few degrees below the air temperature and a moderate uplift of the air caused by topography or convection can induce precipitation. The effect of topography is seen in rainfall distribution over the basin and adjacent areas, being highest on the windward side of mountain ranges lying across the path of the south-west monsoon, such as the Chhor Phnum Dangrek Range along the border of Cambodia and south-eastern Thailand, and the Truong Son Range across Laos, eastern Cambodia and adjacent areas in Viet Nam.

High rainfall on the eastern slopes of the Truong Son mountains is caused by tropical storms and typhoons entering the basin from the east, most frequently via central Viet Nam. Rainfall is lowest on the leeward side of these mountains, in the Great Lake basin and north-eastern Thailand. Here thunderstorms are intense, brief, and mainly affect limited areas. Wet season rainfall is usually sufficient to grow rice, the main crop, but rainfall is unevenly distributed during the growing season, causing drought damage throughout the

basin nearly every year. Where there is annual rainfall of 2,000 mm or more, there is little drought damage. But in most of the basin, rainfall is only 1,000-1,200 mm/year. An adequate water supply could double paddy yields.

In order to develop both the Mekong River and its tributaries as renewable and clean sources of energy, a new concept of developing run-of-the-river type projects with low head and channel storage has been adopted by the Mekong Committee (see page 8). This is in lieu of building huge storages for economic advantage, but causing considerable impacts on the population and the environment as practised in the traditional way.

At the same time, opportunities to export energy to neighbouring countries and to link up national grids to a regional grid are being studied (see page 9).

As low head projects may result in lower economic return, storage possibilities on the Mekong tributaries, where socioeconomic and environmental impacts are not problematic, are of increased importance. The tributaries will provide additional energy and more regulated flows which will enhance the economics of the mainstream power stations.

Approximate Flow Distributions of the Mekong River

Country	Catchment Area sq km	Total %	Average Flow cu m/sec	Total %
China	165,000	21	2,410	16
Myanmar	24,000	3	300	2
Laos	202,000	25	5,270	35
Thailand	184,000	23	2,560	18
Cambodia	155,000	20	2,860	18
Viet Nam	65,000	8	1,660	11
Total	795,000	100	15,060	100

Note: Approximate figures from the *Indicative Basin Plan, 1987*, arranged according to the geographical location; that is, from the upper reach to the lower reach of the Mekong River

The project external funding, time frame and progress of ongoing projects are illustrated by the chart below:

PROJECT & EXTERNAL FUNDING	TIME FRAME										PROGRESS
	1988	1989	1990	1991	1992	1993	1994	1995	1996		
<b>I Policy and Planning</b>											
Preparatory organ./legal studies (EU \$770,000) (UNDP \$48,000) (ADB \$335,000) (Asia Foundation \$6,000)											Several studies completed, workshops and training seminars organized. Training of four riparian master's students until mid 1995.
East-West transport corridor (ADB/France \$125,000)											Begun in 1994.
Upper Mekong navigation (ADB/France \$99,000)											Preparations during 1993 and project starting in January 1994.
<b>II Technical Support</b>											
Groundwater investigation programme (Sweden \$525,000)											Monitoring of groundwater wells in the riparian countries.
Salinity forecasting in the Delta, Stage III (Australia \$460,000)											Activities include training, data collection, salinity modelling, analysis of salinity intrusion and distribution of flow in the delta.
Improvement of the hydrometeorological network (including Cambodia)(core activity) (New Zealand \$144,000) (Australia \$30,000) (Japan \$608,000)											Hydrometeorological data collection continued.
Flood forecasting (core activity) (Denmark \$245,000)											Forecasting at 45 stations in the four riparian countries.
Improvement of Documentation Centre (UNDP \$34,000)											Improvements ongoing.
Aerial photography in Cambodia (Belgium \$619,000) (EU \$438,000) (Finland \$432,000) (UNDP \$250,000)											Nearly 80% of Cambodia has been mapped using aerial photography.
Geographic information system (ADB \$600,000) (Switzerland \$345,000) (UNEP/GRID \$129,000)											Mekong GIS and the Mekong Resources Information System operations extended until December 1994.
Management of acid sulphate soils (Sweden \$585,000)											Intensive training on chemistry and modelling in Sweden organized. Field and laboratory experiments as planned.

PROJECT & EXTERNAL FUNDING	TIME FRAME										PROGRESS
	1988	1989	1990	1991	1992	1993	1994	1995	1996		
Ya-Soup (Viet Nam) (Republic of Korea I \$400,000) (Republic of Korea II \$980,000)							■	■			Preparatory work for Phase II undertaken in 1994.
Improved land and water use in Thailand. (Denmark \$376,000)							■	■			Government participation emphasized in 1994.
Nam Houm irrigation system (Laos) (Italy \$1,750,000)			■	■	■	■	■	■			Completed in 1994.
Irrigation rehabilitation study (Cambodia) (UNDP \$1,222,000)						■	■	■			Rehabilitation of existing irrigation systems undertaken.
Forestry, Long Xuyen quadrangle (Australia \$1,205,000)					■	■	■	■			Training and community involvement emphasized.
Forestry cover assessment (Germany approx.\$1,650,000)							■	■	■		Mapping work underway.
Mekong watershed classification (Switzerland \$551,000)			■	■	■	■	■	■			Design of methodology and training for counterparts.
Sustainable management of resources. (Gennany approx.\$1,750,000)								■	■		Preparatory work in 1994.
Reservoir fisheries (Denmark \$3,491,000)							■	■			Field activities begun in 1994.
Freshwater capture fisheries (Cambodia) (Denmark \$1,888,000)							■	■	■		Personnel in place during 1994.
River ports in Laos (Australia \$659,000)			■	■	■	■	■	■			Rolling programme.
Mekong river bank protection (Australia \$1,379,000)	■	■	■	■	■	■	■	■	■	■	Rolling programme.
Updating of the hydrographic atlas (Finland \$4,700,000)		■	■	■	■	■	■	■	■	■	Mapping continued.
Navigation training (Viet Nam) (Belgium \$650,000)								■	■		Preparatory work in 1994.
Ferry facilities (Cambodia) (Denmark \$116,000)								■	■		Preparatory work in 1994.
Bassac entrance (Belgium \$1,580,000)								■	■		Preparatory work in 1994.
Environmental training fund (Sweden \$320,000)				■	■	■	■	■			Riparians trained at Secretariat and study tours organized (an ongoing rolling programme).
Water resources training programme (Australia \$1,472,000) (New Zealand \$28,000)									■	■	Graduate students enrolled at Universities abroad.

PROJECT & EXTERNAL FUNDING	TIME FRAME										PROGRESS	
	1988	1989	1990	1991	1992	1993	1994	1995	1996			
Management of the wetlands (Sweden \$635,000)		■									Training courses organized, including those in Cambodia.	
Management of problem soils (Sweden \$326,000)			■									Phase II begun in 1994.
Water quality monitoring network in the lower Mekong basin, Phase II (Sweden \$2,600,000) (UNEP \$177,000)	■										Study tour in Europe for senior officials.	
Integration of environmental components (Sweden \$1,575,000)			■									Consultancies and equipment procured for projects.
Control of soil erosion, sedimentation and flash flood hazards (Sweden \$675,000)			■									Assessment of erosion in some parts of Laos and Thailand continued.
Diagnostic study (UNEP \$203,000)									■		Begun in 1994.	
<b>III Resources Development</b>												
Pilot microhydropower with standardized equipment (Japan \$250,000)						■					Two microhydropower units, one each in Laos and Viet Nam established.	
Rural electrification (Sweden/UNDP \$20,000) (Japan \$120,000)						■					Second phase of studies begun in 1994.	
Review of hydropower projects (Cambodia) (Austria \$419,000)						■					Field work undertaken.	
Kirirom hydropower (Austria/Sweden \$22,000,000)						■					Preparatory meetings held in 1994.	
Integrated transmission system (Japan \$687,000)									■		Project begun in September 1994.	
Action plan Srepok basin (Viet Nam) (Denmark-I \$1,434,000) (Denmark-II \$600,000)						■					New component ongoing.	
Run-of-the-river hydropower (UNDP \$352,000)						■					Project ended in late 1994.	
Development Plan for Tonle Sap (Cambodia) (France \$166,000) (UNDP \$988,000)						■					Phase II begun in 1994.	
Sustainable Irrigated Agriculture (SIRAP) (Netherlands-I \$3,300,000) (Netherlands-II \$6,667,000)	■										Emphasis on farmers' organizations.	

PROJECT & EXTERNAL FUNDING	TIME FRAME										PROGRESS
	1988	1989	1990	1991	1992	1993	1994	1995	1996		
Human resources development. (Australia \$859,000) (Sweden \$175,000) (Switzerland \$100,000)											Riparian-on-stipend programme and other activities ongoing.
Strategic HRD planning (UNDP \$50,000)											Regional workshop planned for 1995.
<b>IV Programme Projects</b>											
Australian Consultancy Fund (Australia \$435,000)											Funds used for various studies and training.
Swedish Consultancy Fund for studies, investigations and training Sweden \$1,480,000											Funds allocated for several studies and training activities.
Support for Mekong programme (UNDP \$2,815,000)											Arrangments for the new framework and other activities progressing.
UK Consultancy Fund (UK \$37,000)											Funds allocated for studies in 1994-95.
Danish Consultancy Fund (Denmark \$420,000)											Funds allocated for studies in 1994.



*Daily life of Mekong people*

## RECAP OF ONGOING AND COMPLETED PROJECTS

Although the ongoing discussions on the modality for future cooperation among the Mekong countries had just concluded by the end of November, the donors' support to the Mekong Programme remained encouraging throughout the year. There was a continual shift toward basinwide rather than national projects from 1985 to 1994. The regional programmes and projects supplement bilateral initiatives. At the end of 1994, 49 projects were funded or 'hard' pipeline projects.

Below are some lists of projects which were initiated during 1994, followed by others which were operationally and financially closed during the year.



### *Projects initiated in 1994*

- |                |   |  |
|----------------|---|--|
| ADB/France     | ☞ | East-West Corridor (\$1,000,000); and Upper Mekong Navigation (\$99,000);                                  |
| Austria/Sweden | ☞ | Kirirom hydropower (Cambodia) (approx. \$22,000,000);  |
| Denmark        | ☞ | Flood forecasting (\$245,000); Reservoir fisheries (\$3,491,000); and Danish Consultancy Fund (\$420,000); |
| Germany        | ☞ | Sustainable management of resources (approx. \$1,750,000);   |
| Japan          | ☞ | Integrated transmission system (\$687,000);  |
| UNEP           | ☞ | Diagnostic study (\$203,000); and  |
| UK             | ☞ | UK Consultancy Fund (\$37,000)   |

### *Projects operationally completed in 1994*

- |             |   |   |
|-------------|---|---|
| Austria     | ☞ | Identification of Priority Hydropower Projects in Cambodia (\$419,000);                 |
| France/UNDP | ☞ | Run-of-the-River Hydropower Possibilities (France: \$100,000; and UNDP: \$352,000); and |
| UNDP        | ☞ | Master Plan for the Integrated Development of the Mekong Delta (\$3,737,000)            |

### *Projects financially closed in 1994*

- |           |   |   |
|-----------|---|---|
| Australia | ☞ | Study on international aspects of the My Thuan bridge (\$68,000);       |
| France    | ☞ | Preliminary study on the Chruai Changvar Port (Cambodia) (\$61,000);    |
|           | ☞ | Development Plan for Tonle Sap and Chakdomuk, Phase I (\$76,000); and   |
|           | ☞ | Strategy Study on the Development of Upper Mekong Navigation (\$97,000) |

## CASH AND IN - KIND CONTRIBUTIONS: 1990 - 94

(AMOUNTS IN U.S. DOLLARS)

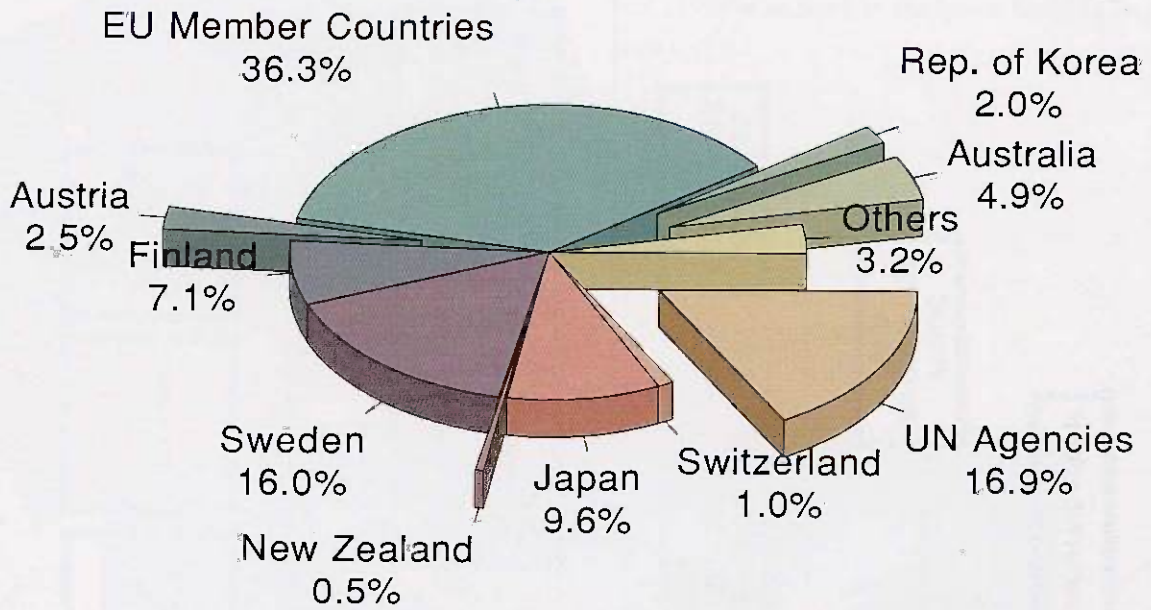
DONORS	1990	1991	1992	1993	1994	TOTAL
<b>A) CASH CONTRIBUTIONS:</b>						
Australia	672,596	915,898	1,342,167	596,676	435,982	3,963,319
Austria	0	0	0	200,000	219,000	419,000
Canada	0	43,976	0	0	0	43,976
European Union:						
Belgium	0	0	407,617	0	0	407,617
Denmark	0	130,000	455,356	1,102,519	1,247,796	2,935,671
France	56,092	247,674	458,710	303,555	181,836	1,247,867
Germany	212,041	(24,957)	0	30,439	27,164	244,686
Italy	0	0	500,000	0	0	500,000
Netherlands	2,077,876	1,225,944	738,194	2,173,378	1,576,911	7,792,303
United Kingdom	5,590	1,199	0	0	37,300	44,089
Commission of EU	684,376	139,214	899,819	348,781	164,000	2,236,190
Sub-total EU	3,035,975	1,719,074	3,459,695	3,958,673	3,235,007	15,408,424
Finland	1,192,284	1,572,952	1,139,083	689,509	627,233	5,221,061
Japan	172,000	200,000	236,000	382,000	857,000	1,847,000
Republic of Korea	0	0	0	275,000	175,000	450,000
New Zealand	22,519	34,851	0	42,728	47,850	147,948
Sweden	1,649,542	1,280,120	1,948,443	1,124,493	1,419,440	7,422,038
Switzerland	1,700,000	300,000	1,145,000	532,850	90,000	3,767,850
UN Agencies:						
UNDP/Cambodia	0	0	1,044,528	247,111	692,371	1,984,010
UNDP/Thailand	521,644	714,086	340,710	684,500	579,600	2,840,540
UNDP/OPS	15,500	0	0	31,313	28,500	75,313
UNDP/World Bank	462,762	312,932	0	331,965	0	1,107,659
UNEP	0	0	0	177,000	80,000	257,000
UN/FAO	0	0	0	0	113,562	113,562
UNHCR	0	16,234	13,564	0	0	29,798
Sub-total UN Agencies	999,906	1,043,252	1,398,802	1,471,890	1,494,033	6,407,882
Others:						
Asian Development Bank	95,000	252,000	160,000	403,672	197,252	1,077,924
Asian Institute of Technology	0	0	0	129,360	98,000	227,360
The Asia Foundation	0	0	6,418	0	0	6,418
Mekong's PRF	0	225,000	200,000	0	0	425,000
Miscellaneous	0	0	39,173	32,000	25,500	96,673
Sub-total Others	95,000	477,000	405,591	565,032	290,752	1,833,375
<b>Total Cash Contribution</b>	<b>9,539,822</b>	<b>7,587,123</b>	<b>11,074,781</b>	<b>9,838,851</b>	<b>8,891,297</b>	<b>46,931,874</b>
<b>B) IN-KIND CONTRIBUTIONS (ESTIMATES):</b>						
Canada	0	430,000	0	0	0	430,000
European Union:						
Belgium	0	82,500	90,750	96,000	120,000	389,250
France	30,500	15,000	60,000	0	0	105,500
Netherlands	45,000	90,000	0	0	0	135,000
United Kingdom	53,251	51,413	0	0	0	104,664
Sub-total EU	128,751	238,913	150,750	96,000	120,000	734,414
Finland	36,000	58,500	10,500	0	0	105,000
Japan	120,000	187,500	270,000	297,000	240,000	1,114,500
Republic of Korea	0	0	0	0	120,000	120,000
Sweden	307,955	266,119	248,200	273,020	0	1,095,294
Switzerland	85,000	90,000	90,000	198,000	240,000	703,000
<b>Total: In-Kind Contribution</b>	<b>677,706</b>	<b>1,271,032</b>	<b>769,450</b>	<b>864,020</b>	<b>720,000</b>	<b>4,302,208</b>
<b>Grand Totals: Contribution Received</b>	<b>10,217,528</b>	<b>8,858,155</b>	<b>11,844,231</b>	<b>10,702,871</b>	<b>9,611,297</b>	<b>51,234,082</b>



## PROGRAMME SUPPORT BY SOURCE 1994

Annex IV

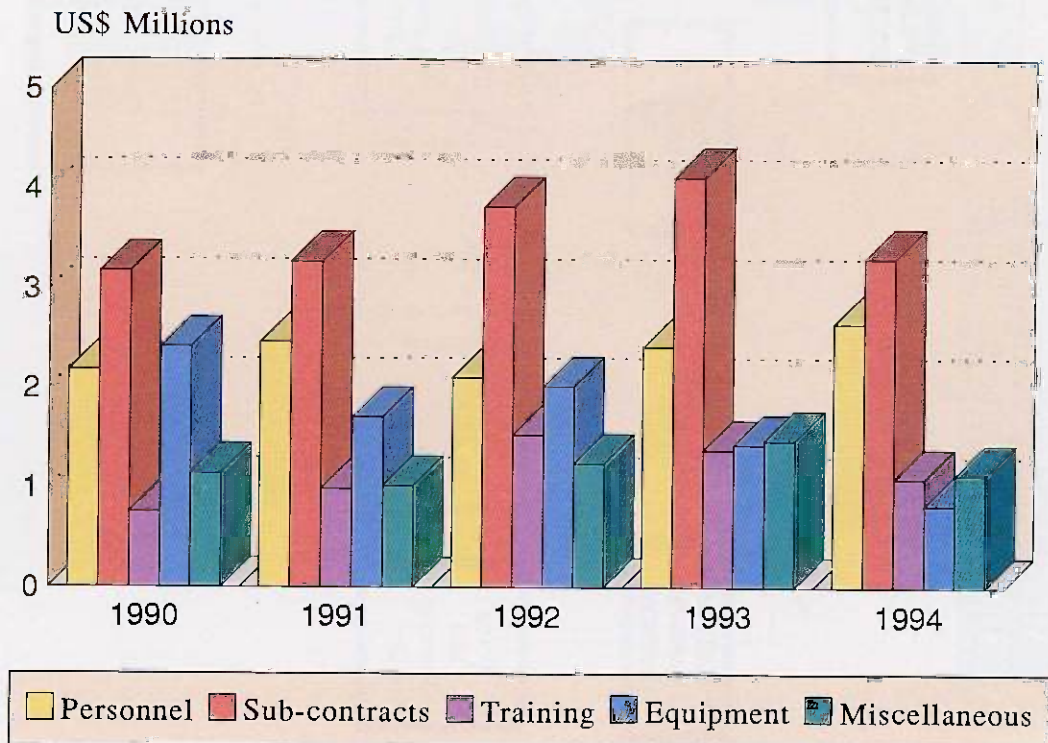
Total Amount: US\$ 8,891,297



Note: As of 31 December, Austria, Finland and Sweden had not joined the EU as yet

## PROGRAMME EXPENDITURES BY COMPONENT

Annex V

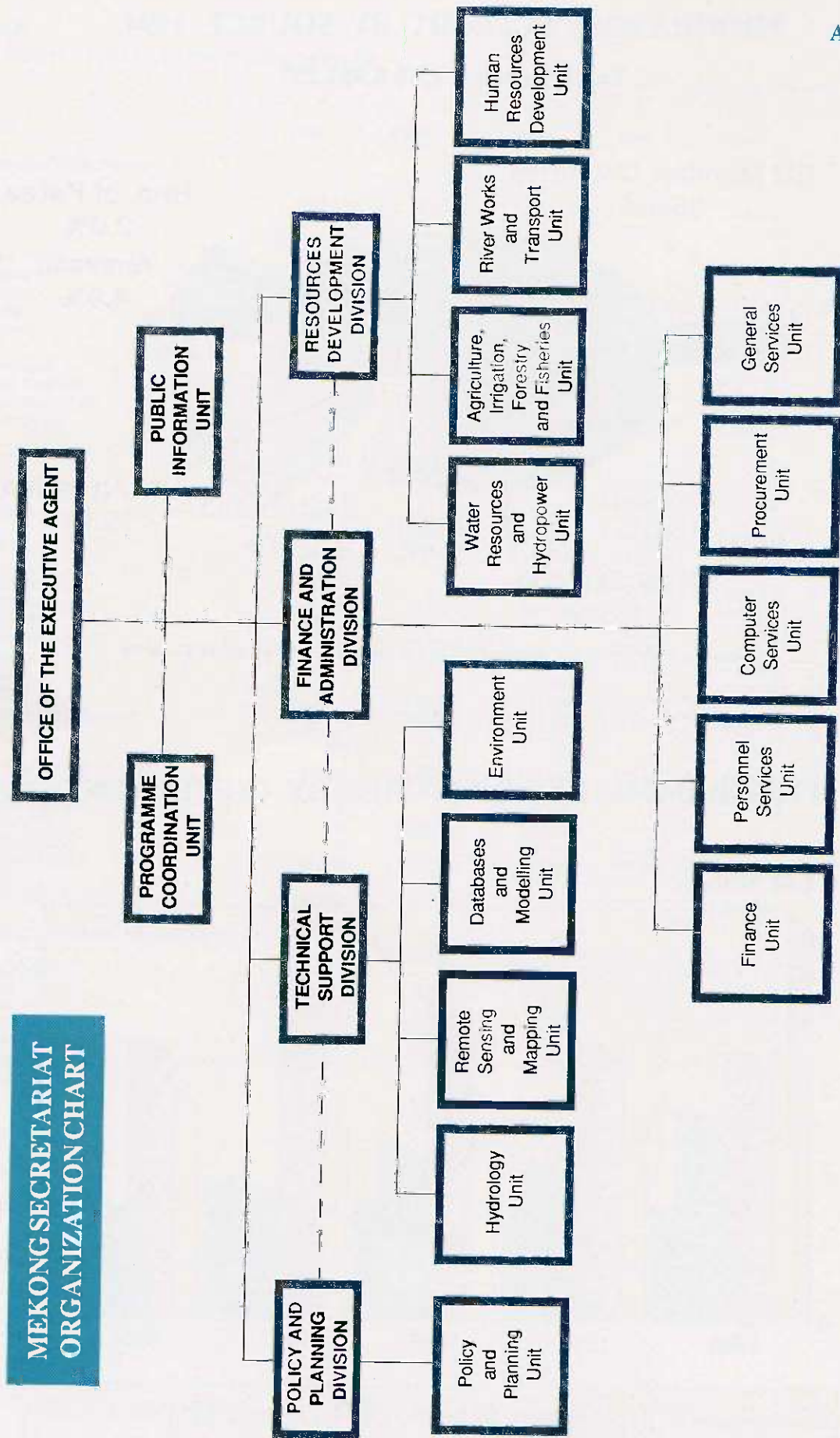


*People at work in the lower Mekong basin*



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