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Food Security and Development in the Lower Mekong River Basin

A Challenge for the Mekong River Commission

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Summary

It is not only a conducive policy and institutional reform at the level of individual countries that is needed to eradicate or reduce poverty. Many aspects of poverty are of a trans-boundary nature. This is most obvious in a major international river system. This paper addresses the question of how the Mekong River Commission (MRC), through regional cooperation between its four member governments, will contribute to food security in the Lower Mekong Basin.

The 1995 Agreement establishing the Mekong River Commission has a unique status in that it forms the basis of the only legally constituted regional organization mandated from the highest political level to deal with Mekong River management in a holistic manner. MRC's activities are performed to create the policy and institutional conditions that will secure maintenance of the ecological integrity of the Mekong River Basin and reduce poverty through sustainable development for this and future generations.

Pressure from population growth is making this an increasingly important task. There are approximately 73 million people living in the entire Mekong River Basin. The Lower Mekong River

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Basin (Cambodia, Lao PDR, Thailand, and Viet Nam) presently contains 84 percent of this basin-wide population. At its present rate of growth, the Basin's population will increase by about 65 percent to approximately 120 million by 2025 with an equivalent increase in the demand for food and clean water year round. Even at a lower growth rate, the population in the Lower Mekong Basin and nearby urban areas will, in the next decades, reach an alarming level.

Balanced and efficient land and water use is essential to long-term food security in the Mekong River Basin. The Basin is one of the world's most significant food sources, particularly for the growing urban population of the Greater Mekong Subregion. It provides the staple diet for perhaps 300 million people and, as demand increases, has the potential to produce much more. Activities related to agriculture and forestry are the most significant direct human environmental influences on the basin and much of this impact occurs across national borders, requiring a regional approach to change.

While the importance of rice for food security in the Lower Mekong Basin is well understood, the role of fish in the overall food security of the population is not always acknowledged. Rice and fish are the basis for the food security of the rural population in the Lower Mekong Basin. Fish is the single most important source of animal protein for this population, and a very important source of income as well.

There is vast potential for developing the natural resources of the Lower Mekong Basin, which is at the core of the MRC mandate. In doing so, a key task in the years to come will be to ensure food security. Expanding agriculture seems to be a viable response to the expected population increase. But agricultural development has to be managed carefully to reduce negative effects on other sectors or in other geographic areas than the ones developed, in particular the fisheries sector. Irrespective of development in the agriculture sector, fish resources—on a per capita basis—are likely to decline. This is mainly due to population increase and adverse effects of development in other sectors. Their significance in terms of critical nutrition components makes it imperative for MRC to seek to sustain the fish resources and simultaneously identify and prepare the ground for introduction of alternative food sources.

Also with regard to other economic sectors, MRC recognizes that development at a given location in the River Basin may have adverse impacts on other sectors and locations. It therefore will apply, in its programs, a Catchment Management Approach, in which all relevant aspects are studied

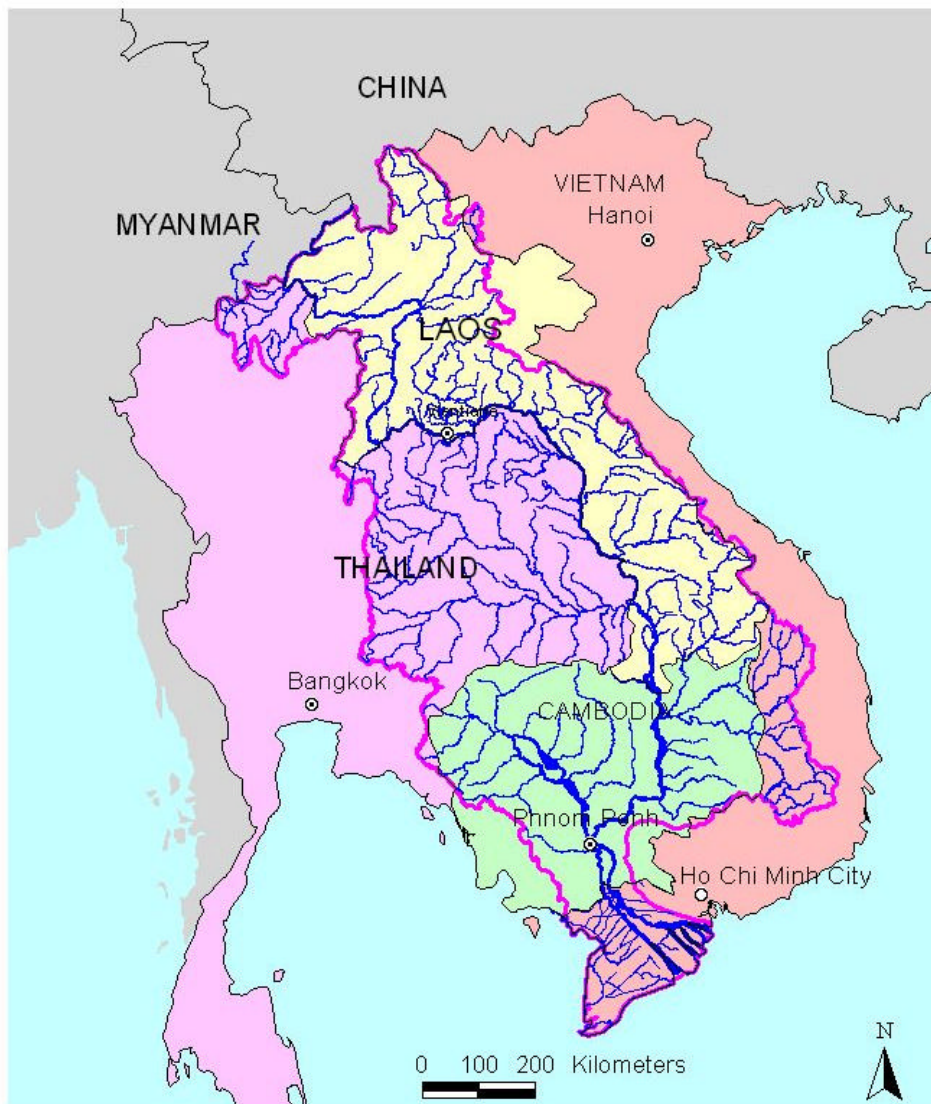
at the level of a tributary's catchment area, and subsequently checked for their interlinkages with the rest of the Mekong River Basin.

The regional interdependence in relation to development of the Basin requires regional cooperation in deciding on development priorities. This, in turn, requires information on possible development options and their consequences. Through regional cooperation and through its catchment management approach, MRC is well placed to ensure that development priorities are set in a holistic perspective, taking into account positive and negative impacts of development in various sectors and guided by the overall objective of reducing poverty. If development options have a negative impact on poverty, compensatory measures have to be introduced to neutralize these effects, so that no one in the Basin is worse off. A key prerequisite for this is knowledge and information. MRC has taken steps to become a regional knowledge center and information hub on Mekong Basin issues. Through its current programs, MRC will generate a vast amount of data and information.

In ensuring food security and, in particular, the nutritional value currently provided by fish resources, more information for development decisions is needed—and is under way.



THE LOWER MEKONG BASIN AND THE MRC COUNTRIES



I. Introduction

Development partners largely agree on the approach that poverty reduction strategy plans should be the basis for development assistance programs. Most often, strategies aim at country-driven poverty reduction. Though very useful in many countries this approach, however, may not take sufficiently into consideration cross-boundary impacts of development measures in regions where several countries share a river basin and highly depend on its associated resources, economically and socially. What one country might consider as development that eventually contributes to poverty reduction may in fact translate in a neighbour country into irreversible ecological harm and as a consequence into increased poverty.

Though poverty is closely related to and measurable through income and the degree of fulfilment of basic human needs, such as food security, it is also fundamentally linked to the ability to participate in the decisions that affect one's life. The improvement of governance structures by increasing transparency and cooperation in decision-making processes is crucial for making informed decisions at all levels of stakeholders.

This paper addresses the question of how the Mekong River Commission (MRC), through regional cooperation between its four member governments (Cambodia, Lao PDR, Thailand, and Viet Nam) can contribute to poverty reduction through food security in the Lower Mekong Basin (LMB).

The Mekong River Basin's capacity to produce the range of services required of it, including food, forest production, clean water, biodiversity and perhaps climate, depends upon the maintenance of its ecological integrity. This in turn depends upon cooperation between the riparian states and between sectors to ensure balanced resource use to the benefit of each state.

A. The Mekong River and the Lower Mekong Basin

The Golden Triangle, where the borders of Myanmar, Lao PDR, and Thailand meet, is the beginning of the LMB, which includes the riparian countries of Cambodia, Lao PDR, Thailand, and Viet Nam. The Mekong River has a total length of approximately 4,400 km. It ranks 12th in the world in terms of length, 21st in terms of catchment, and 8th in terms of discharge.

B. Economic Growth in the Lower Mekong Basin

The last two decades have witnessed rapid economic development in the lower basin countries. This has been fuelled by wide-ranging reform processes following the end of civil strife and ideological barriers within and among the basin states. The opening of the riparian economies to trade with and investment by other countries has been particularly important in the rapid, dynamic economic development processes experienced in Cambodia, Lao PDR, and Viet Nam. Economic development has been concentrated in urban areas and at least part of the urban population has experienced substantial increases in their standard of living over a short period of time.

C. Key Issues Related to Food Security

Seventy-five percent of the population living in the Basin earn their living from agriculture and fisheries. Balanced and efficient land and water use is essential to long-term food security in the Mekong River Basin. The Mekong River Basin is one of the world's most significant food sources, particularly for the growing urban population of the Greater Mekong Subregion. It provides the staple diet for perhaps 300 million people (ADB 1999) and can, with care, produce much more as demand increases.

The inland capture fisheries production in the LMB forms, together with rice, the basis for the food security of the rural population. Fish is the single most important source of animal protein for this population, and a very important source of income as well.

While the importance of rice for food security in the LMB is well understood, the role of fish in the overall food security of the population is not always acknowledged, both in terms of its contribution to overall food production and its essential contribution to the diet of rural people who produce most of their own food. The common property nature of the resource base of the fishery sector is spawning increasing conflicts inside the sector between the different actors as well as threats from other economic sectors using partly the same resource basis. For the economically and socially most vulnerable strata of the society, the poor, access to common property resources constitutes a last safety net in subsistence conditions.

D. The Role of Mekong River Commission in Food Security and Poverty Reduction

The MRC's origins go back to 1957, when the Committee for Coordination of the LMB (the Mekong Committee) was established. Over the period 1978 to 1995 it was known as the Interim

Mekong Committee. In 1995 an Agreement between Cambodia, Lao PDR, Thailand, and Viet Nam established the MRC. Under the 1995 Agreement, MRC's role is to coordinate and promote "Cooperation in all fields of sustainable development, utilisation, management and conservation of the water and related resources of the Basin."

The MRC's focus is on three priority areas, each of which follows directly from the 1995 Agreement:

- (i) Developing rules for the co-operative use of water
- (ii) Basin Development Planning: facilitating co-operative sustainable development of water and related resources
- (iii) Environmental management and monitoring of the basin's natural resources

Activities in these three fields are performed with the aim to create the policy and institutional conditions that will secure maintenance of the ecological integrity of the Mekong River Basin, in order to reduce poverty through sustainable development for this and future generations.

The MRC produces data and analysis useful for basin planning purposes that have the unique benefit of representing the collective views of the riparian states. Each country and associated development agencies can use this indicative information as a basis for decision making. This is particularly significant in water use in agriculture and power generation, fisheries, forestry, and navigation.

II. Aspects of Poverty and Food Security in the Lower Mekong Basin

A. The Dimension of Poverty in the Region

The people in Cambodia and Lao PDR are among the poorest in the world: their income is low, the availability of food is low, and they are suffering from important health problems, due to lack of hygiene and access to safe water and health facilities. Also in the Northeastern part of Thailand and the provinces of Viet Nam that are part of the basin, many people suffer from severe poverty. Poverty is closely related to access to cultivable land and appropriate amounts of water, as well as to fish.

Throughout the basin, small farms are the main feature, many of whom are close to or below subsistence level. Many farms produce a per capita income below US\$100 per year. Farmers are

forced to seek off-farm employment elsewhere. Many are at the mercy of rice traders and are caught in a poverty trap in which they are in debt to private money lenders to whom they have to sell their rice at harvest time at very low prices. Other farmers, for example those in the Delta outside the problematic saline or acidic areas, generate a significant rice surplus. This situation has led to a rather skewed pattern of income distribution.

There are great discrepancies between countries and within countries. Gross domestic product (GDP) per capita in three out of the four MRC member countries is among the lowest in Asia, at US\$290 for Cambodia, US\$324 for Viet Nam, US\$365 for Lao PDR, and US\$2,540 for Thailand (World Bank 1999). The Northeastern part of Thailand is much poorer than the rest of the country. In 1996, 18 million people living in the Thai part of the LMB had an average income of US\$731.²

Such figures, however, do not fully reflect the socioeconomic reality in the region. In fact, most people in rural areas produce a major part of their food by themselves. They reach a balanced diet through their own rice production, fish catch, and gathering of common property resources, rather than through buying a basket of food.

Many people in Cambodia and Lao PDR do not have access to safe drinking water and proper sanitation facilities. Estimates of the percentage of the total population without safe water supply vary between 70 percent and 80 percent for Cambodia and between 50 percent and 60 percent for Lao PDR.

Flooding adds to the multiple facets of poverty in the region. Large areas in the LMB are seasonal wetlands with an important function for biodiversity, fisheries, and soil fertility—and thus for food supply. But floods also aggravate poverty problems. Extreme floods, such as the one in Viet Nam in 1999 and in Cambodia in 2000, destroy fields planted with crops. Relief efforts were partly in vain, due to the poor quality of commercial seeds for replanting. The standing crops in 20 percent of Cambodia's rice paddy fields (400,000 hectares) were washed away in 2000 (*The Cambodian Daily* 12 January 2001). Furthermore, the flooding led to destruction of agricultural land, thereby affecting agricultural productivity. Floods also have an adverse impact on the countries' efforts to build up its

2. Data from the National Economic Social Development Board. Figures in baht converted into US\$ at 37 baht per dollar.

human resources (see for instance the Cambodian government's report on the destruction of schools in 2000).

These losses have not been large on a macroeconomic scale in Cambodia (given the low normal yields³). Yet, the impact on loss of income, food consumption, and means of production is significant. This impact is felt hardest among the poorer section of the population who are producing for their own subsistence, and who are too vulnerable to cushion external shocks.

B. Rice Production

Rice is the principle crop and staple food of the people in the region. The LMB has achieved a remarkable increase in rice production over the last decade in line with the rest of Southeast Asia. This has contributed to the generation of a sizeable net surplus from the Basin as a whole, although Lao PDR still has a significant deficit in the mountain areas. The Mekong River Delta generates annually about 40 percent of the total rice production in Viet Nam.

The overall benefit of rice production is unevenly distributed. A case in point is Cambodia, which was mentioned in a recent WFP study as one of the four Asian countries in which hunger was worst (*International Herald Tribune* 10 January 2001).

C. Fish

The present fisheries yield of the LMB is above one million tons per year. Some 16 percent comes from aquaculture, and the rest from freshwater capture. Tonle Sap is among the world's most productive freshwater fisheries areas. Statistics from the Food and Agriculture Organisation indicate a steady yield in all four member countries in the period 1988-1993.

With a view to the complications of assessing total production,⁴ only tentative estimates of catch and aquaculture yields are available:

3. Rice paddy yields in Cambodia amounted to 1.55 tons per ha in 1990-1998 compared to 2.23 tons in Thailand, 2.53 tons in Lao PDR, 2.55 tons in Viet Nam, and 4.34 tons per ha in Indonesia (RGC 1999, 69).

4. Collection and analysis of catch and effort data is an impossible task in a strongly seasonal small-scale fishery in flood plains and rice fields, etc., with hundreds of different gear types. It also becomes clear that the exclusive registration of the more visible large-scale fisheries will only target a fraction of the real production. Turning to the consideration of food security for the people, however, it becomes crucial to obtain more correct data, which can form the basis for national and regional planning and for the development of appropriate fisheries management systems.

Fish Production in the Lower Mekong Basin		
Fish Production	Volume	Market Value
Capture Fisheries	>1,000,000 tons	>US\$750-800 million
Aquaculture	200,000 tons	US\$150-200 million
Total	1.2 million tons	US\$1,000,000,000

Source: MRC fisheries programme

With a population now estimated at 60 million people, these data imply an average fish consumption in the LMB of not less than 20 kg per capita per year. This is on the upper edge of what is consumed in most industrialized "fish eating" countries. Still this figure is considered preliminary and likely to be well below the correct one. It is believed that the average figure for the whole Basin will fall on the high side of 29 kg when full MRC survey data become available.

The fish harvest is also strongly seasonal. From late November to late March beginning of April when the biggest catches are taken, fish is abundant and the fresh fish price is low. The price rises during the following months. Traditional fish products with a shelf life of 6-9 months therefore play a very important role in food security. An important fraction of the small fish caught when migrating out of the flood plains at the beginning of the dry season is dried, salted, or converted into some of the traditional fermented products. The per capita consumption of these products lies in the range of 10-14 kg per year in much of the Mekong Basin. These products are responsible for a considerable part of the animal protein intake of the people during the rainy season.

Food Security: Per Capita Fish Consumption	
- Average	>20 kg
- Tonle Sap (flood plain)	71 kg
- Luang Prabang (highland)	29 kg
- Hereof traditional products	Approx. 10-14 kg

These traditional products have, however, a much broader importance in the diet. They are an invaluable source of calcium and an important source of vitamin A and other micronutrients. This is an area that requires considerably more research, and, when confirmed for the specific traditional products, may indicate the importance of supporting the production and consumption of traditional fish products in Southeast Asia.

III. Future Prospects: Population Growth, Water Quality and Development Based on Water-related Resources

A. Population Growth and Pollution

(i) Population

Compared to overpopulated river valleys all over the world, the Mekong River Basin belongs to one of the few areas where population pressure has not been overly strong. However, the basin population has been growing comparatively rapidly. At the current rate of 2 percent per year, the population of the Basin will increase from 73 million at present to approximately 120 million by 2025, with an equivalent increase in the demand for food and clean water. Presently, 84 percent of this basinwide population lives in the LMB.

Even if the population grows at the most optimistic low rate, the population in the LMB will reach an alarming level in the next decades. The population pressure will certainly in itself have negative impacts on the sufficiency of clean water and food. The increase in the demand for energy will most likely mean construction of new dams and converting more forests into agricultural land. Agricultural production must be intensified. These and other activities will lead to a considerable pressure on the ecosystems.

(ii) Urbanization

Currently, only about 16 percent of the basin's population live in urban areas. However, urban population growth is expected to increase rapidly in the coming decades, fuelled by both heavy immigration from rural areas and population growth. Of particular importance are the rates of urban growth of Cambodia and Lao PDR, as the largest cities of these countries are located within the Basin area.

In the main cities, there is water supply and storm drainage systems. Yet, in Cambodia, Lao PDR, and (arguably) Viet Nam, these systems require great investments for rehabilitation⁵. In small towns and rural areas there is none, with people taking their water directly from the river, and discharging untreated sewage into the river. Only in Thailand do the majority of people have access to safe drinking water and sanitation on a relatively large scale.

With population increasing, much more investment is required to provide safe drinking water (using ground and surface water). Untreated sewage has to be prevented from polluting surface water bodies. The water quality of the Mekong is already deteriorating significantly and rapidly in major urban centers.

(iii) Industrialization

The growth of the still underdeveloped industrial sector in the Mekong River Basin will also contribute its share to the pollution of water resources. Foreign direct investment is already increasing in several parts of the Basin, and industrial development in general is likely to increase considerably in the longer run. This will significantly raise employment and income opportunities and thereby make an important contribution to poverty reduction. However, it is also likely to increase pressure on the Mekong ecosystem, which could, in particular, affect the fish resources. In this respect, it is worth noting that Lao PDR and Cambodia, the two least developed countries in the LMB, almost lie entirely within the Basin.

B. Prospects in Socioeconomic and Ecological Development

(i) Hydropower

Population growth and industrialization need electric energy. The energy demand in the Basin is projected to rise rapidly and faster than the population increase. Estimates of the hydropower potential of the LMB vary, depending on the feasibility criteria applied. Hydropower development may lead to increased income and employment in the industrial sector, rural electrification, education, sanitation and water supply, irrigation possibilities, and regulation of water flow. But it also may generate negative impacts such as the decline of fish resources, possibly an increase in

5. See for instance, ADB (2000). The ADB is providing substantial funding for these activities.

water-borne diseases, reduced food production due to water logging, and displacement and loss of cultural identity of indigenous people who are generally among the poorest in the region.

(ii) Irrigated Agriculture

The World Water Forum conference in March 2000 in The Hague estimated that food demand from the Mekong River Basin will increase between 20 percent to 50 percent by 2030, accompanied by an increase in water demand. As to the resource base, a substantial increase of the agricultural production is possible.

Despite the primacy of rice in the agricultural sector in the area, the LMB has a relatively low "irrigation ratio" compared with the rest of Asia. A rough estimate would place the ratio of LMB irrigated area over its total cultivated area at a mere 7-10 percent, whereas the ratio for the whole of Asia would be around 45 percent. Cropping intensities in the dry season are generally low. However, in certain areas, good prospects exist for seed crops, vegetables, fish, and shrimp ponds.

A large potential for increasing production exists in irrigated agriculture, mainly through an expansion of the irrigated area (in Cambodia and Lao PDR), and through increasing the water consumption for irrigation (in Cambodia, Lao PDR, and Thailand). This, however, may affect the Mekong Delta (Viet Nam), which is vulnerable to reduced dry season mainstream flow, accompanied by enhanced salinity intrusion from the sea.

Potential positive impacts of agricultural development include increased food production and consumption, income, and employment. Reservoirs for irrigation can also create new opportunities for fish production. These can range from harvesting indigenous fish and stocking of nonindigenous species to cage culture and integrated farming systems. Agriculture, forestry, and fisheries provide the foundation for economic development in a broader sense.

Potential negative impacts include ecosystem damage, competition of limited natural resources with increased population (affecting fish resources by converting wetlands into agriculture land, deforestation leading to flooding etc.); irrigated agriculture reducing water quantity; and depletion of soil quality. Inefficient water use by farmers in irrigation projects can result in large flows of tail-water into receiving waters, usually with high contents of pesticides. This can coincide with low flows in receiving waters leading to threats to fish stocks in rivers and estuaries. A recent survey of rivers, reservoirs, and wetlands in the LMB revealed that all fish sampled had pesticide residues in their

flesh. Such pesticide pollution may especially occur with fish raised in paddy fields, which can create a severe hazard both to the fish stocks and to the consumer. Integrated pest management is a feasible solution to the problem.

(iii) Forest, Wetland, and Coastal Ecosystems

The forest, wetland, and coastal ecosystems in the Mekong River Basin are continuously degraded—other victims of the growing population pressure. Cambodia probably has still the most diversified and preserved forest/wetland ecosystems in the Basin. Lao PDR is one of the richest countries in the region in terms of biodiversity, due to a relatively intact large area of forest resources. Yet, many areas are threatened by development. Biodiversity degradation in Thailand has already proceeded to a stage where only limited areas of species exist within the Mekong River Basin. The Mekong Delta in Viet Nam is fully affected by human intervention (conversion of mangrove forests to shrimp farms and wet rice cultivation, drainage works, etc.).

C. Inland Fisheries—A Complex Issue

(i) Fish Resources of the Mekong

Close to 1,300 different fish species (Rainboth 1996, Rainboth personal communication 1999) have now been identified in the LMB. Approximately 120 species are estimated as being commercially important and are found at market places in the Basin.

The variety of ecosystems with rivers, lakes, flood plains, and estuaries support a high fish diversity. The changes between dry and rainy seasons and the periodical flooding of the land create high fish production and force the fish to migrate. In particular the flooded forests are important as feeding areas and shelter for fish. When the water recedes at the end of the rainy season, the fish migrate back to the main stream where they—if not caught—survive until the next flooding. It is the flood plains that give the high productivity, while the main river and the permanent water bodies create the habitats, where the fish can survive until the next flooding.

Furthermore, each year some of the species have to travel great distances to reach their spawning grounds (see map 2).

With the expected population growth in the LMB, an additional fish production of approximately one million tons is needed by 2025 in order to ensure the food security at a consumption level of approximately 30 kg fish per capita per year.

Capture fishery is considered utilized at its maximum possible level already, and there are only limited possibilities for expanding it in reservoirs and other artificial water bodies. It is more than likely that the development of other economic sectors may lead to some decline in the overall fish production in the Basin in the future.

With strong population growth in the Mekong Basin and a natural capture fishery that can hardly be expanded, aquaculture has an important role to play in food security as a whole. It is the most important source for an increase in fish production required to cope with the population increase.

There is a tradition for inland aquaculture in the Mekong Basin. In an overall perspective the aquaculture production in the Mekong Basin still plays a limited role, with a total production at present estimated at 200,000 tons. The traditional separation of aquaculture and capture fisheries as two almost independent production systems is not feasible in an area as the Mekong Basin. On the one hand, aquaculture receives fry and fingerlings from the wild fisheries and feed for cage culture of predators from the flood plain fisheries. On the other hand, escapees from aquaculture activities reach the natural habitats frequently in high numbers, when exceptional floods surpass the dikes around ponds or accidents cause breakage of fish cages.

An increase from the present approximately 200,000 tons per year to 1,200,000 tons in 2025 would require an annual growth in the sector of around 8-10 percent per year. This is hardly likely to be achieved. On the contrary, there are some significant developments in the LMB that actually form a threat to fisheries.

EXAMPLE OF FISH MIGRATION IN THE REGION

The Arrows indicate migrations of the Trey Riel (*Henicorhynchus spp*).

(ii) Threats to the Fisheries Sector

The most important threat to fish resources comes from habitat destruction.⁶ Fish habitats are changed and destroyed by other sectors, as when the flood-forests, which form important shelters and spawning grounds for fish, are cut down and wetlands are drained in order to allow for increased rice production. The net economic result may be negative.

A second important threat is constraints to fish migration. A dam on the mainstream may in its worst case cause the collapse of the resource system around the flood plains in central Cambodia and the Mekong Delta of Viet Nam. Fish migrations are vital to these resource systems. The systems would probably only slowly and partly be able to recover from constructions that might cut off large spawning habitats (if given a chance).

Pollution from urban areas and industrial development may destroy important habitats, and is also feared to work as a barrier to migrations in the same way as a dam: the fish will not be able to pass the part of the river where it occurs. Failure to address pollution problems in relation to future urban development may cause irreparable damage to the ecosystems in the mainstream and in Tonle Sap. This issue requires the highest attention.

Besides, the increase in rice crops of higher-yielding strains that require more fertilizer and pesticides, may eliminate the traditional extra production of fish, frogs, and other animals for food and income from the fields. This is rarely considered during the planning of this kind of development. Also, the net economic result here may in some cases be negative, especially for the poorer sections of the population.

Flood prevention—in contrast with prudent flood management—will have a negative effect on fish production, since it hampers the free movement of fish. The same applies to measurable reduction of peak flood brought about as an accumulated effect of reservoirs constructed upstream.

6. "Too high fishing effort" is often mentioned as a potential threat, and it is certainly so in some local areas and for some vulnerable species like the giant Mekong fish species and other large species, which reproduce at a relatively advanced age. However, for the Basin as a whole, this appears to be of relatively minor importance compared to habitat destruction.

Thus, the fisheries sector is likely to face severe complications in the near future. Nevertheless, there seems to be few other sources of animal protein that can be developed within a reasonable time span to replace fish in the diet of the rural population.

IV. A Catchment Management Approach to Ensure Balanced Resource Use

A. The Rationale of the Catchment Management Approach

The previous chapter has sketched some of the interrelationships between the environment, human economic activities, and the River Basins' hydrology. All of these together should be taken into account while striving for food security under population growth.

One of the methods the MRC applies to take these parameters into consideration is the so-called *Catchment Management Approach*. With this approach, the MRB is formed into a number of subdivisions, each consisting of an individual catchment area. A catchment is a geographical unit in which all flows of water (precipitation, evaporation, run-off water, ground water, river streams) affect the catchment's main water body, which, in MRC's case, is a tributary to the Mekong River.

The Catchment Management Approach was first introduced in the MRC's Fisheries program and is an integral part of the Agriculture, Irrigation and Forestry Programme (2001-2005). It also forms the methodological backbone of the three MRC core programs that are about to start: the Water Utilisation Programme, the Basin Development Plan, and the Environment Programme.

The Approach aims at optimizing the use of the resources of the catchment for the local community, the particular country, and the LMB as a whole. It involves considerations of all sectors and aspects, such as agriculture, forestry, fisheries, environment, local services, and socioeconomic and cultural characteristics of the local communities. In addition, it also looks at the interlinkages between all these aspects. It recognizes that:

- (i) The local communities in a catchment area are both a cause of environmental stress and may be suffering from the results of irrational planning.
- (ii) Social and economic pressure faced by small communities are often passed on to the environment, mainly through unsustainable farming practices.

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- (iii) Where the exploitation of resources is causing environmental problems, there is often a solution that may minimize the damage and even benefit the rural community in a way that simple compensation would not.
 - (iv) Planning undertaken without participation from potentially affected communities will be susceptible to misunderstandings and difficulties in implementation, leading to increased cost for the project as well as the respective communities.

Furthermore, the Approach works under the premise that local activities from the upper catchment to the bottom valley have an impact on a fragile landscape, which eventually may have an impact on the River Basin as a whole. Under this approach all relevant developments are studied on a smaller scale, while taking into account the overall picture of transboundary issues. The impact of pollution from various sources, siltation, dam construction, urban and industrial areas, etc. are all included.

The implementation of a natural resources management and development strategy will require broad cooperation among different local authorities sharing the same watershed, in some cases even across national borders. Talking about natural resources management is talking about provincial, national, and regional cross-sectoral economic planning, involving various government offices as well as the people concerned. This implies aiming likewise at local development cooperation at the field and district level, where important decisions are made and natural resources management is actually taking place.

B. The Catchment Approach in the Fisheries Program

For fish, a catchment-based management planning system involves determining, for instance, important habitats, and migration routes. The aquaculture potential may be determined in close relationship to the size, type, and role of the wild fish species in food security and their need for habitats. This may be followed by drafting a policy for the use of indigenous and exotic fish species in fish culture as well as a catchment-based fish health management plan. The role of existing reservoir fisheries may have to be defined, not only per individual water body, but also as an integral part of the resource system in the catchment. Plans for and potential impacts of further dams, weirs, or other major economic activities related to the water may then be assessed more easily. In brief, a

catchment-based research and management plan may bring natural resources and their importance in food security into the overall national and regional planning processes.

A catchment approach to fisheries management will explore the following issues:

- (i) Registration of total production, species composition, important habitats, important migration routes, present aquaculture or reservoir fisheries, and the need and priorities for further research
- (ii) Determination of the present roles and development potentials of aquaculture and reservoir fisheries, and development of an overall and integrated management strategy for capture fisheries and aquaculture
- (iii) Establishment of natural resources management systems at river-basin-level as well as at subcatchment and local levels, with more emphasis on the access of the poor to the limited resources

C. The Catchment Approach in Agriculture, Irrigation, and Forestry

The recently developed MRC program in this field focuses on collaborative planning (and learning) for comprehensive development in sensitive cross-border areas, or areas that are likely to have an impact on the LMB as a whole. Small communities may participate in a grant scheme to improve their livelihood

Some of the other activities⁷ that are included in the Catchment Management Approach toward development of these sectors are:

- (i) Establishment of trans-border or trans-sub-Basin local government planning committees to discuss and plan interventions in the catchment. Since their members cover more than one catchment, trans-boundary issues will be taken into account.
- (ii) Establishment of capacity to monitor resource use and trade in the catchment areas.
- (iii) Study on land, water, and forest use rights.

7. Details of these activities are described in MRC (2000).

With irrigated agriculture often being the single largest consumer of water, it is well understood that efficient water use receives special attention. Therefore, this aspect has become a second pillar of the program.

V. River Basin Management: The MRC Strategy

A. River Basin Management

Countries sharing a river are affected by each other's decisions on how to exploit the natural resources in the basin. Cross-border cooperation in resource management is therefore essential. Also, authorities at provincial and district levels who share their daily work with resource users—the small-scale farmers and fishers—must be involved. Within a sector or subsector, food security and preservation of resources cannot be planned in isolation. The planning must take place in coordination with similar efforts of other sectors. The MRC can play a key role in such cooperation.

To meet present opportunities and challenges, the MRC Secretariat was restructured in July 2000. The operational activities were reoriented from a predominantly sectoral project approach to a multisectoral and Basin-wide program approach. The changes aim at focussing MRC on river basin management. As evidenced at the meeting of the MRC Ministerial Council in October 2000, the four Member Countries stand united behind this aim, which also receives strong support from donors.

Three core programs provide the foundation for MRC in river basin management. Their purposes and interlinkages are as follows:

- (i) The Water Utilisation Programme (WUP) provides MRC Member States with the technical framework for managing the Mekong water. This takes the form of rules for water utilization and ecological protection, including maintenance of sufficient flows in the dry season and measures to protect water quality.
- (ii) Closely linked to the WUP objectives, the Basin Development Plan (BDP) ensures coordination of development activities in the Mekong Basin, so that the balance between development of the immense Basin resources on one hand and maintenance of water flow and ecological systems, on the other, can be kept. The BDP aims to identify trans-boundary economic development activities that balance the Basin peoples' development needs with sustainable water quality, quantity and long term environmental integrity.

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- (iii) To provide an adequate basis for development decisions affecting the balance of the many complex, delicate and critical eco-systems at work in the Mekong Basin, the Environment Programme is to provide the knowledge required, and the means to ameliorate adverse environmental effects.

B. Focus on Food Security

There is vast potential for developing the natural resources of the Mekong Basin, which is at the core of the MRC mandate. In doing so a key task in the years to come will be to ensure food security. Expanding agriculture seems to be a viable response to the expected population increase. But agricultural development has to be managed carefully to reduce negative effects on other sectors or in other geographic areas than the ones developed, in particular the fisheries sector. Irrespective of development in the agriculture sector, the fish resources are likely to decline, when measured per capita, due to population increase and adverse effects of development. Their significance in terms of nutritional value makes it imperative for MRC to seek to sustain the fish resources and simultaneously identify and prepare the ground for introduction of alternative sources of protein supply.

In the long term a shift toward integrated, diversified agriculture with a more balanced cropping pattern throughout the year is most likely to be more profitable than the present strong dependency on wet-season rice production. Plans for related infrastructure and investments in agricultural marketing development, institutional development, and support services should therefore be a prime consideration in a planning process for the whole region.

At present, two of five MRC sector programs are directly addressing the issue of food security: the aim of the MRC Fisheries Programme is coordinated and sustainable management, use, and development of the economic and nutritional potential of inland living aquatic resources in the Mekong River Basin. The Agriculture, Irrigation and Forestry Programme, formulated in October 2000, focuses on activities to promote the sustainability and further development of food production from the land and water resources of the Basin where cooperation between member countries is required for success. The overall Programme development objective is to achieve “cooperative sustainable development and utilisation of land and water resources to the benefit of the basin community, and to contribute to poverty alleviation and food security.”

C. Poverty Reduction through Basin Development

Regional interdependence in relation to development of the Basin requires regional cooperation in deciding on development priorities. This, in turn, requires information on possible development options and their consequences, including the possibilities for compensatory measures, when needed. Through regional cooperation and through its catchment management approach, MRC strives to ensure that development priorities are set in a holistic perspective, taking into account positive and negative impacts of development in various sectors, guided by the overall objective of reducing poverty. If development options have a negative impact on poverty, compensatory measures have to be introduced to neutralize these effects, so that no one in the Basin is worse off. A key prerequisite for this is knowledge and information. The MRC has taken steps to become a regional knowledge center and information hub on Mekong Basin issues. Through its current programs, MRC will generate a vast amount of data and information that will be shared with all stakeholders who are invited to participate in their planning and implementation.

In ensuring food security and, in particular the nutritional value currently provided by fish resources, more information for development decisions is needed and is under way.

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