

MEKONG RIVER BASIN PHYSICAL, DEMOGRAPHIC, AND ECOLOGICAL CHARACTERISTICS¹

Truly one of the world's great rivers, the Mekong River begins its life as melting snow at 5,500 metres elevation in the pure, rarefied atmosphere of the Tanggulashan Mountains, on the northeast edge of the Tibetan Plateau. From there to the river delta on the south coasts of Vietnam and Cambodia, where it enters the South China Sea, its meandering journey takes these waters almost 5,000 km through six countries – China's Yunnan Province, along the northeast border of Myanmar with northwest Lao PDR, through northern Lao PDR and along its western border with northeast Thailand, then down the backbone of Cambodia to the southern tip of Vietnam and Cambodia – accumulating immense volumes of water, sediment, and nutrients along the way.

The river is known by many names, reflecting its meaning to the peoples it

The Mekong River

“The Mekong Basin has arguably the most diverse biotic and cultural landscape in the world today.”

(Asian Development Bank)

nourishes and challenges: Mother of All Waters; Nine Dragons River; River of Rocks; The Great River. In Yunnan Province it is called the Lancangjiang.

SOME PHYSICAL AND DEMOGRAPHIC DATA

In numerical terms, the Mekong River is the longest river in Southeast Asia, and the eighth longest in the world. The average annual discharge of $475 \times 10^9 \text{ m}^3$ places it as the twelfth in volume, and its total catchment area of 795,000 km² ranks as 21st worldwide. Table 1 lists some additional data regarding Mekong River Basin (MRB) demographics, catchment areas, and contributions to overall flow.

More significant than these statistics, however, is the fact that 80% of the 60 million people who live within the Lower Mekong Basin (LMB) depend directly on the river and its associated natural resources for their existence and livelihood. The countries through which the river flows have primarily agrarian economies, and their fishers and farmers rely on the annual cycles of the Mekong's flow. According to the Asian Development Bank (ADB), approximately 300 million people in Southeast Asia depend on products from the MRB for sustenance.

A BRIEF JOURNEY DOWN THE MEKONG RIVER

The topography through which the Mekong River flows varies considerably. In its early reaches it drains the

¹ Information in this lesson is taken in part from ADB (2000) and MRC (1997).

Table 1 MRB riparian country populations and catchment areas

COUNTRY	POPULATION (MILLIONS)	POPULATION WITHIN MRB (MILLIONS)	% OF MRB	
			AREA	FLOW
Yunnan, China	n/a	10	22	16
Myanmar	44	2	3	2
Lao PDR	5	5	25	35
Cambodia	11	10	19	18
Vietnam	79	~20	8	11
Thailand	62	~25	23	18

Northern Highlands in Yunnan Province, Lao PDR, Myanmar, and Thailand, where the river and its tributaries flow through deep valleys eroded by natural and anthropogenic actions. In its phase as the Lancangjiang River in Yunnan Province, the Manwan dam – the only dam, so far, on the mainstream river – detains the natural flow. Several more large dams are planned in the steep canyons of this upstream stretch. In northern Lao PDR and northeastern Thailand the river transects the flatlands of the Sakon and Korat Plateaux with their saline soils, before draining the mountain regions of eastern Lao PDR. These Eastern Highlands also have deeply etched valleys that have attracted the attention of dam builders.

Upstream of the border between Lao PDR and Cambodia, the Mekong expands to a width of 10 km and drops 30 metres at Khone Falls, known locally as 'Leepee' or 'Spirit Trap'. Above and below Leepee, the river separates into many ribbons surrounding Si Pan Don (Four Thousand Islands), the richest fishing area in Lao PDR. Several proposals have been made over the years to dynamite Leepee to permit navigation upstream.

As the river passes into southern Lao PDR and then Cambodia and Vietnam, it flows into the Lowlands Floodplain, where one of the most

impressive phenomena of the MRB occurs in the Tonle Sap (or Great Lake), the largest body of freshwater in Southeast Asia. Fed by floodwaters of the Mekong River in the rainy season, the Tonle Sap grows at least seven-fold from its minimum dry season area of approximately 2,500 sq. km to 16,000 sq. km. Its depth increases from 1 metre or less to as much as 10 metres. The Mekong River also contributes fresh silt, replenishes nutrients, and provides abundant habitat for fish and other aquatic organisms in flooded forest areas around the Tonle Sap. In return, the Tonle Sap helps to regulate floods in the LMB by storing water during the rainy season and releasing it when the rains abate.

At Phnom Penh, the Bassac River forks off the main stem of the Mekong River at Chaktomuk Junction, immediately downstream of the point where the Tonle Sap River flows northwest to feed and drain the Great Lake. The Bassac River eventually reconnects with the main stem of the Mekong in the northern reaches of the Mekong Delta. The Southern Uplands, consisting of the Cardamom and Elephant Ranges, drain into the Great Lake, and the Tonle Sap and Bassac Rivers.

In its final stretch, the Mekong River fans into approximately 50,000 sq. km

of channels in the Delta, known as 'Cuu Long' in Vietnamese (or 'The Nine-Tailed Dragon' for the nine principal channels of the river), where much of its remaining silt load is deposited, supporting intensive agriculture and fisheries. In the northern part of the Delta, the river passes through approximately 10,000 sq. km of the Plain of Reeds. Here, efforts have been made to adjust acid-sulphate soils to make them more suitable for crops. Closer to the mouth of the Delta, saltwater intrusion, largely as a result of irrigation schemes, is causing salinification of soils, which also poses challenges to agriculture.

The Mekong Delta occupies approximately 12% of Vietnam, contains almost 40% of the cultivated area of the country, and is home to about 20% of its population. Two-thirds of the Delta is under cultivation, providing more than half of the food consumed in Vietnam, including rice; over 50% of the fish; 60% of the fruit; and about 300,000 tonnes of aquaculture products, primarily shrimp, much of which is exported. The average discharge rate in the Mekong Delta is 15,000 m³/sec.

Along its journey from Tibetan mountains to the South China Sea, the Mekong is joined by more than 130 substantial tributary rivers, each of which contributes its water flow and sediment load to the 'Mother of All Rivers'.

A BRIEF OVERVIEW OF BIODIVERSITY IN THE MRB

As reflected in the quote at the beginning of this lesson, the MRB is home to one of the richest and most diverse biota in the world. New species of plants, land animals, and fish continue to be found, even as some –

far too many – are endangered or face extinction because of habitat loss and excessive hunting, fishing or collection.

Cambodia

Relative to its size, Cambodia has one of the highest proportions of natural forest and wetlands habitats in the world, and one of the least disturbed coastlines in Asia. More than 45 habitat types have been characterised in the country. The natural cycles of the Mekong River and the weather have provided a vast range of natural products. Of 2,300 species of plants that have been described in Cambodia, 40% have traditional uses as food and medicine. The country is believed to have over 130 mammals and more than 500 bird species, many of which are significant to international conservation. At least 300 species of freshwater fish have been identified, of which 215 frequent the Tonle Sap. As in each of the riparian countries, wildlife capture and trade threaten overall biodiversity and the existence of many species.

Lao PDR

Because of its mountainous geography, Lao PDR has wide variations in climate, soils, forested and open areas, which have endowed the country with an extraordinarily rich diversity of ecological niches. Forested areas are believed to be inhabited by approximately 10,000 known species of mammals, reptiles, amphibians, birds, fish, butterflies and plants. Undoubtedly many-fold more are still 'undiscovered'. According to the International Union for the Conservation of Nature and Natural Resources (IUCN), Lao PDR is second to Cambodia in species density, and fourth

after Thailand, Myanmar, and Vietnam in endemic species (i.e., those found only in a particular region or country). About 25 species of mammals and birds in Lao PDR, including the kouprey, Javan rhinoceros, Siamese crocodile, and Eastern Sarus crane, are rated as endangered.

Thailand

No figures were available specific to the MRB portion of Thailand, but the country overall has been a cornucopia of now rapidly diminishing plant and animal life. Countrywide, Thailand is said to contain 10,000-13,000 vascular plants and 86,000 animal species, of which 5,000 are vertebrates. However, several species of mammals, fish, birds, and reptiles endemic to Thailand have recently become extinct. Another 20 freshwater fish, 2 amphibians, 10 reptiles, and about 40 birds and 40 mammals are endangered. About 100 species of plants are considered to be endangered, 600 are rare, and 300 vulnerable.

Vietnam

Although Vietnam covers only 1% of the earth's surface, it is home to 10% of the world's mammal, bird, and fish species. Forest cover has been drastically reduced in the past 30 years; even so, the remaining forests contain the highest bird and primate diversity in mainland Southeast Asia. There are about 23,000 identified species of terrestrial and aquatic species of animals, and several new species of large mammals have recently been encountered. But of Vietnam's endemic species, 28% of mammals, 10% of birds, and 21% of amphibian and reptile species are considered endangered. Of the country's 12,000 known plant

species, about 40% are endemic; approximately 5,000 plants have existing economic value.

Loss of a species is irreversible, diminishes ecosystem and genetic biodiversity, and may harm future economic prospects.

FISHERIES IN THE MRB

Approximately 1,300 fish species have been identified in the MRB, of which 50% are endemic to the region, and 120 are of commercial importance in local markets. There are about 125 species of catfish, but large specimens of the Giant catfish are now extremely rare. These fish take many years to reach spawning age and because of overfishing, the population may now be unsustainable. The situation is similar for the Giant barb and Irrawaddy dolphin.

In addition to the flooding of the Tonle Sap, mentioned previously, the Mekong River annually floods about 30,000 km² below Phnom Penh in Cambodia, plus extensive areas of the Delta in Vietnam and Cambodia. Temporarily flooded areas yield many more times the biomass of fish than the same area of permanent water, which is one reason the waters and flood plains of the Mekong River are among the most productive on earth. For example, the flooded forest area of the Tonle Sap yields 138-175 kg fish per ha. By contrast, yields in the River Amazon average 24 kg/ha.

Estimates of total fish caught in the MRB range up to 1 million tonnes per year, plus 200,000 tonnes of cultured fish (Jensen, 2000) and the previously noted 300,000 tonnes of shrimp from aquaculture operations in the Mekong Delta. Approximately 20% of the total is

taken from the Tonle Sap. Much of the catch is needed locally for nutrition, but if it was all available on the world market it would fetch an estimated US \$1 billion per year. Average fish consumption in the LMB is about 20 kg/person/year, although in Cambodia and the Delta the amount is 60-70 kg/person/year, on par with some of the highest levels in the world, e.g., in seafaring countries such as Norway, Japan, and some islands in the Pacific Ocean.

The life cycle of many fish, especially the economically-important ones, depends on the flooding of the forest around the Tonle Sap and free passage from there into the mainstream Mekong River and its tributaries. For instance, the Trey Riel, a small, nutritionally important fish caught in large quantities in the dai fishery in the Tonle Sap River, migrates as far as 1,000 km upstream in the Mekong River to various tributaries to spawn, before returning at the start of the rainy season to the Tonle Sap. Some migrate up to 300 km south to the Delta in Vietnam. Unimpeded passage for these and many other fish species is vital to their survival and to the sustenance that they provide to the people of the LMB.

The natural ebb and flow of the Mekong River is a primary source of life and health for the fishery.

FORESTRY IN THE MRB

Forest cover in the MRB has been decreasing at an alarming rate in the past 30 years. Dry land and wetland forests (such as the Tonle Sap flooded forest and coastal mangrove forests) have been 'mined' for commercial timber and other purposes. The situation is of grave concern in all LMB countries. Figures in the following

paragraphs are estimates only, since reliable data are not available.

Cambodia

Cambodia has somewhere between 49-63% forest cover remaining (approximately 10 million ha.), depending on the information source. The ADB considers that Cambodia remains well endowed with forest resources compared with its neighbours, despite estimates that deforestation is continuing at a rate of about 300,000 ha/year, or 3% of the total each year.

Lao PDR

Between 40-50% of Lao PDR is forested (11 million ha. in 1992), down from 70% fifty years ago. More land is covered by forests in the south of the country (58%) than the north (36%). According to MRC (1997), only about 4.5 million ha (19% of the total land area) is covered with high-density forest, and only 4.7% of the land area consists of commercially valuable timber. A similar annual rate of deforestation to Cambodia is estimated for Lao PDR.

Thailand

Deforestation in Thailand has proceeded at a pace faster than any other country in the region. Based on 1997 estimates by the Ministry of Science, Technology, and Environment (MOSTE), forest cover in the whole country decreased by an average of 400,000 ha/year, from 53% to 25% between 1961 and 1998. In northeastern Thailand (i.e., the area of the country which is in the MRB) remaining forest cover is only 13%, a decrease of 69% in the past 30 years.

Forests are being cut at a rate of 0.3% of the total each year.

Vietnam

In the Mekong Delta, forest cover was reduced from 23% in 1943 to 9% in 1991. Approximately 34,000 ha mangrove forests and 13 ha *Melaleuca* forests remained in Vietnam in the mid 1990s. In Vietnam overall, about 30% of the total forested areas have been lost in the past 30 years to the point where only 11% of the forest left is considered good quality timber. The annual deforestation rate is 0.8%.

SUMMARY OF KEY POINTS

- The many facets of the Mekong River – water, hydrology, sediment, fish – are vital to the livelihood and well-being of people in the MRB.
- The MRB is unique in terms of its biological and cultural diversity.
- Approximately 50 million people in the MRB depend directly on the river for their existence and livelihood.
- Variations in river flow, which cause annual flooding of large areas of land in the rainy season, are the reason fisheries in the MRB are among the most productive in the world.
- As a result of increased pressure in recent years on forests, fisheries, and other plants and wildlife, natural resources throughout the MRB have declined, in some cases drastically.