

Feeding Southeast Asia: Mekong River Fisheries and Regional Food Security

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Introduction

From riverside communities to urban areas, throughout the Mekong Region, the Mekong River's wild-capture fish are a vital source of animal protein and nutrients. According to the Mekong River Commission, up to 2.6 million tonnes of wild fish and other aquatic resources are harvested each year, worth at least US\$2 billion at first-sale value. This makes the Mekong River system the world's largest inland fishery. Taking into account secondary industries, such as fish processing and marketing, the total economic value for the Mekong's fisheries is between US\$5.6 and US\$9.4 billion per year, contributing significantly to the region's economy (Dugan, 2008).

Food security is a foundation on which other important forms of development are built, such as good health, education, ability to work productively and, overall, that individual and family needs are met satisfactorily. Not only are the Mekong's fisheries an important source of income for fishers from the riparian communities, which include many of the region's poorest people, but they are also vital in ensuring food security for the residents of the region's towns and cities.

The governments of Cambodia, Laos, and Thailand are considering plans to build eleven big hydropower dams on the Mekong River's lower mainstream. If built, these dams would block the major fish migrations that are essential to the life cycle of around 70 percent of the Mekong River's commercial fish catch (Dugan, 2008). Experience around the world indicates that these impacts cannot be adequately mitigated. Replacing the current contribution of wild-capture fish protein with other sources of protein, if possible at all, will be immensely expensive and a daunting logistical challenge.

This paper reviews the available literature that links regional food security to the Mekong River's wild capture fisheries, and argues for recognition of the existing contribution that the fisheries make to regional development. With a focus on the proposed Mekong mainstream dams, it explores how decision-making on large water infrastructure should be strengthened by appropriately recognizing and accounting for basin-wide environmental, social and cultural considerations, in addition to economic factors.

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What is Food Security?

The United Nation’s (UN) Food and Agriculture Organization (FAO) defines food security as when “all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” (FAO, 1996). In a ‘food secure’ community, food is available, accessible, and safely and healthily prepared, all year, every year.

Eating enough food to provide the energy for daily life is important, and is one measure of food security. A moderately active adult needs an average of 2,100 calories per day, about the amount of energy contained in 10 cups of rice. However, to measure food security by energy consumption alone is misleading.

Eating a diversity of foods with adequate protein and micronutrients is equally important to maintaining the balanced diet required for food security. A combination of appropriate foods ensures people consume the right amount of carbohydrates, fats, proteins and micronutrients. Regional diets in Cambodia, Laos, Thailand and Vietnam show some similarities but also reflect locally-available food products and unique cultures. A food secure family typically eats a diet of rice, fish, other meats, fruit, and vegetables.

In Thailand, for example, the Thai Nutrition Division encourages dietary balance by defining appropriate servings of food and then recommending numbers of servings of each food group that a person should eat in a day. Although serving size depends on the specific food, the daily recommendation is about 600 grams of grains, 200 grams of vegetables, 380 grams of fruit, 135 grams of fish or meat, and 1-2 cups of milk or equivalent dairy products.

Why is ensuring food security central to development?

Food *insecurity* catalyzes a downward spiral of poverty that is difficult to stop. The presence of undernutrition and malnutrition undermines development (box 1). The health of a pregnant woman already begins to shape her developing baby’s future; micronutrient deficiencies in a mother’s diet, for example, prevent an unborn baby’s brain and body from developing properly. Malnourished women also face higher risks of complications and death during pregnancy (Christian, 2002).

Box 1 - Defining Food Insecurity: Undernourishment and Malnourishment

Undernourishment is a result of not eating enough food and is visible in somebody who is underweight, too short for their age (stunted), or dangerously thin for their height (wasted). Malnourishment occurs in somebody who has an unbalanced diet that lacks the correct proportions of macro- and micronutrients. Both undernourishment and malnourishment impair daily activity and hinder human and economic development.

If food insecurity persists through childhood, a child’s physical growth and ability to learn will be impeded. During adulthood, food insecurity impacts an individual’s ability to lead a productive and full life. Food insecurity increases vulnerability to sickness and infectious diseases – including diarrhea, acute respiratory infections, malaria and possibly measles – which cause missed work and sometimes costly

medical expenses (Rice *et al* 2000). One recent study concludes that the disease burden in developing countries could be reduced by one-third if malnutrition is eliminated (Disease Control Priorities Project, (2007). Another study blames malnutrition for directly or indirectly reducing life expectancy in developing countries by an average of 32 years (Jamison et al, 2006).

An Asian Development Bank study that looked at low-income Asian countries including Cambodia, Laos, and Vietnam reports iron deficiency reduces heavy-labor productivity by 17% and moderate-activity productivity by 5% (Horton, 1999). Restoring productivity will certainly aid development. The World Bank estimates that addressing micronutrient deficiencies in developing countries – which may cost only 0.3% of Gross National Product (GNP) – could raise GNP up to 5% (McGuire and Galloway, 1994). This is but one example of the relationship between ensuring food security and economic development.

The Millennium Development Goals: Reducing Hunger is a Global Priority

The UN’s Millennium Development Goals (MDGs), agreed to in 2000 by the world’s governments, form a global pact to promote health and development and reduce poverty. The eight MDGs outline concrete targets that governments and development institutions pledged to achieve by 2015. The first MDG explicitly targets eradication of extreme hunger and poverty.

Establishing food security is also a necessary step towards attaining the majority of the remaining MDGs. MDG 2 focuses on achieving universal primary education and cannot be effectively accomplished without first ensuring food security, given the importance of nutrition to cognitive development and effective learning. Achieving MDG 4 on reducing child mortality also requires addressing food insecurity; 53% of children’s deaths in developing countries may be attributable to the consequences of malnutrition (Pelletier *et al.*, 1995). Finally, improving maternal health and combating infectious diseases – the focus of MDGs 5 and 6 – are also linked to eliminating food insecurity.

Despite some success stories, food insecurity remains one of the world’s most pressing problems. Globally, there are an estimated 963 million chronically hungry people, two-thirds of whom live in Asia. An estimated 27.1 million undernourished people live in Cambodia, Laos, Thailand, and Vietnam (FAO, 2008).

The World Food Program (2009a), on MDG1’s goal to eliminate extreme hunger, state “While people are hungry, all other development activities are thwarted.”

Food Security in the Mekong Region: An Overview

Reflecting the government’s priority on ensuring food security, Cambodia, Laos, Thailand and Vietnam have made substantial progress towards attaining food security since the early 1990s; rates of child malnutrition, child mortality and undernutrition in mainland Southeast Asia have dropped faster than the worldwide average (Von Grember *et al.*, 2008).

Asia’s tremendous progress is especially clear when contrasted to that of Sub-Saharan Africa; whereas an additional 43 million people were classed as chronically

undernourished in Sub-Saharan Africa between 1990 and 2005, Asia witnessed a decrease of 40 million people (FAO, 2008). Thailand and Vietnam are recognized as global success stories, and are ranked among the world’s top ten countries with the most improved Global Hunger Index (GHI)² scores (Von Grember *et al.*, 2008).

Despite this remarkable headway, maintaining an adequate and nutritious diet remains a struggle for many people in the region and there still remains more to be done to ensure food security throughout the Mekong region.

Cambodia has, over the last ten years, reduced poverty by about 1 percent each year (MDG Monitor, 2008). Despite this steady success, according to the GHI, Cambodia still falls in the “alarming” score range. Cambodia’s natural food production only just meets many of the population’s basic needs, and food distribution and access remain difficult. Because of these challenges, 26% of the overall population is classified as undernourished and 28% of children are malnourished (GHI, 2009).

Laos’ Five-Year National Socio-Economic Development Plan demonstrates a commitment to improving food security and meeting the MDGs. Like Cambodia, however, Laos struggles to produce and market enough food, and falls into the “serious” GHI score range. World Food Program research identifies that two out of every three people in rural Laos are either food insecure or at risk of becoming food insecure (WFP, 2007). At present, 19% of the total Lao population is undernourished and 37% of children under five are underweight (WFP, 2009c).

Vietnam, in recent years, has witnessed remarkable economic growth and food security has also steadily improved. Nonetheless, the Vietnam GHI score is classified as “serious”; presently, 14% of the overall population is classified as undernourished and 20% of children under the age of five are malnourished (GHI, 2009).

Of the four countries, Thailand has the best GHI score. Since 1990, Thailand has witnessed a 50% reduction in underweight children. The challenge of hunger in Thailand is not fully resolved, however. Thailand’s GHI score is in the “moderate” range; presently, 17% of the overall population is classified as undernourished and 7% of children under the age of five are malnourished (GHI, 2009).

The Mekong River: Nature’s Supermarket

Throughout mainland Southeast Asia, fish is a staple food. It’s not surprising, given the region’s abundance and diversity of fish species; the Mekong is second in biodiversity only to the Amazon. The Mekong River system alone is home to up to an estimated 1,500 different species of fish (AMRC, 2008). No less than 120 of these species are commercially important (Coates *et al.*, 2006). By comparison, the Mississippi River in the United States– also

“Mian Tuk, Mian Trey”
“Where there’s water,
there’s fish”
Cambodian Proverb

² The Global Hunger Index (GHI), developed by the International Food Policy Research Institute, is a well-established index of hunger and food insecurity that combines rates of calorie deficiency, child malnutrition, and child mortality. It is commonly used to measure MDG progress.

recognized for its high biodiversity – has only 241 fish species (Water Encyclopedia, 2007).

The Mekong fishers’ haul is another measure of the river’s abundance. The Mekong supports the world’s largest inland fishery, with approximately 2.6 million tonnes harvested annually from the Lower Mekong Basin (Dugan, 2008). According to the FAO, two percent of all fish caught in the world’s marine and inland fisheries come from the Mekong River Basin (Poulsen *et al* 2008). According to Baran (2010), Mekong fisheries produce between 7% and 22% of the world’s freshwater capture fish. Combining the varying datasets available, Baran (2010) estimates that approximately 33%, 32%, 29% and 5% of the total catch are made in Cambodia, Thailand, Vietnam and Laos respectively.

As the caught fish pass from fishers to collectors, transporters, wholesalers, processors, market sellers, and restaurant owners, monetary value is added. At first catch, the Mekong’s wild-capture fisheries have an estimated value of US\$2-3 billion (Dugan, 2008). While precise statistics remain elusive, a significant amount of this figure will end up in the hands of some of the region’s poorest people, who are fishers. This money directly increases these families’ purchasing power, allowing more to be spent on food, which increases food security.

By the time fish-based products have been transported, processed and marketed to the final consumer, the fish are estimated to be worth between US\$5.6 and \$9.4 billion (Dugan, 2008). In comparison, although the Mississippi River is nearly as long as the Mekong, its commercial fishing generates only 0.1 percent of the Mekong’s first-catch fish value (Water Encyclopedia, 2007).

The revenues generated from wild-capture fisheries and fish trade make a significant contribution to the Gross Domestic Product (GDP) of each Mekong country. 8% of Lao’s GDP and 16% of Cambodia’s GDP can be traced to fisheries (Souvannaphanh *et al.*, 2003; Van Zalinge N. *et al.* 2004).

In the Khone Falls area of Southern Laos alone, fishing on the Mekong mainstream supports over 65,000 livelihoods (Bush, 2004). Each year, the average family in the Khong district catches 355 kilograms and consumes 249 kilograms of fish (Baird *et al*, 1998). The 4,000 total annual tons of fish from Khone Falls are worth an estimated US\$450,000 to \$1,000,000 (Bush, 2004).

From the River to Marketplace: A Remarkable Journey

Fish consumption in mainland Southeast Asia far exceeds most other places in the world. Per year, the average person in the Lower Mekong Basin eats 56.6 kilograms of freshwater fish products (Van Zalinge *et al*, 2004). This is over two times the average total fish consumption and 18 times the freshwater fish consumption in Europe and America (FAO, 2003). In the Cambodian provinces bordering Tonle Sap Lake, people eat as much as 75.6 kg of fish each year, and in Laos’ Savannakhet province, four of every five meals contain fish (Ahmed *et al*, 1998; Mollot *et al.*, 2003).

It is no easy task to get such large quantities of fish from the river to the dinner plate. This remarkable race against time begins as soon as teams of fishers pull the fish from the water.

For some fish, the journey from fishing boat to cooking pot is short – feeding either the fisher themselves or residents of nearby communities. In areas that are difficult to reach by ground transportation, this local fish consumption is especially vital. Rough, flooded, or non-existent roads can make it extremely difficult for villagers to reach markets to trade and buy food that cannot be grown: in Laos, for example, in 14 of 16 provinces, an average one-way trip to the nearest market takes more than four hours (WFP, 2007). Such remote villages often face the most extreme poverty. And, in cases where rivers reach where roads cannot, availability of animal protein from fish critically determines whether families achieve food security.

To feed towns and cities away from the river, caught fish must travel across land and sometimes even across national borders. The clock keeps ticking because caught fish must reach their destinations before they start to rot. In their journey to the dinner plate, fish often pass through more than 12 pairs of hands. First, on the water, teams of collectors buy fish from fishing boats. Once landed, wholesale buyers rush to accumulate piles of fish to pass on to the transporters and processors. Packed and ready to go, fresh fish, fermented fish, fish sauce and fish balls are transported in trucks and boats. Fish destined for neighboring countries are traded for cash at borders. By the time fish arrive at the wholesale markets, they are well on their way to their final destination. As most urban residents sleep, local traders are busy negotiating prices with the wholesalers, filling their pickup trucks, and then traveling to the local markets to ready their stalls for the morning shoppers.

Most shoppers will not give a second thought to the incredible journey their fish have just undertaken, and there is a remarkable absence of research on Mekong River wild-capture fishery commodity chains. Yet, whether recognized or not, the fact remains that the Mekong River’s fish feed vast swathes of mainland Southeast Asia. (See Box 2).

Box 2: Important Known Mekong Fish Trade Routes

There are many threads in the complex fish trade web. Fish caught along the Mekong’s mainstream and major tributaries, such as the Songkhram, Mun, Chi, Sekong, Sesan, and Srepok, feed both people nearby and further away.

Wild capture fish caught from the Songkhram River in Northeastern Thailand, for example, are sold over 500 kilometers away in Bangkok. Pla Daek – fermented fish - from the Songkhram River is widely regarded and is sought by traders far and wide.

Fish from Cambodia’s fish-basket, the Tonle Sap Lake, feed not only nearby villages and the one million residents of the capital, Phnom Penh, but are also trucked to Laos and Thailand (Chea and McKenney, 2003). Cambodia’s Pursat province alone, for example, ships 3,500 tons of fish each year through Poi Pet to Thailand (Seng, 2006). A fish wholesaler at Thailand’s Ang Tong market nearby Bangkok put it quite simply:

“Without Cambodian fish, Thai people would not have enough river fish to eat.” (pers comm., 2009)

Laos’ Siphandone fishery, another fishing hot spot, meets both local needs and those further afield. Thousands of tons of fish – worth US\$450,000 to \$1,000,000 annually – are sold in Pakse to Laos’ capital, Vientiane, as well as to Khong Chiam and other major towns in northeastern Thailand (Bush, 2004).

Yet another major fishery hub is the Mekong Delta in Vietnam. From the delta, wild-capture fish feed local villages, board trucks to Ho Chi Minh City and Hanoi, and catch planes to countries as far away as the United States (Lam, 2005). In the delta, aquaculture is also prevalent, and wild-capture “trash fish” are often used as feed.

That the logistical challenge of each trade route is routinely met is remarkable in itself. Yet, it is the year-round web of interwoven races that feeds the entire Mekong region; the remarkable species diversity and productivity of the region’s wild-capture fisheries are needed to meet the high demand for fish throughout the lower Mekong Basin.

Nutritious Fish

Fish are highly nutritious, and in every Mekong country fish are the most important source of animal protein. Although the amount of animal protein from fish varies – from an average of 60% in Vietnam (Sinh, 2005) to as high as 79% in some Cambodian villages (Israel et al, 2005) and 78% in the Khong district of Lao (Baird *et al.*, 1998) – it is well-established that fish protein is important to food security throughout the region.

Fish are also an essential source of vitamins and minerals, helping to ward off the nutritional deficiencies that are sadly still too common. For calcium content alone, fish have earned the nickname “the milk of southeast Asia.” (Jenson, 2001). Fish also provide important amounts of iron, Vitamin A, zinc and iodine. Eating enough fish can prevent weakened muscles and bones associated with calcium deficiency, perpetual tiredness from iron deficiency, body-wasting and memory-loss associated with zinc deficiency, decreased resistance to disease from insufficient Vitamin A, and mental retardation caused by too little iodine.

It is no understatement to note further that Mekong River fish are also central to many of the region’s most popular dishes, and as such are immeasurably valuable culturally.

Overview: Mekong Fisheries and Food Security in Cambodia

Of the four Lower Mekong countries, Cambodia catches the most inland fish; according to one estimate, Cambodian fishers pull between 289,000 to 431,000 tons from the Mekong every year (Van Zalinge *et al.*, 2000). Over 80% of those living nearby Tonle Sap derive some income from fish: fishing and fish-related activities provide a primary income for over 1.8 million people living nearby the Tonle Sap Lake and River and a secondary income for over 2.8 million people there (Baran, 2005).

Given this massive catch, Mekong fish are nothing less than critical to Cambodia’s food security. At least 65-75% of the animal protein average Cambodian households consume can be traced back to small-scale fisheries (Ahmed *et al.*, 1998). This is not surprising since the typical Cambodian living in the Mekong Basin eats 65 kilograms of freshwater fish a year (Van Zalinge *et al.*, 2004).

Many of Cambodia’s favorite dishes revolve around fish from the Tonle Sap: *amok trei* – banana leaf-wrapped fish curried with coconut milk – is just one example. Perhaps less fancy, but more nutritionally important, is *prahoc* (fermented fish); this, for many poorer Cambodians, is the only affordable source of complete protein (McKenney and Tola, 2004).³

Furthermore, fish and fish products like *prahoc* are important sources of iron. In Cambodia, an estimated 70% of pregnant women and 74% of under-five children suffer from iron deficiencies (Roos *et al.*, 2007). Iron shortages rob people of energy, ultimately perpetuating the cycle of poverty. Whilst more needs to be done, the high-levels of fish consumption in Cambodia at present guard against even more severe iron deficiency.

Overview: Mekong Fisheries and Food Security in Laos

In Laos, an estimated 27,000 tons of fish are harvested from the inland capture fisheries of the Mekong and its tributaries each year and fish provide an average of 42.5% and up to 90% of consumed animal protein (Van Zalinge *et al.*, 2000; FAO, 1999). The Mekong and its tributaries are an essential source of food; Laotians living in the Mekong basin eat an average of 42.2 kg of freshwater fish and fish products each year (Van Zalinge *et al.*, 2004). The most well nourished communities, in fact, tend to be those that consume the most fish. For example, Savannakhet and Attapeu provinces are two of Laos’ most food secure provinces; here, fish make up 18% of the total food supply (WFP, 2007; Mollot *et al.*, 2003).

Overview: Mekong Fisheries and Food Security in Vietnam

In Vietnam, fish contribute an estimated 60% of the animal protein consumed by Vietnamese people (Sinh, 2005). Fish from inland capture fisheries in Vietnam’s Mekong Basin amount to 190,000 tons each year (Van Zalinge *et al.*, 2000). While fish-farming is important in Vietnam, scientists have noted that “In terms of poverty, the wild inland fishery is of greater importance than aquaculture” (Baran *et al.*, 2005). In the Tra Vinh Province on the Mekong Delta, for example, three-quarters of fish production is from wild-capture fisheries (AMFC, 2002).

As in Laos, in Vietnam fish availability is an important determinant of food security. Recent research in the Mekong Delta found that fish consumption is often the variable that determines whether or not families can attain their daily caloric and protein needs (ESAF, 2004). In the Mekong Delta’s Long An province, inland fish consumption averages over 60 kilograms per person per year (Sjorslev, 2001).

³ Complete protein contains all the amino acids that the human body needs. Although many foods contain some amino acids (referred to as partial protein), fish contains *all* amino acids and is therefore a highly nutritious form of food.

Overview: Mekong Fisheries and Food Security in Thailand

A recent study in Thailand concludes that protein consumption is more positively correlated with food security than any other factor (Piaseu, 2005). In Thailand, fish is still, by far, the most important source of animal protein: in terms of kilograms of meat consumed per person per year, fish consumption is three times greater than chicken consumption, the next most important source of animal protein (Piumsombun, 2003).

Although marine fish dominate the total catch (approximately 94%), Thailand pulls around 209,404 to 303,000 tons of fish from inland capture fisheries in the Mekong Basin each year (Oopatham Pawaputanon Na Mahasarakarm, 2007; Van Zalinge *et al.*, 2000). Freshwater fish remain important to the diet and capture fisheries provide four times more freshwater fish for Thai consumption than reservoir fisheries (Baran, 2007).

Mekong Mainstream Dams: A Threat to Regional Food Security

In Cambodia, Laos, Thailand and Vietnam, protecting food security and achieving the MDGs are inextricably linked to the long-term health of the Mekong River’s fisheries. In 2004, the Mekong River Commission (MRC) named water infrastructure projects “the overriding threat to the future of the Mekong’s fish and fisheries” (Poulsen *et al.*, 2004).

Since 2006, the governments of Cambodia, Laos and Thailand have granted approval to Thai, Malaysian, Vietnamese, Russian and Chinese companies to investigate twelve mainstream hydropower dams. Eight of the dam sites are in Laos, two are in Cambodia, and two are on the Thai-Lao border.

By changing the river’s hydrology and ecology and blocking major fish migrations, these dams, if built, would have serious repercussions throughout the entire basin. The dams risk the livelihoods and food security of millions of people who depend on a healthy Mekong River.

Around 70 percent of the Mekong River’s commercial fish catch migrate long distances, which is essential for their life cycle [see Box 3]. In the dry season Mekong fish migrate upstream to breed, and during the rainy season, the fish eggs and larvae are carried downstream to highly-productive floodplain areas, such as Cambodia’s Tonle Sap Lake, to feed and grow. Juvenile and adult fish also migrate for feeding at this time.

Building dams on the Mekong River’s mainstream will block these crucial migrations. Experience around the world indicates that these impacts cannot be mitigated. Existing fish passage technologies simply cannot handle the massive volume of fish migrations - which can reach up to 3 million fish per hour at peak migration times - and the diversity of migration strategies that characterize the Mekong River’s hundreds of fish species (Baran, 2010).

By rendering long distance migrations impossible, thereby preventing fish from reaching feeding and spawning grounds, and by changing flow patterns that will alter

the nutrient cycling crucial to the base of the food chain, construction of dams on the Mekong River’s mainstream will unavoidably reduce fish biodiversity and productivity. A recent study has estimated that between 700,000 and 1.6 million tons of the Mekong fish – up to 62% of the total Mekong catch – is at risk from the proposed Mekong mainstream dams (Baran, 2010).

As a protein and micronutrient source for rural communities and urban areas throughout mainland Southeast Asia, the Mekong River’s fisheries have an unrivaled regional importance. The consequences of building mainstream dams, therefore, must be considered not only in the light of impacts to river ecology, but also with regard to the serious impacts on *regional food security and development*.

For those families that are already food insecure, as well as those that are now on the borderline, reducing the availability of Mekong fish would make undernutrition and malnutrition more prevalent and serious. Poorer families will be especially hard hit. Consequently - in a downward spiral – people’s health will suffer and illness will become more common, their ability to learn will diminish, work productivity will decline, and poverty will deepen. Ultimately, because of the potential impacts on food security, building dams on the mainstream could seriously set back government and international donor efforts to alleviate poverty and meet the MDGs.

Box 3: The Mekong Basin’s Major Fish Migrations

For 87% of known Mekong fish species, migration is a critical part of the natural reproductive cycle (AMRC, 2008). Although basic migration patterns can vary by specific species and habitat, the importance of fish migrations is clear. Around seventy percent of the Mekong’s *commercial* fish catch is dependent on long-distance migrations (Dugan, 2008).

Whilst various migrations occur all year, major fish migrations coincide with the Mekong River’s monsoon-driven flood-pulse. Between November and January, the dry season’s retreating water levels trigger many Mekong fish to migrate upstream to deep water pools and other sheltered areas. Fish move to these upstream areas to spawn. For example, the *Pangasius krempfi* catfish travels 1,900 kilometers upstream from Vietnam’s Delta to Luang Prabang Province in Laos - the same distance as 42 sequential marathons! This migration is then netted by fishers: when passing through the Khone Falls area in Southern Laos, for example, *Pangasius krempfi* is the dominant species caught by wing traps and a full 73% of catch for the 12-16 cm gillnet fisheries below the Khone Falls (Baird, 2009). Like this, many Mekong migrations cross national borders.

In March and April, as the rainy season approaches, fish eggs and larvae are carried downstream and then to the Mekong’s major flood plains, such as the swelling Tonle Sap Lake, the Mekong Delta, and Northeastern Thailand, to feed and grow. Juvenile and adult fish also make this return journey. Downstream migrations, too, are important to commercial fisheries: for example, as *Pangasius larnaudiei* migrate from near Vientiane to below the Khone Falls area, they are caught at Hou Som Yai and are economically the area’s most important catch (MRC, n.d.).

Finally, as the floodplains begin to dry towards the end of the rainy season, newly hatched young fish join adult fish to move back to the main river and the cycle begins anew.

Fishing itself is made easier by migrations as fishing traps are specifically designed to catch fish as they swim up and downstream. Since migrating fish cross national borders, it is clear that the actions of one state can greatly impact the fish supplies of other countries. Dams on the Mekong River’s mainstream and tributaries threaten to block these crucial fish migrations and fragment the Mekong River’s ecosystem.

Conclusion: Wild-capture fisheries, Food Security and Human Development

If the population of the Lower Mekong Basin continues to expand at its current rate, the population will have increased by thirty to fifty percent by 2025. With a total population of over 100 million people, further effort will be required to attain regional food security. (MRC, 2010)

Although meeting this increase in demand may seem daunting, Mekong wild-capture fisheries can help provide a solution. Working with – instead of against – nature and the natural lifecycles of fish will be the easiest way forward. To improve food security, the goal must be to get more fish to more people in more sustainable ways. Whilst Baran (2010) suggests that the wild capture fishery yield may have leveled off, others state “There is no indication that this [Mekong] fishery has reached its maximum annual yield. Indeed, there may still be potential to increase the total market value of the fishery”(Sverdrup-Jensen , 2002).

Box 4: Alternatives to Mainstream Dams: Better Energy Solutions

The energy revolution that is now sweeping the globe provides many new options to meet electricity demand, making big dams an increasingly outdated technology. Electricity needs can now be better met by improving energy efficiency and deploying recent innovations in decentralized and renewable energy technologies. By adopting national energy policies that encourage investment in these new energy technologies, the Mekong governments could leapfrog the use of big dam technologies and start growing sustainable, modern economies without losing the benefits that healthy rivers bring. (see, for example, www.palangthai.org)

Already the economic importance of the Mekong fish trade cannot be overstated. With an estimated economic value of between US\$5.6 and 9.4 billion per year, Mekong fisheries employ millions of people (at least part-time), including fishers, crafters of fishing-gear, fish transporters, fish wholesalers, fish processors, and fish-market salespeople. Many of those people are the region’s poorest and depend on fisheries incomes for basic life necessities. Furthermore, economic data such as this fails to capture the fisheries’ total value because subsistence use of the fisheries are often unrecorded and are potentially significant.

The MRC’s Fisheries Program has outlined a number of development options at each level of fish-trade for wild-capture fisheries (Sverdrup-Jensen, 2002). Fishing activity could be made more productive with improved designation and allocation of fishing zones and promotion of fishing gears that ensure sustainable harvesting of fish. Small-scale fishers could increase their slice of the value added in the fisheries trade

by processing fish themselves. Fish availability and the profits of middlemen would increase as more ice is used during transportation to minimize rot. Improving laws to facilitate rapid transportation would also minimize spoiling during transit. Whilst there are widely-recognized barriers to implementing these and other wild-capture fishery development options, the benefits from investing in protecting the Mekong River’s wild-capture fisheries in the long-run could be significant.

The proposals now being considered by the governments of Cambodia, Laos, and Thailand to build eleven big hydropower dams on the Mekong River’s lower mainstream threaten regional food security, given that the dams would block the migratory fish that constitute the majority of the commercial catch and the impacts cannot be adequately mitigated. Replacing the current contribution of wild-capture fish protein with other sources of protein, if possible at all, will be immensely expensive and a daunting logistical challenge. Baran (2010) suggests that whilst there may technically be alternatives to fish in Thailand, Vietnam and Laos (either chicken or pork), there are no alternatives in Cambodia where fish is by far the dominant source of protein.

Only by moving beyond decision-taking focused only on economic growth towards also considering food, health, cultural, and peace security can the shared ambitions of governments, rural communities and the wider public to alleviate poverty, protect the environment and ensure sustainable and equitable development be achieved. As such, the present rationale and decision-making process on dams on the Mekong River’s mainstream appears critically flawed. In a region where wild-capture fisheries remain of critical importance to fishery- and tourism-based economies, as well as regional food security, further progress towards human and economic development could be stalled and the region’s prospects for sustainable development undermined.

Food security is a foundation on which other important forms of development are built, such as good health, education, ability to work productively and, overall, that individual and family needs are satisfactorily met. The ties between Mekong fish, food security, and sustainable and equitable development are clear. Starting at the bottom and working to strengthen wild-capture fisheries is one of the simplest and best ways to promote regional food security and development.

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