

Cambodia's fisheries: a decade of changes and evolution

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How have capture fisheries in Cambodia changed over the past decade? This article compares fish diversity, catches, consumption as well as livelihood strategies and fisheries arrangements as documented by two studies published in 2004 and 2014.

The Mekong is home to the biggest inland fishery in the world, yielding more than two million tonnes of fish each year (Hortle, 2009). The system is highly productive due to an extensive floodplain system nurtured by annual monsoons. Cambodia contributes about a third of the inland catch, the world's fifth largest after China, India, Bangladesh and Myanmar since 2004, according to FAO data.

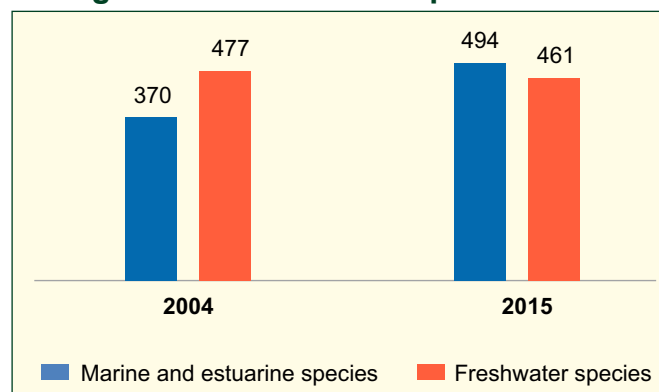
In Cambodia, fish plays an important nutritional and socio-economic role. The sector contributes significantly to gross domestic product (GDP) and provides full-time, part-time or seasonal employment to about 50% of the population (FAO, 2011; Un *et al.*, 2015). Capture fisheries also provide a dominant share of protein intake (Hortle, 2007) and combat micronutrient deficiencies in malnourished populations (Kawarazuka and Béné, 2010).

Given Cambodia's dependency on inland fish resources, it is important to monitor and document changes in the sector. The present review provides a comparison of two time periods a decade apart. It is derived from two main sources (Baran, 2005, and Baran *et al.*, 2014).

In 2004, Cambodia had 847 recorded fish species (758 taxonomically valid ones) of which 477 were freshwater fishes. Currently, Cambodia features 955 fish species of which 461 are freshwater species (see chart). The evolution of the overall number of fish species reflects the development of research in Cambodia over the past decade and subsequent integration of many new site-specific species lists into reference databases (in particular, *FishBase* at www.fishbase.org),

leading to a better listing of all species present. It also reflects the discovery of new species at a remarkably high rate (Thompson, 2008). The slight variation (3%) in the number of species between 2004 and 2014, however, is not significant and corresponds to taxonomic or ecological adjustments (classification as estuarine or freshwater species, for instance). It is unclear whether any species has vanished during the past decade, even though the abundance of some species has decreased a lot, particularly in some areas (Baran *et al.*, 2013).

Changes in counts of fish species



In 2005, ten freshwater species found in Cambodia were classified as either endangered or critically endangered. Following a recent revision by the International Union for the Conservation of Nature (www.iucnredlist.org), 13 freshwater species of Cambodia are listed as endangered. This includes five critically endangered species — the Mekong giant catfish (*Pangasianodon gigas*), giant pangasius (*Pangasius sanitwongsei*), Mekong giant salmon carp (*Aptosyax grypus*), giant carp (*Catlocarpio siamensis*) and Siamese tiger perch (*Datnioides pulcher*) as well as eight endangered species (golden dragon fish, Jullien's golden carp, thicklipped barb, flying minnow, striped catfish, Baird's schistura and two stingrays).

Loss of connectivity due to dams or infrastructure development and habitat loss in the basin are

the biggest threats to endangered fish species in Cambodia. Intensive fishing is also a major threat to the “giants” among these endangered species.

According to Cambodian statistics, 324,000 tonnes of river fish were caught in 2005 (in addition to 60,000 tonnes of marine fish and 25,915 tonnes of fish from aquaculture). The catch was generated by large-scale fisheries (1/5), middle-scale fisheries (1/5) and small-scale or subsistence fisheries (3/5). Thus, the bulk of the catch came from fishers using small types of fishing gear such as hooks, traps or small-sized gillnets. The yearly value of catches at landing sites was estimated at \$150-\$225 million, increasing up to fivefold through the marketing chain. Fisheries contributed to between 8 and 12 percent of the country's GDP in the years 2000-2004 (Kurien *et al.*, 2006) and 6.9% of GDP in 2007 for a value of around \$600 million at that time (IMF, 2009).

In 2014, the overall fisheries sector produced 735,310 tonnes of which 69% came from freshwater fish (505,000 tonnes), 16% from marine fish (120,250 tonnes) and 15% from aquaculture (110,055 tonnes). Recently, the Inland Fisheries Research and Development Institute (IFReDI) (2013) estimated that at \$1.60/kg, the total economic value of freshwater fish and aquatic products was \$1 billion per year (\$800 million for inland fish alone). However, there is still no systematic assessment countrywide of the price of fish per kilogram to date. This probably results in an undervaluation of fisheries in the GDP of Cambodia. The total value of the fish production after processing and transport remains unknown.

Between 2001 and 2011, the trend has been steady growth in the inland fisheries sector with an increase of 29% (linearised). The modest growth of large inland fisheries (60,000 tonnes) compared with a substantial expansion of aquaculture (58,000 tonnes). Aquaculture is growing fast but is small and inland capture fisheries is expanding much more slowly but contributes by far the largest share of fish supply in Cambodia.

On the basis of rough estimates, average fish consumption in Cambodia was believed to amount to 38.4 kg/person/year in 2005. In contrast, a detailed study (Ahmed *et al.*, 1995) showed that fish consumption of people living around the Tonle Sap Lake was 75.6 kg/person/year. A subsequent

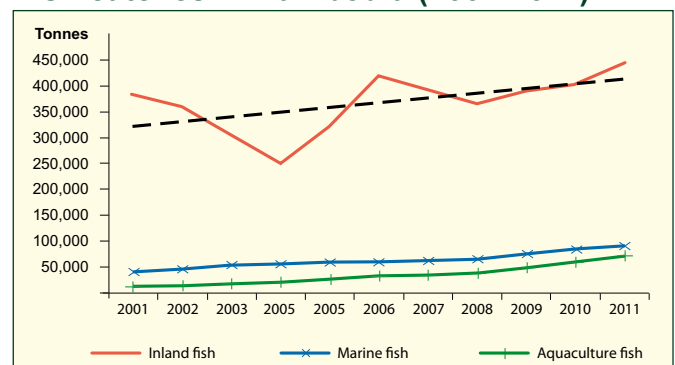
detailed data re-analysis (Hortle, 2007) concluded that average consumption of inland fish in Cambodia was 32.3 kg/person/year (plus 4.5 kg/person/year of other aquatic animals).

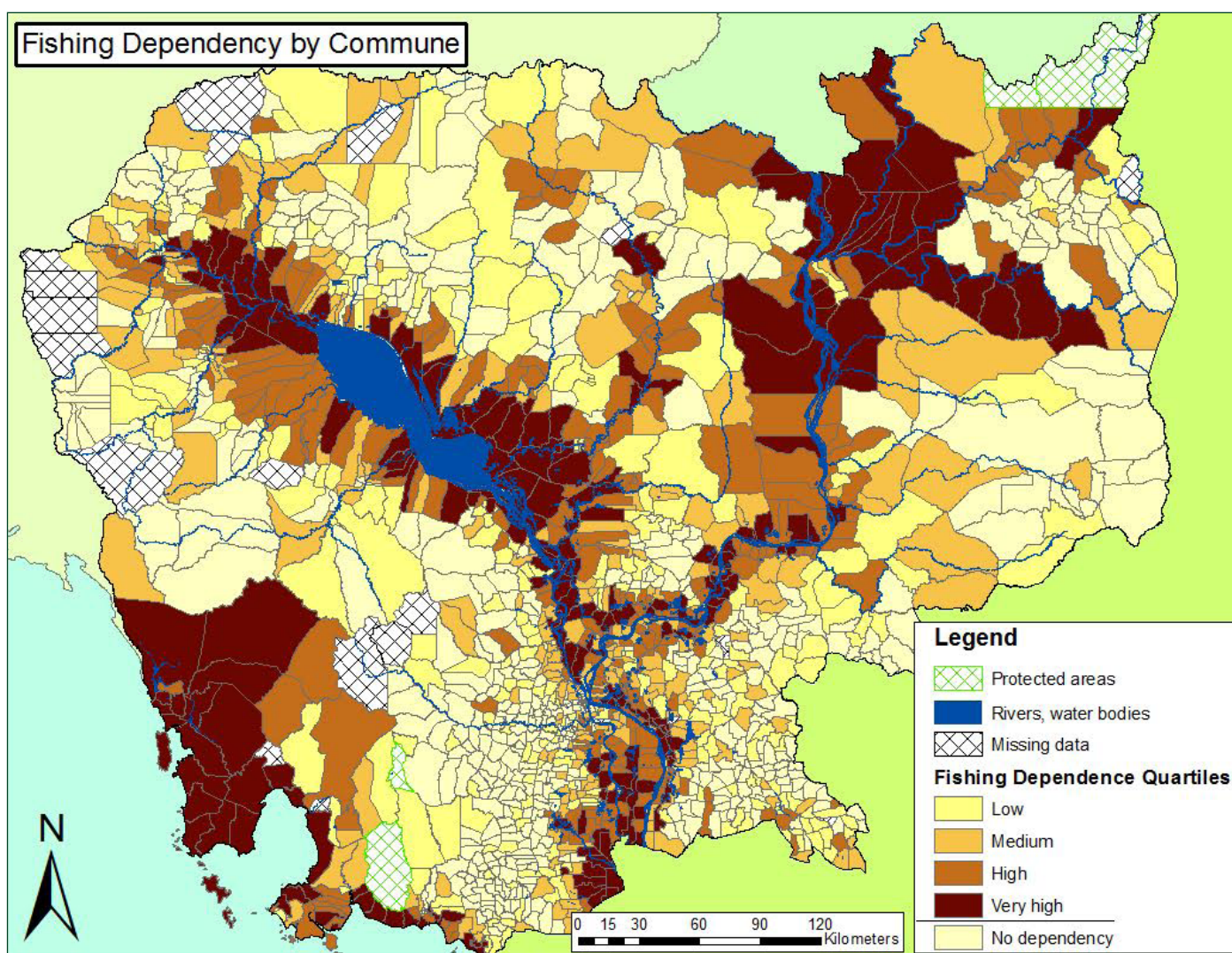
In 2013, an extensive study (IFReDI, 2013) showed that annual fish consumption amounted to 57.8 kg per person on average. Annual consumption of other aquatic products was 5.2 kg per person. The same study showed that fish protein provided 37% of total protein intake and 76% of the intake of animal protein. It is unclear whether this shows increased reliance on fish for nutrition or improved assessments of the role of fish in the diet. What is clear is that no other food sources represent an alternative at present (Kawarazuka, 2010; So Nam and Touch Bunthang, 2011).

Fishing is part of all rural livelihoods, although only a minority of people consider themselves professional fishers. Based on the 1998 population census, only 5.7% of people living around the Tonle Sap Lake were involved in fishing in 2005, although this figure was much disputed. The 2008 national census revised the assessment and concluded that 64% of all rural households (over 7 million people) were engaged in fishing (FAO, 2010). However, only 0.6% of the population declared fishing as their full-time occupation.

Cambodia's income and Human Development Index significantly progressed over a decade. But 85% of the rural population remains largely dependent on natural resources and at least half of the population is employed on a part-time basis in fisheries (Un *et al.*, 2015). Fishing dependency (a combination of fisher density and poverty index) remains very high in provinces where water resources are abundant and where economic and agricultural alternatives are limited (in particular

Fish catches in Cambodia (2001-2011)





SOURCE: NASIELSKI ET AL., 2013

Stung Treng, Kratie, Kampong Thom, Battambang and Banteay Meanchey provinces (see map).

Despite the difficulty of monitoring fish catch trends since the abolition of fishing lots, it is believed that fishing activity has intensified in recent years with increases in the number of fishers and people engaged in fishing-related activities such as trade and processing. Fish resources represent a source of income with a high profit-to-capital investment ratio. Amid climate change and increasingly unpredictable rainfall patterns, fisheries are seen as a factor of improved security among poor households.

In Cambodia, the catch used to be generated in part by large-scale fisheries. These consisted of fishing lots privatised and auctioned by the government. In 2005, there were 162 lots comprising 81 barrage lots partly fenced in the

lake and rivers, covering an area of 852,900 ha. The length of fences reached 409 km, or 34% of the periphery of the Tonle Sap Lake (Baran *et al.*, 2007). Successive fishing lots reforms in 2000 and 2012 resulted in the cancellation of all private fishing lots, marking a shift from large-scale commercial management to decentralised community-based management, together with a change in user rights (more than 1 million hectares were transferred from private concessions to community fisheries).

As of 2015, all fishing lots have been abolished in Cambodia's most significant contemporary policy addressing natural resource management and rural development. It is noted that the catch keeps increasing, regardless of this management reform.

Conclusions

Over the past decade, fish biodiversity in Cambodia

“increased” from 847 to 955 species due to descriptions and recordings of new species. The number of endangered species meanwhile increased from 10 to 13. According to national statistics, inland catches increased from 324,000 to 505,000 tonnes, an average increase of 29% increment per year. This substantial growth in fish yield contradicts the usual claim of resource rarefaction. Population growth (13.1 million in 2005 to 15.7 million in 2015) does not suffice to justify the claim, which highlights either an overestimate of the catch in national statistics or reduced catch per fisher following a substantial — but undocumented — increase in the number of fishers.

Fish consumption figures were not well established in 2005 but annual consumption averaged 57.8 kg of fish per person in 2013, making it the second most consumed food item after rice contributing 37% of the total protein supply. Despite growth and poverty alleviation over the past 10 years, fish remains absolutely central to livelihoods. More than half of the population is engaged in fishing, and fish dependency is very high in some provinces. The abolition of fishing lots and community fishery-based management are a radical change in the management approach, and the consequences remain to be fully assessed.

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