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# River<sub>of</sub> Giants

Giant Fish of the Mekong





The Mekong River

# Executive Summary



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The world's biggest freshwater fish and 4 out of the top ten giant freshwater fish species can be found in the Mekong River which flows through Cambodia, China, Lao PDR, Myanmar, Thailand and Vietnam. More giants inhabit this mighty river than any other on Earth.

Little is known about these magnificent species of the Greater Mekong region, some attaining five metres in length and over half a ton in weight. What is known is that their future is uncertain.

Populations of the Mekong giant catfish have plummeted 90 per cent in just two decades, whilst the giant dog-eating catfish is seldom seen now in the wild. Living amongst the new emerging economic powers of Asia, a combination of infrastructure development, habitat destruction and overharvesting, is quickly eroding populations of these extraordinary species.

The single most important threat is the hydropower dams in the lower Mekong and large tributaries. For many of the fish, the obstruction posed by these developments blocks migration routes to spawning grounds; if the mega fish stop migrating, they will stop spawning. The clock is ticking. There are plans in various stages of development for 11 dams on the lower Mekong mainstream, including the Sayabouly hydropower dam in Sayabouly Province, northern Lao PDR, that will place further pressure on remaining populations of giant fish.

As ambassadors of the Greater Mekong region, vulnerable to fishing pressure and changes in the river environment, the status of the giant fish is one indicator of the health and ecological integrity of the Mekong. The well-being of these species is therefore closely linked to the sustainable management of the region and to limiting the environmental impacts of increased regional economic activity and integration.

Any impact on the ecological balance of the river also threatens the sustainability of the aquatic resources that support millions of people. There are at least 50 migratory species which are highly vulnerable to mainstream dam development. These make up between 40-70 per cent of the catch of fish in the Mekong.

The 1995 agreement of the Mekong River Commission should be fully recognized and endorsed; in particular the procedures for notification, prior consultation and agreement. WWF supports a delay in the approval of the mainstream dams, including the Sayabouly hydropower dam in Sayabouly Province, to ensure a comprehensive study is undertaken to fully consider the costs and benefits of their construction and operation. WWF encourages others to join in supporting the Mekong countries to commit to the study phase.

**Cover image:** Giant sheatfish, *Wallago attu*, one of the top 20 giant freshwater fish species © Ursula Bes.

**Above, right:** A Mekong giant catfish is caught.



# The Mighty Mekong

© Adam Cathro

## An Ancient and Mega Diverse River

Born 50 million years ago from a powerful tectonic collision in the heart of Asia, the mighty Mekong River emerges from the vast and towering mountains surrounding the Tibetan plateau and begins its long descent through the Greater Mekong region of Southeast Asia.

At a colossal 4,800km in length, the Mekong River begins in the Tibetan Plateau and runs through the Chinese province of Yunnan, Myanmar, Lao PDR, Thailand and Cambodia, before forming the ‘nine headed dragon’ in the Mekong Delta of southern Vietnam, and dispersing into the South China Sea.

The longest river in Southeast Asia unites 320 million people across the Greater Mekong region<sup>1</sup>, supporting a way of life, vital livelihoods and subsistence, agriculture and fisheries, and much-needed energy for development. But this great river and its mosaic of tributaries also nurtures and sustains an extraordinary level of species diversity and endemism. Fostering more fish species per unit area than even the Amazon, the Mekong is estimated to provide habitat for at least 1,100 species of fish<sup>2</sup>.

## A Mother to Giants

Throughout its journey, the Mekong takes on many forms, from little variation in depth, to stretches marked with rocks and boulders, rapids and deep pools. At least 170 deep water pools can be found across the Mekong in Cambodia and Lao PDR alone<sup>3</sup>, with the deepest being 80m in depth<sup>4</sup>. In the dry season the Mekong recedes and fish habitats on the floodplain disappear. Deep pools play a crucial role at this point, providing extraordinary refuges for many of the Greater Mekong’s fish species to feed and grow, maintaining the integrity and productivity of the ecosystem<sup>5</sup>.

Possessing ‘indeterminate growth’, fish species can usually keep growing as long as food and habitat continue to remain and that they are free from disease. Extraordinarily, with the Mekong’s prehistoric age and the natural protection and richness of food that these pools, floodplain and isolated tributaries provide, a steady amplification of fish size has taken place over evolutionary time, producing a number of super-sized species.

In scientific terms, a species must be capable of growing to at least two metres in length or 100kg in weight to qualify as a giant fish. Remarkably, certain species of the Greater Mekong region can grow to a monstrous five metres in length. The giant freshwater stingray, at half the length of a bus, may be the largest fish swimming in freshwater on Earth. To date, the Mekong giant catfish is the world’s greatest ever recorded catch, with a 293kg car-sized specimen famously hauled into a boat in northern Thailand in 2005.

These giants are encountered as they emerge from deep waters and traverse across the region, often migrating to other areas to spawn. Scientists now estimate that one quarter of the world’s giant fish can be found in the Mekong, more species of giant freshwater fish than any other river on Earth<sup>6</sup>.



**Above:** The Mekong River, as seen from Thailand. On the left is Myanmar; to the right is Lao PDR.

# The Global Top 10 Giant Freshwater Fish

Common Name	Scientific Name	Maximum Weight (Length)	River System
Giant freshwater stingray	<i>Himantura chaophraya</i>	600kg (500cm, 240cm disc width)	Mekong River Basin
Chinese paddlefish	<i>Psephurus gladius</i>	500kg (700cm)	Yangtze River Basin
Mekong giant catfish	<i>Pangasianodon gigas</i>	350kg (300cm)	Mekong River Basin
Wels catfish	<i>Silurus glanis</i>	306kg (500cm)	Widespread in Europe and Asia
Giant pangasius (dog-eating catfish)	<i>Pangasius sanitwongsei</i>	300kg (300cm)	Mekong River Basin
Giant barb	<i>Catlocarpio siamensis</i>	300kg (300cm)	Mekong River Basin
Arapaima (pirarucu; paiche)	<i>Arapaima gigas</i>	200kg (450cm)	Amazon River Basin
Piraíba (laulau; lechero)	<i>Brachyplatystoma filamentosum</i>	200kg (360cm)	Amazon River Basin
Nile perch	<i>Lates niloticus</i>	200kg (200cm)	Nile River Basin
Alligator gar	<i>Atractosteus spatula</i>	137kg (305cm)	Mississippi River Basin

Adapted from Stone, R. (2007) The Last of the Leviathans. Science 316:1684-1688.



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# 1. Giant freshwater stingray (*Himantura chaophraya*)

**At half the length of a bus, the gargantuan freshwater stingray may be the largest fish swimming in freshwater on Earth today. At more than half a ton in size, large stingrays have been known to pull boats up and down rivers and even underwater.**

Experts believe that this fish, wide and flat in form, and sporting a long, whip-like tail, has changed little over many millions of years. The species is known to inhabit estuaries and large deep rivers, burying in sandy or silted river bottoms, to lie in wait for unsuspecting fish, clams and crabs, using a sensor that can detect an animal's electrical field.

Unusually, this species is occasionally sighted near urban centres of the region. Mekong communities claim to have observed absolutely enormous stingrays, including one four metres wide and twice as long<sup>7</sup>, another specimen was six metres in length<sup>8</sup>. Supernatural sightings aside, scientists estimate that *Himantura chaophraya* can grow five metres and 600kg in size<sup>9</sup>, certainly making it among the largest of the approximately 200 species of rays. Ovoviviparous, the fish gives birth to live young measuring 30cm wide, so even the small ones are large!

Though stingrays do not readily attack humans, they are one of the few Mekong giant fish that can pose a real danger to those who handle them. Their tail has a deadly barb at its base which can be as long as 38cm - the largest of any stingray - and can easily penetrate human skin and even bone, much like an arrow and typically inject poison.

Despite its mega dimensions and toxicity, surprisingly these nomadic species remain elusive and cloaked in mystery, only first being identified by scientists less than 20 years ago. Decades ago they were reported to be more common than they are now. This could be because of overharvesting, pollution and because their river habitats have degraded, and it appears they no longer inhabit some parts of their historical range.

Populations of giant stingray are faring better than other Mekong giant fish. Experts suggest this may be because of the depth of the river these species inhabit as well as the fact that they are so difficult to catch.

**Common name:** Giant freshwater stingray  
**Scientific name:** *Himantura chaophraya*  
**Also known as:** Freshwater whipray  
**Date of discovery:** Monkolprasit & Roberts, 1990  
**Maximum Size:** 600kg, 500cm length, 240cm disc width  
**Defining features:** Wide and flat in form, with long whip-like tail  
**Distribution in the Greater Mekong:** Cambodia, Lao PDR, Thailand, Vietnam.  
**Diet:** Carnivore. Feeds on benthic invertebrates crustaceans and fishes  
**Average lifespan in the wild:** Unknown  
**Threats:** Over harvesting and pollution  
**IUCN Red List Category:** Vulnerable





## 2. Mekong giant catfish (*Pangasianodon gigas*)

© Suthep Kritsanavarin / WWF-Canon

**Perhaps the most famous catfish in all of Asia is the gigantic Mekong giant catfish. A colossal 2.7m, 293kg, car-sized specimen, was famously hauled into a boat in northern Thailand in 2005 and into the history books as the largest recorded freshwater catch.**

Believed capable of reaching an almost mythical three metres in length and 350kg<sup>10</sup>, this river titan is one of the fastest growing in the world; newly hatched fry measure half a centimetre, by day 11 they measure 2.5cm, and at only six years of age they can weigh nearly 200kg.

Distinguished from other large catfish in the Mekong by its low-set eyes situated below the level of its mouth, lack of teeth in adults, and the almost complete absence of catfish whiskers, or barbels, this gentle giant is a herbivore, mainly feeding on plants and algae. A highly migratory fish, the species occurs in the Mekong and its medium-to-large sized tributaries, as well as in Cambodia's Tonlé Sap lake.

Despite it being illegal to capture, sell, or transport the species in Cambodia since 1971 and Lao PDR since 1987<sup>11</sup>, today this leviathan is in real trouble. The Mekong giant catfish is captured not because it is a delicacy but because it has a god-like status<sup>12</sup>, believed to bring good luck forever once eaten, and bestowing the gifts of wisdom and long life. Consequently, a 250kg giant catfish can fetch up to US\$2,500<sup>13</sup>.

Incidental capture in the stationary bagnet fishery, or dai fishery, of Cambodia is also a major threat, although it is Cambodian government policy to release Mekong giant catfish back into the river if caught.

Historical reports indicate that a century ago the species was abundant in the Mekong, from Vietnam to southern China, with one observer estimating a haul of some 7,000 during a single fishing season in the late 1800s<sup>14</sup>. Today, governments of the Mekong Basin are taking steps to recover wild Mekong giant catfish numbers by reducing fishing pressures. In the last five years, the annual average basin-wide catch has been ten fish<sup>15</sup>. According to scientists, the population of *Pangasianodon gigas* declined over 90 per cent in the space of two decades alone<sup>16</sup>.

Artificial breeding programmes established since the 1980s to halt the decline of this species<sup>17</sup>, have also had mixed results and it is unclear what impact these measures have had on the viability and stability of the fish population in the wild.

**Common name:** Mekong Giant Catfish  
**Scientific name:** *Pangasianodon gigas*  
**Also known as:** King of fish or royal fish (Cambodia), giant fish (Thailand, Lao PDR), and blubber fish (Vietnam)  
**Date of discovery:** Chevey, 1931  
**Maximum size:** 350kg, 300cm  
**Defining features:** Low-set eyes situated below level of mouth  
**Distribution in the Greater Mekong:** Cambodia, Lao PDR, Thailand, Vietnam and Yunnan (China). Endemic to the Greater Mekong  
**Diet:** Herbivore. Feeds mainly on plants and algae on the bottom  
**Average lifespan in wild:** Over 60 years  
**Threats:** Overharvesting for local and commercial fisheries, habitat loss and pollution, increasing threat from intentional hybridization with *Pangasianodon hypophthalmus* for aquaculture. Bag-net fishery of Cambodia is also a major threat  
**IUCN Red List Category:** Critically Endangered. Banned from international trade in 1975

Dire circumstances call for drastic measures, and one scientist even resorted to buying up giant catfish caught by fisheries and releasing them back into the wild, eventually saving 21 of these titans from certain death<sup>18</sup>.



© Jean-Francois Helias

### 3. Giant dog-eating catfish (*Pangasius sanitwongsei*)

**Known to enjoy feasting on the carcasses of large animals, the remains of dead fowl and dogs have been used as bait to ensnare this beast. At an impressive 300kg, the dog-eating catfish is almost a match for the largest ever recorded bull shark.**

Belonging to the family Pangasiidae, so-called ‘shark catfishes’ or ‘iridescent sharks’, the giant pangasius certainly qualifies as one of the largest freshwater fish species in the world. This enormous species has a long distinctive elongated dorsal fin and is exclusively found patrolling deep water and large rivers across the Greater Mekong region. Fast growing, the species spawns just before the monsoon season in June and by the middle of the month young have already reached 10cm.

*Pangasius sanitwongsei* is a predator usually feeding on small fishes and crustaceans such as shrimps, but also reserving a taste for other catfish, larger prey and, obviously, dogs<sup>19</sup>.

Such is its importance for food and livelihoods in the region, fishers revere this species and fishing expeditions used to be ceremoniously blessed before departing<sup>20</sup>. Early fishing stories include a fatal encounter with the fin of a two metre giant pangasius, after one unfortunate local netted the fish near Raheng, Thailand.

Apocalyptically, this may have also been the last sighting of a large specimen. Scientists have now declared the species locally extinct in some areas of Thailand<sup>21</sup>, estimating that this behemoth is highly vulnerable<sup>22</sup> and likely to be well on its way to oblivion across the Mekong<sup>23</sup>.

In an attempt to save this disappearing species, *Pangasius sanitwongsei* are now artificially spawned for aquaculture purposes. This has also seen juveniles appearing in the aquarium trade in large numbers, where they are sold under the names “paroon shark”, “hi-fin tiger shark” and “hi-fin Pangasius”.

Clearly, a dog-eating catfish is not an appropriate aquarium fish. Even within captivity these fish are still easily capable of growing into two-metre monsters, far-exceeding the owner’s expectations, expertise and facilities! This has led to public aquaria being inundated with quantities of fish that simply cannot be accommodated.

**Common name:** Giant pangasius (dog-eating catfish)

**Scientific name:** *Pangasius sanitwongsei*

**Also known as:** Paroon shark; Chao Phraya giant catfish

**Date of discovery:** Smith, 1931

**Maximum size:** 300kg, 300cm

**Defining features:** Very elongated dorsal fin

**Distribution in the Greater Mekong:** Cambodia, Lao PDR, Thailand, Vietnam and Yunnan (China). Endemic to the Greater Mekong

**Diet:** Carnivore

**Average lifespan in the wild:**

Unknown, but can reach 20 years in captivity

**Threats:** Overharvesting for local and commercial fisheries, habitat loss, pollution and aquarium trade

**IUCN Red List Category:** Data Deficient





## 4. Giant barb (*Catlocarpio siamensis*)

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**This species has an historic relationship with Cambodia, with the giant barb appearing in ancient temple carvings at Angkor Wat. Described as a “powerful submarine with fins”, the national fish of Cambodia is the largest species of carp in the world.**

Estimated to be the largest fish in the Cyprinidae family<sup>24</sup>, this slow moving beast is normally seen inhabiting sizeable pools along the edges of large rivers, but juveniles can be seen in floodplain habitats, small tributaries, swamps and flooded forests<sup>25</sup>, suggesting that the fish is migratory and moves into these areas to spawn.

The flesh of the giant barb has long been considered a delicacy among residents of the Greater Mekong. Being a desirable food fish however has taken its toll and combined with water pollution and increasing river traffic, the giant barb has become severely threatened along its native range.

A protected species now in Cambodia, this monster carp, known at one point to reach three metres and 300kg<sup>26</sup>, remains very rare in the great lake of Tonlé Sap, where fishing for this species has been prohibited for several years<sup>27</sup>. Measures

being taken now may be too late. Populations have seriously declined across Cambodia<sup>28</sup>, Lao PDR<sup>29</sup> and Thailand<sup>30</sup> where giant barbs were formerly found in abundance. According to the Mekong River Commission, the catch of giant barb in Cambodia dropped from 50 in 1980 to just 10 in 2000 and despite not being on the IUCN Red List the species is rarely seen across the Mekong today<sup>31</sup>. Populations have depleted to the point where few survive to reach the age of reproductive maturity, placing the entire future of the species in a highly vulnerable position<sup>32</sup>.

Government programmes have focused on captive breeding in an attempt to save this regional icon. With young giant barbs showing a remarkable ability to acclimatize to pond life, it is likely that the future of this species lies in fish farms, where they will be reared specifically for food markets.

**Common name:** Giant barb  
**Scientific name:** *Catlocarpio siamensis*

**Also known as:** Siamese giant carp  
**Date of discovery:** Boulenger, 1898

**Maximum size:** 300kg, 300cm

**Defining features:** Gigantic head

**Distribution in the Greater Mekong:** Cambodia, Lao PDR, Thailand, Vietnam. Endemic to the Greater Mekong

**Diet:** Omnivore. Feeds on crab, shrimp, as well as algae, phytoplankton and fruits of flooded terrestrial plants  
**Average lifespan in the wild:** Over 30 years.

**Threats:** Overharvesting for local and commercial fisheries, habitat loss  
**IUCN Red List Category:** Not Evaluated

# Giant Threats to Giant Fish

The single most important and urgent threat posed to giant fish in the Mekong are the hydropower dams in the Lower Mekong and large tributaries. These will disrupt several stages in the life cycle of spawning, growth and breeding. Many of the Mekong giants are migratory fish, requiring unobstructed journeys across large stretches of river to critical spawning grounds. Dams can also cause biodiversity and habitat loss, and can impact on fisheries and cause coastal erosion.

Sayabouly hydropower dam in Sayabouly Province, northern Lao PDR, is the first Lower Mekong River mainstream dam to go through the Notification, Prior Consultation, and Agreement from the Mekong River Commission (MRC). This procedure will assess the trans-boundary impacts of the dam, in order to gain agreement for its construction.

The Mekong has species found nowhere else in the world. These species are at risk of extinction if the Sayabouly dam is built. In northern Laos, inclusive of the area where the Sayabouly hydropower dam is to be constructed, the endemism rate and total number of endemics is higher than in the rest of Lao PDR. For example, a fish survey conducted in 2009 on the Nam Ou tributary of the Mekong, north of the Sayabouly area, found 84 species with 6 per cent found nowhere else<sup>33</sup>.

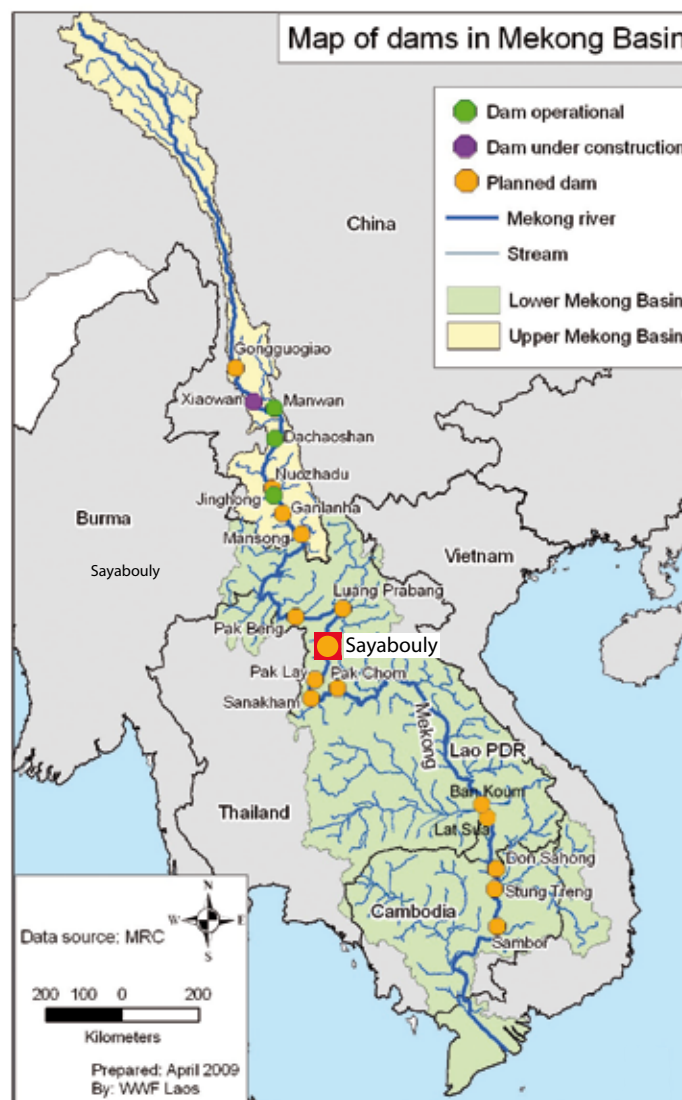
## Building the Sayabouly dam will cause the extinction of wild populations of the Mekong giant catfish

The Mekong giant catfish is a critically endangered species that will not survive if it cannot migrate through the Sayabouly dam. Many scientists and local fishermen believe the section of the Mekong River between Chang Rai, Thailand, and Bokeo, Laos, is a critical area for spawning. This area is one of the last places in the world where the critically endangered Mekong giant catfish is found spawning in the wild. As the catfish is a long-distance migrant, between the Tonle Sap lake in Cambodia and the Mekong River in northern Thailand and Lao PDR, if any dam is built on the mainstream of the lower Mekong River the species will not be able to migrate to its spawning grounds. This will mean that the species cannot increase its numbers and its population will plummet to unrecoverable levels.

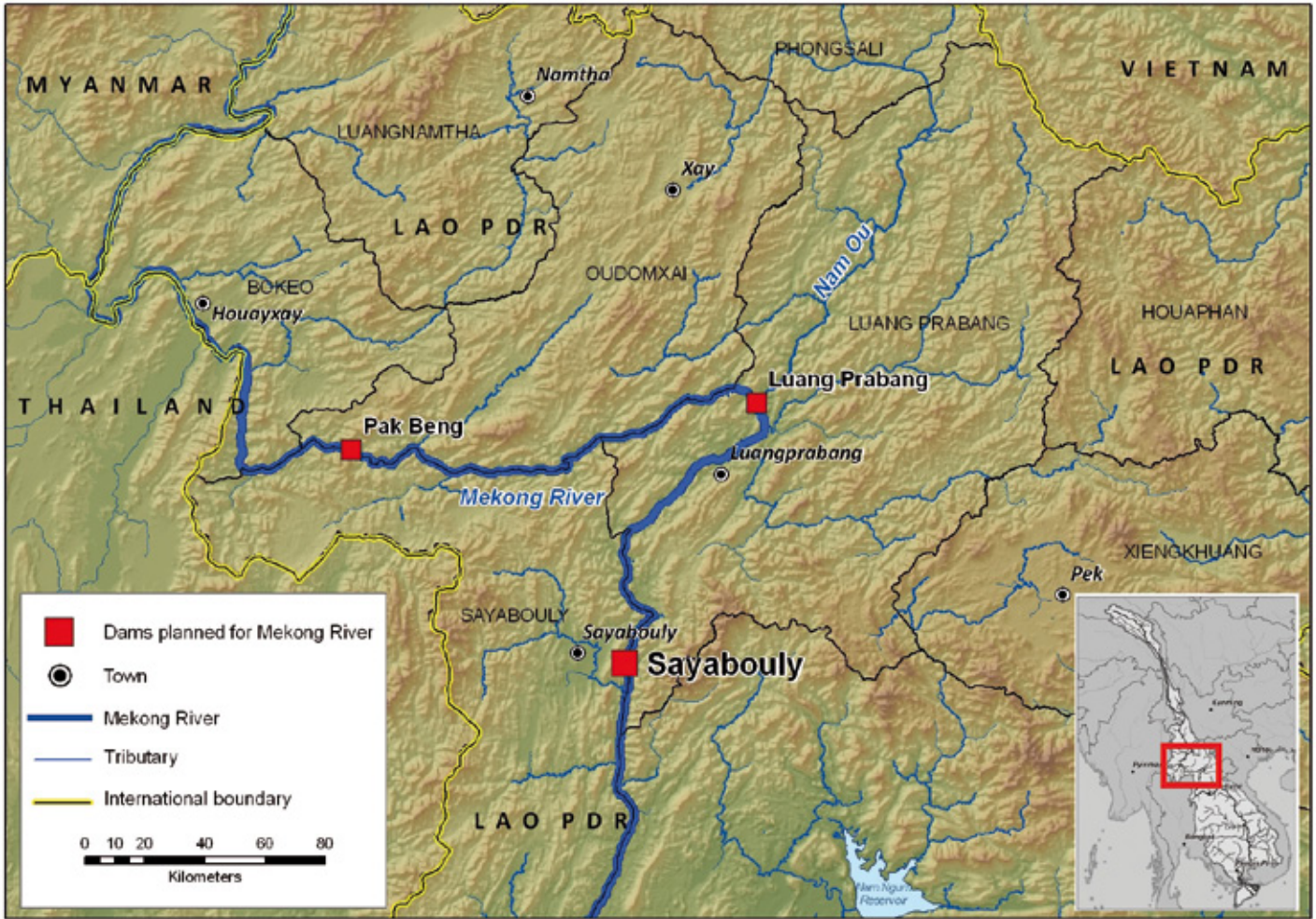
## Building the dam will exacerbate the impacts of climate change

Some of the greatest impacts of dam development will be felt in the Lower Mekong River, one of the world's most productive regions for agriculture and fisheries. Building the Sayabouly dam would reduce sediment and nutrients from flowing downstream to the Mekong River Delta. This will reduce the ability of the delta to replenish itself and lead to increased coastal erosion, inundation, and saltwater intrusion from sea level rise and more intense tropical storms associated with climate change. This will potentially displace millions of people and cause agricultural land worth millions of dollars to be lost<sup>34</sup>.

Over 90 per cent of Vietnam's total national rice export comes from the Mekong Delta<sup>35</sup>, which is why it is known as 'the rice bowl' of Vietnam. The delta is also an important habitat for many of the Mekong's fish species. Today, however, this abundant delta is one of the top three most threatened deltas in the world from the impacts of climate change<sup>36</sup>.







Above: Plans for dam development in the Sayabouly region.

# Recommendations

In the First Mekong River Commission Summit, held in Hua Hin, Thailand in April 2010, the four Prime Ministers of the Lower Mekong countries recognised that the sustainable management of water resources in the Mekong River Basin is crucial to the economic and social well-being of people of the Basin and to poverty alleviation efforts. The Heads of Government affirmed a strong and continued commitment to cooperate and promote the sustainable development, utilisation, conservation and management of the Mekong Basin's water and related resources. The resulting MRC Hua Hin Declaration, reaffirmed their solidarity and the highest level of political commitment to the implementation of the 1995 Mekong Agreement.

## Impacts of hydropower development need to be fully assessed

There are 11 hydropower dams planned for the mainstream of the Lower Mekong River. While the impacts of dams have been well studied in other areas of the world, data gaps in the Greater Mekong region prevent a proper assessment of the impacts of the 11 hydropower dams planned. WWF supports a delay in the approval of the mainstream dams, including the Sayabouly hydropower dam in Sayabouly Province, to ensure a comprehensive study is undertaken to fully consider the costs and benefits of their construction and operation.

WWF promotes sustainable hydropower projects on tributaries to the Mekong River because it is easier to assess the costs and benefits of their construction. If you block one tributary with a dam another tributary can be left free-flowing to maintain the connectivity between the upper and lower reaches of the basin. There is only one Mekong River mainstream, if you construct a dam on it ecosystem connectivity will be lost.

In the meantime, short-term energy demand could be met from dams placed on suitable tributaries to the Mekong River. WWF is assessing which of the tributaries should be developed for hydropower and which should be kept free-flowing. In addition, WWF is partnering with other stakeholders to find concrete ways to ensure that any dams built are environmentally sustainable.

Like tigers, the giant fish of the Mekong are flagship species, immense in size, unique and culturally significant. Being flagship species also means that as they rely on a number of different habitats and are so vulnerable to changes to the river ecosystem, their status is an important gauge of the health, ecological integrity and sustainable management of the Mekong and its many habitats. Successful management and conservation of these flagship species will therefore also benefit many other species which share similar habitats or face similar threats<sup>37</sup>.

“**We commit to working together for sustainable development, economic growth and improvement of livelihoods. In parallel, we recognise that efforts need to be expanded to protect the natural resources of the Mekong Basin for the sustainable management and use of the Basin's resources.**”

- MRC Hua Hin Declaration presented by  
H.E. the Prime Minister of Thailand



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Currently, the Lower Mekong remains free-flowing, which presents a rare opportunity for the conservation of these species. But the clock is ticking.



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WWF is one of the world's largest and most experienced independent conservation organisations, with almost 5 million supporters and a global network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

WWF Greater Mekong  
P.O Box 7871  
House no. 39, Unit 05,  
Ban Saylom,  
Chanthabouly District,  
Vientiane, Lao PDR  
Tel +856 21 216080  
Fax +856 21 251883  
[www.panda.org/greatermekong](http://www.panda.org/greatermekong)

