



*Strengthening local capacity
in the economic analysis
of environmental issues*

The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam.) It aims to strengthen local capacity for the economic analysis of environmental issues so that researchers can provide sound advice to policy makers.

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The Value of Mangrove Forests to Local Fishing Communities – A Study from Cambodia

In Cambodia, as in many tropical countries, mangroves provide a vitally important habitat for a wide variety of wildlife.

They are also relied upon as a source of food, resources, and income by more than 70% of the country's coastal population.

Unfortunately, during the last decade, Cambodia's mangrove forests have declined at an alarming rate. This mirrors similar dramatic declines elsewhere in the world.

Now, in order to highlight the importance of mangrove conservation, a new EEPSEA study has assessed the economic value of Cambodia's key mangrove areas to local coastal communities. The study is the work of Kong Sopheak and Cheb Hoeurn from the Royal University of Phnom Penh. It finds that mangrove forests are worth over USD 10,000 per household per year. The study recommends that much more should be done to conserve mangrove forests in Cambodia and suggests a number of policies that should be implemented to make this happen.



A summary of EEPSEA Research Report "An Estimation of Production Function for Fisheries in Peam Krasaob Wildlife Sanctuary in Koh Kong Province, Cambodia," by Kong Sopheak and Cheb Hoeurn. Graduate Program in Development Studies, Faculty of Development Studies, Royal University of Phnom Penh, Cambodia. Russian Blvd., Room A216, Level 2, RUPP Main Campus, Sangkat Beoung Kok II, Khan Toul Kork, Phnom Penh, Cambodia. Tel: +855 17 477 930.
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The mangrove crisis

Mangrove forests are mostly found in the tropics and are rich in flora and fauna. They help to control floods, protect coastal areas from storms, stabilize shorelines, and stop soil erosion. Mangroves also act as nurseries and shelters for many species of commercially important finfish and crustaceans. Thus, mangroves support local and commercial fisheries.

Mangrove forests have been declining rapidly around the world, with around 35% of the total area of this type of habitat lost in the past decades. As a result, coastal mangroves are now considered one of the most threatened ecosystems on earth.

In Cambodia, it is estimated that about 85,100 hectares of mangroves fringe the coastal areas of the Gulf of Thailand. About 75% of these mangroves are found in the Koh Kong region. During the last few decades, however, the country’s mangroves have been declining at a rate of at least 1.6% a year.

Mangroves in Cambodia are being degraded and destroyed for many different reasons, including demand for wood and timber and due to the expansion of agriculture, aquaculture, and residential developments. The rapid decline of the country’s mangrove forests has not only threatened the productivity of its fisheries, but has also left many coastal areas vulnerable to natural disasters such as floods.

Mangrove areas in Cambodia have been given various types of protection under national law. For example, they have all been designated within Cambodia’s protected areas system. Although mangrove conservation projects have been widely implemented, there is little evidence that these efforts are having the desired

effect. This is thought to be due to poor law enforcement and because government policies tend to be biased toward other development priorities.

Assessing the value of the mangrove resource

The study was conducted in four villages, one in each of the coastal provinces of Koh Kong, Kep, Kampot, and Preah Sihanouk provinces. All of Cambodia’s mangroves are located in these four provinces.

The research focused on assessing the economic value of non-timber forest products (NTFP) that households collect from their local mangrove areas. These NTFPs include fuelwood, charcoal, and wood for construction materials, fish, and snails. In addition, the researchers assessed the indirect use value of mangrove forests. This value derives from the nursery and breeding ground services that mangroves provide for commercially important finfish species. The study did not assess the value of mangrove biodiversity,

nor did it assess the nonuse value of mangrove forests.

Collecting information from households

The study combined qualitative and quantitative data sources, including past research literature, key informant interviews, focus group discussions, and a household survey. The survey involved interviewing representatives from 300 households in the four study locations (75 from each village). The survey was used to collect information on how local communities used the mangrove resources close to where they lived.

The direct use value of the mangrove was calculated by adding together the net income that local people received from the NTFPs they had gathered from “their” mangrove areas. Market prices were used to calculate the gross income generated for the products that had been sold. For products that were used for subsistence purposes only, the gross income was calculated using surrogate

prices. These were calculated using the market prices of a substitute product or by assessing the opportunity cost of the time spent collecting the products themselves.

In order to calculate the indirect value of the mangrove areas, the interviewees were asked to recall the amount of fish they had caught over the previous year. The fishing year in the surveyed provinces was divided into two main periods: the normal season (eight months from March to October) and the fishing season (four months from November to February). Interviewees were asked about the catches they had made in each season. This information was then analyzed in order to assess how fish catches were affected by the size and location of mangrove areas.

The value of the poles, fuel, snails, and fisheries

The study found that mangrove forests provide valuable benefits to local communities. In particular, mangrove poles were used by all households for building and repairing houses, boats, and fences. The aggregate mean value of the mangrove poles collected in each village was estimated to be USD 181.88 per household per year. The households also collected fuelwood from the mangrove areas and this was used as their main

energy source for cooking food and boiling water. The aggregate mean value of the fuelwood collected was calculated to be USD 54.81 per household per year. Over a quarter of all of the surveyed households collected snails from mangrove areas. Accordingly, the aggregate mean value of the snails collected was estimated to be USD 72.28 per household per year.

Fishing is the primary source of income for the majority of coastal families. On average, coastal households went to approximately 18.79 fishing trips per month during the normal season and 21.58 trips per month during the fishing season. Households tended to fish near the shore since their boats are typically low-powered and not able to go far out to sea. The mean value of fishing to the households in each village was estimated to be approximately USD 2,793.13 per household per year during the normal season and USD 5,504.22 per household per year during the fishing season.

There was little use for non-wood products such as resins, medicines, and reed/cane in the surveyed villages. In addition, collecting wildlife resources (such as meat, skins, fur, gathered honey from bees, tortoise, and birds’ eggs) was prohibited.

The impact of mangroves on fishing activities

All respondents said that mangrove forests have had a positive impact on fishery activities. They also believed that mangrove forests had played very important roles in protecting them from storms, in preventing saltwater intrusion, in providing fish and other wildlife habitats, in maintaining water quality, in producing wood and fuelwood, and in providing areas for recreation.

In most of the villages, some mangrove conservation efforts have been recently implemented. For example, in Phum Ti Buon Village (located in Koh Kong Province), at least three mangrove-replanting projects have been implemented in the area around the village in the last three years. Mangrove logging has also been prohibited in the area around the village.

Over 61% of all the respondents said that they had participated in mangrove conservation and replanting projects. Many also observed that, as a result of these projects, the area of mangrove forests in their localities had increased during the last five years. Indeed, 61% of respondents said that mangrove forests have increased “a lot.”

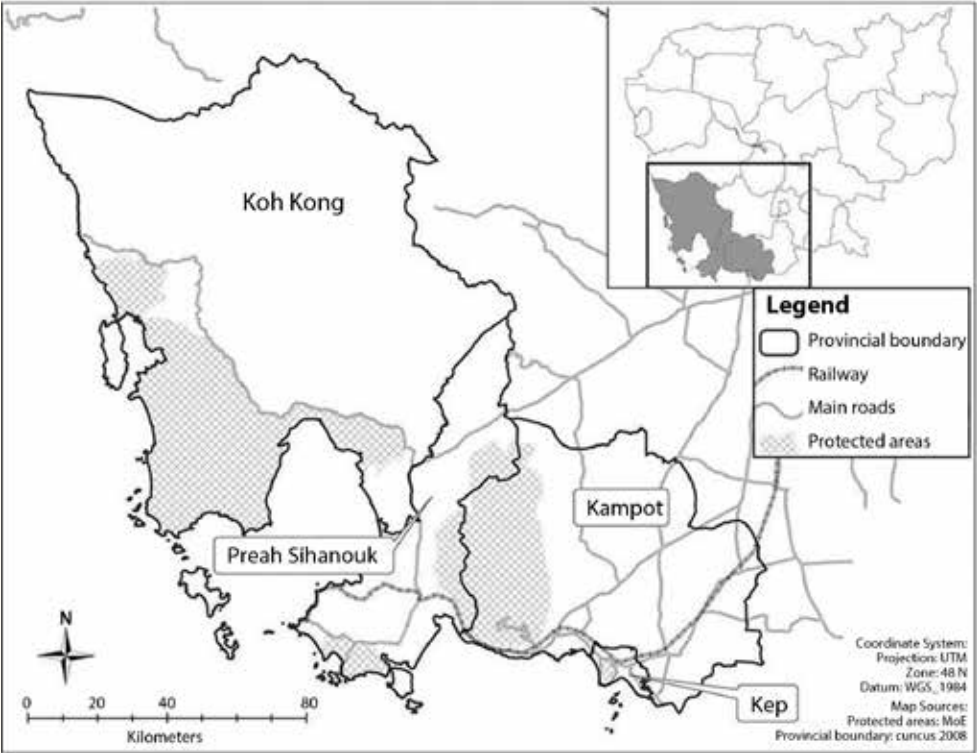


Figure. Map of coastal provinces in Cambodia

Village	No. of Days per Trip	No. of Trip per Month	No. People per Trip	No. Fishing Gears	Average Catch (kg/trip)	Average Price (USD/kg)	Costs (USD/trip)	Mean Value of Fishing (USD/hh/year)
Normal Season	1.37	18.79	3.04	3.18	31.73	0.75	13.81	2,793.13
Phum Ti Buon	1.18	21.29	2.79	4.19	55.45	0.66	16.98	5,913.87
Thmey	1.61	17.17	3.03	2.37	20.47	0.84	14.51	890.61
Kampong Kaes	1.60	15.16	3.19	2.97	25.35	0.81	13.16	2,146.22
Phum Pir	1.09	21.55	3.18	3.20	25.67	0.72	10.60	2,221.84
Fishing Season	1.08	21.58	3.09	3.39	93.81	0.51	29.99	5,504.22
Phum Ti Buon	1.05	25.27	2.84	4.49	159.46	0.53	48.90	11,339.51
Thmey	1.14	20.03	2.79	2.63	36.73	0.54	15.13	1,289.00
Kampong Kaes	1.00	18.31	2.70	3.00	56.80	0.46	14.66	2,519.75
Phum Pir	1.13	22.74	4.04	3.45	122.26	0.52	41.30	6,868.66

The indirect use value of mangrove forests

As expected, the study found that the larger the area of mangrove that exists, the more productive local fisheries are. Specifically, it found that for every 1% increase in the size of a mangrove area, fish catch would increase by 0.22% in the normal season and by 0.18% in the fishing season. In turn, a 1% increase in mangrove area would increase the profitability of fishing by 0.29% in the normal season and by 0.26% in the fishing season.

The study also found that the distance between a mangrove area and a fishing site had a significant effect on fish catch. Specifically, results indicated that for every 1% increase in the distance from a mangrove area to a fishing site, fish catch would decrease by 0.17% in the normal season and by 0.04% in the fishing season. In addition, an increase of 1% in the distance from a mangrove area to a fishing site would decrease the profitability of fishing by 0.18% in the normal season and by 0.03% in the fishing season. In other words, the smaller the distance between a fishing site and a mangrove area, the higher the catch and the higher the profit that a fisherman can achieve.

Overall, the indirect use value of mangrove, in terms of the breeding and nursery ground services it provides, was estimated to be USD 44.82 per household per year.

Policy makers need a better understanding of the value of mangroves

In the study, the net total mean value of the direct use value of mangrove obtained by the households was estimated to be approximately USD 10,493.82 per household per year.

Both the direct and indirect values derived from mangrove forests were very high. As a result, it is clear that it is better to conserve mangrove forests rather than clear them for other land uses. Failing to develop and implement effective mangrove conservation strategies would lead to serious or irreversible ecological degradation, alongside substantial economic losses.

Given the important role that mangrove forests play in supporting fishery productivity and the livelihood of coastal communities, local authorities and policy makers need to realize the importance of the nonmarket value of mangrove forests. This understanding will help policy makers to make better decisions and avoid decisions that are biased toward development options in which the output can be easily measured.

All stakeholders should also understand that one of the key ways to increase fishery productivity in coastal area is to ensure the sustainable management of mangrove forests. For example, alternative sources of energy should be developed to reduce the cutting of fuelwood in mangrove areas.

More research and action needed

To get more information on this vital area, the study recommends conducting more studies that measure the economic values of mangrove areas. The empirical evidence generated by such studies should help bridge a critical knowledge gap and reduce policy biases, thereby improving the sustainability of mangrove ecosystems.

Mangrove replanting and restoration initiatives have been widely implemented in Cambodia by government agencies and NGOs. However, it is clear that the people's lack of involvement in such efforts has reduced the effectiveness of these measures. This challenge should be assessed by further research. Future studies on this issue should focus on the roles of local communities and their collective abilities and their willingness to pay for mangrove conservation and restoration. A better understanding of these issues should result in the more effective implementation of vital mangrove protection strategies.

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