



## Mangrove Conservation vs. Shrimp Farming in Thailand

*Economic value of mangrove versus development into shrimp farm. Value of mangrove not internalised within corporate account or highest and best use. Overall benefit of mangrove higher than the value to shrimp farming. Analysis based on article by Sathirathai and Barbier, 2001 with reanalysis by Charles McNeil. Comparison of market and public values.*

### OUTLINE

Thailand's shrimp farming industry makes an appreciable contribution to the country's economy and is thus an industry that is supported by the Thai government. While fishing was historically limited to traditional techniques, there has increasingly been intensification and industrialisation of shrimp farming. As a result, Thailand's mangrove swamp areas have gradually been used for expansion of shrimp farming, with consequent loss of mangrove. This produces employment for those involved in the shrimping sector and the government subsidises the sector's development to incentivise expansion.

Sathirathai and Barbier analysed this in a paper published in 2001<sup>1</sup> which compared the wider array of impacts than simply the expansion of shrimping, to cover mangrove and associated losses. Professor Barbier has published several papers on the economic value of natural habitat, and Dr. Sathirathai was at the time of publication Thailand's Foreign Affairs Minister. The paper's main hypothesis is that "direct use value" and "indirect use value" are not taken into account when deciding to create the shrimp farm. They identified that intensive shrimp farming reduces other uses that thrive under natural mangrove use of the land; but because the shrimp farm can out-compete for control and development of the mangrove, those other businesses suffer. In addition there are coastal protection and other public benefits that are lost.

Buoyed by subsidies, shrimp farming is profitable from the farmer's perspective. A 'traditional' valuation for the shrimp farmer or lender that addresses the highest and best use and market value of the shrimp farming business, would conclude the project exceeds the value as mangrove swamp. A valuation would likely suggest the project to be viable and provide adequate security, since evidence presumably exists of other such farms. The valuer would conclude there is adequate underlying security for the farm and the loan would be approved.

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<sup>1</sup> "[Valuing Mangrove Conservation in Southern Thailand](#)" April 2001 by S Sathirathai and EB Barbier.

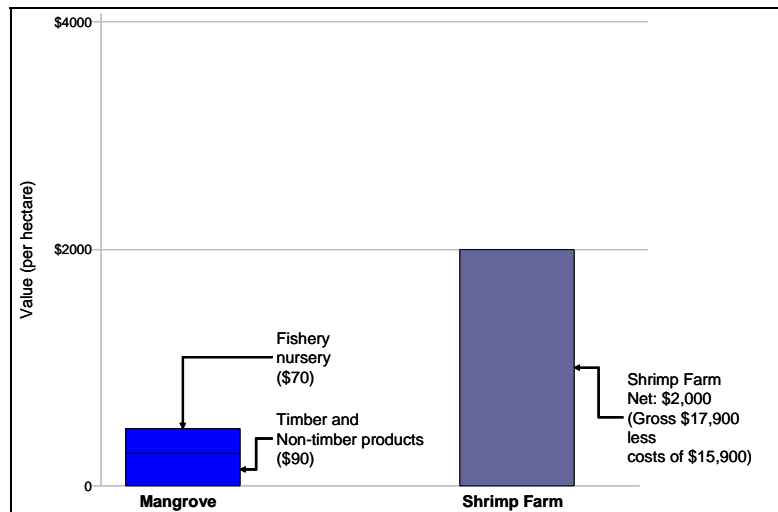
Once externalised (indirect use) values are considered however, the overall value balance changes in favour of retaining mangrove, but only if viewed holistically, i.e. taking into account all the aspects impacting not only the shrimp farm but also the businesses impacted by the change to shrimping. This is sometimes referred to as the "single taxpayer" approach, i.e. it values an enterprise by taking the perspective of the taxpayer and the economy, who would benefit from the businesses taxes but also pay for the subsidies and coastal protection. This is also known as "Public Value" – which is contentious for valuation professions. Detail is provided in the Interpretation section below.

**INTERPRETATION**

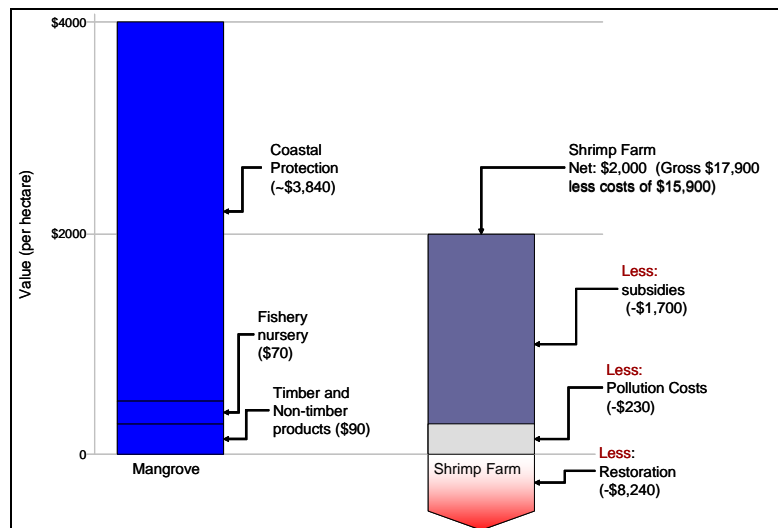
Dr. Charles McNeil of the United Nations Development Program has distilled the issue into simplified diagrams, redrawn and included as Figure 1 and Figure 2.

Figure 1 values the mangrove and shrimp farms traditionally. Land use as a mangrove swamp shows that revenues from timber and non-timber products of \$90 per hectare and a fishery nursery of \$70 per hectare suggests a total revenue of approximately \$160 per hectare.

By contrast, a shrimp farm can be built for about \$15,900 per hectare and yields (net present value) revenues to the shrimp farm of \$17,900 per hectare. Thus, the shrimp farmer has a net income of approximately \$2,000 per hectare, exceeding the revenues receivable from owning the land as a mangrove swamp.



**Figure 1: Standard valuation: shrimp farm is most valuable**



**Figure 2: Holistic perspective**

This would complete a standard valuation approach: the shrimp farm is the highest and best use and market value and would out-compete the use as a mangrove swamp. However there are several public

interest aspects that have not been taken into account and using a "single taxpayer" or Public Value approach, the financials can take account of the impact on the Thai taxpayer.

Figure 2 shows that the shrimp farm net revenue includes subsidies of about \$1,700 per hectare and there are externalised pollution costs of approximately \$230 per hectare. From a taxpayer's perspective, there is a net loss of \$1,930 per hectare and these would largely be paid by the Thai government or others. If this were to be charged to the shrimp farm that caused the loss, this would reduce the shrimp farm's value to about \$70 per hectare, i.e. less than the value of the mangrove swamp if it had not been converted to a shrimp farm. However this is not the end of the valuation calculation.

Swamps provide coastal protection from storms – something noted by the Mayor of New Orleans when his city was devastated by Hurricane Katrina. Thus, we have to adjust for loss of coastal protection afforded by the mangrove swamp as it will cost the Thai government about \$3,840 per hectare in added coastal defence costs. This is a benefit to retaining the mangrove swamp, so Figure 2 shows this as revenue to the mangrove swamp's account.

This suggests the mangrove swamp is financially superior to the taxpayer since its coastal protection value is substantial and combined with revenues from the mangroves, suggests a total value of about \$4,000 per hectare . By contrast the market value of the shrimp farm is only some \$70 per hectare.

<b>Valuation: Net Present Value per hectare</b>		
	<b>Private</b>	<b>Public</b>
Mangrove:	\$91	+\$1,000 - \$+3,600
Shrimp Farm:	\$2000	-\$5,400 - \$+200

**Figure 3: Valuation summary: market vs. public value**

Current valuation methods are generally oriented to a single recipient of value – which follows the concept of highest and best use and value (i.e. there can only be one buyer and that is the highest and best value purchaser). Thus, the shrimp farm would have been built. *However* given the increasing challenges of global warming, if the Thai government restores the swamp, the cost of reforestation is estimated at a sum in the order of \$8,240 per hectare.

The conclusion is therefore, that the shrimp farm is not the highest and best use and value: mangrove is. From a value perspective therefore, technically the Thai people are the highest and best user with the most value in mangrove.

## **VALUATION ASPECTS**

The original analysis by Sathirathai and Barbier uses an economist's approach to valuation and the embedded methodologies and detailed calculations are not sufficient for complete deconstruction of the methods used. Dominantly however, discounted cash flow calculations were used and values expressed in terms of net present value. Comparables would have been used for components and valuation approaches

used fairly traditional economic and financial analysis, which is useful to observe. The analysis did not use theoretical valuation techniques, but simply considered the impact on other accounts together with the interests of the public (i.e. not just the shrimp farm).

The key aspect this raises is whether a standard valuation approach is enough to determine value. In this instance, the overall highest and best purchaser is not the shrimp farm but the Thai government. The problem with this is that they are not an arm's length purchaser acting reasonably and knowledgeably. If they did, they would preserve the swamp for mangrove.



**Figure 4: Mangrove swamp<sup>2</sup>**

## CONCLUSION

As with Case Study 1, a valuation focused solely on business will not evaluate the external benefits of certain enterprises. Those that are especially positive or negative to the environment generally impact the public interest and valuation of the social and environmental accounts is necessary to capture those impacts. As compared with Case Study 1, this example demonstrates a negative impact of business on the environment.

Another item of note is that capturing the Triple Bottom Line accounting for the shrimp farmer would be insufficient to take proper account of the public's perspective. Only by considering the three dimensional perspective of all costs and revenues, their contributors and beneficiaries, is it possible to gain a holistic perspective on the aspects of value seen in this example. For projects of this type where there is an appreciable impact on the environment, governments may wish to consider holistic valuations to address the single taxpayer perspective.

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<sup>2</sup> [Photograph courtesy of NOAA.](#)