



South Asian Network for Development
and Environmental Economics

POLICY

Brief

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Water Pollution Lowers Returns to Shrimp Farms - Evidence from Sri Lanka

Sri Lanka's shrimp industry is an important foreign exchange earner for the country and accounts for half of all of Sri Lankan fisheries exports. Private sector initiative has driven the rapid growth of the industry, which is concentrated in Sri Lanka's North Western Province. As a large employment generator and as an industry with a direct impact on wetlands, shrimp farming in Sri Lanka is unfortunately an example of unmanaged development. In the Dutch canal lagoon, where shrimp farming is booming, pollutants from the farms are now hurting the very wetlands the industry depends on, and this in turn is affecting shrimp harvests. SANDEE researcher, W.R Rohitha, examines how a vibrant industry is being tripped up by its own growth and makes the case for the shrimp industry to clean up its house if it is to continue to grow and profit responsibly. Rohitha's work predicts that shrimp yields per hectare would rise by 6-7 per cent if the Dutch canal wetlands were cleaned up and water pollution was reduced to a 'safe' level.

FIXING RESPONSIBILITY

A thriving industry unable or unwilling to act collectively to secure its future. A government that wants to see a business success duplicated but has not examined the industry's sustainability. That sums up the Sri Lankan shrimp farming dilemma. The imperative is clear enough. In 1996 and 1998-99 the industry faced a severe outbreak of the Whitespot virus disease, which affected shrimp in three-quarters of the farming areas. These were two particularly difficult spells, but the shrimp industry experiences such disease outbreaks frequently, which pull productivity down. The outbreaks are attributed to pollution in the wetlands that is generated by the farms themselves. Despite such experiences, both industry and government have been slow to tackle shrimp farming's pollution of its own vital water sources. The government has proposed to clean up the Dutch Canal wetlands but progress has been slow.

THE COSTS OF BUSINESS AS USUAL

Cleaning up the Canal and wetlands will not be cheap, but the financial implications of not doing so are found to be far more damaging to the industry. Shrimp farmers are today indebted to financial institutions by over LKR 1.7 billion on capital investment and accumulated loan interest. They simply cannot afford further disease outbreaks that will jeopardise these investments. With over 40,000 people connected directly and indirectly to the industry – apart from traditional lagoon fisherfolk – shrimp farming must reach for long-term stability.

Why is Rohitha's examination of the Dutch Canal wetlands important for the industry today and its sustainable expansion tomorrow? His work shows that at the level of the individual farm, shrimp farming is a viable and profitable business. However as an industrial system, shrimp farming is found to be ecologically and financially unsustainable.

This policy brief is based on SANDEE working paper No. 29-08, 'Evaluating Gains From De-Eutrophication of the Dutch Canal in Sri Lanka: A Cost Benefit Analysis', by W.R. Rohitha, Action Aid. The full report is available at www.sandeeonline.org



Courtesy: D. T. Hewagama

HOW THE INDUSTRY WORKS

The Dutch Canal system lies in Puttalam district, in Sri Lanka's north-western coastal region. It is a 172km long strip which was once an interdependent mosaic of mangroves, salt marshes and sea grass beds - all ecologically important ecosystems. The expansion of shrimp farming in this narrow strip has altered the landscape completely: an estimated 1,500 hectares of mangroves have been cleared to construct shrimp farms, and this loss has upset the natural balance of the ecosystem.

Rohitha's field survey found that approximately two-thirds of the shrimp farms in the district are quite small (with three to five ponds each) and operate illegally. Most shrimp farms in Sri Lanka function as cottage enterprises, and maintain pond-specific records only for feeding and stocking, which are useful for them to determine the harvesting schedule. This confirms the unregulated and uncoordinated nature of the industry. Typically, each shrimp farm is chronically affected by water polluted with effluent discharge from other farms.

Rohitha's analysis can help develop guidelines for coastal aquaculture elsewhere in Sri Lanka, for example the North Eastern Coast which is considered a high potential area for commercial shrimp farming.

POLLUTANTS AND THEIR CAUSES

This study has made important links between (shrimp) seed, feed, yield, stocking density and water pollution. In Rohitha's set of surveyed shrimp farms, seed and feed have a positive effect and water pollution has a negative effect on shrimp yield. This confirms the well-known observation in the shrimp farming industry: that increasing stocking densities increases the yield but at a decreasing rate.



Shrimp do not convert feed into mass efficiently and the conversion ratio recorded by Rohitha's study suggests unutilised feed in the shrimp farm ponds, which is the main cause of water pollution in the study area. For every kilogramme of shrimp produced, more than a matching amount of organic matter is released into the environment as dry matter content – the main pollutant in water. Such findings support one of the key conclusions of the study about the need for educating shrimp farmers about the causes and effects of lagoon pollution. Most crucially, Rohitha's work predicts that per hectare yields would rise by about 6-7 per cent if the water quality improved to a 'safe' level.

WHY IT'S WORTH THE EXPENSE

What financial impact would this have on the industry and could it catalyse a system-wide clean-up? Rohitha's work shows the impact as positive and the potential for bringing regulatory change large. He tabulates the average annual market price, cost of production of shrimp and average of annual shrimp production in Puttalam district. He employs these data to calculate the additional revenue that would be earned by shrimp farms if water pollution could be reduced. Extrapolating the incremental revenue per farm to all ponds in the study area provides evidence of a hefty *annual* benefit of LKR 163 million awaiting the industry – but only if it acts in concert.

Against this is the estimated project *one-time* cost of cleaning up the Dutch Canal at LKR 180 million. Rohitha's findings clearly show that ecologically reviving the Dutch Canal wetlands system is economically feasible because the costs can be recovered within two years (even at a 10 per cent discount rate) without affecting the present profitability of the farmers. This is a clear and robust case for action to be taken.

This SANDEE study sets out the reasons why a well-managed shrimp industry can bring much needed infrastructure to rural coastal Sri Lanka. Rohitha's findings and conclusions take on greater importance given a recent government announcement about the introduction of shrimp farming to southern areas of the country. That can certainly be pursued with a coherent national shrimp industry policy in place, one that fairly includes the interests of all concerned - shrimp farmers, labour, the residents of these coastal wetlands and government.

KEY MESSAGES

The vital numbers from Rohitha's work indicate that the shrimp farming industry and government will benefit if they work together to take the initiative and set down policy for the industry. This SANDEE study shows how the cost of clean-up today can be quickly recovered and will strengthen industry in future.

Shrimp Productivity Improvements from Reducing Water Pollution

Particulars	Amount
Predicted value of yield per hectare based on current level of pollution	1,874 kg
Predicted value of yield per hectare based on safe level of pollution	2001 kg
Incremental output per hectare due to water quality improvement from current level to safe level	127 kg
Incremental revenue per hectare	LKR 81, 532
Incremental profit of water quality improvement for shrimp farms in the Puttalam district (incremental profit x total area under shrimp farming, which is 2,000 hectares for both seasons)	LKR 163, 064, 320



SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional network that seeks to bring together analysts from the different countries in South Asia to address their development-environment problems. Its mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the inter-linkages among economic development, poverty, and environmental change, and, to disseminate practical information that can be applied to development policies. SANDEE's activities cover Bangladesh, Bhutan, Nepal, India, Pakistan and Sri Lanka.

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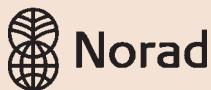
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Courtesy: D. T. Hewagama

In order to control further pollution the government needs to regulate effluent discharge into Dutch canal. Planning authorities could play an important role by (a) demarcating shrimp production areas, (b) limiting effluent emission to the environmental absorption capacity of the canal, and (c) educating the shrimp farmers about the effects of lagoon pollution on their productivity.

Rohitha's data and findings point to direct financial benefits for individual farms, and the Dutch Canal wetlands economy, from the cleaning project. Employment to the more than 40,000 workers in these farms would be further assured, and the other related trading activities could encourage additional job creation.

