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The Social Impacts of Shrimp Farming in Nellore District, India

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Severe impact or only a nuisance?

The authors describe a methodology for a more precise social impact assessment of brackishwater pond shrimp culture that can provide policy makers more reliable basis for weighty decisions - such as closing down an entire industry - than exaggerated claims and anecdotal evidence.

Abstract

The social impacts of brackishwater shrimp aquaculture were assessed by ranking the relative severity of impacts as determined by the Social Impact Index (SII) and as applied to data collected from twenty-six villages located adjacent to shrimp farming clusters. We found that each of the specific social impacts disrupting the well-being of a village community and its degree of severity differs by village occupation. Blocked access and well water salinity were very severe and severe impacts, respectively, on fishing villages but only problematic for the farming communities surveyed; fodder & fuelwood collection is a severe problem for farming villages while only a nuisance for fishing villages; unemployment is moderately severe for fishing villages while only of minor significance for farming villages; agricultural land salinity, however is of moderate severity for both fishers and farmers.

*All correspondence to Centre for Economic Performance; London School of Economics, Houghton Street, London WC2A 2AE, United Kingdom; tel: 44-171-955-7442; fax: 44-171-955-7595; email *p.patil@lse.ac.uk*. All errors are solely our own. This article is based on the research results presented at the Agricultural Economics Research Association conference held in New Delhi in September 1997 and at the London School of Economics. It is part of a wider study on shrimp farming impacts conducted by the first author as part of his PhD work at LSE. The ideas expressed in this paper are not necessarily representative of the above-mentioned institutions.

Overview

In response to a social movement against brackishwater shrimp aquaculture (shrimp farming) initiated by S. Jaganathan, an Indian social activist, the sector was recently banned in India (*S. Jaganathan vs G.O.I, December 13, 1997*). Indeed, the alleged intensity of social impacts on rural communities appears to have played a heavy hand in tipping the scale in favour of banning the shrimp farming sector in India. The Indian Supreme Court (SC) decision has provided fuel for activists in other countries to shut down this sector. In fact, in 1997 an international embargo on shrimp produce was initiated by a conglomeration of western NGOs. While activists have correctly pointed out some of the social and environmental consequences of shrimp farming, the magnitude of the impacts across entire regions does not warrant banning this sector outright. In addition, evidence presented to the SC on the severity of social impacts on rural populations as a result of this sector is anecdotal at best.

Three questions are often raised regarding the social impacts of brackishwater shrimp aquaculture. First, *what are the social impacts affecting a particular region of interest*? A large proportion of the literature available on this subject tends to focus on answering this first question. Nonetheless, the social impacts of brackishwater shrimp aquaculture are sparsely documented. Second, *which impacts are considered more problematic for a specific village or in a particular shrimp farming region*? Third, specifically, *what are the determinants of the social impacts* faced by a particular village community? To our knowledge, no empirical study has rigorously investi-

gated the latter two questions. This is a result of the general unavailability of secondary data and the time-consuming nature of collecting a primary data set. The answers to these questions are important as they enable policy makers to seek ways in which to minimise the social impacts of shrimp farming by effectively regulating this sector. In this article, we focus on answering the first two of the three important questions posed.

Identifying social impacts

The results of a rapid rural appraisal survey of twenty-six coastal villages in Nellore District, Andhra Pradesh conducted by the authors, indicate that 19 villages or 73% identified agricultural land salinity and blocked access to the creek/beach as a problem in their village; seventeen or 66% of the villages reported that well water salinity was a problem in their village; fourteen villages or 54% identified unemployment as a problem; ten villages or 38% reported fodder and fuelwood collection as a problem; and nine villages or 35% identified health problems as a result of aquaculture development as a problem.

Aggregated data for all twenty-six villages, however present a distorted picture of the problems faced by specific occupation based villages. *Table 1* illustrates that 94% of those villages comprised of fishers identified blocked beach access as a problem whereas only 33% of farming based villages identified access as a problem. Similarly, unemployment and health problems affect a majority of the fishing community, 76 and 53 percent respectively but only one of the farming villages. Approximately 89% of farming communities identified fodder & fuelwood collection as a problem whereas only 12% of the fishing communities did so. Well water salinity, however remained a problem for both 66% of fishing and farming village communities.

Table 1. Problems identified by coastal farming and fishing communities adjacent to shrimp farms in Kandaleru region, Nellore district, Andhra Pradesh.

% Villages w/ problems (N=26))	Well water salinity	Access to beach or creek blocked	Agr'l land salinity	Unfunder employ-ment	Poor health	Fodder & fuelwood problems
Fishing villages	65%	94%	65%	76%	53%	12%
(N=17)	(11)	(15)	(11)	(13)	(9)	(2)
Farming villages	66%	33%	89%	11%	0%	89%
(N=9)	(6)	(3)	(8)	(1)	(0)	(8)
All villages	65%	73%	73%	54%	35%	38%
(N=26)	(17)	(19)	(19)	(14)	(9)	(10)

Source: Patil and Krishnan (1997).
Note: the number of villages are in parenthesis.

Impacts on economic activity

Each of the above identified social problems have an associated impact on the economic activity taking place within the village community. Overall increases in the amount of *time* required to carry out a particular economic activity ultimately reduces the overall productivity of the community.

In the case of blocked access to the beach or creek, fishers require a longer amount of time to gain access to their boats which are kept on the beach. Before the advent of shrimp farming, fishers had a direct path to their fishing crafts. With shrimp farms situated between fishing villages and the beach and occupying several dozen hectares of land, direct access between the beach and the village is clearly blocked. This has several other implications such as a longer and more difficult transport route of fish catch to the local village market. Several farming communities indicated that they suffer from blocked access to the Kandleru creek. Blocked access is a problem since a small proportion of predominantly farming communities use the creek for subsistence fishing.

Salinity of agricultural land is a problem faced by farming communities involved primarily in agricultural production and some fishing communities that rely on the productivity of small vegetable plots for their own consumption. Approximately 90 percent of the farming villages in our sample complained of agricultural land salinity and specifically, falling paddy and casuarian yields on plots directly adjacent to shrimp farms.

Both farming and fishing communities have experienced salinity problems with their drinking water supply. The force of this impact falls on women who are usually in charge of water collection for the household. In many cases, less than fifty percent of the village wells were left idle as a result of salinity problems. In extreme cases where all the village wells were contaminated, we were informed that women had to walk up to two kilometers to fetch potable water from the nearest uncontaminated well. It appears, however, that well water salinity is seasonal and related to the intensity of the monsoon season.

The demands on village females are further strained as a result of problems with fodder and fuelwood collection. Semi-structured interviews of women suggest that in farming communities women are required to spend more time searching for cooking fuel and fodder to feed their animals. This is perhaps a result of the growing number of shrimp farms occupying wasteland once used to graze animals and collect fuelwood. With the advent of shrimp farms, large areas of thorny bushes (used as a source of fuelwood) have been cleared.

Fishers' productivity and general well-being are also affected by health related problems associated with shrimp farm effluent discharge from jetties into the nearshore area where they fish. In addition, they complain that their nets get snagged by the effluent discharge pipes that extend up to 50 meters out to the sea.

Employment issues tend to affect fishing communities much more than farming communities. Although farms continue to hire a steady stream of rural inhabitants for seasonal employment on shrimp farms, inhabitants of fishing villages complain that the direct purchase of wild seed has declined rapidly over the past year. This is perhaps a direct result of the growth of operational seed hatcheries in the nearby vicinity. Whereas shrimp farms in the region once relied solely on wild caught seed purchased from fishers, the growth and development of hatcheries have given farms a steady supply of seed at a rate scaled by the quantity purchased as opposed to per individual seed.

Severity of social impacts

Policy makers are faced with making important decisions with respect to regulating the shrimp farming sector while constrained by shrinking budgets and bound by public sentiments and public opinion. Application of the Social Impact Index (SII) offers policy makers two functions -- the first enables an objective way of identifying and classifying social impacts, the second makes it possible to rank and quantify the severity of an impact. The SII enables a methodologically sound way with which to identify and index the social impacts faced by village communities.

Second, the numerical value of the SII falls within a particular range which identifies the *severity* of that specific social impact.

In addition, each social impact can be ranked in order of severity faced by the villages. The ranking order identifies the importance of each impact relative to other impacts while the severity class-impact intensity conversion table interprets the numerical value of the Social Impact Index by the *severity* of the social impact on villages.

The results and discussion presented next are based on application of the Social Impact Index theoretically constructed in Patil (1997b). We use this index to (i) assess the severity of each impact on rural inhabitants and (ii) rank each social impact by the severity of its impact on the well-being of rural communities. The methodology employed to collect the data set used for the empirical application of social impacts is discussed in Patil (1997a).

The 26 villages in the study are categorised by principal occupation, namely, fishing and farming villages. There are seventeen fishing villages and nine farming villages. The numerical SII calculated for each of the six social impacts affecting the welfare of inhabitants of the fishing and farming villages are considered separately and presented in Table 2.

Table 2. Social impact indices by villages' primary occupation

SII INDEX	Well water salinity	Blocked access	Agric'l land salinity	Un/under employment	Poor health	Fodder & fuelwood
Fishing villages (N=16)	0.149 (11)	0.090 (16)	0.248 (11)	0.272 (13)	0.440 (9)	1.500 (2)
Farming villages (N=9)	0.471 (6)	0.443 (3)	0.281 (8)	1.00 (1)	1.75 (0)	0.235 (8)

Source: Patil (1997c)
Notes: the number of villages reporting this impact as problematic is in parenthesis.

The Social Impact Index is a numerical value that falls into one of 6 Severity Classes that can be interpreted using the scaling factor outlined in the *Severity Class-Impact Intensity Conversion Table* below.

Severity class-impact intensity conversion table

Severity Class	Range	Intensity of Social Impact
SC(5)	$0.000 < SC(5) \leq 0.055$	social crisis
SC(4)	$0.055 < SC(4) \leq 0.109$	very severe
SC(3)	$0.109 < SC(3) \leq 0.219$	severe
SC(2)	$0.219 < SC(2) \leq 0.438$	moderate
SC(1)	$0.438 < SC(1) \leq 0.875$	problematic
SC(0)	$0.875 < SC(0) \leq 1.750$	nuisance

Source: Patil (1997c)

For the 17 fishing villages in the sample, blocked access to the beach (SII=0.09) is a *very severe* social problem; well water salinity (SII= 0.149) is a *severe* problem; agricultural land salinity (SII=0.248) and Un/underemployment (SII=0.272) are problems with a *moderate* severity; poor health (SII=0.440) is *problematic* and difficulties in fodder & fuelwood collection (SII=1.5) are the least severe problem or simply an overall *nuisance*. No *social crisis* was identified using this method of indexing social impacts.

Overall, the distribution of Social Impact Indices for farming villages is skewed towards less severe impacts than fishing villages. The problems of fodder and fuelwood collection (SII=0.235) and agricultural land salinity (SII=0.281) arising from the advent of shrimp farming are *moderately severe* for farming villages. Blocked access (SII=0.443) to the brackishwater source (either creek or beach) and well water salinity (SII=0.471) are *problematic*. Un/under-employment (SII=1.00) is a *nuisance* whereas, Poor Health (SII=1.75) is at most a *nuisance* to farming communities.

Ranking social impacts by severity

Social Impacts are ranked by *severity* for both fishing and farming categories in Table 3. In conjunction with the severity of the impacts on the well-being of a village community, policy makers are able to identify the most pressing problems facing a group of villages. The ranking also further highlights how the magnitude of social impacts differ by occupational groupings.

Table 3. Severity ranking of social impacts in fishing and farming villages.

Ranked Impacts	Fishing Villages Rank	Farming Villages Rank
Well water salinity	2	4
Blocked access	1	3
Agricultural land salinity	3	2
Un/under-employment	4	5
Poor health	5	6
Fodder & fuelwood	6	1

Source: Patil (1997c)

Sustainable shrimp farming

Sustainable shrimp farming practices require minimal disruptions to the surrounding ecosystem and coexistence with rural communities that have historical ties to the land and waters. A delicate balance is needed between promoting the development of an industry that generates large capital inflows to the national economy and industrial growth in rural areas and punishing this sector for its associated negative externalities.

Efforts to accommodate the Indian brackishwater shrimp aquaculture sector within its coastal zone regulatory policy framework have been difficult. Both regional and national pro-aquaculture lobbying groups claim that regulatory agencies have catered primarily to traditional constituency groups such as social activists and the environmentalists acting on their behalf. The December 1996 Supreme Court ban of this sector is one example where an engine of well intentioned sentiment can drive policy. However, quality research of social impacts can expose the nature of each social impact and its magnitude. This provides some hard facts for policy makers to utilise in effectively regulating this sector.

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