



Power, profits and payments for ecosystem services in *Hilsa* fisheries in Bangladesh: A value chain analysis



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A B S T R A C T

Commitments for sustainable growth often look good on paper but are messy in the practice. The Government of Bangladesh shows huge initiative towards SDG 14 (conservation and sustainable use of marine resources) by establishing measures to improve the stock of *hilsa* fish in the country, thus ensuring the supply of a valuable and charismatic fish species. Initial reports of the measures are optimistic, suggesting larger sizes of fish caught across the seasons. Bigger *hilsa* fetches better prices – as high as US\$25 per kilo in niche markets. It is conservation business with profits. Yet the costs of these regulations are falling squarely on the shoulders of small fishermen who are poor, uneducated and in permanent debt. The government offers a small in-kind payment for ecosystem service (PES) in the form of rice, which is good but does not compensate for the loss of revenues and household protein during bans. These small fishers have no bargaining power and no voice in the design of policies that affect them. A common problem in policy design is the lack of clarity of the markets they affect, especially if they are informal. This study uses value chain models to unpick the *hilsa* value chain. It study provides hard data and evidence on processes, power, and profit creation. This consultation can help policy makers design better strategies to re-govern markets in more inclusive ways and help to achieve Sustainable Development Goals commitments.

1. Introduction

Fishery policies are particularly vulnerable to failure. For example, their open access characteristics make compliance difficult. Trade is often informal and non-regulated, with multiple pressure points across the supply chain. Attention to the social component of the policies is particularly important for artisanal fisheries, as the main actors affected by regulation tend to be poor, vulnerable and with no power to influence policy decisions.

This article explores how improvements in marine ecosystems affect value chains associated with fish capture and trade. It focuses in Bangladesh, where a temporary fishing ban and a payment for ecosystem services (PES) compensation are used to improve the stock of *hilsa* fish.

Hilsa fish (*Tenulosa ilisha*) is an important source of income and cultural identity in Bangladesh. It represents 11 per cent of the total catch in the country, and provides jobs to over 2.5 million people [1]. Declining stocks over 30 years led to the government's decision to introduce drastic measures to improve the health of the stock. Some of the measures include restrictions on fishing gear, regulation on the type of

vessels, and seasonal fishing bans. This ban is designed to allow mature fish to reproduce and juvenile *hilsa* (*jatka*) to grow, thus achieving better sizes (and prices). It also allows juvenile fish to mature and reproduce to replenish the overall stock.

While the primary goal of this programme is environmental, it is funded through a national Vulnerable Group Feeding (VGF) programme aimed at reducing food insecurity [2,3]. Because of this the programme targets the artisanal fishers living inside and around the sanctuary areas that affected by the ban, and tries to improve their socioeconomic condition [4,5].

As a compensatory measure the government distributes rice (40 kg per month per family) as a form of Payment for Ecosystem Services (PES), and provides capacity building for alternative income generating activities, to partially compensate for the temporarily loss of their fishing income, and balance out household diets.

This set of measures seems to be working, and the reported *hilsa* stock shows signs of recovering. Although there are no counterfactuals or before/after impact evaluations, recent studies suggest that the ban has a positive impact on the stock: 1) higher number of mature *hilsa* fish at maturity stages (V and VI) than in the other adjacent areas [6], as

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<http://dx.doi.org/10.1016/j.marpol.2017.06.031>

Received 13 February 2017; Received in revised form 26 June 2017; Accepted 27 June 2017

Available online 10 August 2017

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well as a higher number of spent fish –e.g. fish which have recently completed spawning; 2) increased production of hatchlings and juveniles: Rahman et al. [6] recorded about eight times as many eggs and juveniles in 2011 than in the base year 2007–2008, attributed to the 11-day fishing ban in the spawning grounds of *Hilsa* during peak spawning period; and 3) positive impact of the HCP on the finfish and shellfish biodiversity: evaluations by Islam et al. [1] in several fish sanctuaries (Shariatpur, Chandpur, Paatuakhai and Bhola) suggest that the temporal fishing ban is impacting positively on the fish and shellfish biodiversity within all the four sanctuary areas.

Bigger and better fish sizes sell at much better prices and bring higher profits across the value chains. The flavour and characteristics of Bangladesh *hilsa* make it a valuable commodity –fetching as much as US \$25 per kilo in niche Dhaka and foreign markets. This is good news for the fishing industry and exports in Bangladesh, which already represents 4.3% of GDP [4].

Focusing on the fishing families as the entry point of analysis, the study uses value chain analysis and business model canvas as methodologies [7] to: 1) understand the main value chains affected by a change in the quality of the ecosystem; 2) to provide a snapshot of the state of the *hilsa* fish value chain in Bangladesh, identifying and measuring the economic relationships along the value chain; 3) to identify existing opportunities and conflicts in the chain, and 4) to suggest how can a compensation scheme be designed to help re-balance the chain. The ultimate aim of the study is to help inform the design of economic instruments, such as PES that are better aligned to market failures.

2. Policy relevance: PES for environmental and poverty objectives

Ecosystem management and poverty reduction have traditionally been pursued in isolation: from each other, using separate instruments, and managed by unconnected and often opposing government departments. The emergence of global agendas like the Sustainable Development Goals, the Addis Ababa Action agenda and the Paris Climate Change Agreement bring back to the table the urgent need to link agendas, deal with trade-offs, maximise overlaps, and achieve larger pools of financing by joining resources.

Action for ecosystem conservation needs to be coordinated [8,9]. This includes looking at the mix of regulation and incentives needed to manage resources, for example rules and rights for resource access, elimination of harmful subsidies and conditional incentives, such as PES, to promote good behaviour to manage ecosystems. PES is a positive incentive that rewards good ecosystem management agreements (such as improving soil conservation, or refraining from doing damaging activities like overfishing) expected to result in ecosystem benefits, like cleaner water, reduced carbon emissions [10,11]. Recent meta-analysis of PES schemes [11,12] brings forward practical suggestions for better environmental effectiveness linked to spatial targeting, payment differentiation, and strong conditionality. The social reach of PES remains more dubious. Pascual et al. [13] suggest that many PES examples lack a focus on equity issues and poverty reduction, and experience from ongoing PES suggests that they may moderately help reduce poverty [14] and in many cases the payments go to large or relatively wealthier participants [15,16]. According to Rodríguez et al. [36], attempting to incorporate a few measures to make PES look proper and legitimate has meant less efficiency in achieving environmental outcomes – or risking not to achieve either [17].

Instrument design also needs to respond to the specific economic activity, taking into account the impacts within the economic unit [18] and the rest of the economy. Recent attention turns to how PES affects associated value chains such as forestry or fisheries and tries to understand motivations, obstacles and opportunities [19–21]. Many of these obstacles are similar to traditional smallholder agriculture and artisanal fisheries activities and much can be learned from their strategies [22–24].

3. Methodology

This study combines desk-based research, focus group discussions, interviews with key informants and household surveys to map out value chains and business model canvas (BMC) of the *hilsa* fish industry.

3.1. Value chain and business model canvas

The value chain approach is used to identify and characterise the key actors of the *hilsa* trade, with a strong focus on the artisanal fishing family enterprise. The value chain is useful to identify partner networks that supports, intervenes, or assists different links of the business. It helps to define relationships and interconnections, understand the flow of products, services, information and payments; and identify entry points or key leverage points to improve the value chain. The business model canvas [7,25] shows how individual economic units create, capture and deliver value. It is used in combination with value chains to understand and compare players along the chain. BMC uses a common language along the stages to: a) what is the value proposition; b) who are the buyers of the products and what are the channels to reach them; c) how is value created (e.g. the key partners, resources, inputs, and activities necessary to capture and create value); and d) what are the costs and benefits attached to the operation. The BMC helps to identify opportunities and gaps, distributional impacts and develop reasonable monitoring strategies. Interviews with key stakeholders are used to understand the formal and informal rules determining how costs and benefits are distributed for the different actors.

3.2. Data collection

Data collection followed a three-step approach. First, a field trip at the start of the study helped to identify research gaps, firm up methodology and determine field sites. It included a focus group in Dhaka (fishers, intermediaries, Department of Fisheries, universities and NGOs), as well as visits to local fish markets. Second, field surveys (conducted between March and October 2016) which generated 249 valid observations for fishers, suppliers and intermediaries located mostly in Barisal, Bhola and Dhaka. Third, structured focus groups and in-depth interviews were conducted with five wholesaler intermediaries (*araddars*) from Kawran Bazar (the biggest wholesale fish market in Bangladesh, with more than 300 wholesalers) and six from Suwarighat fish market (one of the oldest wholesale fish market near Chawkbazar in Dhaka, with over 40 wholesale traders), as well as a personal interview with a fish exporter in Dhaka South City Corporation.

4. Results: the *hilsa* fish value chain

Fig. 1 presents a simplified value chain for the *hilsa* fish in Bangladesh. It focuses on three stages: 1) the fishing families and their input suppliers, 2) landing centers and first level wholesalers, and 3) retailers reaching final consumers (including the export sector). The figure also identifies their position in relation to primary, secondary and retail markets, as well as some of the main inputs needed for their value proposition. It is important to highlight that the focus of this study is on the fishing families. See Porras et al. [26] for detailed business canvas for fishers, wholesalers (*araddars*) and exporters as high-end retailers.

4.1. Who? Description of key players along the chain

Fishers are at the first rung of the *hilsa* value chain. For the most part they are poor, uneducated and have large households with many dependents. Roles are gender divided [1]: males will own or rent boats, or join as crew. Women participate in other activities such as processing, trading and gear mending.

Fishing is a job for life. The average age across the group was

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