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Can co-management emerge spontaneously? Collaborative management in Sri Lankan shrimp aquaculture

Eranga K. Galappaththi *, Fikret Berkes

Natural Resources Institute, University of Manitoba, 70 Dysart Road, Winnipeg, Manitoba, Canada R3T 2N2

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ABSTRACT

Shrimp aquaculture in northwestern Sri Lanka shows co-management like features. To understand the reasons behind co-management and to identify the mechanisms by which co-management is carried out, the paper examines shrimp aquaculture operations in three coastal communities using a case study approach. Water from an interconnected lagoon system is the key input for shrimp ponds, but it is also the potential source of shrimp disease outbreaks that threaten all shrimp farms. Farmers try to prevent the spread of disease by co-operating to adjust the timing of water intake and wastewater release. This is done through a zonal crop calendar system which is developed and implemented by a vertically integrated institutional structure with three levels: sub-zonal/community, zonal, and national. Partnerships, overall sharing of power and authority, and learning-by-doing are key features of this collaborative management system. The case shows that adaptive co-management can develop through collaborative problem-solving over time, even in the absence of legal arrangements.

1. Introduction

Diverse forms of collaborative management have been adopted by various resource sectors, including fisheries and aquaculture [1,2]. At one level, resource users can collaborate for their mutual benefit, using collective action (rather than individual action) to solve common problems [3]. At another level, resource users and government can work collaboratively, solving problems that neither party can solve alone [4]. Such collaborative management can be carried out in multiple ways [5], and it can take many forms. The terminology used can be equally complex. Plummer and FitzGibbon [6] make a distinction among three commonly used terms associated with co-operative environmental management: partnership, collaboration, and co-management.

Partnership "is a dynamic relationship among diverse actors, based on mutually agreed objectives, pursued through a shared understanding of the most rational division of labor based on the respective comparative advantages of each partner" [7,21]. Further, mutual influence which leads to the mutual respect, equal participation in decision making, and mutual accountability and transparency are often also involved in partnerships [7]. Collaboration is linked to the term partnership, and these two terms are often used interchangeably [8]. Main idea of collaboration is achieving shared interest of multiple parties by pooling of resources to solve problems. Core issues for collaboration are inclusion, power, and decision-making [6].

The term collaborative management is often used as a substitute for co-management, especially in cases where the government party seeks to specify that a particular case is not a legally binding arrangement, as in some national parks cases in Canada [9]. However, the functional distinction is often difficult to make. For example, Seixas et al. [10] investigated five aquatic resource co-management cases in Brazil. Some of these cases were identified as informal co-management experiences evolving from self-organized but non-legal relationships, while others were formal arrangements originating from legal frameworks.

Co-management can be defined as the sharing of power and responsibility between the government and the local resource users [9]. Some of the important features of co-management are the sharing of authority [11]; partnerships of government and local people [4]; decentralized decision-making [12]; and vertical linkages for governance [13]. Transparency, accountability, and legitimacy are key attributes [4]. Time-tested co-management, with learning-by-doing, turns into adaptive co-management [14]. Olsson et al. [15: 75] characterize adaptive co-management as "flexible, community-based systems of resource management tailored to specific places and situations, and supported by and working with, various organizations at different scales".

Can co-management develop independently of formal arrangements? Ruitenbeek and Cartier [16] advanced the hypothesis that adaptive co-management may be an emergent property of complex

* Corresponding author.
E-mail addresses: erangakokila@yahoo.com (E.K. Galappaththi), fikret.berkes@umanitoba.ca (F. Berkes).

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systems of resource management. They argued that it could evolve spontaneously through feedback learning over time from simple systems of management, and this could happen with little or no external intervention. In fact, they argued that policy intervention to introduce co-management could lead to failure. There are many case of failure of top-down co-management [17] but fewer examples of spontaneously evolving co-management through feedback learning over time [10,18].

This paper investigates collaborative management arrangements involving small-scale coastal shrimp aquaculture communities located in northwestern Sri Lanka. The objectives are (1) to understand the reasons for collaborative management, and (2) to identify the regulatory mechanism by which collaborative management is carried out. The study unfolds unique ways of managing natural resources collaboratively to overcome common challenges, and addresses the question of whether co-management can emerge spontaneously through collaborative problem solving.

1.1. Context

Sri Lanka has a strong history of collaborative management practice [2,19]. Examples include inland lake/reservoir aquaculture [2], 250-year old stake-net fishery on Negombo lagoon [1,20], shore (beach) seine fishery on the western, southern, and eastern coastlines, and near-shore shrimp fishery on the western coast [22]. Both community-based management and *de facto* co-management exist within these contexts [23,24]. However, there are no studies of co-management in the context of shrimp aquaculture.

Galappaththi and Berkes [25] summarized the history and development of the Sri Lankan shrimp aquaculture. The 1990s, there was an uncontrolled growth of shrimp farming in northwestern Sri Lanka. The government started promoting shrimp aquaculture as a profitable self-employment opportunity among locals in the northwestern coastal area. Many small-scale farmers took on farming, leading to an expansion of shrimp aquaculture. Small-scale farmers continued to farm within their community areas, while large and medium-scale farmers shifted from place to place by converting mangrove [26] and coconut cultivating lands into shrimp farms [27]. Low stocking densities of shrimp post-larvae (PL) in small-scale farms (7–12 PL/m^2) compared to that of large- and medium-scale farms (12–25 PL/m^2) cause less disease incidences in small-scale farms and also lower operation cost in small-scale farms than in other farms bring about high profit margins per unit area in small-scale farms [28].

In the wake of shrimp aquaculture development, farmers across the northwestern area began to organize into associations in mid-1990s. However, there was no control over the industry, with respect to such factors as water bodies used, shrimp production time and volumes, and quality standards, by the government or other regulatory bodies. This led to the emergence of conditions that stimulated the spread of shrimp disease. The proliferation of shrimp farms in the northwestern province since 1980s for which the major sea water input and discharge output was Dutch canal, there has been a considerable pollution in the Dutch Canal and the surrounding coastal areas [29,30]. In 1999, the Government listened to the representations made by the shrimp farmers and prepared a proposal for cleaning up the Dutch Canal, its main objectives being ridding the canal of eutrophication and returning the canal to normal conditions.

In early 2000s, the shrimp breeders association took the initiative to collaborate with shrimp aquaculture sector stakeholders to deal with the challenges of shrimp disease. These discussions resulted in the formation of a national level sector association called Sri Lanka Aquaculture Development Alliance (SLADA). SLADA requested the Ministry of Fisheries to appoint/form a government institution responsible for monitoring the northwestern shrimp aquaculture sector. As a result, in 2003/4, the central government became directly involved in the management of the shrimp aquaculture sector through a line department called National Aquaculture Development Authority (NAQDA). NAQDA's approach was to work in collaboration with SLADA, community-level shrimp farmers and breeders associations. One of the initial tasks of SLADA and NAQDA was to respond to the disease problem, thus starting a collaborative management arrangement.

Water for shrimp ponds is the key production input and is obtained from an interconnected common natural water body. This common water body consists of three main lagoons (Puttalam, Mundal, and Chilaw) that are interconnected by a human-made canal called the Dutch Canal. Almost all the shrimp farms are connected to the common water body directly or indirectly through canals. Interconnection of waterways is significant for shrimp aquaculture, as shrimp disease can spread through water. The most risky shrimp disease, White Spot Syndrome (WSS), mainly infects penaeid shrimp. Two main characteristics of these viruses are their ability to act rapidly and kill shrimp within about 24 hours, and the ability to spread fast using other aquatic animals (crustaceans, birds) as carriers. The latter creates the main impact as it quickly spreads throughout the entire water system and the shrimp farms connected by this water system [28]. There were three major shrimp disease outbreaks in the study area from1988 to 1998 [25].

2. Methods and study area

A qualitative case-study research approach [31] was conducted in the coastal communities of Ambakandawila, Koththanthive, and Karamba (hereafter referred to as communities A, B, and C respectively) located in northwestern Sri Lanka (Fig. 1). The data collection took place from April to August, 2012. Primary data were collected through the following methods: (a) participant observation in the three communities and other parts of northwestern Sri Lanka; (b) semi-structured interviews with shrimp farmers and shrimp farming community associations; (c) focus group discussions; and (d) key informant interviews with influential people involved in shrimp farming. Three research assistants were recruited from the communities to assist with the interviews and focus group discussions, which were used in primary data collection and validation of findings. As well, the lead author observed 12 community-level meetings and five national-level meetings. Snowball sampling technique was applied and a total of 38 shrimp farmers (13 in community A, 11 in B, and 14 in C) were interviewed. Three focus group discussions (one from each community) and seven key informant interviews were conducted.

These three communities show diversity in terms of cultural and ethnic backgrounds. Community A was entirely Sinhalese; community B was entirely Tamil; and community C was comprised of a mix of residents of Sinhalese, Tamil, and Muslim backgrounds. The selected communities were located in three different geographical parts of the northwestern area. Community A is an isolated rural community located close to the Chilaw Lagoon with about 150 households. Income generating activities included shrimp farming, shrimp hatcheries, brood stock supply, and shrimp feed sales. Coastal fishing, government jobs, and money lending are also important; this was a fishing community even before big aquaculture. Community B, another isolated rural community, is located around the mid-northwestern coast, close to Mundal lagoon. It has about 200 households involved in capture fishery, paddy (rice) farming, and coconut plantations. Community C, also an isolated rural community, is located near the Puttalam