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# Impact evaluation of a fisheries development project

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ABSTRACT

A number of fisheries development projects are undertaken every year in recognition of the important role fisheries play in many coastal communities. The objectives vary, but typically go beyond a limited focus on fisheries management and the ecosystem. This makes it difficult to evaluate the contribution of a project, particularly in data poor environments such as most developing countries. This paper used the recently developed Fisheries Performance Indicators (FPIs) to evaluate the impact of a World Bank development project in a Liberian coastal community. FPIs are designed to capture economic and social performance of a fisheries system in addition to the management and environmental impacts. The results show improvements in most ecological dimensions, and also in many social and economic dimensions targeted by the project. Hence, the project intervention appears to be positive. However, some indicators, particularly in relation to general governance in Liberia, showed a negative development which was not caused by the project.

## 1. Introduction

It is well known that the quality of fisheries management depends critically on institutions [4,13,20,31], which is why good fisheries outcomes are difficult to achieve in countries with poor institutions. This is a particular challenge in many developing countries, where fisheries are often more essential for the fabric of society, as they are an important provider of proteins and other nutrients [17,21], and an essential contributor to public health and food security [25,8,10,16], jobs [28], and income [6,7,9,25]. Moreover, the fishery management systems directly and indirectly have an impact on coastal communities by influencing fleet structure, how the fishery is conducted and how the fish is consumed [15,26,27]. Given the impact of poor fishery governance on coastal communities' long-term development potential, international donors have invested in a number of fisheries development projects to help improve fisheries in developing countries.

A challenge for evaluating the impacts of investments in the fishery sector is that common approaches tend to be narrowly focused on specific facets of the fishery, often the ecological performance and/or the management system, while the reality is that fisheries are complex and interlinked socio-economic-ecological systems. Therefore, the evaluation should also be multi-dimensional. However, lack of information and data usually prevents such approaches. In this paper the impact of a World Bank fishery project in Liberia was evaluated by using the Fisheries Performance Indicators (FPIs) of Anderson et al. [2]. The main objective of the World Bank project was to strengthen the capacity of Liberia to govern and manage targeted fisheries, reduce illegal fishing and increase local value added to fish products [32]. It aimed to improve the whole value chain from harvest to post-harvest.

The FPIs are a multi-dimensional evaluation tool to assess the performance of fisheries management systems in achieving environmental, economic and social outcomes [2]. They are designed to be cost-effective, quantitative, accurate, comparable, and applicable in both data poor and data rich fisheries systems. The guiding principle is that a successful fishery is one that is ecologically sustainable, socially acceptable, and generates sustainable resource rents or profits to maintain an economically sustainable industry [3]. One single dimension is not effective in measuring whether a fishery system is sustainable or not, particularly for the community as a whole. Anderson et al. [2] show how the FPI indicators can be aggregated into different groups. For example, the indicators can be grouped into the three main dimensions of sustainability (social, ecological and economic), also known as the triple bottom line. The metrics vary from specific indicators related to fisheries management to general indicators of the society or the environment the fishery operates in. This allows evaluation based on the narrow indicators mostly considered in fishery science as well as a wider set of indicators that allow more general impacts to be accounted for.

Anderson et al. [2] introduced this methodology and illustrated its value in evaluating fisheries management systems according to

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economic and community outcomes, in addition to resource and environmental status. The FPIs have also been used to compare fisheries management systems and make inferences about how to improve fishery outcomes [1,11,12]. This study will show that the FPIs are well suited to make comparisons over time by evaluating the impact of investments into fisheries using data from one World Bank project in West Point, Liberia.

## 2. Small-scale fisheries in Liberia

The small-scale fisheries in Liberia include artisanal, semi-industrial and subsistence fisheries [18,19], defined based on the type of vessel and engine used. They provide livelihoods for approximately 33,000 fishers and processors along the country's 579 km coastline [24]. Most fishers operate small wooden dug-out non-motorized canoes called Kru canoes. The canoes are typically less than 7 m and Kru fishermen use purse seines, beach seines, gillnets, long line, and hook and line to capture coastal shallow and deep-water demersal and small pelagic fishes [19]. About 3000 of these Kru canoes conduct fishing in Liberia's coastal waters. Additionally, there are more than 500 larger motorized vessels that are generally referred to as the Ghanaian fishing boats or 'Fanti' boats. These vessels are 12–15 m long and powered by 15–40 horsepower engines with 6–20 crew members. They target mainly small pelagics, shallow and deep-water demersal, sailfish, and some larger pelagic species using ring nets, drift nets, set nets and gillnets. The primary fishing season is from October to March. Most of the catch is processed locally through salting, drying, and smoking and most fish products are consumed locally.

West Point is a township of Monrovia, the Liberian capital city with about 75,000 people and is one of the most densely populated communities. West Point had 125 Fanti boats (Ghanaian motorized), 29 Ghanaian non-motorized boats, 24 Liberian motorized canoes, and 222 Liberian non-motorized canoes in 2015 (Patrick 2016). There is an interesting social dynamic between the Liberian and Ghanaian fishermen in West Point and in Liberia in general. Ghanaian fishermen are allowed to fish in Liberia by law. They normally have larger boats, better skills, and higher income compared to Liberian fishermen. The majority of these Ghanaian fishermen have Liberian passports, have lived in Liberia for a few decades, and many of them married Liberian women; however, they are still referred as Ghanaian. This is primarily because the local Liberian fishermen believe Ghanaian fishermen came to take advantage of the Liberian fishery resources; Ghanaian fishermen frequently send their savings back to Ghana to build houses and many will return to Ghana when they retire from fishing.

Fishing permits are issued to vessel owners, and captains are hired by owners of larger boats. During the dry season (Jan-April), they typically fish every day. During the rainy season (May-June), they go fishing every day as long as there is good weather. From July to August, they fish three days a week because of strong winds. From September to December, they fish five days a week and leave one day for maintenance. On each fishing trip, the boat owner receives one third of the catch, the captain receives one third, and the rest will be shared among the crew members. Other than this daily catch share, they also receive an income at the end of the year depending on the type of boat and role they play. Table 1 shows the income matrix for 2015.

The Bureau of National Fisheries (BNF) under the Ministry of Agriculture, created by an Act of the National Legislature under the Natural Resources Laws of 1956, is responsible for managing and developing fisheries and aquaculture in Liberia [19]. The role of the BNF is to implement fisheries policy; formulate guidelines, rules and regulations to govern national fisheries and aquaculture for its planning, development, and management [14]. There are four Divisions: Research and Statistics, Marine Fisheries, Aquaculture and Inland Fisheries, and Administration.

Major activities of BNF include registration of fishing vessels, issuance of fishing licenses and inspection of fishing vessels and gear [19].

**Table 1**
Income received by fishermen at the end of year, 2015, in West Point, Liberia.
*Source:* Sayon, P. [23]. FPIs Case Study for Artisanal Fisheries in West Point, Liberia.

| | Captain $/year | Crew $/year | Total number of boats | No. crew/boat |
|---|---|---|---|---|
| Ghanaian motorized | $1388 | $800 | 125 | 6–20 |
| Ghanaian non-motorized | $600 | $400 | 29 | 3 |
| Liberia motorized | $800 | $500–600 | 24 | 2–4 |
| Kru boat (Liberia non-motorized) | $650 | $400 | 222 | 1–3 |

However, budget constraints have limited the effectiveness of these efforts. The fishery operates under regulated open access. The biggest challenge in Liberia back to 2009 was illegal fishing boats, mainly foreign trawlers, fishing close to shore and competing with local small scale fishing vessels [30]. It was common to have incident reports in which illegal trawlers ran over the local boats, destroyed their nets, badly damaged the fishing grounds, and negatively impacted local livelihoods [33]. The BNF had no ability to enforce the law or chase the illegal fishing vessels away.

## 3. Liberia-West Africa regional fishery program

In 2009, the World Bank approved its first fishery project for developing countries after several decades of absence from this sector. The West Africa Regional Fishery Program (WARFP) was developed to support the fishery management reform in Cape Verde, Liberia, Senegal and Sierra Leone with a $55 million loan [32]. The project became effective on April 19, 2010. Liberia received a $12 million allocation. On November 24, 2010, the Liberian government established the six nautical miles Inshore Exclusion Zone (IEZ) for the sole use of subsistence, artisanal and semi-industrial fishing activities defined in the new Fishery Regulations 2010 (Ministry of Agriculture, 2010). This was the first step to drive away illegal industrial trawlers from the nearshore area and allow the fishery resources to recover [35].

WARFP partnered with the BNF and the Liberia Coast Guard to secure the 6 mile IEZ. The project supported the establishment of a Fishery Monitoring Center (FMC) by providing equipment like computers, radios, training, operating costs such as fuel, and installed a Vessel Monitoring System (VMS) to strengthen the country's Monitoring, Control, and Surveillance (MCS) capability. The US Coast Guard provided training for the Liberian Coast Guard and the US National Oceanic and Atmospheric Administration (NOAA) provided training for the observers who were placed on the industrial boats. This gave Liberia the ability to chase the illegal fishing boats, arrest them, and issue fines [30]. With stronger enforcement capacity and improved community awareness campaigns, domestic illegal fishing methods like dynamite fishing and chemical fishing were reduced [22]. The project also supported a revision of the fisheries regulations and the drafting of a new Fisheries and Aquaculture Act, which has been endorsed by the Cabinet and submitted to the National Legislature for enactment [34].

On the community side, the project supported community-led fishery management by helping establish the local Community Management Association (CMA), develop by-laws, conduct trainings, elect management teams, and implement local monitoring and surveillance. The trawler spotter, a GPS-connected camera, was used by local volunteers to take pictures of illegal fishing vessels from the shore, which were used in court as evidence [22]. Additionally, the project leveraged additional financing from a trust fund managed by the World Bank to support development of landing sites in Mesurado and Robertsport, improve value-added products, reduce post-harvest losses and increase the economic benefits generated from the fishery products. Unfortunately, these two landing sites were not completed by the time the project was closed.