

Morocco Small Scale Fisheries Project: Evaluation Design Report

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LIST OF ACRONYMS

APP	<i>Agence de Partenariat pour le Progrès</i> (Agency for the Partnership for Progress)
CAPI	computer-assisted personal interviewing
CBA	cost-benefit analysis
EMC	Evaluation Management Committee
ERR	economic rate of return
FAO	Food and Agriculture Organization of the United Nations
FGD	focus group discussion
GDP	gross domestic product
GoM	Government of Morocco
INRH	<i>Institut National de Recherche Halieutique</i> (National Institute of Fisheries Research)
IRB	Institutional review board
ITS	interrupted time-series
KII	key informant interview
M&E	monitoring and evaluation
MBTS	multiple-baseline time series
MCC	Millennium Challenge Corporation
MPA	marine protected area
ONP	<i>Office National des Pêches</i> (National Office of Fisheries)
TA	technical assistance

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I. INTRODUCTION

A. Background

With 3,500 kilometers of coastline, Morocco is the largest fish producer in Africa and the Middle East and 13th in the world in terms of total fish production (FAO 2018b). In 2016, fish production in Morocco reached more than 1.4 million metric tons, with more than 45 percent of the catch exported, primarily to Europe (FAO 2018b). The Food and Agriculture Organization of the United Nations (FAO) projects that annual fish production in fisheries and aquaculture in Morocco will total 1.7 million metric tons in 2030 (FAO 2018b). In 2013, total annual value-at-landing of Morocco's catch was about \$832 million, making fishing one of the most important industries in the country (Curtis et al. 2016).

In 2005, the Government of Morocco (GoM) launched the *Plan Emergence Industriel*, which identified fishing as a high-potential sector because national demand for fish was expected to continue to increase, driven by an expanding tourism sector and anticipated growth in domestic fish consumption. Small-scale fisheries were one of the most underdeveloped segments of Morocco's fishing sector because of inadequate coastal landing sites and port infrastructure, lack of a reliable temperature-controlled supply chain from the sea to consumers, limited access to markets, and insufficient training for fishers and their cooperatives. The GoM believed that these small-scale fisheries could have a high potential to alleviate poverty in poor, coastal regions of Morocco if it could improve infrastructure, market access, and skills for small-scale fishers. Following this initiative, the GoM launched the *Plan Maroc Bleu* or *Plan Halieutis* in 2009 to increase gross domestic product (GDP), employment, exports, and fish consumption by promoting and developing the fishing sector in Morocco. The plan centered on three pillars—durability, performance, and competitiveness—and mapped out 16 strategic projects to address shortcomings (Lazraq 2010).

To address some of these challenges and to support the goals of the *Plan Halieutis*, the Millennium Challenge Corporation (MCC) partnered with the GoM to fund the Morocco Compact from 2008 to 2013. The *Agence de Partenariat pour le Progrès* (APP), a public Moroccan entity established by the compact, implemented five projects aimed at increasing productivity and employment in sectors with high potential to contribute to economic growth, including agriculture, fishing, and the artisan sector. The Small-Scale Fisheries Project was designed to modernize the means of catching, landing, storing, and marketing fish, thereby improving the quality of the catch, maintaining the value chain, and increasing fishers' access to both local and export markets. The project aimed to do so through three activities, (1) the Fish Landing Sites and Ports Facilities Activity; (2) the Wholesale Fish Markets Activity; and (3) the Mobile Fish Vendors Activity, and one (1A) sub-activity, the Marine Protected Areas (MPA) Sub-Activity.¹

¹ Mathematica's evaluation will not include the Mobile Fish Vendors Activity because it was the subject of a previous evaluation.

B. Objectives of this report

MCC contracted with Mathematica to conduct an ex post evaluation of the Small-Scale Fisheries Project; this report describes the evaluation's design. To evaluate the Small-Scale Fisheries Project, we will conduct a mixed-methods ex post performance evaluation that examines whether the activities resulted in the outcomes outlined in the conceptual framework. The evaluation will draw on sub-studies using both quantitative and qualitative methods to assess impacts and implementation (Table I.1).

Table I.1. Evaluation overview

Activity	Approaches	Data sources
1. Fish Landing Sites and Ports Facilities Activity	<ol style="list-style-type: none"> 1. Time series analysis 2. Quantitative outcomes analysis 3. Qualitative implementation study 4. Port infrastructure assessment 	<ul style="list-style-type: none"> • Port and fish landing sites data • Survey with fishers at sites • Qualitative interviews and focus groups • Project documentation review
2. Wholesale Fish Markets Activity	<ol style="list-style-type: none"> 1. Quantitative outcomes analysis 2. Pre-post analysis 3. Qualitative implementation study 	<ul style="list-style-type: none"> • Wholesale fish market data • Qualitative interviews and focus groups • Project documentation review
3. Marine Protected Areas Sub-Activity	<ol style="list-style-type: none"> 1. Qualitative implementation study with descriptive analysis 	<ul style="list-style-type: none"> • Qualitative interviews and focus groups • Project documentation review

By constructing fish landing sites and equipping ports with small-scale fishery infrastructure, the **Fish Landing Sites and Ports Facilities Activity** aimed to improve fish quality; improve the process of its marketing, particularly for the fish landing sites; and reduce operating costs for fishers. To analyze the project's implementation and the outcomes associated with this activity, the study will include a time series analysis and a descriptive ex post analysis of quantitative outcomes such as fish catch and sales prices, a qualitative implementation study, and a port and fish landing site infrastructure assessment. We will evaluate the ports and fish landing sites separately, as they differed substantially in terms of the extent of investment and the expected impacts of the investment.

The construction of a network of wholesale fish markets through the **Wholesale Fish Markets Activity** aimed to give inland cities access to better quality fish, thus improving nutritional outcomes, and to improve the overall performance of the sector. The study of the Wholesale Fish Markets Activity will include a quantitative outcomes analysis of outcomes related to fish sales and consumption as well as a separate qualitative implementation study to examine how the fish value chain and household fish consumption have changed in market cities.

Finally, the **MPA Sub-Activity** aimed to train fishers on how to protect resources through marine protected areas. The study of the MPA Sub-Activity will be a qualitative implementation study that includes a descriptive analysis of existing data on marine health to report on the implementation and perceive outcomes of this sub-activity.

In the chapters that follow, we provide context for the evaluation and describe its planned design in further detail. In Chapter II, we present the program logic and describe the activities of the Small-Scale Fisheries Project and the economic rate of return (ERR). In Chapter III, we review the existing literature on the impacts of building wholesale markets, fish landing sites, and port facilities on the fish industry; the impacts of training fishers on the fish industry; and the impacts of establishing MPAs on marine health and resource sustainability. In Chapter IV, we outline the research questions that the evaluation seeks to answer and provide an overview of the quantitative and qualitative evaluation designs and data sources that will enable us to answer these questions. In Chapter V, we discuss the quality assurance plan for collecting data and the risks and challenges of collecting data. We conclude in Chapter VI with a discussion of several evaluation administration-related issues, including institutional review board (IRB) requirements, the data anonymization process, our dissemination plan, evaluation team roles and responsibilities, and a timeline and budget for remaining work.

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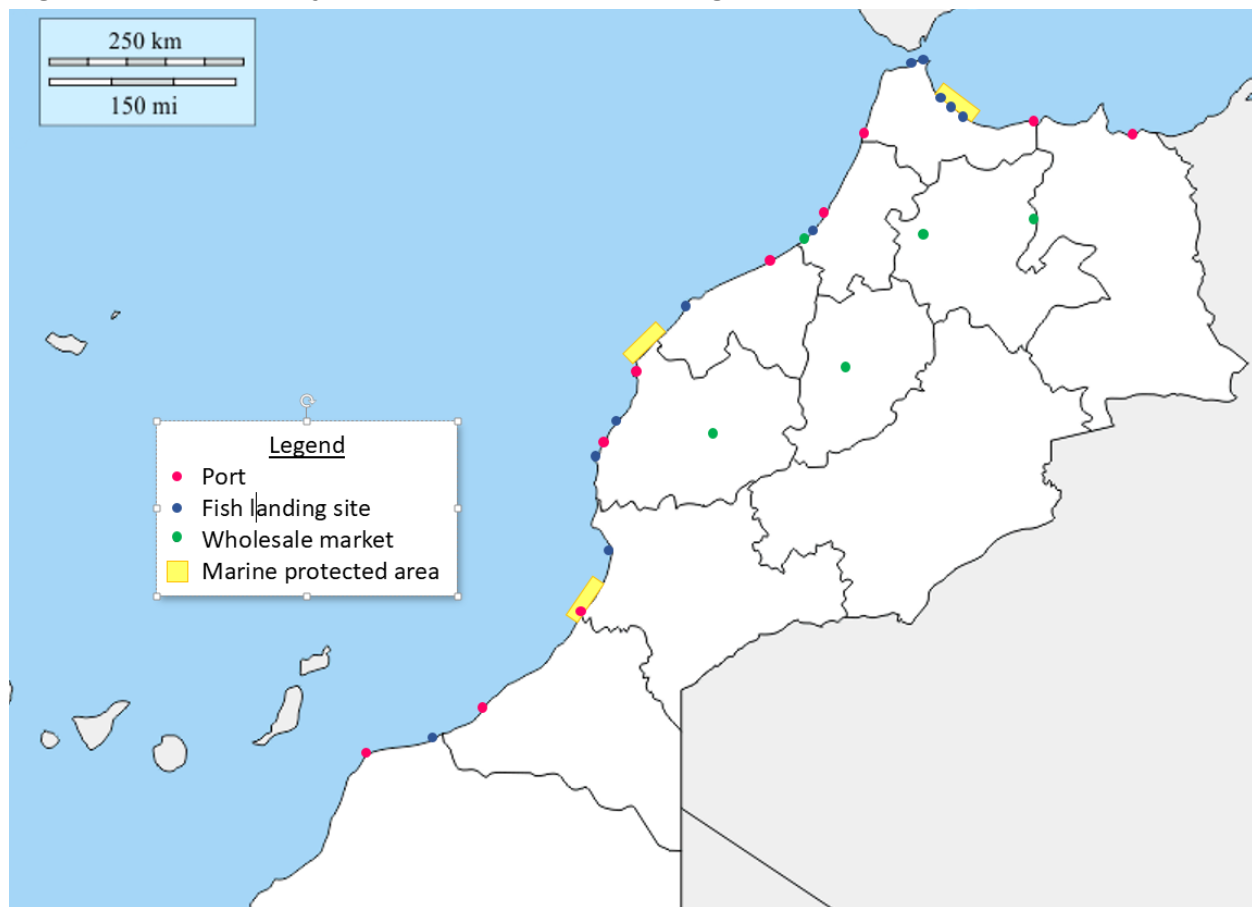
II. THE SMALL-SCALE FISHERIES PROJECT

In this chapter, we provide context for the evaluation of the Small-Scale Fisheries Project by describing project activities and the mechanisms through which the program logic expected they would affect outcomes. We describe the ERR that MCC calculated to compare the expected benefits and costs of the project as well as the beneficiary analysis, which estimated the expected distribution of income gains in the areas that will see investments.

A. Overview

On August 31, 2007, MCC and the GoM signed a \$697.5 million compact agreement to modernize industrial sectors and target areas in which the country had competitive advantages, such as textiles, agribusiness, fishing, and handicrafts. The focus of the compact was in accordance with the GoM's *Plan Maroc Vert* and *Plan Maroc Bleu*, two strategies to boost, modernize, and promote the agricultural and fishing sectors to stimulate productivity and growth. The compact, which entered into force on September 15, 2008, comprised five projects: (1) the Fruit Tree Productivity Project; (2) the Small-Scale Fisheries Project; (3) the Artisan and Fez Medina Project; (4) the Enterprise Support Project; and (5) the Financial Services Project. Mathematica is designing and conducting an ex-post evaluation of the Small-Scale Fisheries Project.

The **Small-Scale Fisheries Project** aimed to improve the quality of fish moving through domestic channels and assure the sustainable use of fishing resources through three activities: (1) the Wholesale Fish Markets Activity; (2) the Fish Landing Sites and Port Facilities Activity; and (3) the Mobile Fish Vendors Activity. The project's original target was to construct or rehabilitate 20 improved landing sites, 13 ports, and 6 wholesale fish markets. Budget constraints, environmental and social considerations, and an inability to secure land titles led to the exclusion of 13 sites (9 landing sites, 3 ports, and 1 wholesale market) from consideration, and implementation challenges resulted in one fish landing site not being constructed. Figure II.1 shows a map of all completed project sites.

Figure II.1. Map of project investments (fish landing sites, ports, and markets)

Mathematica will evaluate two activities and one sub-activity included in the Small-Scale Fisheries Project:

1. The **Fish Landing Sites and Port Facilities Activity** upgraded facilities in 10 major existing ports and constructed 11 new fish landing sites (*Points de Débarquement Aménagés*) equipped with essential services for small-scale fishers and an auction hall where they can sell their catches. Although investments in the fish landing sites and port facilities were part of a single activity, they involved different levels of investment. The fish landing sites were newly constructed facilities, and the port facilities, already in operation, received upgraded existing infrastructure. Construction began in November 2010, with the port of TanTan and the fish landing site of Tifnit. Average construction time was just under 13 months for ports and 17 months for fish landing sites. TanTan and Tifnit both became operational in 2012 and the remaining ports and fish landing sites became operational in 2013. Trainings for fishers began in spring 2012 and continued through the close of the compact in September 2013.
2. The **Wholesale Fish Markets Activity** built five wholesale fish markets in major cities, located mainly in the interior of the country (Beni Mellal, Marrakech, Meknes, Rabat, and Taza). The activity also included technical and training assistance to the *Office National des*

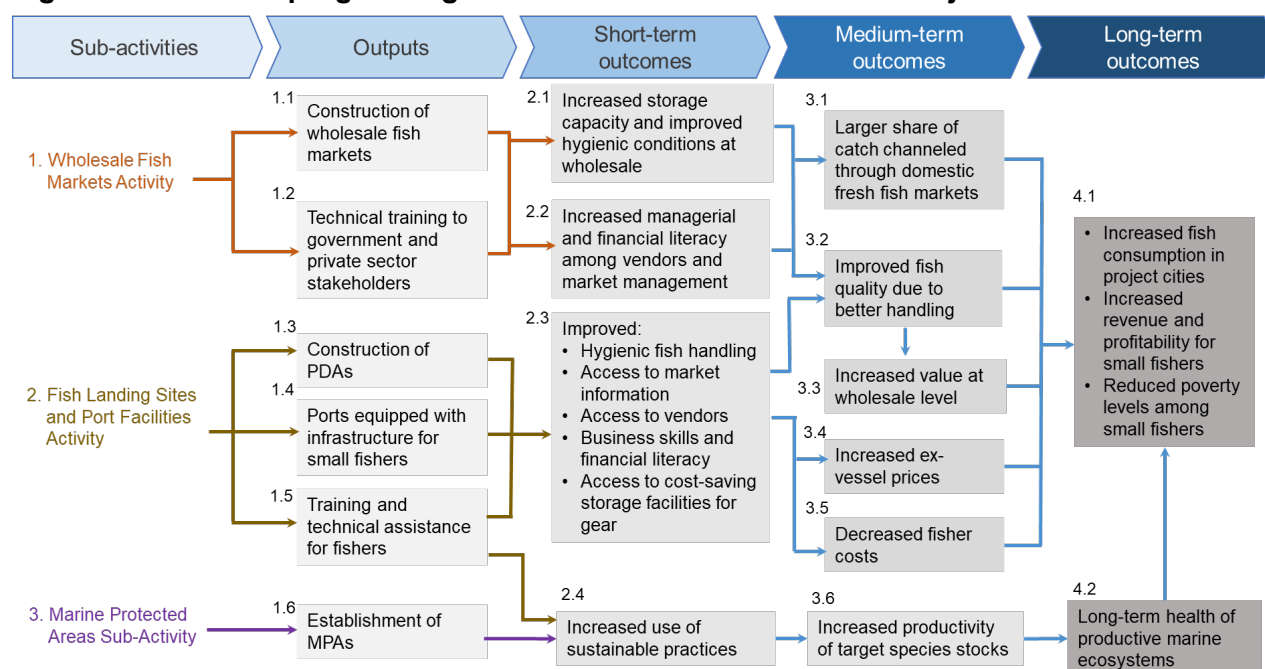
Pêches (ONP) on topics such as management and sanitation. Construction of the markets began in January 2011 with Beni Mellal and continued through September 2013 with the completion of Rabat. Construction took an average of 19 months for each market. As of the close of the compact, all of the markets except for Rabat had become operational.

3. The **MPA Sub-Activity**—part of the Fish Landing Sites and Port Facilities Activity—established three new MPAs with the goal of improving marine health and biodiversity to support the sustainable supply of marine resources. The sub-activity also involved technical and training assistance for fishers on managing MPAs. Mathematica will treat this sub-activity separately in the evaluation to emphasize its isolated, specific contributions to the project’s long-term outcomes. All three MPAs were established in mid-2013 before the close of the compact.

B. Program logic

The activities planned under the project are designed to contribute, individually or in combination, to increased economic growth and reduced poverty through (1) increased fish consumption in project cities, (2) increased revenue and profitability for fishers, and (3) reduced poverty levels among small fishers. MCC’s Morocco Compact theory of change (not shown here) shows how MCC expects each of the five compact projects to contribute to the compact’s goals. A detailed theory of change, including only the activities covered by Mathematica’s evaluation of the Small-Scale Fisheries Project, illustrates the activities; outputs; and short-, medium-, and long-term outcomes related to those activities (Figure II.2).

Figure II.2. Revised program logic for the Small-Scale Fisheries Project



Mathematica modified the theory of change slightly from MCC's original version. Our revised model incorporates information about the program design that we drew from project documents. The revised model also maps the compact's assumptions on how the activities could result in higher profitability and revenues for fishers, increased fish consumption in project cities, and long-term health and sustainability for marine ecosystems—ultimately leading to reduced poverty through economic growth. Although the compact activities have ended, a clear model that lays out the links between the project activities, the outputs they are expected to generate, and the outcomes they are expected to contribute has guided our evaluation design.

Several assumptions related to these linkages must hold true for the theory of change to be realistic. We considered whether the assumptions outlined by MCC are realistic and whether evidence suggests that the proposed activities can lead to the suggested outcomes. The evaluation design described in this report will enable us to assess whether these assumptions are accurate. For example, a key assumption of the project is that higher quality fish will fetch higher prices for small-scale fishers. Such an assumption depends on the relative market power of fishers and fish buyers as well as the elasticities of supply and demand, all of which are difficult to predict *ex ante*. Through our surveys and focus group discussions (FGDs) with fishers and discussions with managers and staff at the ports and fish landing sites, we will assess whether higher quality fish sell for a higher price.

C. ERR and beneficiary analysis

MCC expected its investment in the Small-Scale Fisheries Project to benefit various actors in the supply chain of the artisan fishing sector through improved quality of catch, the maintenance of the value chain, and increased access for fishers to local and export markets.

To determine whether these benefits exceed project costs, MCC calculates the ERR of its projects by conducting a cost-benefit analysis (CBA) of project activities. The ERR is a summary statistic that reflects the economic merits of an investment, representing the discount rate at which an intervention's benefits exactly offset costs. The ERR is computed using the estimated economic value of the total costs and benefits of each project activity, with benefits aggregated across all beneficiaries, accounting for the timing of cost and benefit accrual. To ensure that estimated returns are attributable to MCC's investments, we construct CBA models using scenarios with and without the project to establish a counterfactual.

At the compact's closure, MCC calculated an estimated ERR of the Small-Scale Fisheries Project of 23.5 percent. The CBA analysis for the project includes separate models for the Fish Landing Sites and Port Facilities and Wholesale Fish Markets Activities. The expected benefits of the MPAs are not explicitly factored into the CBA models for the Fish Landing Sites and Port Facilities Activity. MCC's current CBA model assumes that benefits arise primarily from higher volumes of fish and higher prices because of increased quality. It also expects some costs for fishers and fish handlers to decrease as a result of the improved infrastructure. All program costs are actual costs incurred—as opposed to estimates—as the ERR was updated after the close of the compact. Costs include construction, training, and technical support for various stakeholders. The evaluability assessment provides a more complete discussion of the assumptions underlying

the ERR. Data collected for this evaluation will serve to update the Small-Scale Fisheries CBA models with estimates of fish catch and prices and fisher, wholesaler, and retailer operational costs.

As part of the evaluation, we will compute the ex-post ERR of the Small-Scale Fisheries Project using updated estimates of benefits and costs across the evaluated activities, drawing primarily on data collected for the quantitative outcomes analysis we will describe in Chapter IV. We can compare this ex-post ERR with that of other investments, enabling MCC and other stakeholders to determine the soundness of this project based on whether it surpasses MCC's hurdle rate of 10 percent.

The Small-Scale Fisheries Project identifies beneficiaries to be primarily the small-scale fishers and mobile fish vendors (not considered in the Mathematica evaluation) affected by the project and estimates this total to be more than 75,000 people, including 14,200 fishers at the ports and fish landing sites, 660 people working in associated with the wholesale markets, and their families (APP 2013). In our analysis, we will examine benefits accrued to different groups of potential beneficiaries where feasible.

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III. LITERATURE REVIEW

Morocco is the leading producer of fish in Africa in terms of total volume (FAO 2018a), and the country's fisheries are an important source for foreign exchange, income, and jobs, including for the rural poor. The fishing sector plays a vital role in the country's economy, generating more than 1.4 million tons of fish production and an estimated \$1.5 billion in exports annually (Holmyard 2018). The fishing industry already accounts for a substantial 3 percent of Morocco's overall GDP, and the sector has grown steadily in recent years. Morocco's fish production grew by 6 percent in the year 2014 alone, and, from 2014 to 2018, Morocco jumped from the 25th to the 13th largest fish producer in the world (FAO 2018a; FAO 2018b).

This growing industry has the potential to alleviate poverty through employment and income generation. Although industrial fishing sectors typically contribute to a large portion of a country's volume of fish caught, the labor-intensive small-scale sector has a high potential for reducing poverty through its contributions to local food security, job creation, and revenue generation for the poor, particularly in rural regions (Béné et al. 2007). The fishing industry is already an important employer for Moroccans; in 2018, the fishing industry directly employed 170,000 people in Morocco, and 3 million people depended on fisheries for their livelihoods (FAO 2018a). Small-scale fisheries employ 104,000 fishers in Morocco directly, and 400,000 people depend on the small-scale fishing sector to generate income (Basurto et. al. 2017; EEAS 2013). Employees in this industry include not only the fishers themselves but also those in the post-harvest sector, such as fish processors and vendors, as well as in upstream employment in boatbuilding, gear manufacturing, and support services at harbors and landing sites.

Morocco's fisheries sector faces challenges that are typical in developing and emerging economies: lack of infrastructure, overfishing, knowledge gaps, and lack of capacity for outreach and enforcement. Small-scale fisheries remain underdeveloped because of poor infrastructure and inadequate training for fishers. Small-scale fishers have inadequate access to wholesale markets, which are key to selling catch at competitive prices, and the sector lacks the human resource capacity to process and move catch efficiently, resulting in unnecessary post-harvest losses (FAO 2018a). In addition, overfishing threatens to deplete the fish stocks, jeopardizing the sustainability of Morocco's fishing industry. Although the GoM has made significant efforts to protect fish stocks since 2010 with 15 species-specific management plans, issues with enforcement persist (MAPM 2019, North Africa Post 2017). As a result of these challenges, the sector is underperforming in terms of its potential for poverty reduction, food security, economic growth, and environmental sustainability. Moroccan fishers remain mostly illiterate, and average monthly incomes from fishing are barely enough to cover household expenses (Awadh et al. 2018).

The goal of MCC's Small-Scale Fisheries Project was to stimulate the small-scale fishing sector through a variety of interventions aimed at reducing post-harvest losses and improving marketing and sustainable fishing practices. Better infrastructure and access to ice and cold storage was intended to decrease spoilage, thus increasing the amount of fish that make it to market and improving the quality—and therefore increasing the price—of fish sold at those markets.

Focusing these efforts on the small-scale sector has the potential to increase small-scale fisheries' contribution to GDP and alleviate poverty in rural areas. In this chapter, we review the existing literature on the four main types of interventions addressed by our evaluation. These interventions are (1) upgrading landing sites and port facilities, (2) providing technical assistance (TA) and training for fishers (a component of the project's Fish Landing Sites and Port Facilities Activity), (3) developing, and increasing access to, wholesale markets, and (4) establishing MPAs.

A. Evidence on upgrading landing sites and port facilities

Researchers have identified the need for better access to improved fishery infrastructure such as landing sites and port facilities with cold storage, boat repair, equipment storage, and access to markets in fishing communities around the developing world (Benediktsson and Gestsson 2006). The existing literature supports the hypothesis that equipping landing sites and ports with proper facilities is key to reducing waste, improving the quality and price of fish, and boosting fish consumption and fishery employment. Limitations or deficiencies in infrastructure at landing sites, such as lack of ice, could translate into high levels of spoilage and low profitability for small-scale fishers. In a cost-benefit study of the World Bank's investment in a landing site for small-scale fishers in Sierra Leone, Jalloh (2009) estimated that constructing a landing site equipped with cold rooms, ice makers, a fish market, a repair shop for boat engines, a fueling station, and shops with fish inputs such as nets and engines would increase unit prices of the catch by 10 to 20 percent and reduce operating costs for fishers.

Improving fishery infrastructure can also help increase employment, diversify income, and help fishers conserve food resources. For example, Liberian fishers could not fish during the long rainy season because of a lack of facilities to prevent the catch from spoiling in the rain before the establishment of the Robertsport Fish Landing Cluster preservation facilities in 2017. These facilities have allowed fishers to store fish in cold storage and thus decrease post-harvest losses and sell fish at higher prices. Furthermore, the facility has helped transform the rainy season from a season of hunger to a productive fishing time, which translated to a 16-percent increase in fisheries employment (World Bank 2018).

Landing sites infrastructure might improve the livelihoods of small-scale fish traders and processors, including women. Improved sanitary conditions such as running water, storage options, sanitation, and even shelter for sleeping the night before the catch arrives early in the morning increases access to landing sites and fish markets for small-scale fish processors and vendors, especially women (Béné et al. 2007). Béné et al. also note that although, in general, improved facilities help poor fish vendors gain better access to fish, some infrastructure developments have actually marginalized the poor in the past when access to facilities was inequitably distributed. For example, an evaluation of the International Fund for Agricultural Development project in the Maldives noted that although the ice plants they constructed helped improve practices in and access to the market for high quality fish, and the vessels with access to ice facilities had higher profits than those without, only the larger, often state-owned, companies

benefitted from these improvements rather than the project's desired targets, small-scale fishers (International Fund for Agricultural Development 2017).

Although projects focused on building or improving landing site facilities improved some outcomes for fishers and small-scale fish vendors, negative consequences have included potential overfishing near the facilities as an increase in fish prices can drive fishers to increase their fishing effort. A collection of anecdotal evidence from 150 fishing facilities from nine Pacific Island nations warns that establishing and providing government subsidies to improved fishing centers (with facilities such as ice makers, transport to markets, vessel repair, and extension services) might encourage overfishing. In some extreme cases, investments in such fishing centers resulted in reduced food fish for the local communities that the centers were intended to help. For example, in the Marshall Islands and Fiji, there were reports of concerns of fish depletion in the areas near improved fishing facilities (Gillett 2010).

Infrastructure investments could also face challenges with commercial viability and long-term sustainability of such facilities. Jalloh (2009) noted that good facilities management would be necessary to achieve the positive results hypothesized by the CBA of landing site improvements in Sierra Leone. In an assessment of infrastructure projects in the Pacific Islands, Gillett (2010) found that few have been commercially viable, as many are either unused or receiving costly annual subsidies. The biggest expenses of these landing sites and ports are operations and maintenance; ice production specifically can be prohibitively expensive in remote regions, and the increased revenues for fishers often cannot cover the cost of the ice. Although these centers have benefitted the target fisher communities (by increasing income and improving general living standards) and the greater society (by stalling urban–rural migration and increasing domestic fish consumption), lack of commercial viability threatens their financial sustainability.

B. Evidence on fisher training and TA

The United Nations identified a strong need for training and TA for small-scale fisheries around the world (United Nations 2014), but few programs that have provided TA, training, or both on the performance of marine ecosystems and the economic well-being of fishers have been evaluated because of the complexity of the subject. Some trends, however, seem to emerge from the literature. One quasi-experimental study of fisher trainings conducted in Bangladesh showed that trainings on fishery technology such as harvesting, stocking, and fish conservation improved the incomes of fishing households. But the authors conclude that the ownership of fishery equipment was a more important factor than the trainings in determining household income (Mahmud et al. 2012).

Some descriptive studies reported that programs providing TA to fishers have social benefits for recipients. For example, shellfish fishers in Quintay, Chile, hired TA consultants to help manage their marine resources. Although the impacts of this collaboration have not been measured, Schumman (2010) found that the exchange of knowledge between the TA consultants and the fishers was linked to many social benefits, including improving trust between fishers and the state, promoting conservation practices among fishers, and facilitating the development of fishers' associations. The Japanese government provided a larger-scale TA program to fishing

communities in the Caribbean on topics such as fishing gear and methods, engine maintenance, coastal fishing technology, fish marketing, product development, and marine biology. Participants reported that these projects improved livelihoods of coastal communities and that effects have been long lasting (Caribbean Regional Fisheries Mechanism 2015). Similarly, the FAO partnered with the Angolan government to provide freshwater fishing communities on Lake N'golomé in Angola with TA to strengthen local capacity in management, processing, and commercialization of fish products. Post-harvest losses were reported to have decreased, although no empirical evidence exists to support this claim (Basurto et al. 2017). One project in the Philippines aimed to improve the status of women in fishing communities by providing women's groups with trainings on team building, organizational skills, and microenterprise development as well as TA on preparing project proposals. A case study of this project described the program to have improved nutrition and to have made "modest to dramatic" improvements in economic and social benefits for the beneficiaries and their families. Moreover, evaluators believe that the project's positive effects persisted five years after the end of the project assistance (Tietze and Villareal 2003).

C. Evidence on wholesale markets

The literature on the effects of wholesale markets focuses primarily on the impacts on fish consumption, fish prices, and fish vendors' livelihoods. Some descriptive studies suggest that giving fishers access to markets can improve catch prices. According to the FAO, selling fish at markets increases competition among intermediary sellers and improves fishers' access to price information; both of these effects can help small-scale fishers fetch higher prices (Purcell et al. 2017). Without access to markets, fishers generally sell their catch upon landing to individual traders, typically for lower prices. Competition is entirely lacking among such traders, which renders the fishers vulnerable to exploitation and keeps small-scale fisher communities in poverty. For example, the small-scale fishers in Bangladesh and India lack bargaining power because they meet intermediary buyers one on one, their product is highly perishable, pressuring them sell fish quickly; and without a designated location for selling fish, fishers cannot find new potential buyers and possibly fetch higher prices (FAO 2001).

One of the goals of the Wholesale Fish Markets Activity was to increase fish consumption in the target cities. Although Morocco is a top fish producer (producing 1.1 million metric tons of captured fish in 2010, the year the compact began), domestic annual per capita fish consumption in Morocco is not commensurate with production. Often referred to as nature's superfood, fish is an important source of protein and nutrients (Vitamin D, omega 3, iron, and so on), particularly in developing countries, where fish accounts for 20 percent of total animal protein intake (FAO n.d.). Low protein intake can cause protein-energy malnutrition, which affects 10 percent of Moroccan children. Moreover, protein nutrition is unequal across different populations in the country—children in rural areas suffer protein-energy malnutrition at higher rates than children in urban areas (14 percent and 7 percent, respectively). Protein-energy malnutrition affects children younger than age 5 the most, resulting in a high prevalence of stunting (18 percent) (HelgiLibrary n.d.; Hassan 2012). Although empirical evidence of the impacts of wholesale markets on fish consumption are lacking, some descriptive studies suggest that wholesale fish

markets might help increase fish consumption and protein nutrition. For example, traditional wholesale markets for tilapia in Bangladesh are seen as an important part of connecting consumers and producers and might be responsible for increasing food supply (Ahmed et al. 2012).

D. Evidence on establishing MPAs

As a measure to prevent overfishing and to protect marine life, fishery experts have supported establishing MPAs that can help support marine biodiversity and increase the sustainability of marine resources, ultimately ensuring a stable income source for poor fishers. Marine protection strategies offer various levels of protection and vary widely, from complete and partial area closures to technical restrictions such as mesh size and hook frequency. These strategies are generally perceived as successful, which has led to a global push to increase MPA coverage from 5 to 6 percent of the ocean surface in 2011 to 10 percent by 2020 and 30 percent by 2030 (IUCN 2016).

There is evidence that establishing MPAs can decrease poverty among fishing communities in Africa. For example, McClanahan (2010) found that gear restrictions and closures in coral reefs in Kenya had positive effects on fisher incomes, and that fishers caught larger fish and species of higher market value with decreased effort. The cost of fishing also decreased, and the number of people employed in fishing increased (McClanahan 2010). The World Bank's West Africa Regional Fisheries Program project in Liberia restricted access of industrial boats from a six-mile zone, which has allowed small-scale fishers better access to this area. As a result, small-scale fishers in Liberia have experienced increases in fish-landing sizes, and overall fish catch volumes have doubled since the start of the project in 2009. Fishers also reported that the removal of illegal trawlers improved their livelihoods; certain communities report 30 percent increases in small-scale fish landings, and official public revenues from the fisheries sector are estimated to have increased by 322 percent over five years (World Bank 2016; Gurney et al. 2015). Leisher et al. (2007), using a quasi-experimental design, find that MPAs in Indonesia contributed to poverty reduction through increased catch quantity and quality; about 80 percent of fishers surveyed in the affected zones report that fish catches have improved because of positive spillovers from the protected zones. In addition, the MPAs also boosted tourism and thus improved household incomes through new jobs in the tourist industry. Survey respondents in the study also reported increases in protein intake through fish consumption (Leisher et al. 2007).

Marine protection strategies are not always successful, however, because of issues with enforcement and conflicts of interest, which might lead to inequitable outcomes. To ensure marine health and biodiversity, MPAs must be enforceable, but in most of the world, fisheries rights are difficult to enforce. As a result, many fisheries continue to be overfished, ultimately hurting the livelihoods of resource-poor households (Béné et al. 2010). Moreover, when marine protection strategies focus solely on conservation, excluding poverty alleviation as a core goal, they might actually widen the income inequality gap and cause conflicts. Some experts argue that restrictions that do not prioritize the interests of the poor, who often lack resources and power to protect their interests, could result in heterogeneous responses across different socio-

economic groups. The potential for inequitable impacts of MPAs is often discussed in nonacademic literature, but empirical evidence for these claims is limited.

E. Gaps in literature and policy relevance

The proposed evaluations of the Small-Scale Fisheries Project will contribute to each strand of the literature discussed in this section. The Fish Landing Sites and Port Facilities Activity evaluation will provide evidence on the impact of improved fisheries infrastructure on fisher incomes and fish prices in the Moroccan context. Specifically, the evaluation will provide rigorous evidence on the effects of infrastructure projects on fishing effort, landing volume, and fisher earnings. In addition, the MPA Sub-Activity evaluation will contribute suggestive evidence of the impact of marine protections and regulations on incomes of fishers and the sustainability of such regulations, specifically in the Moroccan context. Our study of the fish landing sites and ports will also contribute to literature on the uptake and sustainability of fisher training techniques and practices, and the infrastructure assessment will contribute to our understanding of the sustainability of similar infrastructure investments. An important feature of this activity was the combination of fisher infrastructure investments with MPAs and fisher trainings. These interventions are likely to be complementary; therefore, combining them could be a model for future implementation if our evaluation suggests that the combination is effective.

Currently, evidence on the effects of establishing and upgrading wholesale markets on household consumption and nutrition is limited. Our Wholesale Fish Markets Activity evaluation will contribute qualitative evidence to this literature. Given the limited literature on wholesale markets—especially in North Africa—the contributions of this proposed evaluation to the literature are potentially meaningful.

IV. EVALUATION DESIGN

In this chapter, we describe our proposed design for a mixed-methods evaluation of the Small-Scale Fisheries Project. Our evaluation of the Fish Landing Sites and Port Facilities Activity will include a quantitative outcomes analysis of indicators such as fish catch, costs and revenues, and sales prices; a qualitative implementation study; and a facilities infrastructure assessment (Section A). The evaluation of the Wholesale Fish Markets Activity will include a descriptive analysis of quantitative outcomes related to fish sales and consumption as well as a separate qualitative implementation study and an infrastructure assessment (Section B). Our evaluation of the MPA Sub-activity will be a multisite case study that includes a descriptive analysis of existing data on marine health (Section C). For each activity and sub-activity included in the evaluation, we describe the proposed evaluation design, listing the evaluation questions we intend to address, the data that we will use, and the proposed analysis methods.

A. Fish Landing Sites and Port Facilities Activity evaluation

The Fish Landing Sites and Port Facilities Activity constructed 11 fish landing sites and improved 10 port facilities; conducted training and TA for fishers on improved hygiene and safety techniques, business skills, and conservation of marine resources; and established three MPAs. (Section C describes this evaluation.) The purpose of the investment was to increase fishers' incomes by improving access to national and international markets for fishers at the fish landing sites, improving fish quality, and lowering operational costs. We propose two different quantitative outcomes analyses, along with an implementation study and infrastructure assessment, to assess the extent to which the activity achieved its goals (Table IV.1).

Whenever possible, we will separate our analyses of the ports and the fish landing sites because the investments in the two types of sites were substantially different. MCC's investments in the fish landing sites were more comprehensive than those made in the ports. Port facilities were already functional before the implementation of project activities, and the project consisted of upgrading facilities and constructing storage space and machine shops. The fish landing sites, on the other hand, had no physical infrastructure before the project, so the facilities were constructed from the ground up. Based on the level of investment in the two facility types, we would expect to see a larger impact on outcomes of interest at the fish landing sites than at the ports.

Our quantitative outcomes analysis includes a rigorous time-series analysis of high-frequency fish landing data available from each port, a pre-post analysis of fisher survey data to analyze outcomes not included in the fish landing data, and a description of quantitative outcomes for sites for which we are lacking pre-project data (Subsection 1). Our implementation study will complement and contextualize our quantitative findings using FGDs and key informant interviews (KII) with a range of actors involved with and impacted by the project (Subsection 2). Our infrastructure assessment will examine the physical infrastructure at each site to determine whether facilities function as intended (Subsection 3).

Table IV.1. Research questions and evaluation methods for the Fish Landing Sites and Port Facilities Activity evaluation

Research questions	Quantitative outcomes analyses	Implementation study	Infrastructure assessment
1. Was the activity implemented according to plan?*		X	X
2. Are facilities properly built, well maintained, and functioning properly?*		X	X
3. Has the number of fishers using the newly constructed or upgraded infrastructure increased?	X	X	
4. Has the quality of fish caught improved? If so, do these quality improvements correlate with higher prices received by fishers for their catch? **	X	X	
5. Have fishers' earnings increased at the fish landing sites and ports constructed or upgraded by the project? **	X		
6. Are fishers receiving higher prices for their catch?	X		
7. Have fishers adopted the recommended techniques included in the trainings provided by the project?	X	X	
8. Are the professional organizations that received training and technical assistance through the project still operational? If so, what services do they provide for their members? Are the members satisfied with these services? Are the services provided to the members sustainable after project completion?		X	
9. To what extent have national practices in environmental and social management improved during the implementation of the project?		X	
10. What are the impacts of the project at the institutional level? Have the results or lessons learned from the project influenced the design and/or implementation of similar investments by the ONP and the Department of Fisheries?		X	

* This denotes a research question added to those initially listed in the request for proposal.

** This denotes a research question revised to improve clarity or feasibility.

1. Quantitative outcomes analysis

We will draw on fish landing data from the port sites provided by ONP and fisher surveys conducted before and after the project at both fish landing sites and ports to conduct quantitative analyses of key outcomes at sites in which the project funded construction or rehabilitation.

Each fish landing site and port collects detailed high-frequency fish landing data. These data include landing volume and sales prices, by species and by boat, collected daily by each auction hall and maintained by the ONP. The fish landing sites are newly created, so the fish landing data are only available at most fish landing sites for the period after the sites were constructed (pre-construction data are available for two fish landing sites, presumably because there were some facilities there before the project started). Because ports existed before the activity began and only received upgrades, fish landing data are available both before and after implementation. This comprehensive time-series data provides us with the ability to conduct a rigorous analysis with strong causal inference for the ports, comparing trends before construction with those after

construction to infer changes in outcomes that appear to be driven by facilities improvements. For the fish landing sites, no such inference is possible without a comparison to pre-project trends, so we can only use the fish landing data to describe the outcomes of interest after construction.

For both ports and fish landing sites, we have data from fisher surveys that the *Institut National de Recherche Halieutique* (INRH) conducted before the project, and we will conduct our own follow-up surveys with fishers. These surveys will enable us to examine additional outcomes not included in the fish landing data and to conduct a pre-post comparison in the fish landing sites, which is not possible using the ONP fish landing data. Both the INRH and ONP data include boat identification codes that will allow us to link the two datasets to create a rich dataset that combines fisher-reported information with information collected by the auction halls and information collected at various time frequencies. This combined dataset will allow us to analyze the change in catch volumes and prices over time, and data that we collect from our follow-up fisher survey will provide details on costs that we can compare to baseline cost data from the INRH survey. In addition, we will include questions in our survey about fish not sold at the auction halls and qualitative questions such as application of techniques taught in trainings and fishers' assessment of fish abundance and quality.

Because MCC's levels of effort and investment for ports and fish landing sites varied significantly, and because data availability differs, we will treat ports and fish landing sites as two distinct project types. Table IV.2 provides an overview of the different analyses that we will conduct and data sources we will rely on for each facility type.

Table IV.2. Quantitative analyses and data sources

Analysis	Ports	Fish landing sites
Data source: Fish landing data (pre- and post-intervention for ports, post-intervention for fish landing sites)		
Individual site-level analysis: interrupted time series	X	
Activity-wide analysis: multiple-baseline time series	X	
Descriptive post-intervention analysis		X
Data source: Fisher surveys (pre- and post-intervention for ports and fish landing sites)		
Pre-post descriptive comparison	X	X

a. Time series analysis of fish landing data (ports only)

The high-frequency time series fish landing data enable us to observe changes in fishing effort, fish landing volume, relative mix of species, and prices over time. Daily data are available from January 2010 to December 2018 for all port facilities impacted by project activities (Table IV.3). Data are available for at least 10 months before the infrastructure improvements. Data also include several ports and fish landing sites that were not affected by the project.

Table IV.3. Fish landing data availability by site

Site	Earliest available data*	Project completed	Site operational
Ports			
Agadir	1/2010	6/2013	10/2013
Al Hoceima	1/2010	7/2013	9/2013
Jebha	1/2010	5/2013	8/2013
Larache	1/2010	5/2013	8/2013
Mehdia	1/2010	8/2013	9/2013
Mohammedia	1/2010	2/2013	10/2013
Ras Kebdana	1/2010	11/2012	2/2013
Sidi Ifni	1/2010	12/2012	5/2013
TanTan	1/2010	12/2011	5/2012
Tarfaya	1/2010	1/7/2013	10/2013

Source: Suivi de l'opérationnalisation des sites réalisés dans le cadre du financement MCC. We will confirm these dates, and correct them if necessary, through our qualitative field work.

* All sites have data available through December 2018.

n.a. = not applicable.

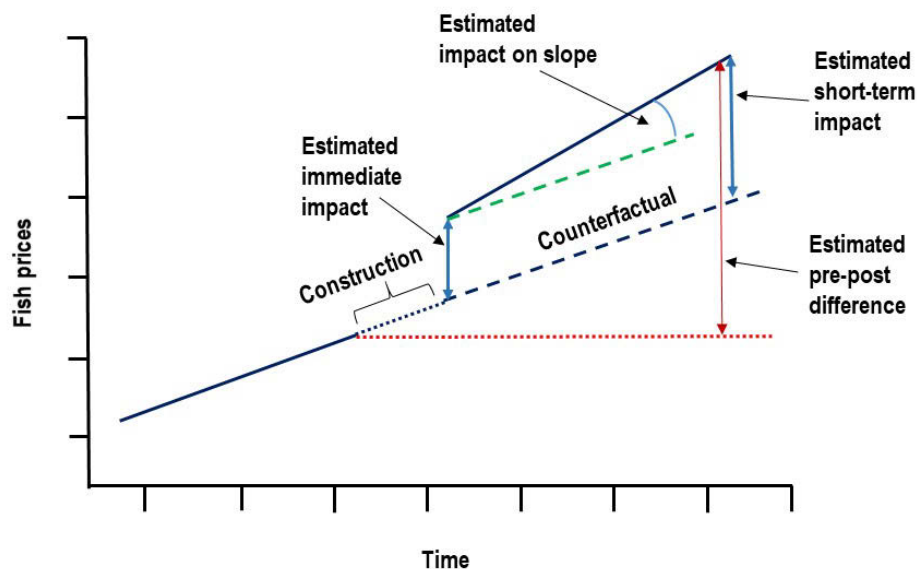
We will analyze these fish landing data from sites individually to examine the changes over time at each facility and jointly to examine the overall change over time across all sites. We propose two separate time-series analytical approaches to study the sites separately and together. The outcomes of interest that we will analyze using the ONP fish landing data include the following:

- Level of effort—including the number of boats registered at each port and the number of days at sea for each boat
- Fish landing volume—including total volume and volume by species
- Sales prices—total and by species
- Fishers' revenue—calculated from catch volume and sales prices
- Fish quality—although the landing data do not provide any measure of fish quality, we will explore time series data to assess whether we can infer quality from key quality proxies, including total catch sold per boat (under the assumption that fewer fish are thrown away if their quality are higher) and price per kilogram (as higher quality fish will fetch a higher price).

Individual site-level analysis: interrupted time-series (ITS). We propose to estimate the impact of project activities on each individual site by using an ITS approach (Bernal et al. 2017). This approach estimates the causal impact of a specific project activity (or interruption—in this case, rehabilitating a port) by analyzing time-series data before and after the project activity finishes and assessing to what extent outcomes of interest change immediately after the project activity ends relative to a possible preexisting trend.

The advantage of an ITS approach over a simple pre-post is that by examining trends before and after an intervention, we can observe either a change in level—indicating a short-term effect on the outcome of interest—or a change in slope—indicating an effect on the trend over time, or both. Figure IV.1 is a graphical representation of the ITS approach to estimating the impact of a single project activity in one project area. To predict fish prices in the absence of the project activity—known as the counterfactual—the ITS analysis relies on frequent observations before the project activity ends. In the hypothetical scenario presented, in the period before construction, there is an increasing trend in fish prices. After construction, prices jump up (shown in the estimated immediate impact) and begin to rise more quickly (shown by a change in slope between the counterfactual and the post-construction trend line).

Figure IV.1. Interrupted time-series approach (illustrative example)



A simple pre-post estimate would overstate the true impact of the intervention because it would not account for the pre-intervention upward trend in prices. The ITS approach relies critically on the assumption that this existing trend would have continued over time in the absence of the project activity. The graph reflects this assumption in the continuity between the upward-sloping line in costs before construction and the counterfactual line.

In estimating the impacts of project activities using the ITS approach, we must account for confounding factors that could affect the outcomes of interest, such as weather, trends in fish demand, or other external shocks. We will account for possible seasonal effects and weekday variations through corresponding indicators. Our analysis will include indicator variables for season and day of the week along with a time variable to capture long-run time trends. We will also test the data for the presence of time dependence after including these other variables and include time lag variables if appropriate to capture the impact that one day's outcomes has on the next day's outcomes that isn't fully captured by seasonality or a long-run time trend. In addition,

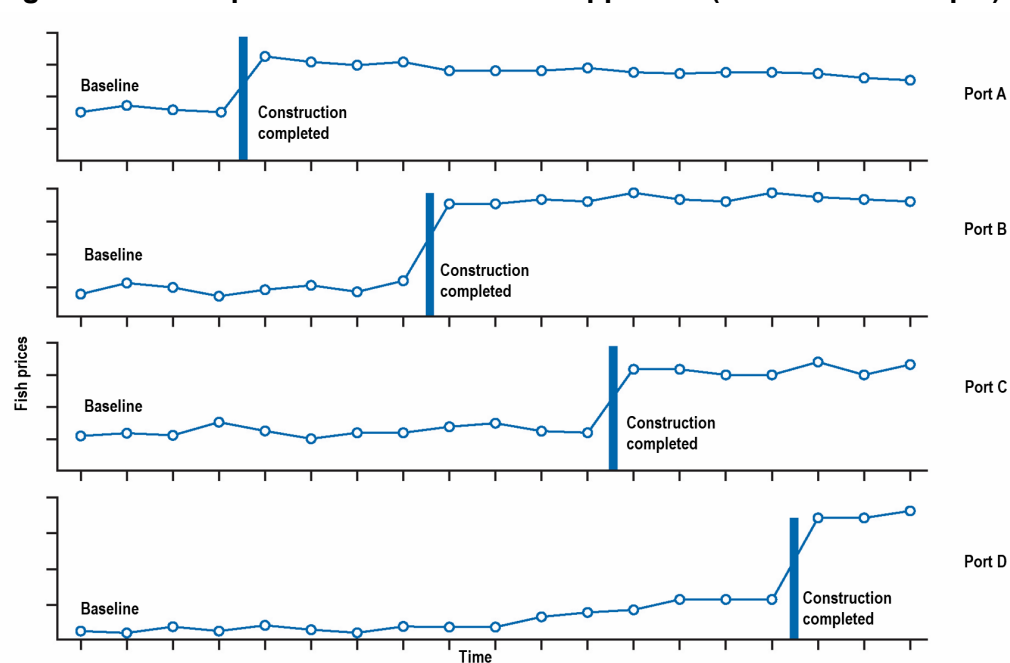
we can include aggregate price and/or landing volume data from the other ports in our dataset to capture any shocks that could influence outcomes of interest in our analysis.

Activity-wide analysis: multiple-baseline time-series. In addition to the analyses of each individual site, we propose to aggregate the analysis across all ports. We can take advantage of the data from before and after project construction and the staggered construction work at the different sites over time to conduct a multiple-baseline time series (MBTS) analysis (Baer et al. 1968, Biglan et al. 2000). MBTS is a variation of the ITS approach that estimates the causal impact of a specific type of project activity by using multiple time-series in multiple groups, each of which receives the intervention at a different time.

In an MBTS analysis, the counterfactual is the population for which construction has not yet occurred, so each site will serve as a counterfactual in the periods before construction ends. Establishing a counterfactual enables us to estimate stronger causal evidence than comparing the outcomes before and after the intervention. Any external confounding factors—such as shifts in the global fish market or seasonal effects—would likely affect all intervention sites simultaneously, so the multiple baselines design enables us to isolate the changes likely attributable to the intervention from those related to confounding factors.

Figure IV.2 provides a hypothetical example of an MBTS analysis. In the example, construction ends at a different month at each site (staggered across time). The example illustrates that we observe a repeated pattern of an increase in the measured outcome—fish prices in this example—following construction. These hypothetical results suggest that the intervention has an effect.

Figure IV.2. Multiple baseline time-series approach (illustrative example)



Source: Adapted from Hawkins et al. 2007.

b. Pre-post analysis of fisher survey data

To analyze the changes over time for indicators not present in the fish landing data, we propose to rely primarily on a pre-post analysis using fisher survey data collected before project implementation and from a follow-up survey among fishers at the ports and fish landing sites. We plan to draw on baseline fisher surveys that INRH conducted in 2010-2013 before any project activities began (Table IV.4).

Table IV.4. Baseline fisher surveys

Survey	Dates	Sample	Variables
INRH biannual survey	May 2010 – January 2013	1-5 surveys at each site (65 total) across all project sites and one non-project site	<ul style="list-style-type: none"> Number of fishers and boats active during each season Different types of gear used at each site
INRH quarterly survey	July 2010 – August 2013	1355 observations: 931 different fishers, each interviewed 1-8 times	<p>Survey asks about the fishers' typical experience over the previous quarter.</p> <ul style="list-style-type: none"> Fishing effort: number of days fished in each month in the past quarter Typical catch volume and total value per day, by species and by gear Typical daily variable costs Annual maintenance costs Capital expenses: cost, lifespan, and year of purchase of fishing equipment
INRH monthly survey	June 2010 – July 2013	2,505 observations: 1621 fishers, each interviewed 1-20 times	<p>Survey asks about the fisher's experience on the day data were collected.</p> <ul style="list-style-type: none"> Details about the day's fishing trip: time spent fishing, location, and depth Catch volume Total price of catch Variable costs Number of days of effort that month

Approximately 75% of the boats in the INRH dataset are also in the ONP landing data, so we can merge the two datasets to combine catch and price data collected by the auction halls with data reported by the fishers themselves. We can use the overlapping data—that is, catch and price data for the same time periods for individual boats in the two datasets—to check the accuracy of fisher-reported data and to impute more accurate catch and price data for the fish landing sites, where we are missing ONP landing data.

Because the ONP landing data provides us with catch and price data after the project, we propose to focus our data collection efforts on fishers' costs. By focusing primarily on collecting cost data, we expect to be able to spend adequate time in the surveys to capture all aspects of fishers' costs, from variable costs that depend on season and species to capital costs and depreciation of large equipment. We will also ask fishers about any catch that is not sold at the auction halls—for example, lower-quality fish that is sold on the beach—and some qualitative questions to assess other components of the project. For example, we will ask about fishers' participation in the fisher trainings and use of the techniques learned, and whether fishers participate in the social

security system² (Table IV.5). We will survey fishers at all ports and fish landing sites, using similar question wording and survey methodology as the INRH survey instruments to enable comparison between baseline and follow-up measures.

Table IV.5. Topics covered in proposed fisher survey

Topic	Measure
Costs	<ul style="list-style-type: none"> • Capital costs: cost, typical lifespan, and age of major equipment • Fixed costs: boat maintenance, insurance, and so on • Variable costs: fuel, bait, and so on
Catch	<ul style="list-style-type: none"> • Volume of fish caught, disaggregated by species and by buyer type • Techniques taught in fisher training and whether fishers have adopted those techniques* • Fisher's assessment of fish quality*
Sales	<ul style="list-style-type: none"> • Price per kilo, disaggregated by species, of fish sold outside of the auction hall • Buyer information
Other benefits to fishers	<ul style="list-style-type: none"> • Professional organizations available* • Services provided by professional organizations* • Social security benefits*

* Indicates questions new to the follow-up survey

Sampling. For the follow-up survey, we will draw a stratified random sample, using registries of boats at each port and fish landing site as the sample frame. It is important to survey fishers at all project sites because they differ in many ways, including in the level of improvements implemented, the species targeted at each site, the physical conditions of the fisheries, and the proximity to different markets. Boats must register with the port or fish landing site where they sell their fish, so we will work with the facilities staff to obtain a list of all boats registered at each site. We do not anticipate any difficulty obtaining these lists from the facilities, and because the facilities record catch every day from each boat we expect the lists to be comprehensive. We will draw a random sample of fishers at each site, sampling in proportion to the number of boats registered at each site so that our sample is representative of all project sites.

Statistical power and sample size. To be successful, a quantitative evaluation must have a large enough sample to detect any difference if true differences exist in the outcomes of interest between baseline and follow-up. For catch volume and prices, we will rely on existing ONP data, which includes every sale made in the auction halls, but we need a sufficient survey sample to detect any differences in fishing costs and fishers' earnings over time. To determine the optimal sample size for our follow-up survey of fishers, we estimated the minimum detectable differences for tests of changes over time in fishing costs and compared our estimates to MCC's predicted effect sizes.. MCC's CBA predicted that the cost of food, ice, and boat maintenance would each decrease by 20% while the cost of bait would decrease by 15% at the fish landing sites. At the same time, fishers were expected to spend some money cooperative fees and storage rental fees, resulting in a total expected reduction in annual costs of 19% at the fish landing sites.

² In our scoping trip, many people mentioned social security as a major benefit of the MCC project. When fishers sell through the formal market, they are able to participate in the government social security program, which many view as an important benefit to fishers.

At the ports, only the costs of fishing equipment, unloading expenses, and maintenance were expected to decrease, each by 5%, while other costs were expected to stay constant, resulting in a decrease in total daily costs of only 1%. The CBA model predicted an increase in total annual costs at the ports due to an increase in the number of days at sea. There have not been previous rigorous studies of the impacts of upgraded facilities on the outcomes of interest for this evaluation, so the predictions in the CBA are the best benchmarks we have to which to compare our estimated MDDs.

We estimated MDDs for fisher expenses on rations, landing/cleaning costs, bait, and ice per trip and on total annual boat, motor, and gear maintenance, using means and standard deviations from INRH's baseline survey data (Table IV.6). Because the interventions varied between ports and fish landing sites, we intend to conduct the analyses separately and should select a sample size for each type of facility that will allow us to detect effect sizes predicted in the CBA for each type of site.³ A sample size of 1,000 fishers at the fish landing sites (an average of nearly 100 per site) will allow us to detect differences in cost predicted in the CBA model; with a smaller sample size, we do not expect to be able to detect a 15% decrease in the daily cost of bait.. Because the CBA model predicted only a very small decrease in fishing costs at the port sites, we do not expect to be able to detect such a difference without a very large sample size. We propose conducting 500 surveys at ports (an average of 50 per site) to gather cost data at those sites and to enable us to calculate fisher earnings for fishers at the ports. We can present a descriptive comparison of means between baseline and follow-up, but do not expect to be able to detect statistically significant differences if the true effect size was close to that predicted in the CBA model for the ports.

³ Power calculations did not account for clustering at the site level. Power calculations with site-level clustering estimated MDDs far larger than the effect sizes in the CBA model, so we expect to be able to detect differences across all sites but not at individual sites.

Table IV.6. MDDs in fisher costs

	Rations (per trip)	Landing costs (per trip)	Bait (per trip)	Ice (per trip)	Maintenance (annual)
Follow-up sample size: total	Mean = 104.7 s.d. = 84.1	Mean = 66.5 s.d. = 26.6	Mean = 136.6 s.d. = 127.1	Mean = 49.1 s.d. = 17.2	Mean = 8,730.1 s.d. = 5,920.1
500	8.2 (7.9%)	3.6 (5.5%)	16.3 (11.9%)	3.5 (7.1%)	763.4 (8.7%)
1000	6.8 (6.5%)	3.1 (4.6%)	13.9 (10.2%)	3.2 (6.5%)	622.5 (7.1%)
1,500	6.3 (6.0%)	2.9 (4.3%)	13.0 (9.5%)	3.1 (6.3%)	567.8 (6.5%)
2,000	6.0 (5.7%)	2.7 (4.1%)	12.6 (9.2%)	3.1 (6.2%)	538.4 (6.2%)
2,500	5.8 (5.5%)	2.7 (4.0%)	12.3 (9.0%)	3.0 (6.2%)	519.9 (6.0%)
Follow-up sample size: ports	Mean = 134.7 s.d. = 98.9	Mean = 74.2 s.d. = 26.9	Mean = 159.7 s.d. = 145.6	Mean = 50.8 s.d. = 16.5	Mean = 10,065.6 s.d. = 6,473.8
250	13.7 (10.2%)	5.5 (7.4%)	23.5 (14.7%)	4.4 (8.7%)	1,196.4 (11.9%)
500	11.4 (8.4%)	4.7 (6.3%)	20.4 (12.8%)	4.0 (7.8%)	977.8 (9.7%)
750	10.5 (7.8%)	4.4 (5.9%)	19.3 (12.1%)	3.8 (7.5%)	893.2 (8.9%)
1,000	10.0 (7.4%)	4.2 (5.7%)	18.7 (11.7%)	3.7 (7.3%)	847.7 (8.4%)
1,250	9.7 (7.2%)	4.1 (5.5%)	18.3 (11.5%)	3.7 (7.2%)	819.2 (8.1%)
Follow-up sample size: fish landing sites	Mean = 65.6 s.d. = 36.7	Mean = 60.8 s.d. = 25.4	Mean = 111.7 s.d. = 103.3	Mean = 47.5 s.d. = 21.4	Mean = 7,590.1 s.d. = 5,027.2
250	7.1 (10.8%)	4.9 (8.0%)	21.6 (19.3%)	6.5 (13.7%)	961.3 (12.7%)
500	5.9 (9.0%)	4.1 (6.7%)	18.4 (16.5%)	6.3 (13.3%)	789.9 (10.4%)
750	5.5 (8.3%)	3.8 (6.3%)	17.2 (15.4%)	6.2 (13.1%)	723.9 (9.5%)
1,000	5.2 (8.0%)	3.7 (6.0%)	16.6 (14.8%)	6.2 (13.1%)	688.5 (9.1%)
1,250	5.1 (7.7%)	3.6 (5.9%)	16.2 (14.5%)	6.2 (13.0%)	666.3 (8.8%)

Notes: Means, standard deviations, intraclass correlations, and R^2 are from the quarterly INRH baseline fish surveys. MDDs are calculated based on a two-sided test with 80 percent power at $\alpha=0.05$. Respondents were asked for typical daily variable costs and annual maintenance costs. MDDs are calculated without clustering at the site level.

MDD = minimum detectable difference.

Survey rounds and timing. Baseline surveys were conducted over a period of four years, collecting data over different seasons. A pre-post comparison will be most accurate if the data from before and after the intervention include a similar range of data collected. Fish catch, sale prices, and fishing costs all vary both seasonally and annually, so data across all seasons and across multiple years helps capture a more complete range of outcomes and avoids possible bias that could result from collecting data only once, particularly if data collection occurs during a period of particularly high or low volumes, prices, or costs.

Replicating the baseline survey methodology with many visits to each site over multiple years is not feasible with the project timeline and budget, so we compared the variability in costs across years to the variability across months to determine which source of variability was more important to capture in our survey. One way to make this comparison is to average costs separately by month and by year and compare the standard deviations in monthly averages to the standard deviations in yearly averages (Table IV.7). For four of the five types of costs included in the INRH baseline survey, variation across years was greater than variation across months. Given a limited budget, conducting surveys across multiple years appears to be more important than conducting repeated seasonal surveys within a given year.

Table IV.7. Yearly and monthly variation in fishing costs

Cost	Standard deviation in monthly averages	Standard deviation in yearly averages
Rations	22.9	26.9
Landing and cleaning	5.6	5.8
Bait	24.7	10.9
Ice	4.6	5.2

With repeated annual surveys, we will also be able to gather data that includes seasonal variability by asking fishers to report their costs from the past year. There is a risk of inaccurate recall, but the baseline data provide some evidence that recall inaccuracy does not introduce a source of bias. The INRH quarterly surveys were conducted after the end of a quarter, and sometimes with some delay, so there is a range in how much time had elapsed between the end of the quarter and the time of the survey. For example, surveys for the first quarter of the year (ending in March) were conducted between April and July, so some respondents had to recall only one month prior while others had to recall three or four months prior. Regressions of fishing costs on the time since the end of the quarter, controlling for site and season, show no relationship between costs and recall time, so it does not appear that reported costs are systematically higher or lower if the recall time is longer. In other words, recall may be inaccurate, but this inaccuracy is likely to add only noise to our analysis, rather than introduce bias.

Given the high inter-annual variability in costs and the low likelihood of recall bias for costs recalled from previous months in the year, we propose conducting the survey across two rounds, one year apart, to get data from two years. Fish catch varies seasonally, so we propose timing data collection in the summer—the high season for most of the important fish caught in Morocco—in order to collect the most accurate data on the most important season.

2. Qualitative implementation study

To evaluate the implementation fidelity of the Fish Landing Sites and Port Facilities Activity, to assess which components of this activity drove changes in outcomes, and to assess the sustainability of the investment, we will conduct an ex-post implementation study using qualitative and administrative data. This implementation study will draw upon FGDs, KIIs with beneficiaries and implementation staff, and administrative records to answer the qualitative evaluation questions (Table IV.8).

Available administrative data include implementation reports, monitoring and evaluation (M&E) reports, compact completion reports, and reports from an earlier partial evaluation of the project. We have also obtained some financial information from the individual ports and fish landing sites detailing their costs and revenues, and we will work with the staff at these sites to obtain any additional records that can help us evaluate the functional and financial status of the facilities.

Table IV.8. Qualitative data sources for the Fish Landing Sites and Port Facilities Activity implementation study

Respondent or source	Data collection method	Number	Evaluation questions (see Table IV.1)	Illustrative topics
Fishers*	Focus group discussions	25**	1, 3, 4, 7, 8	<ul style="list-style-type: none"> • Perceived changes in fishers' operating costs, earnings, and quality of fish caught • Type of training received and adoption of training techniques • Fishers' use of new equipment • Services offered by professional organizations to fishers, fishers' satisfaction with services, and fishers' perceptions of the organizations managing the facilities • Value chain mapping
Fish landing site and port staff members	Interviews	21	1, 2, 3, 4, 9, 10	<ul style="list-style-type: none"> • Extent of institutional reform • Functioning of new facility infrastructure and equipment • Perceived changes in fish quality and prices • Challenges and successes related to infrastructure maintenance • Value chain mapping
Government stakeholders*	Interviews	3	1, 2, 3, 9, 10	<ul style="list-style-type: none"> • Successes and challenges related to implementation • Perceived impacts on fishers • Changes in government policies and practices related to management of fisheries
MCC and APP staff*	Interviews	3	1, 2, 3, 9, 10	<ul style="list-style-type: none"> • Successes and challenges related to implementation • Lessons learned from implementation • Revisions to implementation plans
Implementing partners	Interview	2	1, 2, 3, 9, 10	<ul style="list-style-type: none"> • Final infrastructure design • Extent to which final plans were implemented
Administrative records	n.a.	n.a.	1, 3, 9, 10	<ul style="list-style-type: none"> • Successes and challenges related to implementation • Project impact on environmental and social management at institutional and national levels • Financial sustainability of facilities

* We will combine interviews denoted with *with those conducted for the Wholesale Fish Markets Activity and MPA Sub-Activity evaluations, so each interview will discuss multiple topics.

** The 25 FGDs with fishers will include 11 with fishers at fish landing sites, 10 with fishers at ports, and 4 with fishers at sites not impacted by the project.

APP = Agence de Partenariat pour le Progrès; MCC = Millennium Challenge Corporation; n.a. = not applicable.

FGDs. To best understand implementation from beneficiaries' points of view, we will conduct FGDs with fishers at landing sites and ports.

- *FGD sample size.* We plan to conduct up to 27 FGDs at landing sites and ports with 8-10 participants for each. We intend to conduct 21 of the FGDs with fishers at the port facility and landing site areas where the project implemented infrastructure improvements (one FGD per project site) and the remaining 6 with fishers at non-project sites (3 at sites similar to the

project fish landing sites and 3 at ports that did not benefit from the projects infrastructure improvements). For each type of site, the intervention was the same and targeted the same type of population, so 10-11 FGDs for each type of site should be sufficient to reach saturation (Namey et al. 2016). To reach saturation in the non-project sites as well, we intend to conduct three FGDs at each type of location. We plan to conduct our qualitative data collection after our quantitative data collection, so we will re-assess our exact FGD sample size based on the degree of heterogeneity across sites that we observe in our quantitative data. We will assess heterogeneity in terms of variables such as fisher characteristics, size of the facility, and species mix, and possibly change the number or distribution of FGDs across sites.

- FGD sample selection.* We will recruit a range of fishers to represent the diversity of boat size, fishing methods, and target species at each site; this basic background information will be recorded for all participants before the start of the discussion to ensure diversity. We will use administrative records and discussions with relevant stakeholders to help us identify the sample for the focus groups. To recruit fishers in project areas, we will leverage ONP's database with daily data on the volume of catch, by species, by boat, and for all registered boats at project sites. At the four non-project sites, we will work with fisher professional organizations and local facility site staff to identify a list of potential respondents with a variety of characteristics. Facility staff and fisher professional organizations will also help identify key characteristics that are likely to influence findings, such as the volume of catch, species caught, type of gear used and level of effort. We will then randomly select focus group participants from the fisher lists, stratifying by these characteristics to ensure a diverse sample.
- Themes.* These FGDs will gather information related to the type of training and TA fishers received; their adoption of new techniques; their perception of infrastructure improvements; and their perceived changes in fishers' operating costs, earnings, and the quality of fish caught as a result of the project.
- Data Collection.* Prior to the start of data collection, we will develop tailored data collection protocols to guide the FGDs for all types of sites: 1) project landings sites, 2) project ports, 3) non-project landing sites, and 4) non-project ports. These protocols will cover similar themes to enable us to triangulate information across all types of sites, as well as with data from other stakeholders, but will also be tailored to the perspectives and the environment of stakeholders at specific site types. The protocols will be developed together with local consultants to ensure that the questions and phrasing is clear and appropriate to the context of the study. A trained, high-level moderator will lead the FGDs using the protocols, and use non-leading probes to elicit detailed information whenever necessary. The moderator will be trained to elicit input from all participants to ensure that diverse perspectives are captured in the data. The discussion will be recorded on a minimum of two devices, and a note-taker will document the proceedings of the discussion.
- Timeline.* We will conduct the FGDs over several weeks in late 2020 or early 2021, following the quantitative data collection. We plan to use some of the data from the fisher

survey to assess the degree of heterogeneity across ports and fish landing sites so that we can best target our FGDs across the different types.

Interviews. To understand implementation from key stakeholders' points of view, we will conduct KIIs with the following stakeholders:

- **Port facility and fish landing site management staff.** We will interview management staff at the new facilities (one at each facility) to examine overall institutional reforms and how well the facilities function overall. These interviews will also assess the change in the number of fishers using the new infrastructure and challenges and successes related to the maintenance of this infrastructure.
- **Government agency staff.** We will interview officials from the *Institut National de Recherche Halieutique* (INRH), ONP, and the Ministry of Agriculture and Fisheries to ask about the implementation of the activity, perceived impacts, and changes in government policies and practices related to managing ports and fish landing sites since the inception of the compact.
- **MCC staff and former staff of APP.** Interviews with MCC staff and former APP staff will provide valuable information about the successes and challenges in implementing the project, including how closely project implementation matched the original plan, why deviations occurred, and how they believe future projects could avoid deviations. We will also collect evidence on revisions made to the implementation plan and how well facilities implemented those revised plans.
- **Implementing partners.** We will interview management staff and engineers from private firms and organizations involved in the planning and construction of the port and fish landing site infrastructure investments. These interviews will provide first-hand accounts of the final infrastructure designs and the extent to which implementing partners carried out those designs and plans.

Using information gathered in the FGDs and KIIs, our team will conduct a value chain mapping exercise. This exercise will identify (1) where different species of fish are sold and to whom (including direct sales and middlemen), (2) sales in the informal market, (3) how much volume typically gets lost at each step and why, (4) how much prices are marked up at each step, and (5) perceptions of how the value chain has changed over time. We will combine quantitative and focus group data to complete the mapping exercise.

Administrative records. To understand how well the original project plans were implemented and the challenges associated with implementing and sustaining the project, we will review a variety of administrative records and project documents. This exercise will also help us understand the impact of the project at the institutional and national levels, in particular in relation to improvements in environmental and social management. The documents included in this review will include MCC and APP implementation reports and evaluations, including progress reports, M&E plans, compact completion and transfer reports, and final evaluation

reports. We will also review Small-Scale Fisheries Project planning documents, reports from implementers (that is, COFREPECHE, CANAEST Consultores), management records, and financial statements, including records of revenues and costs at each facility.

We plan to review administrative records before conducting our qualitative field work so that our findings from our document review can inform the development of our interview guides. By gathering the information that we can from the available documents, we can avoid spending time in interviews on simple factual questions that we can answer from the documents. Background from available documents can also provide us with a starting point from which to begin our interviews so that we can address any information that is missing from the documents, particularly challenges that were left out of reports but can provide important learning.

Qualitative analysis. We will use the framework method to manage and systematically analyze our qualitative data (Ritchie et al. 2003). This method entails processing raw audio data into transcripts, then reviewing, coding, and analyzing the transcribed interview and focus group data. We will analyze the data following these four steps (Creswell 2009):

- **Raw data management** is the process of organizing raw data into formats usable for analysis (that is, from audio files to transcripts). During raw data management, we will remove any data that are not useful to our analysis, such as extraneous small talk.
- **Chunking and initial coding**, or data reduction, is the process of reading through interview and focus group transcripts several times to obtain a holistic view of the data. We will use the framework method to organize and analyze themes, patterns, and issues in the data. We will develop a detailed initial coding scheme—themes that map to the research questions and conceptual framework. After an initial review of all of the transcripts, the team will develop a coding scheme for the themes that emerge from the data.
- **Detailed coding** will involve further refining the coding scheme and recoding the data as we examine them in greater depth. We will use NVivo software to review and code the transcripts based on the initial codes developed during the chunking process. Use of NVivo software to assign codes to the qualitative data will enable us to access data on a specific topic quickly and organize information in different ways to identify themes and compile evidence supporting them. As additional themes emerge, we will expand and refine the codes in an iterative process. Further, the software will enable us to categorize respondents by gender, age, geographic location, or other salient characteristics to facilitate analysis by subgroup, which will enable us to classify divergent and common perspectives among different groups. At the end of the detailed coding process, we will organize the data by themes, retaining the original meaning of the text.
- **Data interpretation.** We will aggregate and analyze data collected from fishers and staff at different sites together. Because we will analyze multiple data sources to answer each research question, data interpretation and writing will require **data triangulation** to identify consistency and discrepancies in findings across data sources. This process will help confirm

patterns or findings across data sources and identify important similarities and differences among them.

3. Port and fish landing site infrastructure assessment

Our infrastructure assessment will evaluate the quality of the original facility infrastructure constructed and rehabilitated by the project as well as the quality of its state and maintenance. It will assess the physical condition of the infrastructure and combine that with reports from those using the facilities collected through the quantitative and qualitative data collections discussed in the previous sections.

Trained enumerators will visit all 21 fish landing sites and ports and visually assess the quality of the physical infrastructure at each site to determine whether facilities function as intended. We will consult implementation documents and draw on our discussions with implementers and facilities staff to develop a checklist of items to observe at each site, and enumerators will use this checklist to collect data on all relevant infrastructure and its condition. Some examples of items to include on this checklist are the presence and use of gear storage rooms, whether the ice makers are functioning, and temperature measurements in the cold storage room. To limit possible manipulation of infrastructure conditions during data collection, visits will be unannounced.

Qualitative data. To understand beneficiaries' and implementers' perceptions of infrastructure improvements and state, we will include questions on this topic for the 21 FGDs with fishers we will conduct at the newly constructed or renovated port facility and landing site areas, the 21 interviews with facility staff, and the 6 interviews with implementing partners that were involved in the infrastructure improvements that we will conduct for the other evaluations. These focus groups and interviews will gather information related to the fishers' and facility staff's perceptions of the impacts of the project's original construction and rehabilitation work on facility infrastructure, its current state, and maintenance. We will also include questions in our fisher survey to ask for fishers' assessments of the quality of the infrastructure and its maintenance.

Analysis. Because there are no data on the port infrastructure quality and maintenance before the intervention, and the fish landing sites did not exist before the project, we cannot assess change before and after the intervention. The infrastructure assessment data that our team will collect, however, will enable us to produce descriptive statistics to provide insights into the quality and state of project infrastructure improvements. Our analysis will break down the findings by location, facility type, facility size, and number of fishers using the site to detect heterogeneous effects across sites. The information gathered in our qualitative work will help inform the infrastructure assessment. We will use the same qualitative analysis process as for the implementation study (subsection IV.A.2).

B. Wholesale Fish Markets Activity evaluation

The Wholesale Fish Markets Activity consisted of constructing or improving wholesale markets in five cities. The program replaced existing markets that were small and difficult to access with new markets in new locations in three cities (Marrakech, Meknes, and Rabat) and constructed new markets in cities that previously had no wholesale fish markets (Beni Mellal and Taza). As part of this activity, ONP staff, market managers and personnel, and private sector users received training and TA covering topics necessary for proper management of the new markets, such as management, hygiene, and sanitation.

We propose a qualitative study of implementation and outcomes, a quantitative descriptive outcomes analysis, and an infrastructure assessment to evaluate the extent to which the activity achieved its goals (Table IV.9).

Table IV.9. Research questions and evaluation methods for the Wholesale Fish Markets Activity evaluation

Research questions	Quantitative outcomes analysis	Qualitative implementation and outcomes study	Infrastructure Assessment
1. Was the activity implemented according to plan?*		X	X
2. Did fish consumption increase in the five cities where wholesale markets were constructed? ** How did fish consumption evolve in cities where wholesale market existed before the project (Marrakech Meknes, and Rabat) as compared to cities where wholesale markets were built for the first time (Beni Mellal and Taza)?		X	
3. Did consumers' preferences change in terms of fish consumption? ** Has the nutritional status of populations in cities and neighboring region improved? **		X	
4. Did the activity increase the volume of fish marketed through wholesale markets?	X	X	
5. Did the construction of a wholesale market increase the performance of the value chain of fishery products? If so, how?		X	
6. Is there an impact on retail fish marketing? On job creation?		X	

* This denotes a research question added to those initially listed in the request for proposal.

** This denotes a research question revised to improve clarity or feasibility.

Our quantitative outcomes analysis includes a descriptive post-intervention analysis of market data to assess the volume of fish sold at the markets (Subsection 1). Our qualitative implementation and outcomes study will complement and contextualize our quantitative findings using FGDs and KIIs with a range of actors involved with and impacted by the project to provide evidence on the implementation of the project and its impacts on fish marketing and fish consumption (Subsection 2). Our infrastructure assessment will examine the physical infrastructure of each market to determine whether facilities function as intended (Subsection 3).

1. Quantitative outcomes analysis

We will analyze quantitative outcomes for market actors using ONP's wholesale market data collected daily at the wholesale markets (Table IV.10).

Table IV.10. Quantitative data sources for the Wholesale Fish Markets Activity evaluation

Dataset	Collection details	Illustrative indicators
Wholesale market data provided by ONP	<ul style="list-style-type: none"> Daily, since completion of markets, available for four project markets (Beni Mellal, Marrakech, Meknes, and Taza)^a, and two non-project markets (Casablanca and Oujda) 	<ul style="list-style-type: none"> Fish volume by species and date Average daily fish price by species

^a Data are not available from Rabat, as that market opened in late 2018 or early 2019; if we are able to obtain more recent data at the time of analysis, we will include Rabat in our analysis.

Pre-construction estimates of fish volume and value in the cities targeted by the Wholesale Fish Markets Activity are not available, making a rigorous assessment of changes since baseline impossible. But given the high-quality data available since completion of project markets, we will use descriptive statistics to provide insight into volume and value trends over time. With detailed daily post-completion data on fish sale volumes and prices (2013 to 2019), we can present a comprehensive, species-specific summary of the state and trend of the wholesale fish markets in the years after their completion. As with our analysis of the fish landing data from ports and fish landing sites, we expect seasonal variation in the quantity of fish and specific species being caught, so all of our analysis will control for seasonality.

Although an ex-post examination of time trends alone will not enable us to assess how prices and volumes have changed since before the project, we can compare trends in prices and sales volumes in project markets with those in two non-project cities for which wholesale market data are available. We cannot infer causality from such a comparison, as the two non-project cities are likely to be different from the project cities in ways that would bias the differences in outcomes. While a direct comparison in outcomes could be misleading due to differences between the cities, a comparison of trends could provide suggestive evidence about the changes in volume and prices in markets funded by the activity. For example, a rapid increase in prices at the project markets that we do not observe in the non-project markets suggests that the new markets increase sale prices and that the increase is not due to a larger trend in prices that we would observe in any market.

Similar to our study of the fish landing sites, we will use information gathered in our qualitative work to try to identify possible points at which different components of the wholesale markets became operational (such as ice factories, public pricing data, mobile vendors). If there are components of the markets that were not functional until after construction ended, we can use the times when these components become functional as interruptions in an ITS analysis such as that described in Section IV.A.1.

2. Qualitative implementation study

We will complement the pre-post study for the Wholesale Fish Markets Activity with a qualitative implementation and outcomes study. This qualitative study will aim to understand the fidelity of implementation, explain how and why observed changes occurred, identify lessons learned, and gather evidence on the perceived outcomes of the project on market actors and on households in the market cities. This evaluation will draw upon a variety of data sources, such as focus groups with households in wholesale market areas, interviews with actors involved with the markets, and administrative records (Table IV.12).

A baseline household survey was conducted to asked households in the market cities about their fish consumption, including where they purchase fish, their relative consumption of different types of fish (including different species and different preparations, such as fresh or frozen), and the frequency and quantity of fish purchased and consumed. Unfortunately, due to the design of the questionnaire, the data do not enable us to calculate total fish purchases or total fish consumption.⁴ The questionable design of the questionnaire and the lack of clarity on sampling strategy raise concerns about the quality of the data itself, and based on our power calculations using the baseline data, we think it is unlikely that we would be able to detect an increase in fish consumption using household survey data. We therefore plan to rely on qualitative data, including discussions with households and other market actors, to assess impacts of the project on fish consumption.

⁶ The survey asked, for example, the minimum and maximum number of times a household purchases fish in a week. These measures would not enable us to calculate overall fish consumption, because the survey did not ask how often households purchase the minimum amount compared with the maximum amount

Table IV.11. Qualitative data sources for the Wholesale Fish Markets Activity implementation study

Respondent or source	Data collection method	Number	Evaluation questions	Illustrative topics
Customers	Focus group discussions	7	2, 3	<ul style="list-style-type: none"> • Changes in consumption and purchasing behavior • Customer perceptions of markets
Wholesale market vendors	Interviews	15	2–6	<ul style="list-style-type: none"> • How markets function • Changes in sales volume, prices, and value chain • Perceived changes in fish quality
Government stakeholders*	Interviews	3	1,4–6	<ul style="list-style-type: none"> • Successes and challenges in implementation • Perceived impacts on fishers • Changes in fish value chain in project cities
MCC and APP staff*	Interviews	3	1,4–6	<ul style="list-style-type: none"> • Successes and challenges in implementation • Lessons learned from implementation • Revisions to implementation plans
Implementing partners*	Interviews	2	1	<ul style="list-style-type: none"> • Final infrastructure design • Extent to which final plans were implemented
Senior officials at wholesale markets	Interviews	5	1–6	<ul style="list-style-type: none"> • Successes and challenges in implementation • Financial sustainability of the markets • Changes in fish volume, fish value chain, fish marketing, and employment • Perceived changes in fish consumption by households in market cities • Perceived changes in fish quality
Value-chain actors	Interviews	10	2–6	<ul style="list-style-type: none"> • Changes in fish consumption and purchasing • Activity sustainability • Changes in fish volume, fish value chain, fish marketing, and employment • Perceived changes in fish consumption by households in market cities • Perceived changes in fish quality
Administrative records	n.a.	n.a.	1, 4, 5	<ul style="list-style-type: none"> • Successes and challenges in implementation • Project impact on fish value chain and marketing at the institutional and national levels • Financial sustainability of the markets

* We will combine interviews denoted with (*) with those conducted for the Fish Landing Site and Port Facility Activity and MPA Sub-Activity evaluations, so each interview will discuss multiple topics.

APP = Agence de Partenariat pour le Progrès; MCC = Millennium Challenge Corporation ; n.a. = not applicable

FGDs. To best understand implementation from beneficiaries' points of view, we will conduct FGDs with market customers the cities where new wholesale markets were built to understand how the markets function, changes in sales volume and prices, and the overall fish value chain.

- *FGD sample size.* We will conduct a total of seven FGDs with customers in cities with wholesale markets. In order to understand differences in project effects between cities where wholesale markets existed before the project (Marrakech, Meknes, and Rabat) and cities where there were no wholesale markets previously (Beni Mellal and Taza), we will conduct one FGD in each of the three cities where markets existed before the project which will be sufficient to reach data saturation since these sites are similar, and two FGDs in each city that did not have markets. The intervention was similar in each group of cities, and targeted the

same type of population, so three to four FGDs in each group should be sufficient to reach saturation.

- *FGD sample selection.* We will recruit a diverse group of customers in each market city in order to capture a variety of perspectives, from private customers to larger commercial customers with various purchase volume and value. Wholesale market managers will help identify potential buyers of various types to include in the focus group. The market staff will also help identify key characteristics that are likely to influence findings, and provide customer contact information. We will then randomly select focus group participants from the customer lists, stratifying by characteristics to ensure a diverse sample.
- *Themes.* These FGDs will gather information about the functionality of the markets, changes in sales volume and prices, the fish value chain, customer perceptions of the markets and how the markets have contributed to any changes in their purchasing behavior.
- *Data Collection.* Prior to the start of data collection, we will develop tailored data collection protocols to guide the FGDs. The protocols will be developed together with local consultants to ensure that the questions and phrasing is clear and appropriate to the context of the study. In addition, the protocols will be revised based on what we learn from the quantitative data from the household consumption survey. Trained moderators will lead the FGDs following the highest standards for qualitative data collection, similar to the fisher FGDs.

Interviews. We will also conduct 32 KIIs (of which 16 were already mentioned in the previous section) with the following groups of people to obtain different perspectives about project implementation and outcomes:

- **Vendors at the wholesale markets.** We will interview management staff and vendors at the markets to understand how the markets function, changes in sales volume and prices, and the overall fish value chain.
- **Government stakeholders.** Our interviews with officials from INRH, ONP, and the Ministry of Agriculture and Fisheries will include questions about implementing the wholesale markets activity, perceived impacts, and changes in the fish value chain in the selected cities.
- **MCC staff and former APP staff.** In our interviews with MCC staff and former APP staff, we will ask questions about successes and challenges in implementation and changes in the implementation plan over the course of the compact.
- **Implementing partners.** We will conduct interviews with management staff and engineers from private firms and organizations involved in the planning and construction of the Wholesale Fish Market Activity. These interviews will provide first-hand accounts of the final infrastructure designs and TA and training activities as well as the extent to which implementing partners carried out those designs and plans.

- **Senior officials at wholesale markets.** In addition to the interviews with wholesale market vendors, we will interview a senior official at each of the five project wholesale markets. These interviews will complement our understanding of project implementation, the sustainability of the activity, and the activity's effect on fish volume, fish value chain, fish marketing, and related jobs.
- **Other value-chain actors.** We will interview other people involved in the value chain. We will identify respondents from among actors in the value chain such as local supermarkets and local retail sellers. We will identify specific respondents during the value chain mapping exercise, and interview topics will include changes in fish volume, marketing, consumption and purchasing behaviors, overall changes in the fish value chain, related employment, and activity sustainability.
- **Administrative records.** A review of administrative records will complement the data collected during focus groups and interviews. In particular, the administrative records will help us understand the original activity plans, challenges and successes with implementation of the activity, and the sustainability of the wholesale markets. The documents included in this review will include MCC and APP implementation reports and evaluations, including progress reports (from ONP), M&E plans, compact completion and transfer reports, and final evaluation reports. We will also review Small-Scale Fisheries Project planning documents, reports from implementers (that is, COFREPECHE, CANAEST Consultores) management records, and financial statements.

We will use the same qualitative analysis process as for the Fish Landing Sites and Port Facilities Activity implementation study (Subsection IV.A.2).

3. Wholesale market infrastructure assessment

Our infrastructure assessment will evaluate the quality of the original market infrastructure constructed and rehabilitated by the project and its condition at the time of data collection. The findings of the infrastructure assessment will be combined with the findings from the qualitative data to give full picture of this sub-activity.

A team of enumerators will be trained to assess the quality of the physical infrastructure at each of the five project markets to determine whether facilities function as intended. Drawing on implementation documents and discussions with implementers and market staff, we will develop a checklist of items to assess at each site, and enumerators will use this checklist to collect data on all relevant infrastructure and its condition. For example, enumerators will check the presence and state of condition of storage facilities, ice maker functionality, and temperature measurements in the cold storage room. The enumerator visits will be unannounced in order to limit possible manipulation of infrastructure conditions during data collection.

Qualitative data. To understand beneficiaries' and implementers' perceptions of infrastructure improvements and condition, we will include questions on this topic for the FGDs with customers at the five cities where the project constructed wholesale markets, and in the

interviews with wholesale market vendors and implementing partners that were involved in the infrastructure improvements that we will conduct for the other evaluations. These focus groups and interviews will gather information related to the customer and market staff's perceptions of the impacts of the project's original construction and rehabilitation work on market infrastructure, its current state, and maintenance.

Analysis. No data was collected on the quality and maintenance of the market infrastructure prior to the project, so we will not be able to measure the changes before and after the intervention. However, the infrastructure assessment data that our team will collect will enable us to produce descriptive statistics to provide insights into the quality and state of project infrastructure improvements. The information gathered in our qualitative work will help inform the infrastructure assessment. We will use the same qualitative analysis process as for the implementation study (subsection IV.A.2).

C. MPA Sub-Activity evaluation

The MPA Sub-Activity established three MPAs with the goals of improving marine health and biodiversity in those areas and ultimately improving the sustainability of marine resources for the small-scale fishing industry. We will evaluate the implementation and the effect of the MPA Sub-activity on marine health and biodiversity by conducting a multisite case study of the three locations targeted by this sub-activity (Table IV.13).

Table IV.12. Research questions for the MPA Sub-Activity evaluation

Research questions ^a	Multisite case study
1. Was the activity implemented according to plan?*	X
2. What is the perceived state of fish resources in the three MPAs? **	X
3. Do artisan fishers follow the rules of governance of the MPAs? Do other actors and other types of fishing activities? Have fishers adopted the practices recommended by the project?	X
4. Has the sub-activity influenced how the Government of Morocco manages its marine resources?	X

* Denotes research question that was added to those initially listed in the request for proposal.

** Denotes research question that was revised either to improve clarity or feasibility.

^a The following research questions were in the RFQ and are not included in our evaluation because they cannot be addressed given the available data: (1) What impact, if any, did the sub-activity have on the income of fishers operating in the MPAs? (2) Has the sub-activity had an impact on the marine ecosystem, including flora and fauna, in the three MPAs? In particular, did the sub-activity have an impact on the sustainability of the marine resource?

For this study, we will collect qualitative data by adding modules about the MPAs to the FGDs with fishers, interviews with key stakeholders and implementing partners, and administrative data that will be collected as part of the other evaluations (Table IV.14). Whenever possible, the case study will draw on data gathered for the evaluations of the Fish Landing Sites and Port Facilities and Wholesale Fish Markets Activities, such as the mix of species in the landing data for sites close to the MPAs, as species mix serves as an indicator of marine health.

Table IV.14. Qualitative data sources for the MPA Sub-Activity case study

Respondent or source	Data collection method	Number	Evaluation questions	Illustrative topics
Fishers*	Focus group discussions	5**	2, 3	<ul style="list-style-type: none"> • Changes in fish stock health (species mix) • Level of fishing efforts • Length and weight of fish caught • Adoption of recommended conservation practices
Government stakeholders*	Interviews	2	1–4	<ul style="list-style-type: none"> • Fish stock health and changes in marine resources • Changes in marine resources management • Perceptions of how different types of fishers use marine resources and how MPA rules are being followed
MCC and APP staff*	Interviews	3	1	<ul style="list-style-type: none"> • Successes and challenges related to implementation • Lessons learned from implementation • Revisions to implementation plans
Administrative records***	n.a.	n.a.	1–4	<ul style="list-style-type: none"> • Successes and challenges related to implementation • Project impact on fish value chain and marketing at the institutional and national levels • Activity sustainability

* We will combine interviews denoted with (*) with those conducted for the Fish Landing Sites and Port Facilities Activity and MPA Sub-Activity evaluations, so each interview will discuss multiple topics.

** We will also add additional questions aimed at assessing the links between the MPAs and fishers' outcomes to fisher FGDs at ports and fish landing sites near MPAs

*** This includes INRH reports, Global Fishing Watch satellite data, MCC, APP, and implementing partner reports, and data from MPA hotline, if available.

APP = Agence de Partenariat pour le Progrès; INRH = Institut National de Recherche Halieutique; MCC = Millennium Challenge Corporation; MPA = marine protected area; n.a. = not applicable.

FGDs. We will conduct focus groups with fishers about the impacts of the MPAs.

- *FGD sample size.* We will conduct five FGDs, one at each of the three fish landing sites and two ports included near the three MPAs. We are planning on conducting FGDs with fishers at these sites as part of the Fish Landing Sites and Port Facilities Activity evaluation. At these five sites we will add a module to the fisher FGD protocols about the MPAs. .
- *Themes.* The MPA module of the fisher FGD protocol will include questions about the fish catch that can provide indicators of fish stock health, such as the species mix, the level of effort required to reach a certain volume or value of catch, and the average length and weight of fish caught. We will also explore issues of governance with questions about the MPA rules and whether small and large fishers have adopted the recommended fishing practices.
- *FGD sample selection, data collection and timeline.* Since these focus groups will be conducted as part of the Fish Landing Sites and Port Facilities Activity evaluation, the sample selection, data collection and timeline will be the same for this evaluation.

Interviews. In KIIs with officials from INRH, ONP, the Ministry of Agriculture and Fisheries, MCC, and APP, we will include questions about the health of the fish stock and changes in marine resource management since the establishment of the MPAs. We will also ask officials

about their perceptions of how different fishers use marine resources and whether governance rules of the MPAs are being followed.

Administrative data. The administrative data that we will use for the multisite case study will include reports from INRH; satellite data from Global Fishing Watch; reports from MCC, APP, and implementing partners; and data from the MPA hotline.

- **INRH reports.** INRH's reports present measures of different types of marine resources from different zones in the seas around Morocco. The reports include information on the number of fishing vessels working in each zone and the level of fishing effort. Data on fishing effort and estimates of fish stock, analyzed over time, will provide a picture of how the health of the fish resources changed. We will use reports on fish stock to assess the overall biomass and the biodiversity of marine life in certain zones. Fishing effort can also be an important measure of the health of the fish resources and the effectiveness of the MPAs. Increased effort within and near the MPAs indicates the health of the fish stock, whereas evidence of fishing inside of the MPAs for vessels prohibited from doing so might indicate a lack of enforcement of MPA fishing restrictions.
- **Satellite data.** Global Fishing Watch tracks fishing effort around the world in near real-time using satellite automated information systems and makes its data and maps available to the public. These data do not provide details on most fishing vessels, which typically do not carry satellite systems, but do provide data on large vessels. Studies have used predictive modeling and satellite data to show that industrial fishing effort and pelagic fishes overlap, and thus the presence of large vessels near the MPAs can indicate the health of the fish stock, as fishers will choose to fish near the MPAs if they have abundant fish (White et al. 2019). We will also use these data to determine the effectiveness of fishing restrictions in the MPAs for larger vessels, as the presence of large vessels fishing inside the MPAs could indicate ineffective enforcement of fishing restrictions.
- **Reports from MCC, APP, and implementing partners.** Reports by MCC, APP, and implementing partners document the original activity plans, challenges and successes with implementation of the activity, and the sustainability of the MPAs. A document review of these reports will help assess implementation and sustainability of this activity. We will use the same document review process as for the Fish Landing Sites and Port Facilities Activity implementation study (Subsection IV.A.2).
- **MPA hotline data.** As part of the MPA activity, a hotline was established for reporting MPA regulation violations. We will verify that this hotline is functional and then collect records from the hotline on violation reports, if such reports are available. This will help us learn about the frequency of regulation enforcement issues and the functionality of the hotline.

We will use the same qualitative analysis process (Subsection IV.A.2) as we used for the other evaluations. In addition, we will examine any potential differences in implementation or perceived effectiveness of the project activities across sites because of location, geography, and population differences.

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V. DATA COLLECTION

In this chapter, we describe our approach to developing data collection instruments, enumerator and interviewer trainings, as well as the procedures we will put in place to ensure that all data we collect is of the highest possible quality.

Data collection overview. We plan to administer in-person surveys with about 1,500 fishers at the project fish landing sites and ports, half of whom will be surveyed in the summer of 2020 and the other half in the summer of 2021. The summer is the ideal time for these data collections since it is the high season for many of the important fish in Morocco. We will also conduct the port and fish landing site infrastructure assessment data collection at the same time as the first round of the fisher survey in 2020 in order to save on transportation costs since these activities will be occurring at the same locations (ports and PDAs). In preparation for field work, we will pilot the fisher survey in early July, revise our instrument accordingly, and train a team of enumerators and supervisors. We will work closely with INRH and other stakeholders in Morocco as we develop our exact data collection schedule to ensure that the timing of data collection is optimal for reaching fishers and engaging them in the survey.

All of the qualitative focus groups and interviews will be implemented after quantitative data collection is complete, starting in August. We will use what we learned during the quantitative data collection to revise the qualitative protocols accordingly before the start of data collection. After the field work ends, the data collection firm will transcribe and translate the qualitative data starting in September. The qualitative work will be accompanied by the wholesale market infrastructure assessment activity, as part of the qualitative data collection will be done in wholesale market cities.

Table V.1. Data collection summary

Data collection activity	Sample size
Quantitative	
Fisher survey	1,500
Fisher site infrastructure assessment	26
Wholesale market infrastructure assessment	5
Qualitative	
Fisher FGDs	25
Fish landing site and port staff member KIIs	21
Government stakeholder KIIs	3
MCC and APP staff KIIs	3
Fish landing sites and ports implementing partners KIIs	2
Wholesale market customer FGDs	7
Wholesale market vendor KIIs	15
Wholesale market implementing partner KIIs	2
Wholesale market senior official KIIs	5
Other value-chain actor KIIs	10

APP = Agence de Partenariat pour le Progrès; FGD = focus group discussion; KII = key informant interview; MCC = Millennium Challenge Corporation.

Figure V.1. Data collection timeline (2020-2021)

Year	2020												2021											
Quarter	Q1			Q2			Q3			Q4			Q1			Q2			Q3					
Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S			
Fisher Survey and Infrastructure Assessment																								
Instrument development																								
Instrument programming																								
Instrument translation																								
Instrument pre-testing																								
Data collection pilot																								
Data collection training																								
Fisher survey field work																								
Infrastructure assessments																								
Qualitative data collection																								
Instrument development																								
Instrument translation																								
Data collection training																								
Qualitative data collection																								
Transcription																								
Qualitative data translation																								

Staffing. Mathematica will hire a local data collection firm to conduct the surveys, infrastructure assessments, focus groups, and some of the interviews. Mathematica staff will conduct the more sensitive interviews, including those with the relevant government stakeholders, MCC, and APP. Depending on scheduling constraints, Mathematica staff, a local consultant, or the local data collection firm could interview some implementing partners. The local data collection firm will be responsible for transcribing and translating all qualitative data (including from interviews conducted by Mathematica or Mathematica's local consultant). Mathematica will be responsible for all data cleaning, coding, and analysis. Throughout data collection, Mathematica will monitor all of the field work and review all deliverables submitted by the data collection firm.

Quality assurance in data collection. We will follow the highest quality data collection procedures at each stage of planning, implementation, analysis, reporting, and data transfer. Mathematica will competitively procure the local data collection partner for collecting quantitative and qualitative data. The procurement process will assess the firm's overall approach to collecting high quality data, experience collecting data in a similar context, and the expertise of the team leading the efforts. Mathematica will also review costs carefully to ensure they are reasonable and competitive. The capacity to collect data, even among established firms in Morocco, is low. As we have done in the past, to help gather high quality data, we will work closely with the local data collectors at every step of data collection.

We will use computer-assisted personal interviewing (CAPI) instruments, which are valuable for collecting high quality data. CAPI reduces error through programmed validity checks and automated skip patterns. A CAPI system removes the need for data entry, reducing survey administration time. We have extensive experience using CAPI with local firms in Morocco, which enables us to focus training on weaknesses we have experienced with firms on our other evaluations. Specifically, our team has deep expertise using Survey Solutions, a survey software developed by the World Bank. Mathematica will program the CAPI instruments in Survey Solutions or another CAPI program and, together with the local data collection firm, test the

instruments using tablets following a testing protocol. Our team will use CAPI field work management tools to review daily the data collected in the field and respond quickly to any data quality issues.

We will collect data using best practices, from the instrument design and sample selection to the interviewing methods and data analysis techniques. Our team will develop the questionnaires, drawing on our vast repository of data collection instruments and field experience and using questions from relevant baseline surveys when possible. We will submit all instrument drafts to MCC for review and input and revise them before field work. Instruments will first be developed in French and English and then translated using the team translation approach (the industry's gold standard) into local Moroccan languages (Darija Arabic and Berber/Amazigh) by the data collection firm. We will supervise the local data collector to ensure best practices are used during interview recordings, transcription, and translations, when needed. All instruments will be pre-tested to ensure that phrasing and language are appropriate and that all questions are easily understood.

Survey data can be uploaded daily from the field, enabling us to review the data and conduct consistency checks on an ongoing basis. As interviewers collect the data, a supervisor will check the data for inconsistencies on a daily basis. Mathematica will also review the data on a rolling basis.

For qualitative data, we will hire only interviewers with experience conducting FGDs and KIIs. We will ensure that they adhere to the highest standards for qualitative data collection through intensive training on how to conduct qualitative interviews and effectively run focus groups, hiring only those interviewers who meet our stringent criteria. The training will include information on how to gain the trust of focus group participants and facilitate a conversation without inserting any bias. Mathematica and the local data collector might conduct some of the high-level interviews jointly to ensure that Mathematica has a representative there if a stakeholder wants to learn more about the evaluation. To ensure that protocols are followed properly, Mathematica will observe interviewers and attend interviewer debriefings. The data collection firm will then have to code the data and will also send Mathematica transcripts of all interview conversations to review the coding and ensure they meet our rigorous quality standards.

Data collection risks and challenges. The success of the evaluation depends on the collection of high quality data, particularly the accuracy, reliability, and timeliness of the data. Although our planned data collection is designed to elicit the best possible answers to the key research questions, its implementation might also present some challenges. Here, we discuss some of those challenges and how we plan to resolve them.

- **Recall bias.** Considering the time lapse between the design, the rollout of implementation, and the data collection, it is possible that respondents might have difficulty remembering the details and timing of the activities. This bias is likely to be particularly strong for decisions or events that took place a few years earlier, such as design decisions. In addition, respondents' perceptions could have changed over time or have been affected by current events, leading to

inaccurate answers to questions about the past. Focus groups related to some of the trainings will occur years after a training took place, resulting in possible recall issues. In those instances, we will include prompts in our protocol to summarize the context and timing that we are interested in learning about. For those cases in which faulty memories are likely to be especially relevant, we will give more weight to written documentation. To help deal with recall bias, our interviewers will be trained to help respondents reference the appropriate time frame for each question.

- **Response bias.** It is likely that some responses obtained through qualitative methods will be biased. For example, an implementing party might have a more positive view of the success of implementation because of personal bias. For this reason, we plan to triangulate different parties' responses to interview and focus group questions and to interpret these responses in light of interviewees' incentives, experiences, and affiliations.
- **Stakeholder leadership and staff transitions.** To ensure commitment to the evaluation after the end of the compact, we will work with local stakeholders in Morocco at the national and local levels to obtain institutional buy-in, not just personal commitments, from those who occupy leadership positions at the outset of the study. If new people assume key leadership and staff positions during the evaluation period, we will ensure that they are briefed and informed about the evaluation and the level and type of contribution expected of them and made aware of the value of their participation.

VI. ADMINISTRATION

Given the complexity of this multicomponent project and evaluation, careful management of the evaluation and the timeline is essential. In this section, we discuss administrative issues related to the evaluation and present a timeline of evaluation activities.

A. Summary of IRB requirements and clearances

Mathematica is committed to protecting the rights and welfare of human subjects by obtaining approval from an IRB for relevant research and data collection activities. IRB approval requires three sets of documents: (1) a research protocol in which we describe the purpose and design of the research and provide information about our plans for protecting study participants, their confidentiality, and their human rights, including how we will acquire consent from individuals for their participation; (2) copies of all data collection instruments and consent forms that we plan to use for the evaluation; and (3) a completed IRB questionnaire that provides information about the research protocol, how we will securely collect and store data, participants' protection, and any possible threats to participants resulting from the study or any compromise of data confidentiality. For example, we will ensure that interviewees, survey respondents, and participants in the focus groups are not identified in the reports. We expect our documents to qualify for an expedited review by the IRB because the study presents minimal risk to participants.⁵

B. Preparing data files for access, privacy, and documentation plan

We will store the qualitative and quantitative data collected for this evaluation on Mathematica's secure server, accessible only to project team members. After producing and finalizing the evaluation reports, we will prepare corresponding de-identified data files based on the quantitative data. We understand that these files could be made available to the public, so we will de-identify these data files according to the most recent guidelines set forth by MCC. Public use data files will be free of personal or geographic identifiers that would permit unassisted identification of individual respondents or their households, and we will remove or adjust variables that introduce reasonable risks of deductive disclosure of the identity of individual participants. We will also recode unique and rare data using top- and bottom-coding or by replacing these observations with missing values. If necessary, we will also collapse any variables that make any individual highly visible because of geographic or other factors into coarser categories. Owing to its nature, qualitative data cannot be anonymized. We will not submit qualitative data as restricted or public use files, though we will submit qualitative instruments and codebooks.

⁵ The local data collection firm hired by Mathematica will obtain permits or clearances from the relevant national or local government offices before starting field work.

C. Dissemination plan

To ensure that the results and lessons from the evaluation reach a wide audience, we will work with MCC to increase the visibility of the evaluation and findings targeted to the fisheries sector, particularly for policymakers and practitioners. During the first year of the evaluation, we have engaged stakeholders in the evaluation design process. As we proceed, we will share relevant materials, such as survey instruments, with the ONP, local authorities involved in small-scale fishing activities, and other representatives of the GoM. We will present the findings from the final report to MCC in Washington, DC, and to key stakeholders in Morocco.

We expect the broader research community to have a strong interest in the findings from the evaluation. To facilitate wider dissemination of findings and lessons learned, we will collaborate with MCC and other stakeholders to identify additional forums—conferences, workshops, and publications—to disseminate the results and encourage other donors and implementers to integrate the findings into their programming.

D. Evaluation team roles and responsibilities

Our team will contribute our extensive experience and expertise to meet MCC's evaluation needs. Mr. Matt Sloan, the program manager, will oversee the evaluation's implementation. Mr. Sloan has primary responsibility for coordinating deliverables and ensuring that the quality of work is high and that it is completed on time and within budget.

Dr. Abbie Turiansky and expert consultant Dr. Antonius Gagern will lead the quantitative and qualitative evaluations, direct data collection activities, and lead the analysis of qualitative and quantitative data. Dr. Jane Fortson will ensure that the team produces only high-quality deliverables. Ms. Elena Moroz will support Dr. Turiansky and Dr. Gagern in the technical design process and in the quantitative and qualitative analysis activities. Ms. Beryl Seiler manages the project internally for Mathematica and supports programming and research activities. Our team also draws on our expert consultant, Mr. Mohamed Ihlal, as well as other Mathematica staff.

E. Evaluation timeline and reporting schedule

The evaluation activities will commence with follow-up data collection. Data collection will involve follow-up surveys; infrastructure assessments; and key KIIs and FGDs with officials, fishers, and households in beneficiary areas. Because we expect to complete data collection by the end of March 2020, the team will begin analyzing the data in April 2020. We will produce a report summarizing the findings from these data. We expect to finalize the report in early 2021 after we have presented the draft report to stakeholders and obtained their feedback. Table VI.1 provides an updated evaluation timeline and reporting schedule for remaining work.

Table VI.1. Evaluation timeline and reporting schedule

Task name	Task number	Activity	Date
Develop evaluation design report	2	Draft evaluation design report	August 2019
		*Design report will include data collection firm terms of reference	
		Stakeholder review and Evaluation Management Committee presentation	September 2019 to January 2020
		Design presentation (Morocco)	January 2020
		Nesstar metadata template for evaluation catalog entry	February 2020
		Final evaluation design report (English and French)	February 2020
Develop evaluation materials	3	Data collection firm subcontract sent for approval	February 2020
		Draft English quantitative questionnaires and qualitative protocols and enumerator training manuals (Data collection 1)	May 2020
		Written review of back translation (Data collection 1)	June 2020
		Summary of pilot test (Data collection 1)	July 2020
		Final English and local language questionnaires and enumerator training manuals (Data collection 1)	July 2020
		IRB package	July 2020
		Revise English quantitative questionnaires and enumerator training manuals (Data collection 2)	May 2021
		Written review of translation revision (Data collection 2)	June 2021
		Final English and local language questionnaires and enumerator training manuals (Data collection 2)	June 2021
Data collection	4	Quantitative data collection 1 and ports/PDAs infrastructure assessment	July-August 2020
		Qualitative data collection & market infrastructure assessment	August-September 2020
		Quantitative data collection 2	July-August 2021
Develop final report	5	Draft final report and cost-benefit analysis model	January 2020 to December 2021
		Final report, cost-benefit analysis model, and data package	January to March 2022
Disseminate final results	6	Presentations, updates to Nesstar template	March 2022

Figure VI.1. Evaluation timeline

	Base	Option Period 1				Option Period 2				
Year	2019	2020				2021				2022
Quarter	3	4	1	2	3	4	1	2	3	4
Task										
2. Develop evaluation design report										
Draft evaluation design report	▲									
Stakeholder review and design presentations			□							
Nesstar metadata template for evaluation catalog entry			▲							
Final evaluation design report			▲							
3. Develop evaluation materials										
Data collection firm TORs and subcontract			▲							
Draft English questionnaires and enumerator training manuals				▲				▲		
Written review of back translation, summary of pilot test				□	▲				▲	
IRB Package					▲				▲	
Final English questionnaires and enumerator training manuals					▲				▲	
4. Supervise endline data collection										
Data collection					□				□	
5. Develop final report										
Draft final report and CBA models										▲
Data package as per MCC guidelines										▲
Final report and CBA models										▲
6. Disseminate final report										
Presentation materials, updates Nesstar template										□ ▲

□ Trip to Morocco

▲ Key deliverables

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