The Oceans and Fisheries Partnership (USAID Oceans)

FINAL INTERNAL REVIEW:
KEY FINDINGS, LESSONS, AND RECOMMENDATONS




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Acronyms and Abbreviations

ASEAN	Association of Southeast Asian Nations
ATH	Alliance of Tuna Handliners
BFAR	Bureau of Fisheries and Aquatic Resources
BFAR	Bureau of Fisheries and Aquatic Resources
CDT	Catch documentation and traceability
EAFM	Ecosystem Approach to Fisheries Management
eCDT	Electronic catch documentation and traceability
FAME	Futuristic Aviation and Maritime Enterprise
FGD	Focus group discussion
FMA	Fisheries Management Area
FMO	Fisheries Management Office
GT	Gross Tons
IUU	Illegal, unreported, and unregulated [fishing]
KDE	Key data element
KII	Key informant interview
LGU	Local Government Unit
MMAF	[Indonesia] Ministry of Maritime Affairs and Fisheries
NFC	Near-field communication
RDMA	Regional Development Mission for Asia
SAQ	Self-administered questionnaire
USAID	United States Agency for International Development
USAID Oceans	USAID Oceans and Fisheries Partnership
USAID SEA	USAID Sustainable Ecosystems Advanced Project

EXECUTIVE SUMMARY

Tetra Tech was awarded the United States Agency for International Development Oceans and Fisheries Partnership Activity (USAID Oceans) from the USAID Regional Development Mission Asia (RDMA) on May 14, 2015, to develop and test sustainable electronic catch documentation and traceability (eCDT) systems as a tool to add value to the fishery supply chain, reduce illegal, unreported, and unregulated (IUU) fishing, and improve fisheries management. Since the Activity's launch, USAID Oceans has used a Theory of Change founded on three key assumptions to guide program development to achieve program objectives. An internal mid-term review was conducted between March 10-24, 2018 as part of USAID Oceans' M&E activities to validate Theory of Change assumptions and to inform programming for the second half of the program. The final internal review documented in this report was conducted between September 16-27, 2019 to: (1) review the validity of the USAID Oceans Theory of Change; (2) compare findings from mid-term and final internal reviews, and (3) identify key findings and lessons to guide future similar projects.

The USAID Oceans Theory of Change was grounded on three basic assumptions that linked incentives gained by fishers to support adoption of eCDT systems, the use of data from this technology to improve fisheries management, and the value of regional capacity and cooperation to expand and sustain the use of catch documentation and traceability as one tool to support an ecosystem approach to fisheries management (EAFM). Stakeholders identified many benefits of eCDT system adoption along the supply chain in addition to increased value of fish. These included operational efficiency, two-way communication, maritime security, and safety at sea. The percentage of respondents identifying advantages of eCDT systems during the final internal review was higher than at mid-term internal review. The percentage of respondents identifying disadvantages of eCDT system use was generally lower during the final internal review compared to the mid-term internal review. However, certain challenges—in particular, the costs associated with eCDT technology investment—were raised as a concern during both midterm and final reviews. Stakeholders also identified many benefits of using eCDT data for fisheries management. The percentage of respondents that valued eCDT data for fisheries management was higher compared to the mid-term internal review following increased awareness of these systems.

Overall, stakeholder interviews indicated that USAID Oceans was instrumental in increasing awareness and demonstrating the benefits of eCDT systems to reduce illegal, unreported, and unregulated fishing and supporting fisheries management. Based on stakeholder inputs during the final internal review, recommended future actions include:

- Develop a national protocol and stakeholder engagement mechanism for evaluating and integrating eCDT system technologies and supporting data sharing for fisheries management.
- Develop five-year national roadmaps with an investment and incentive strategies to continue implementing and strengthening eCDT systems nationally.
- Demonstrate ways eCDT data can support sustainable fisheries management, including stock assessments and area-based fisheries management.
- Develop legal instruments to promote gender equity and women's empowerment in sustainable fisheries management.
- Address systemic problems in the fishery supply chain that limit the benefits of adopting eCDT systems.

1. INTRODUCTION

Tetra Tech was awarded the United States Agency for International Development Oceans and Fisheries Partnership (USAID Oceans) activity from the USAID Regional Development Mission Asia (RDMA) on May 14, 2015. Program objectives were:

(1) to **develop and test sustainable eCDT systems** as a tool to add value to the fishery supply chain, reduce IUU fishing, and improve fisheries management;
(2) to **support expansion of the use of eCDT systems and EAFM** to areas important for biodiversity in the Association of Southeast Asian Nations (ASEAN) and Coral Triangle regions;
(3) to strengthen the capacity of regional organizations to **conserve marine biodiversity using EAFM** with eCDT systems as important tools to combat IUU fishing and seafood fraud; and
(4) to engage the fishing industry and private sector in general to encourage sustainability and uptake of EAFM and the eCDT systems to **advance fisheries governance**.

Since its launch, USAID Oceans has used a Theory of Change (Figure 1) founded in three key assumptions (see box below) to guide work toward achieving the program objectives. These assumptions link incentives gained by fishers to support adoption of eCDT systems, the use of data from this technology to improve fisheries management, and the value of regional capacity and cooperation to expand and sustain the use of catch documentation and traceability as one tool to support EAFM. This final review follows an internal mid-term review conducted from March 10-24, 2018 to validate Theory of Change and to inform activities for the second half of the program. The "Mid-Term Internal Review Report" (USAID Oceans 2018) detailed key findings and recommendations to direct program activities for the remaining period of performance.

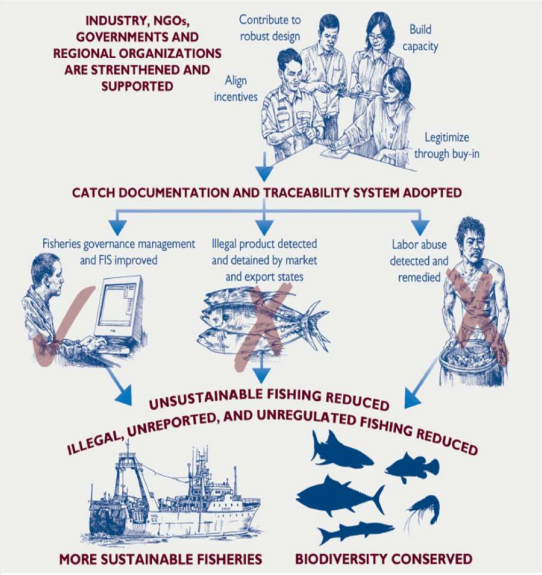

Figure 1. USAID Oceans Theory of Change

This final internal review was conducted between September 16-27, 2019 to: (1) review the validity of the three key assumptions of USAID Oceans Theory of Change; (2) compare responses and assess progress from mid-term and final internal reviews, and (3) identify key findings and lessons to guide future similar projects. The final internal review is not intended to serve as an in-depth evaluation of the effectiveness of the USAID Oceans project's interventions. In addition to this internal review, USAID conducted an in-depth external evaluation of the program during February and March 2019, the results of which are publicly available and have been shared with relevant stakeholders.

Key Assumptions

Assumption 1. If the eCDT system is robust, meets stakeholders' needs, and provides an economic incentive to fishers through the increased demand for and value of traceable fishery products, then the system will be adopted by the private sector and supported by government agencies throughout the region.

Assumption 2. If fisheries managers use eCDT systems with other tools (including an ecosystem approach to fisheries management and promoting safe, legal, and equitable labor practices) to inform fisheries management plans and regulatory regimes, then local and national fisheries governance will be strengthened.

Assumption 3. If regional capacity and cooperation is built to support EAFM and CDT, then more institutions and countries in the region will endorse and sustain their use.

2. METHODOLOGY

The methodology used for the final internal review was similar to that used during the mid-term internal review (USAID Oceans, 2019). Key informant interviews and focus group discussions were held with key stakeholders. Key questions for both methods were drawn from the mid-term review approach and framework, and findings were compared to the final internal review.

Stakeholder Identification. The final review team worked closely with national and learning site coordinators in Indonesia and the Philippines to identify stakeholders to participate in the mid-term review. Four priority stakeholder groups were identified at regional, national, and learning site levels:

- Government (national, provincial, local)
- Private sector (fisheries industry, technology firms)
- Non-governmental organization/academe
- Regional organizations

Participation in all activities followed USAID-required research practices and ethical standards, including obtaining written informed consent from all participants. An information brief was provided to all participants to explain the objectives of the final review and expected outputs.

Key Informant Interviews. Priority stakeholders were engaged through key informant interviews (KIIs). A total of 143 KIIs were conducted (73 in the Philippines, 70 in Indonesia). More KIIs were completed during the final internal review than the mid-term internal review (Table 1).

The approach outlined in the "Final Internal Review Approach and Framework" proposed to conduct KIIs as a self-administered questionnaire (SAQ). Field staff determined in pre-testing the SAQ that this approach would not facilitate adequate response, especially from small-scale fishers. As a result, field staff used the SAQ to conduct one-on-one interviews, similar to the approach used to conduct KIIs in the mid-term internal review. The key difference was that the SAQ was designed as a "close-ended" questionnaire. Each question provided possible responses for key informant to select. These possible responses were based on coding performed during the mid-term internal review during which the KIIs questions were "open-ended." As such, the tabulation of results for the final internal review did not require coding, but just a tallying of the results. A quantitative analysis was conducted using the SPSS statistical analysis software application of the results of the close-ended questions from SAQ.

Table 1. Number of KIIs Conducted during Mid-term and Final Internal Reviews

Review Period	Number of Key Informant Interviews						
	Philippines			Indonesia			Total
	Female	Male	Total	Female	Male	Total	
Mid-term Internal Review	27	28	55	21	21	42	97
Final Internal Review	37	36	73	56	14	70	143

Focus Group Discussions: Stakeholders directly engaged with USAID Ocean were convened for focus group discussions. The number of participants engaged in focus group discussions for the final internal review was similar the mid-term internal review (Table 2). Focus group discussions were used to provide more in-depth information about the questions used for the KIIs.

One unexpected challenge faced when conducing focus group discussions was that the review team was not able to meet with a key stakeholder, the Indonesian Ministry of Marine Affairs (MMAF), in Jakarta due to a change in administration and senior leadership at the time of the final internal review.

Table 2. Number of Participants in Focus Group Discussions Conducted during Mid-term and Final Internal Reviews

Review Period	Number of Participants in Focus Group Discussions						
	Philippines			Indonesia			Total
	Female	Male	Total	Female	Male	Total	
Mid-term Internal Review	21	22	43	27	24	51	94
Final Internal Review	39	24	63	24	15	39	102

3. FINDINGS & LESSONS LEARNED

***Assumption 1**: If the CDT System is robust, meets stakeholders' needs, and provides an economic incentive to fishers through increased demand and value of traceable fishery products, then the CDT System will be adopted by the private sector and supported by government agencies throughout the region.*

Assumption 1, that if users obtained economic incentives, they would adopt eCDT systems, remained mostly valid, but the economic incentive—increased demand and value of traceable fishery products—was not fully tested and was defined too narrowly. The increased demand for and value of traceable products was just beginning to be realized at the time of this internal review; some fish buyers were giving monetary incentives to small-scale fishers for the return of near-field communication (NFC) cards that recorded their fish catch. Stakeholders identified many other benefits of using eCDT System (Figure 1). "First Movers," eCDT technology users identified through partners and fisheries associations, were essential in identifying benefits that could be integrated in the design and testing of eCDT systems. The percentage of respondents identifying advantages of eCDT systems during the final internal review (bars) was higher than at mid-term (yellow circles) (Figure 1). This difference might be due to increased awareness of stakeholder awareness of eCDT systems and their advantages following the additional 1.5 years of eCDT testing and operation at both learning sites under the project between the mid-term and final review. The percentage of respondents identifying disadvantages of eCDT system use was generally lower during the final review compared to the mid-term review. The costs associated with eCDT technology investment in terms of equipment and training was the highest concern raised by stakeholders interviewed, particularly in the Philippines (

Figure 2). It is notable that the level of respondents reporting "high cost" being an issue during the final review was only half the rate compared to mid-term, indicating an overall reduced level of concern. Regardless of the concerns over cost, stakeholders indicated eCDT system adoption and use would be sustained as the benefit outweighed the cost and the technology was easy to use (Figure 3).

Other benefits emerged as equally important to stakeholders along the supply chain, such as increased operational efficiency, two-way communication, maritime security, and safety at sea. Companies that covered the entire supply chain, fishing, processing, and export, experienced benefits from advanced knowledge of catch to inform staffing and processing. The cost savings to business operations were an essential benefit as manual, paper-based documentation was replaced by electronic systems. Two-way communication and safety-at-sea seemed to be tangible benefits to small-scale fishers in using available eCDT technologies but was limited due to the limited possession of smart phones. Government enforcement entities realized that small- and medium-scale fishers could play an important role in surveillance for maritime security and search and rescue. At the time of this review, the positions of and alerts from small-scale fishers were not being tracked by national coast guard systems. Collaboration between local and national government is needed to realize these benefits.

Increased demand and value of traceable fisheries products could not be documented over the relatively short timeframe for the project. A much longer period of eCDT system implementation with a larger pool of participants would be needed to validate this assumption. It is noteworthy that most processors are already reporting declines in fish supply. However, some examples of incentivizing the use of CDT are emerging from USAID Oceans partners. USAID Sustainable Ecosystems Advanced Project in Indonesia, through partnership with Masyarakat dan Perikanan Indonesia, has deployed eCDT technology developed with support from USAID Oceans as part of their "FairTrade Program" where small-scale fisher cooperatives providing CDT information to specific buyers receive a premium for their catch. The premium is then put into a pooled cooperative fund. In the Philippines, a premium is given by buyers to individual small-scale fishers providing CDT information. Even with these examples, there are systemic problems in the supply chain that inhibit, especially for small-scale fishers, realizing an increased value of traceable fisheries products. Middle buyers often finance small-scale fishers. These fishers are then beholden to the middle buyers who may not pass along the added value of the catch to the fisher. Addressing this issue will be an important consideration in the future.

Government policies can both support and hinder government-based eCDT system design and adoption. Government policies that require use of eCDT systems can enhance adoption, especially in controlled port areas where fishing vessels are checked by port authorities to ensure compliance before and after each trip. However, existing government policies may hinder the government-based eCDT system design if key data elements (KDEs) needed by the private sector have not been considered under existing regulations. In both cases, careful review is needed before and after eCDT design to ensure that policies support the system design or are revised to do so.

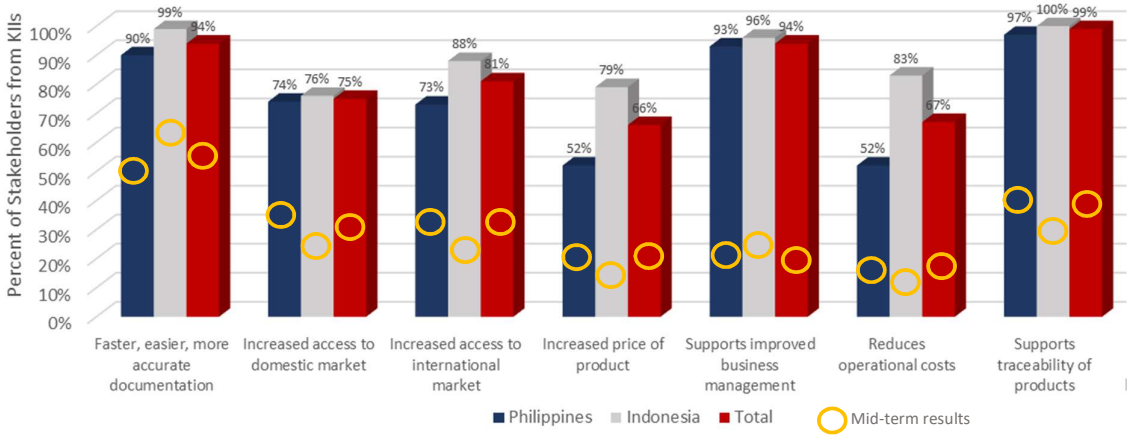

Figure 1. Reported advantages of eCDT systems at the close of the USAID Oceans project

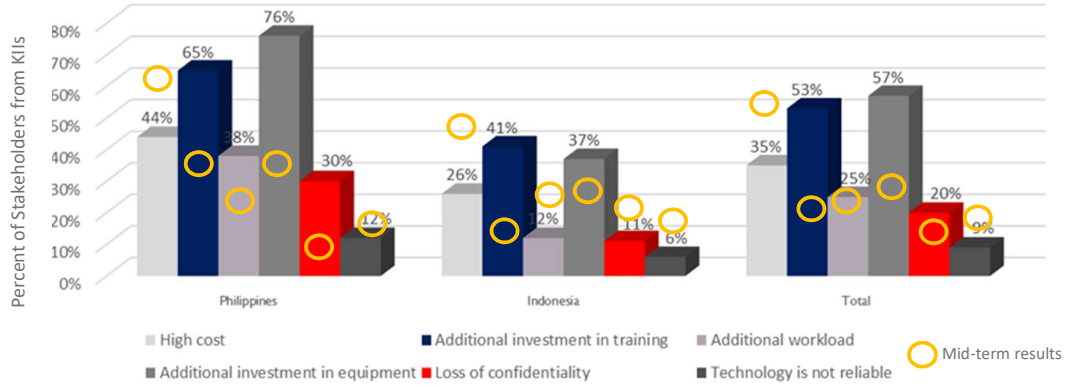

Figure 2. Reported disadvantages of eCDT systems at the close of the USAID Oceans project

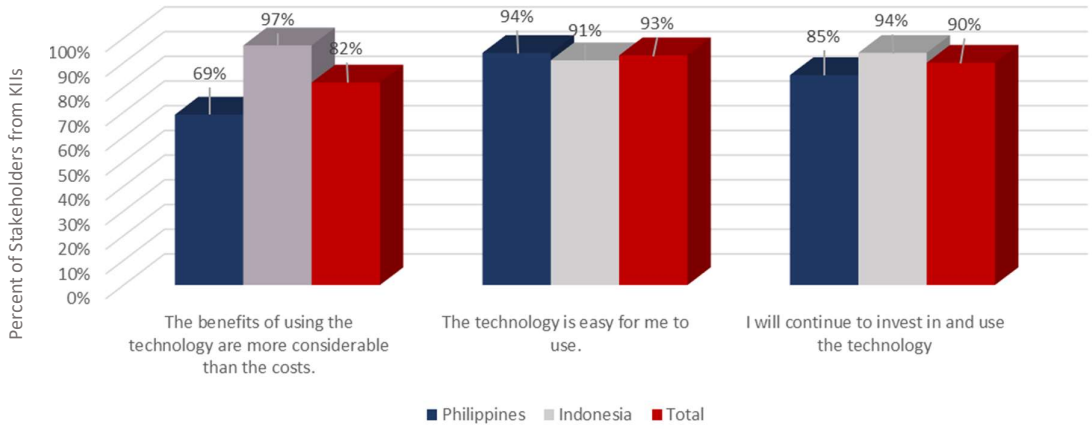

Figure 3. Reported indications of sustained use of eCDT systems beyond the close of the USAID Oceans project

Assumption 2: *If fisheries managers use CDT systems with other tools (i.e., using EAFM and promoting safe, legal, and equitable labor practices) to inform fisheries management plans and regulatory regimes, then local and national fisheries governance will be strengthened.*

Stakeholders reported that they felt Assumption 2 was valid but not fully tested. They identified many benefits of using eCDT data for fisheries management (Figure 4). As awareness of the data that eCDT systems could produce grew, the percentage of stakeholders that valued eCDT data for fisheries management increased compared to the mid-term internal review. Results suggest a significant increase in stakeholder understanding of how eCDT data can reduce IUU fishing and strengthen fisheries management since project mid-term.

Fisheries management plans developed with project assistance and being implemented at the close of the project will be able to utilize eCDT data in the immediate future. Testing and implementation of these eCDT systems was conducted late in the project (years three and four) of the project and with few participants. More time and data are needed to demonstrate the value of eCDT data in developing fisheries policies. Fisheries management plans developed with project assistance did incorporate actions to promote safe, legal, and equitable labor practices, attesting to the increased awareness of these issues in fisheries. Fisheries management plans developed include site-level plans covering Fisheries Management Area (FMA) 716 in North Sulawesi, Indonesia, and the Sarangani Bay and Celebes (Sulawesi) Seas in FMA #3 in southern Mindanao fishing area in the Philippines. Through a USAID Oceans Gender Intervention Grant in General Santos learning site, a grantee reviewed the Gender and Development code of General Santos City and proposed to include fisheries in Gender and Development initiatives. This will help engender fisheries governance that will provide a legal basis for local agencies to implement gender-sensitive interventions. Involving actors along the fisheries value chains in both learning sites in gender intervention activities has contributed to increased interest in the human welfare and gender equity aspects of their fisheries activities.

Availability of eCDT data can support fisheries management needs when aligned with national stock assessment methodologies. USAID Oceans awarded two program EAFM grants—one in each learning site—to explore ways to use eCDT data to improve fisheries management. Under the grants, the two recipient organizations are expected to collect available eCDT data, conduct real-time analysis, and use analytical results to inform local and national fisheries management decision-making. Beyond the life-of-project, additional investigations should be placed on identifying how data from the eCDT system, including incorporating relevant human welfare KDEs, can support national stock assessment and the development of fisheries policies such as closed seasons, harvest control rules, and other EAFM strategies. Additional research and analysis are

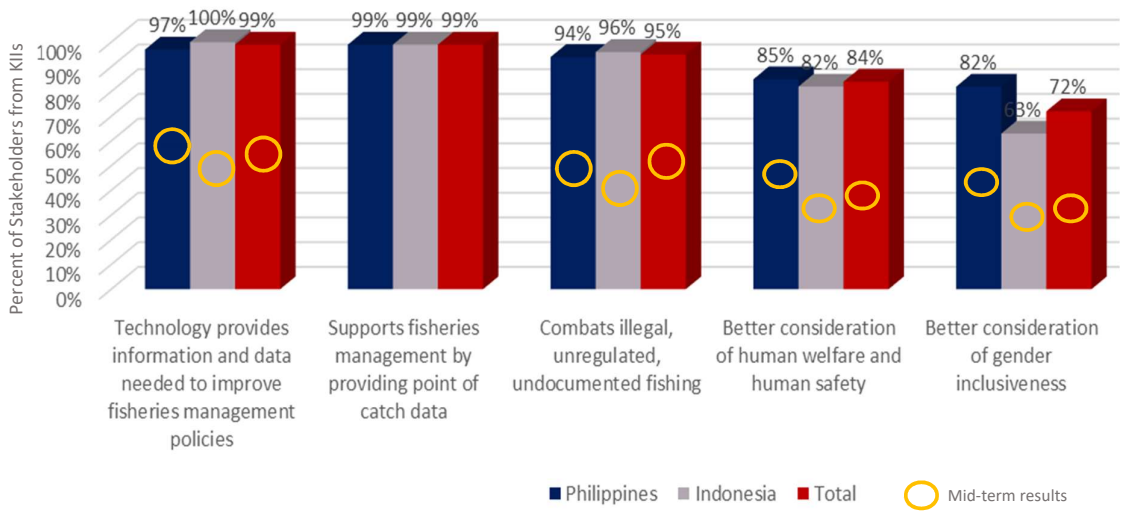

Figure 4. Reported value of eCDT in supporting better fisheries management at the close of the USAID Oceans project

needed to understand and demonstrate how data from the eCDT system can best be used to support fisheries management. Also, engendering EAFM and eCDT training modules and guidelines will help with adherence to gender equality and social inclusion principles and approaches.

Assumption 3: *If regional capacity and cooperation is built to support EAFM and CDT, then more institutions and countries in the region will endorse and sustain their use.*

Assumption 3 remained valid; however, regional capacity and cooperation are needed to explicitly include government, nongovernment, and private sector actors at multiple scales (regional, national, and local) and for all phases of project implementation.

Regional cooperation led to the identification of a wide variety of eCDT system needs. To be effective, eCDT systems must be designed to address diverse geographies and fisheries characteristics to ensure sustained use and expansion. USAID Oceans conducted research in collaboration with regional and national partners to gain a greater understanding of existing systems and gaps. This analysis resulted in the development of foundational documents that partners throughout the region will continue to use to support design and adoption of CDT systems and improve fisheries management beyond the life of the project.

National and site-level coordination is essential for addressing the large and small issues that emerge from eCDT system design and use of data for fisheries management. Regular exchange of information between national and site level multi-sectoral technical working groups ensures that issues are clearly understood and addressed. The use of social media and chat groups was particularly useful in communicating small issues that emerged and sharing possible solutions.

Public-private partnerships at national and local levels resulted in increased cooperation, transparency, and trust. By working together to address eCDT system needs, government and private sector actors gained a greater appreciation of the challenges and opportunities for supporting both a sustainable industry and sustainable management of the fisheries. Fishing associations played a vital role in this partnership with government as they have an in-depth understanding of their members needs and can assist in bringing them together when key decisions are needed. However, having secure data privacy between public and private sectors is a crucial issue that needs to be addressed in adopting or scaling eCDT systems.

4. LEARNING SITE FINDINGS & LESSONS

Bitung, Indonesia

USAID Oceans supported the design and piloting of five CDT tools at the Bitung learning site. Private sector-developed eCDT systems were Trafiz, TraceTales, and Pointrek. Government-developed systems by MMAF were eLogbook and STELINA. These tools were tested by First Movers including fishers, buyers, and processors in Bitung, Manado, Sangihe Islands, and Nain Island. KIIs indicate that USAID Oceans has been instrumental in increasing awareness and demonstrating the benefits eCDT systems. Further, these tools are being used to support Fair Trade and Marine Stewardship Council certification requirements in addition to US and EU export requirements. Stakeholders also recognize that eCDT systems provide data needed to improve fisheries management policies and enforcement.

eLogbook improved CDT data collection and validation. USAID Oceans supported the development and testing of the MMAF's eLogbook, which replaces a manual logbook formerly used and enables capture of catch data at sea. At the time of this review, eLogbook is being used by 442 vessels (≥6 gross tons/GT) in Bitung. The Bitung Port Authority reported that eLogbook supports more efficient and accurate data collection and validation before sending the data to MMAF Jakarta. The use of the data for stock assessment is considered valuable; however, this assumption has yet to be tested.

Pointrek can improve efficiency for both traceability and business management if issues related to cost and duplicative data entry are addressed. First Mover, Nutrindo, is using Pointrek. Nutrindo is a vertically indicated supply chain with its own vessels (<30 GT) and processing facility. The First Mover indicated that the system is efficient and more accurate than previous paper-based methods used. Pointrek supports maintenance records for vessels, has SOS capability, enables communication with the vessel even during stormy weather, and supports managers in purchasing raw materials needed for process. Unlike eLogbook, Pointrek data is available to the company using it. Currently, the First Mover is entering duplicative data in both Pointrek and eLogbook. Costs of using Pointrek ($1,450 for initial set up and equipment and 1-year airtime, $450/year for satellite connection) is still an issue, especially if the company is also required by MMAF to pay for vessel monitoring systems. The entry of data by a vessel captain requires a cultural shift supported by training. Nutrindo reviews the data entered periodically by each captain to ensure quality control. A next step is the integration of Pointrek data with the eLogbook to eliminate the double data entry and to require vessel monitoring system use, which has additional cost implications. Future improvements to Pointrek would include data collection for real-time fish hold temperature and fuel consumption as well as an on-vessel surveillance camera.

Trafiz can improve traceability and business management for small-scale fisheries. Trafiz is a traceability system developed by USAID Oceans. Two First Mover middle buyers using Trafiz said the system was useful for their business management but hoped it would automatically share data captured with processors. Additional efforts to socialize the system and integrate it with processor and exporter systems are needed to get more middlepersons to adopt it. In one instance, it was found that the wife of a fisher reviews the Trafiz data from the buyer to verify the husband's catch to support management of household accounts. With a considerable number of women involved in the market economy through fish trading (buying and selling), additional training for women fish traders/middle buyers on data and financial management is necessary, particularly regarding how Trafiz data can link to financial services and fisheries management. In addition, Trafiz was identified as useful for household financial management. More training on financial management and access and use of Trafiz data would be required especially for women who often take a lead role in household finance management. At the time of reporting, the USAID INVEST project, is further defining the needs of women and revising the application accordingly.

TraceTales is a fast and accurate traceability tool for processors. First Movers, PT Blue Ocean Grace International/BOGI and Nutrindo, indicate that using TraceTales leads to greater efficiency, requiring fewer staff and providing market data. It also improves traceability and generates more accurate data and higher confidence in the product. Users indicated that while daily reports are important, the ability of the system to generate monthly and yearly reports and trends would be very useful.

STELINA could serve as a powerful traceability tool when data sources from multiple government departments are integrated and processors/exporters are required by law to use the system for exporting. USAID Oceans supported the testing of the STELINA prototype, a digital backbone for an integrated, export-focused traceability, logistics, and quality assurance system. The system is intended to integrate data from at least 12 disparate government data systems (multiple departments within MMAF and other ministries). This provides improved and more timely visibility of seafood from both wild capture and aquaculture, as it moves through the supply chain. STELINA is intended to increase data collection from traders that operate between vessels and processing companies, filling key traceability and verification gaps. First Mover processor/exporter, SIG Asia, indicated that STELINA should save time, improve accuracy, and support documentation required for export once the system is electronic and linked to the eLogbook. Significant inputs have been provided by the First Mover to improve the system design. STELINA was developed and to be operated by the Directorate Product Competitiveness, which has limited operational arms. Therefore, data entry relies a lot on other sources, including the private sector using a voluntary scheme. Unfortunately, this also comes with some political challenges. Until there are tangible drivers realized, it will be challenging for STELINA to scale, despite it great value to entire traceability. These drivers could be to create a Business Enabling Environment (i.e., incentives, facilitation, trade preference) as well as mandatory compliance through regulations. To be scalable, STELINA needs to be established as a requirement by regulation with data confidentiality requirements that are implemented through standard operating procedures to ensure traders' compliance with international export regulations.

There is a need to develop greater capacity and collaboration between the provincial actors, local academic institutions, nongovernmental organizations, and MMAF to support fisheries science and management. The Provincial Fisheries Management Office (FMO) issues fishing licenses for vessels <30 GT and is responsible for fisheries management in provincial waters. The Provincial FMO routinely shares data with MMAF, but not the other way around. Fisher and fisheries data from the eLogbook are sent directly to MMAF. Through the Fisheries Co-Management Committee, the Provincial FMO is collaborating with Sam Ratulangi University and other stakeholders to support fisheries data analysis through semi-annual meetings. A data sharing agreement is needed with MMAF and academe. Future programs should provide more training and capacity building at the provincial level.

General Santos City Learning Site, Philippines

USAID Oceans supported the design of two catch documentation and traceability tools in the Philippines: Bureau of Fisheries and Aquatic Resources' (BFAR) national eCDT system for commercial operations, and Futuristic Aviation and Maritime Enterprise (FAME) technology for small-scale fishers. Both women and men from the government and private sectors were involved in the development of the designs and the systems, including capacity building. These tools were tested by First Movers including fishers, buyers, and processors in General Santos City, Mindanao. KIIs indicated that by bringing in an electronic system, procurement of equipment, and capacity building, USAID Oceans' support catalyzed BFAR's eCDT system design and testing. USAID Oceans helped bridge gaps between government and industry, which resulted in increased trust and collaboration between BFAR and industry. The revision and amendment of a key policy, BFAR Administrative Circular No. 251, supported by USAID Oceans, was instrumental in making traceability applicable to all fishery and processing types in the supply chain. The involvement and collaboration of seven local government units (LGUs) that are implementing the EAFM plan "Fisheries Annex: Protected Area Management Plan for the Sarangani Bay Protected Seascape, Region 12, Philippines" with USAID Oceans has set forth a process for developing a unified fisheries ordinance and enforcement unit. Representatives from LGUs report that this collaboration will contribute to better fisheries management and improved support small-scale fishers in coastal communities. Ideally LGUs will propose this model to national and provincial government for additional budget allocation in implementation of fisheries management.

eCDT system design should prioritize building in-house capacity of the national fishery agency. An eCDT system built and operated by the national government would require that the government have the capacity to maintain and update the system internally. USAID Oceans provided critical capacity building support for the development of a national eCDT system; however, continued investment by government is needed to sustain the system. Sustainability of the eCDT system by government will require: (1) continued to invest in the eCDT system, (2) maintenance of a protocol and mechanism to monitor and evaluate the system

and to integrate other databases needed to improve the efficiency and effectiveness of the system, and (3) commitment to regular stakeholder engagement and continuous quality improvement that addresses both government and private needs and issues. This system can serve as a platform for widespread use with other fisheries as well as other geographic regions in the country once these sustainability features are in place.

FAME benefits small-scale fishers through vessel tracking, at-sea data collection, improved safety, and communication features. FAME enables real time tracking of small-scale fishing vessel location. The NFC card enables catch documentation at sea. Small-scale fishers identified the benefits of FAME technology as contributing to safety at sea and enabling communication with their families. Potential qualitative benefits were identified such as "peace of mind" of fishers' families knowing their location at sea and the ease of communicating, if small-scale fishers have access to smart phones. LGUs identified key benefits of eCDT systems as catch documentation and traceability data, enhanced value of fish, improved fisheries management, maritime security, and safety-at-sea. Collaboration among multiple entities will be needed to fully realize these benefits; this includes national and local government and academic institutions to analyze data for fisheries management, and national and local government entities to track small-scale fishers for maritime security and search and rescue. The introduction of eCDT systems enhanced small-fisher registration; however, incentives such as price subsidies, fuel, and monetary incentives from buyers are needed to support continued adoption. LGUs also recognize the need for a unified fishery ordinance and enforcement unit to support improved fisheries management. Access to FAME technology is still limited. The benefit of using the NFC cards to increase value and demand for fish just started to be tested in General Santos. In Palawan, a buyer is providing a financial incentive for each NFC card received from a fisher. This system may provide a model for replication in other locations and should be tracked. The integration between BFAR's eCDT system and FAME technology only became functional following the completion of the internal final review. Functional integration of FAME eCDT data within the BFAR eCDT System, including data access protocols, is anticipated in early 2020, immediately prior to the close of the USAID Oceans project. Mechanisms to support adoption and sustainability of FAME technology after USAID Ocean ends are being explored at the time of this report writing.

Local government units are enthusiastic about supporting eCDT systems for small-scale fishers. Municipalities, responsible for managing small-scale fishers (<3 GT) within municipal waters, support the use of eCDT systems to provide data to inform fishing regulations and to proactively forecast the need for alternative livelihoods when catch is declining. USAID Oceans financed the establishment of an enhanced Fisheries Monitoring Center for the BFAR Regional 12 Office, to be formally launched in January 2020, immediately prior to the close of the project. The new Fisheries Monitoring Center intends on enlisting the support of small-scale commercial and municipal fishers operating within the waters of Sarangani Bay and the Celebes Sea to provide at-sea monitoring to enhance maritime security. In the future, eCDT data analytics and dashboards will be incorporated within the fisheries monitoring center for BFAR to visualize events happening within the fisheries sector in real time and inform fisheries management interventions. BFAR also indicated their support for small-scale fishers to adopt eCDT systems. USAID Oceans provided equipment, (e.g. tablet, monitors) to LGUs to monitor fishers registered in their jurisdiction; however, additional equipment is needed to support community-based monitoring centers to enable families to monitor fishers. Small-scale fishers requested tablets or smartphones to be able to access the FAME vessel tracking system. This presents an opportunity to increase the adoption and utility of available eCDT technologies with municipal fishers, their families, and respective LGUs.

5. RECOMMENDATIONS

Develop a national protocol and stakeholder engagement mechanism for evaluating and integrating eCDT system technologies and supporting data sharing for fisheries management. USAID Oceans reviewed and analyzed many technologies in pursuit of systems for use in catch documentation and traceability by the private sector and government. The advantage of private sector-developed systems is that the fishing industry collects and owns the data. Government eCDT systems have one-way data capture that doesn't allow anyone outside a select government management group to access the data once it is submitted. The government needs to prioritize integrating data from private sector systems to avoid duplication of effort and provide more data accessibility to fisheries scientists. New technologies will continue to emerge that could serve as tools for the private sector and fisheries managers. At a national level, the development of a "Technology Evaluation and Integration Protocol" would be helpful. This protocol would include criteria for the review, evaluation, and integration of new technologies as they emerge. A multisector CDT technical advisory group, chaired by the government with members from nongovernmental organizations, fishing associations, and private sector, could meet regularly to review the status of implementation of eCDT system, identify and address issues as they arise, and stay current on latest technologies. This advisory group would sustain significant gains by USAID Oceans in fostering public-private sector collaboration to address IUU fishing and improving fisheries management.

Develop and implement a five-year national roadmap with investment and incentive strategies to continue implementing and strengthening eCDT systems nationwide. USAID Oceans and partners established a solid foundation for eCDT system design, any testing, and phased roll out beyond the learning sites. A five-year roadmap and investment and incentive strategies are needed to bring the eCDT systems into full operation. The national roadmap should detail priority actions needed to support technology integration, data sharing, and data use in fisheries management. National government agencies should detail the investment needed in completing the eCDT systems, facilitating integration of government and private sectors systems, purchasing equipment and back-up systems, and maintenance and upgrade costs. Most importantly, incentives are needed to support early adoption until eCDT systems are mainstreamed in the country. National government agencies should realign their current fisheries and subsidies away from activities that support overfishing, such as providing fishing nets and boats. Instead, a range of incentives should be explored and provided to support eCDT system adoption, especially for small-scale fishers. During mid-2019 through early 2020, USAID Oceans worked with interested ASEAN Member States to create, review, and finalize National CDT Activity Roadmaps for 2020 through 2025, to be implemented following the close of the USAID Oceans project.

Expand the use of eCDT system data to support sustainable fisheries management, including stock assessments and area-based fisheries management. The use of eCDT data to support fisheries science and management is being tested at both learning sites through EAFM grants made during 2019 to design and test "innovative digital solutions" (e.g., dashboard applications) that analyze and visualize real-time eCDT data for use by fisheries managers and decision-makers. Scientists from government and academe should review eCDT data generated as inputs into national fish stock assessments beyond the close of the USAID Oceans project. Both Indonesia and the Philippines have established fisheries management areas (FMA). Specific emphasis should be placed on identifying how data from the eCDT system can support the development of policies such as closed seasons, harvest control rules, and other strategies that support EAFM in the FMA. Also, efforts to improve human well-being, characterized by legal, just, and equitable conditions, can be informed by data from the eCDT system but will also require gender sensitive and socially inclusive approaches when planning and implementing fisheries management.

Assess and address systemic problems in the fishery supply chain that limit the benefits of adopting eCDT systems. Systemic problems in the supply chain inhibit the realization of benefits from eCDT system adoption for small-scale fishers. Middle-actors often finance small-scale fishers. These fishers are then beholden to the middle-actors to sell their catch. The middle-actors do not pass along the added value of the catch to the fisher. Small-scale fisheries are indebted to middle actors because they do not have capital to buy the supplied necessary to go out to sea. The middle-actor provides the capital to buy these supplies, leaving fishers indebted. Small-scale fishers are interested in eCDT systems because they hope they can benefit

by getting a better price of their catch. Before their catch goes to the legitimate exporter it may pass through a series of middle buyers who may not classify their fish properly and only estimate the weight. Overall, there is a lack of transparency about weight, classification, and value along the supply chain. Mechanisms are needed help break the exploitation of small-scale fishers, such as developing a micro-loan program for fishers and making information on daily market values available to fishers.

Develop a roadmap to support the adoption and implementation of legal instruments to promote gender equity and women's empowerment in sustainable fisheries management. Legal instruments for the promotion of gender equity and women's empowerment in sustainable fisheries management in both learning sites are in various stages of development and submission to relevant local, national, regional authorities. One of these instruments—"Promotion of Gender Equality and Women's Empowerment in the Tuna Fisheries Sector in General Santos City and Sarangani Bay Area, Philippines"—has been adopted by the local tuna industry and its partners. To ensure these legal instruments developed with support from USAID Oceans will be properly implemented, a roadmap for the implementation should be in place before the program closeout to responsible bodies to implement, monitor, and evaluate these policies. In the future, an evaluation team should be identified to measure the impact and support adaptive management.

REFERENCES

USAID Oceans. Mid-term Review Report. USAID Oceans, July 2018.

USAID Oceans. Mid-term Review Approach and Framework, February 2018.

USAID Oceans. Final Review Approach and Framework, August 2019.

APPENDIX: PARTICIPATING STAKEHOLDERS

Key Informant Interview (KII) Participants

KII Participants - Philippines			
Organization / Affiliation	**Male**	**Female**	**Total**
Alliance of Tuna Handliners (ATH) Inc.	1		1
ATH Alabel	2		**2**
ATH Gensan	2		**2**
ATH Glan	4		**4**
ATH Maasim	2		**2**
ATH Maitum	2	2	**4**
BFAR Central Office	1	2	**3**
BFAR Region 12	10	8	**18**
Celebes Canning Corporation	1	1	**2**
FAME Inc.	1		**1**
General Tuna Corporation		2	**2**
Gladery Fishing Inc.		1	**1**
LGU Gensan	1	2	**3**
LGU Glan	1	1	**2**
LGU Kiamba	2		**2**
LGU Maasim		2	**2**
Marchael Sea Ventures Corporation		1	**1**
Mommy Gina Tuna Resources, Inc.	1		**1**
Pescarich Manufacturing Corporation		1	**1**
Philippine CinMic Industrial Corporation/ MKMI Fishing	2		**2**
RD Fishing Corporation		1	**1**
Rell and Renn Fishing Corporation		2	**2**
Rell and Renn Seafood Sphere Inc.		1	**1**
Sarangani Province	2		**2**
SARGENSK-THAMA, ATH Inc.	1		**1**
Seatrade Canning Corp.		1	**1**
SOCSKSARGEN Federation of Fishing and Allied Industries, Inc./SFFAII	1	1	**2**
Sta. Cruz Seafood Inc.		2	**2**
Tenpoint Manufacturing Corp.		1	**1**
TSP Marine Industries		1	**1**
Tuna Explorers Inc.		2	**2**
The National Network on Women in Fisheries (Philippines)/WINFISH		1	**1**
Total	**37**	**36**	**73**

KII Participants - Indonesia			
Organization / Affiliation	**Male**	**Female**	**Total**
AP2HI (Indonesian Pole & Line and Handline Fisheries Association)	1	1	2
Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security	2	1	3
LGU, Fishing Port Tumumpa	1		1
Marine and Fisheries Office (DKP Bitung)	1	2	3
Marine and Fisheries Office (DKP North Sulawesi)	1	1	2
Marine and Fisheries Resources Surveillance Bitung	1		1
Masyarakat dan Perikanan Indonesia		2	2
MMAF	12	3	15
Oceanic Fishing Port Authority Bitung	2		2
Polytechnic of Marine and Fisheries Bitung	2		2
PT. Altermyth	1		1
PT. Chen Woo Fisheri	4		4
PT. Jaya Bitung Mandiri	2		2
PT. Marina Nusantara	1		1
PT. Marina	3	1	4
PT. Marina Selaras	1		1
PT. Nutrindo	11		11
PT. Sari Tuna Makmur	2	1	3
PT. Sari Usaha Mandiri	4		4
PT. SIG ASIA		1	1
Regional Fish Quarantine and Inspection Agency of Manado	1		1
Supplier	2		2
University of Samratulangi	1	1	2
USAID SEA Project	1		1
Total	**56**	**14**	**70**

KII Participants - Summary			
Country	**Male**	**Female**	**Total**
Philippines	37	36	73
Indonesia	56	14	70
Total	**93**	**50**	**143**

Focus Group Discussion (FGD) Participants

FGD Participants - Philippines			
Organization / Affiliation	**Male**	**Female**	**Total**
ATH Alabel	3		**3**
ATH Gensan	3	1	**4**
ATH Glan	1		**1**
ATH Kiamba	1	1	**2**
ATH Kiamba			**0**
ATH Maasim	1		**1**
ATH Maitum	5		**5**
ATH Regional	3		**3**
BFAR Central Office	4	2	**6**
BFAR Region 12	5	3	**8**
Celebes Canning	1		**1**
DENR Sarangani Bay Protected Seascape		1	**1**
FAME	2		**2**
General Tuna Corp.		3	**3**
Local Government of Alabel	1		**1**
Local Government of General Santos	1	1	**2**
Local Government of Glan	1	1	**2**
Local Government of Kiamba	1		**1**
Local Government of Maasim		2	**2**
Local Government of Maitum		1	**1**
MKMI Fishing	1		**1**
Mommy Gina Tuna Resources	1		**1**
MSU Naawan Foundation Inc.	1		**1**
Province of Sarangani	2		**2**
RD Fishing		1	**1**
Rell and Renn Seafood Sphere		1	**1**
Santa Cruz Seafood		3	**3**
SOCSKSARGEN Federation of Fishing and Allied Industries, Inc./SFFAII	1	1	**2**
Tuna Explorer Inc.		1	**1**
The National Network on Women in Fisheries (Philippines)/WINFISH		1	
Total	**39**	**34**	**63**

FGD Participants - Indonesia			
Organization / Affiliation	**Male**	**Female**	**Total**
AP2HI (Indonesian Pole & Line and Handline Fisheries Association)	2		**2**
Marine and Fisheries Office, North Sulawesi	4	2	**6**
Marine and Fisheries Office, Tahuna	2		**2**
Marine and Fisheries Resources Surveillance	3	1	**4**
Oceanic Fishing Port Authority	2	2	**4**
PT Blue Ocean Grace International/BOGI	1	3	**4**
PT SIG Asia		4	**4**
PT. Nutrindo	4		**4**
Samratulangi University	1	2	**3**
STELINA User	1		**1**
Trafiz User	2		**2**
Tumumpa Fish Port	1		**1**
USAID SEA Project	1	1	**2**
Total	**24**	**15**	**39**

FGD Participants - Summary			
Country	**Male**	**Female**	**Total**
Philippines	39	34	63
Indonesia	24	15	39
Total	**63**	**49**	**102**