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Fisheries Catch Documentation and Traceability in Southeast Asia



A Conceptual Overview

THE USAID OCEANS AND FISHERIES
PARTNERSHIP

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Fisheries Catch Documentation and Traceability in Southeast Asia:
A Conceptual Overview

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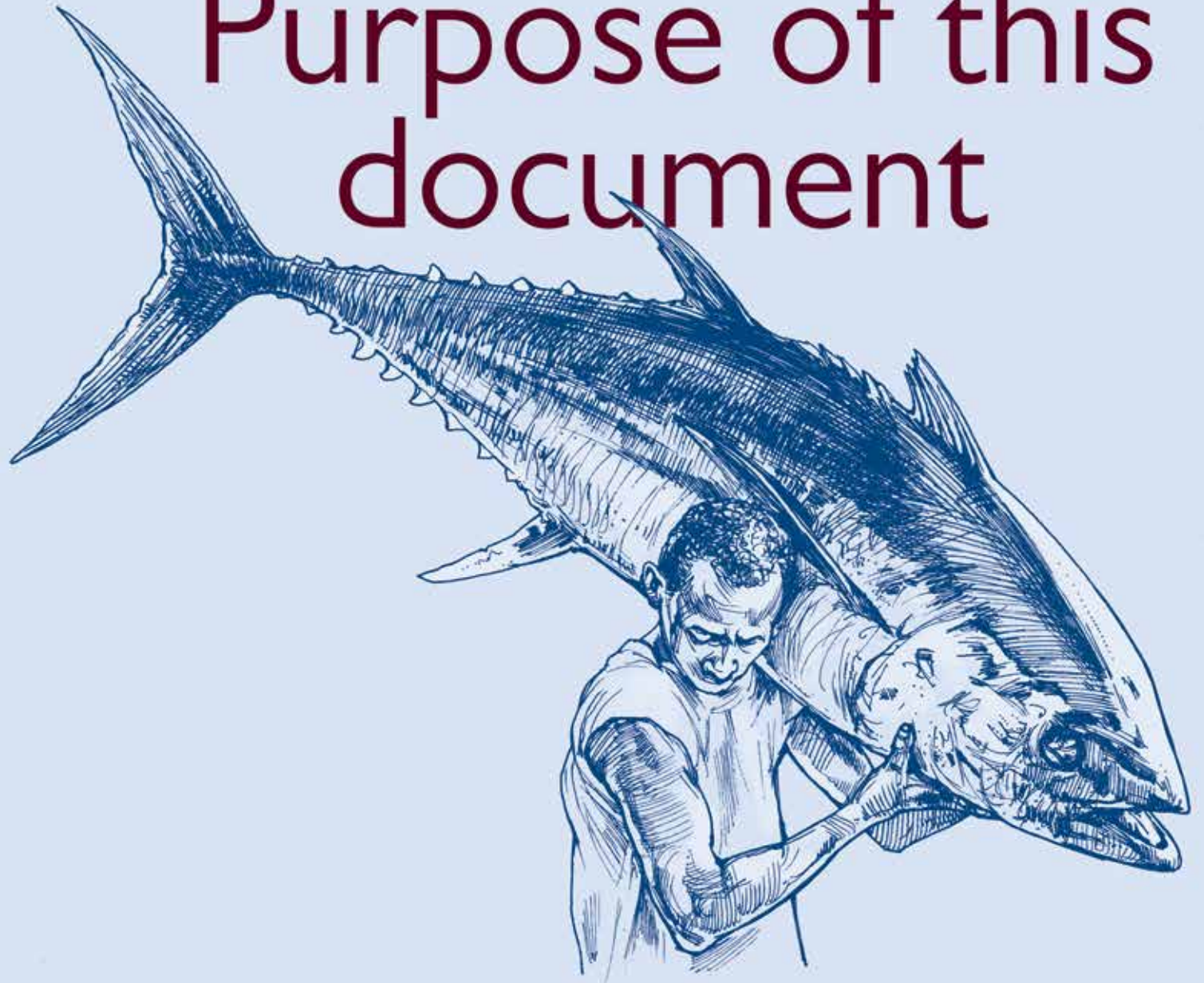
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Acronyms

ACDS	ASEAN Catch Documentation Scheme
AIS	Automatic identification systems
ASSP	ASEAN-SEAFDEC Strategic Partnership
CDT	Catch documentation and traceability
CTI-CFF	Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security
DTD	Digital Traceability Document
EAFM	Ecosystem approach to fisheries management
ERP	Enterprise Resource Planning
EU	European Union
FIS	Fisheries information systems
IUU Fishing	Illegal, unreported, and unregulated fishing
KDE	Key data elements
MCS	Monitoring, control, and surveillance
NGOs	Non-governmental organizations
NOAA	United States National Oceanic and Atmospheric Administration
OCC	Oceans Consultative Committee
PPP	Public Private Partnership
RDMA	Regional Development Mission for Asia
RFMO	Regional Fisheries Management Organization
RPOA	Regional Plan of Action
SEAFDEC	Southeast Asian Fisheries Development Center
US	United States
USAID	United States Agency for International Development
USAID Oceans	USAID Oceans and Fisheries Partnership
VMS	Vessel monitoring systems

Purpose of this document



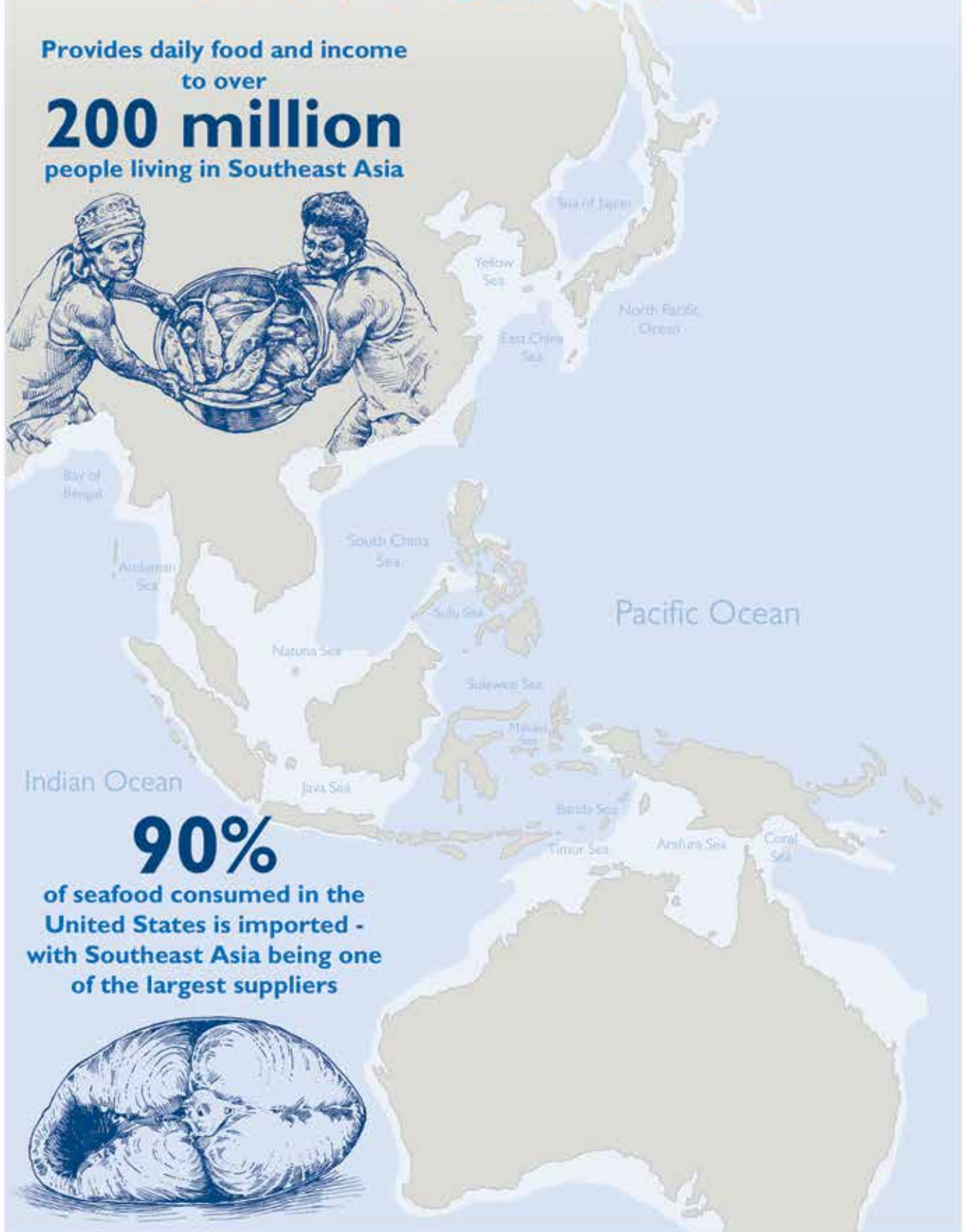
The purpose of *Fisheries Catch Documentation and Traceability in Southeast Asia: A Conceptual Overview (CDT 101)*, is to provide a conceptual overview of the proposed catch documentation and traceability component of the United States Agency for International Development (USAID) Oceans and Fisheries Partnership (USAID Oceans). It is intended to serve as a non-technical document that is accessible to and can be understood by a wide variety of relevant project partners, regional stakeholders, and the interested public. A follow-up document, the *Technical Concept and Specifications (CDT 201)*, includes detailed technical specifications and project details that may be of interest to technical partners, the private sector, and academia.

FIGURE I. The Importance of Asia-Pacific's Fisheries

ASIA PACIFIC SEAS AT A GLANCE

Provides daily food and income
to over

200 million
people living in Southeast Asia



90%
of seafood consumed in the
United States is imported -
with Southeast Asia being one
of the largest suppliers



Following background information provided on the rationale and approach of the USAID Oceans project, this document includes an overview on what catch documentation and traceability (CDT) is, what specific issues CDT is intended to address, and a brief overview of some of the supporting partners in the development and testing of USAID Oceans' CDT system. This is followed by a brief discussion regarding some of the challenges that the USAID Oceans project faces regarding the adoption and application of a CDT system within Southeast Asian seafood markets. The document closes with a set of recommendations that will be followed in order to guide the USAID Oceans project team and its partners in the development, testing, and implementation of a CDT system for Southeast Asia. Together, these sections represent the 'starting point' for the USAID Oceans project regarding: 'what' CDT is; 'why' it is necessary; 'who' the supply chain actors and partners involved are; and 'what' challenges are faced. The longer technical document, the CDT 201, describes 'how' the CDT system will be designed and implemented.

In developing this document, the USAID Oceans team met with a number of relevant technology companies in order to better understand emerging data communication and digital technology innovations, and how these might support a CDT system. The USAID Oceans team also consulted with the USAID Oceans Consultative Committee (OCC), the Partnership's advisory body which includes USAID, the Southeast Asian Fisheries Development Center (SEAFDEC)¹, and the Coral Triangle Initiative for Reefs, Fisheries and Food Security (CTI-CFF); key regional project partners; as well as the U.S. National Oceanic and Atmospheric Administration (NOAA). In addition, national fisheries regulators, the fishing industry, seafood buyers, standards organizations, and non-governmental organizations (NGOs) were consulted in order to

better understand the requirements and concerns of key stakeholders involved in the adoption of a CDT system within the seafood supply chain. The USAID Oceans project is an effort directly in support of, and delivered through, national fisheries regulators—in no way is the project designed to challenge or replace such authorities.

The primary intended audiences for this document are industry partners (e.g., commercial fishing operations; processing, storage, and shipping companies; importing retailers), national government agencies in Southeast Asia, and the US importing regulators. Secondary audiences include regional partner organizations, non-governmental organizations, fisheries technology businesses, and academic institutions.

The political and technical landscape relating to the international documentation and traceability of seafood is evolving rapidly, with multiple discussions, studies, and initiatives underway globally. This report does not purport to reflect all relevant discussions or initiatives currently underway. Similarly, there are a number of promising new approaches and emerging data communication technologies relating to CDT that are being pioneered by talented groups and organizations all over the world. Not all of these approaches and technologies are currently appropriate for application within Southeast Asia. The USAID Oceans team and its partners are carefully considering which approaches and technologies are the most suitable and realistic for adoption given regional conditions and limitations.

Given that seafood traceability is a global challenge and that the fishing industry has made it clear that their preference is for a coordinated, international approach to developing seafood standards, the USAID Oceans team hopes that the CDT approach outlined within this document can be of value to addressing these needs.

USAID Oceans' Partners

USAID Oceans represents a partnership between USAID, the Southeast Asian Fisheries Development Center (SEAFDEC), and the Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security (CTI-CFF). These partners, together, form the Partnership's advisory body, the Oceans Consultative Committee (OCC). SEAFDEC is the technical and operational arm for fisheries matters in the region, and is engaged in the ASEAN-SEAFDEC Strategic Partnership (ASSP). ASSP works to enhance cooperation between ASEAN, SEAFDEC, and its member countries and recognizes USAID Oceans as an official ASSP program. CTI-CFF is an intergovernmental collaboration to conserve marine and fisheries resources. USAID Oceans partners are critical to the design and implementation of project activities with fisheries and environment agencies in the region.



PHOTO: MELINDA DONNELLY

FIGURE 2. The Current Situation: A Sea of Threats

A SEA OF THREATS

ECONOMIC, POLITICAL, AND SOCIAL CONDITIONS INFLUENCE POTENTIAL SOLUTIONS TO ILLEGAL, UNREPORTED, AND UNREGULATED FISHING

UNREGULATED FISHING

- Labor abuse/human trafficking
- Few champions for sustainable fishing
- Inconsistent enforcement of regulations

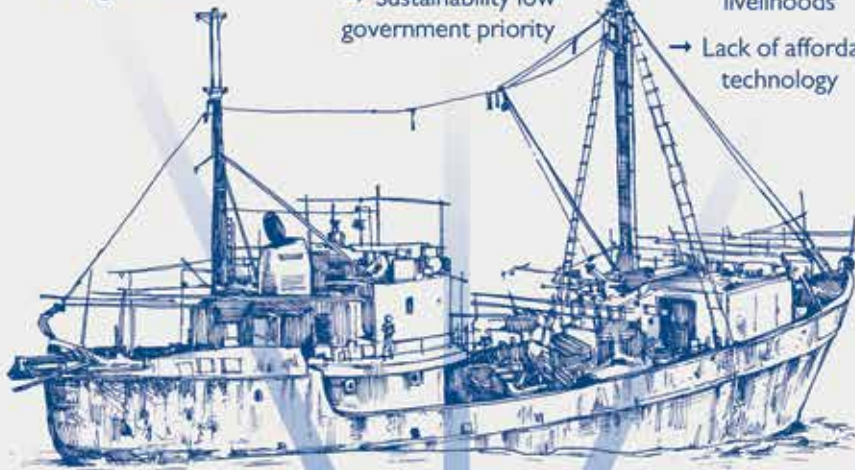
ILLEGAL FISHING

- Limited regional cooperation
- Inadequate national & marine governance
- Sustainability low government priority

UNREPORTED FISHING

- Increasing demand for cheap fish
- Limited alternative livelihoods
- Lack of affordable technology

CLIMATE CHANGE, DESTRUCTIVE DEVELOPMENT, AND MARINE AND LAND-BASED POLLUTION

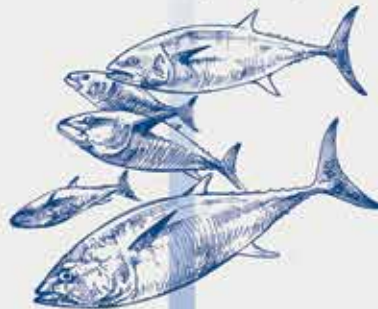


RESULTING IN THREATS TO AT-RISK SPECIES AND MARINE HABITATS

Reef & reef associated species



Near to off-shore pelagic species

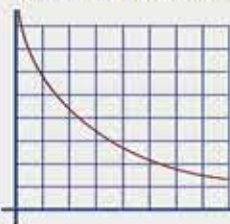


Soft-bottom coastal species



IMPACTING SUSTAINABILITY AND BIODIVERSITY THROUGH:

Reduced diversity/abundance



Habitat degradation



Changing temperatures and pH levels



Reduced reproductive capacity



The Challenge



Seafood is the most widely traded animal protein on Earth.² It plays a critical role in global food security, accounting for nearly one-fifth of humanity's protein intake. With the waters of Indo-Pacific being home to the most biologically diverse and productive marine ecosystems on Earth, it is no surprise that the commercial fisheries industry of Southeast Asia supplies one of the largest and most active seafood markets in the world, exporting products daily to the developed north, particularly within the United States (US), the European Union (EU), and throughout North Asia (China, Japan, Korea, and Russia). In the US alone, approximately 90% of seafood consumed is imported.³

The marine ecosystems of Southeast Asia are a source of daily food and income to over 200 million people living in the region. Similar to global trends, capture fisheries production in Southeast Asia has risen steadily during the past several decades.⁴

Unfortunately, humanity's increased demand for seafood from Southeast Asia has also led to a number of issues that are reducing the productivity and health of the region's marine ecosystems, degrading or destroying native marine habitats and threatening marine species. Chief among these threats are illegal fishing, the use of unsustainable and destructive fishing practices, and

unsustainable rates of extraction; that is, taking more of a fishery population than will allow the population to naturally replenish itself.⁵ Cumulatively, these threats negatively impact marine biodiversity, food security, and livelihoods in the region.

In addition, some fishery operators in the region choose to engage in unethical and illegal labor practices,

including the use of indentured servitude and slave labor. Further, recent studies suggest that a significant proportion of seafood products being imported by the US are illegally caught and/or mislabeled.^{6,7,8} Insufficient fisheries management and a lack of transparency in terms of how, where, and by whom seafood products are being caught threaten to perpetuate such challenges.

Our Approach

In 2014, the United States Government tasked USAID to address challenges related to illegal, unreported, and unregulated (IUU) fishing. Subsequently in 2015, the USAID Oceans and Fisheries Partnership was launched. USAID Oceans works to strengthen regional cooperation to combat IUU fishing and promote sustainable fisheries, in order to conserve marine biodiversity in the Asia-Pacific region. USAID Oceans is implemented through a partnership between USAID's Regional Development Mission for Asia (RDMA), SEAFDEC, CTI-CFF, and NOAA.

USAID Oceans aims to improve marine biodiversity conservation and increase the sustainability of Southeast Asia's international seafood trade through five strategies. While the majority of this document is focused on the catch documentation and traceability strategy, each of the **five strategies** is briefly introduced in this section.



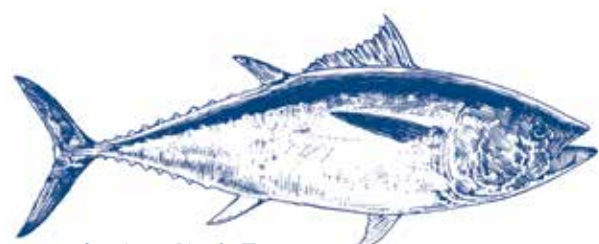
PHOTO: LEN GARCES

I. Catch Documentation and Traceability

USAID Oceans supports the development of a transparent and financially sustainable electronic catch documentation and traceability system to help ensure that fisheries resources from Southeast Asia are legally caught and properly labeled. The electronic CDT system will encourage the collection, sharing, and analysis of verifiable ecological, economic, and social data related to seafood products as they move through the supply chain, such that they are traceable from point-of-harvest to seafood importer retail. As such, it is envisioned that the CDT system will be used by all players in the seafood supply chain, including fishers, processors, exporters, importers, buyers and governments.

The CDT system can provide an important opportunity to support national effective fisheries monitoring, control, and surveillance (MCS), as CDT remains one of the most valuable and comprehensive methods for collecting fisheries statistics at a reasonable cost. Catch documentation at point-of-harvest can also be valuable for stock assessment purposes and marine spatial planning efforts.

Electronic catch reporting has already been tested successfully in several domestic wild-caught fish markets, including in the US, EU, and Australia.^{9, 10} In these jurisdictions, electronic catch reporting systems, and the associated analytics performed on the data collected through them, are well-recognized aspects of a broader approach to marine ecosystem management. The challenge is now to see similar technologies adopted widely and better integrated within a full, international seafood supply chain. The USAID Oceans electronic CDT system will analyze a set of key data elements (KDE) that will incorporate elements from these existing reporting systems, regulatory requirements in import and export countries, and the ASEAN Catch Documentation Scheme (ACDS), among others, focusing at the start on key at-risk species such as tuna.



Southern Bluefin Tuna

2. An Ecosystem Approach to Fisheries Management

Central to fisheries sustainability is taking an ecosystem approach to fisheries management (EAFM), which “strives to balance diverse societal objectives, by taking account of the knowledge and uncertainties of biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries.”¹¹ Marine conservation is highly linked to fisheries management. As such, the global shift away from the single-species fisheries management approach of the past into EAFM seeks to balance environmental and human well-being needs through improved fisheries governance.

The electronic CDT system will support fishery information needs for the ecosystem approach. The CDT system is envisioned to complement and be used in concert with current fisheries management interventions such as law enforcement, vessel/fishers registration, and area closures. Currently, fisheries catch and landing data are collected by mandated national agencies (i.e., fisheries agencies, such as the Philippines’ Bureau of Fisheries and Aquatic Resources and the fish port authority). Other information useful to ecosystem approach planning may also be available but are not linked to the fishing port authorities’ informational databases, such as in-depth fish stock assessments by

fisheries research institutes and academic institutions. The aim of the CDT system is to link data systems, increasing access to the FIS and validating that species landed are from sustainably managed fisheries systems. The electronic CDT system would include key data elements such as species, location of catch, gear/method of catch, and vessel information.

Over time, data provided through the CDT system across multiple fisheries and ecosystem types will help decision-makers and stakeholders more effectively and adaptively manage fisheries at increasingly large scales, both ecologically and economically. The implementation of an EAFM approach at a site-level will also encourage the integration of single, site-specific fisheries within a wider ecosystem context.

In partnership with regional and national institutions, the USAID Oceans team will train local partners and stakeholders in site-based EAFM capacity and strengthened local fisheries governance. CDT interventions will be included in the sustainable fisheries management plan through the EAFM framework and stakeholder engagement. Working with OCC member CTI-CFF, USAID Oceans will build on existing EAFM work already being done in the region.

3. Public-Private Partnerships

The USAID Oceans team is engaging multiple stakeholders — including government agencies, private fishing companies, fishing associations and groups, intergovernmental organizations, and NGOs — from across the international seafood and information technology industries on the design, testing, and implementation of the electronic CDT system. Furthermore, technology partners are also being engaged to assist the USAID Oceans team and national government agencies in the testing and integration of CDT-sourced data to enhance existing and new fisheries information systems (FIS) for adaptive fisheries management purposes.

To ensure that the CDT system meets the needs of different stakeholders, USAID Oceans is initiating public private partnerships (PPPs) to encourage full and inclusive testing and adoption of a CDT system to support sustainable fisheries management. Private sector and industry partners are incentivized to work with USAID Oceans on the CDT system in order to maintain market access as regulations come in effect, increase efficiency across their supply chains, and potentially gain access to higher end markets through traceability.

USAID Oceans will develop strategic market-driven partnerships that take advantage of the seafood industry’s technical expertise, market position, and capacity to engage national and local government counterparts. Fishing companies, brokers, and NGOs will advise USAID Oceans on the design of the CDT system in order to ground-truth and motivate seafood suppliers to adopt and scale the CDT system across multiple countries and fisheries in Southeast Asia, and provide a voice on the development of traceability standards and requirements. Members of other industries, such as information technology, marine telecommunications, and other oceans industries, including industry leadership organizations (e.g., the World Ocean Council) will be engaged to leverage their respective areas of expertise.



4. Safe, Legal & Equitable Labor Practices

A key strategy under the USAID Oceans project is to encourage the adoption of and adherence to safe, legal, and equitable labor standards within the region's seafood industry. To do this, the design of the CDT system will include the collection of relevant labor data to monitor labor practices. Pressure from seafood buyers and governments will promote participation

in the CDT system, which will, in turn, enhance both worker protection and voluntary compliance with labor standards. The actual costs of labor associated with fisheries operations will be more transparently reflected while workers will be empowered to make informed employment decisions and have increased access to enforcement and grievance mechanisms.



Labor abuses, including human trafficking and forced labor, are a growing international concern within Southeast Asia's commercial fisheries.

PHOTO: LEN GARCES

5. Regional Coordination & Governance

The USAID Oceans project aims to strengthen regional coordination and solutions that can improve governance of transboundary fisheries, both directly through EAFM work and indirectly through CDT solutions. USAID Oceans will also support efforts to build capacity for regional fisheries coordination and governance as well as the maintenance and upgrading of the electronic CDT systems developed during the project lifetime (2015-2020). Strengthened regional partners will benefit both national and local fisheries management efforts.

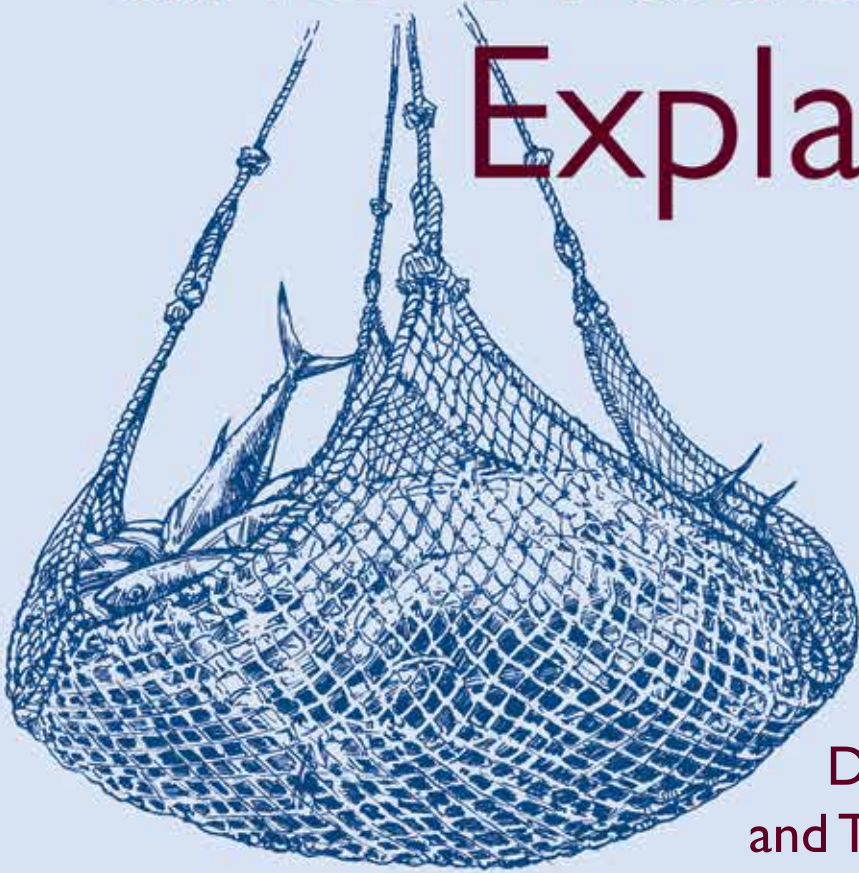
USAID Oceans will coordinate its strategies and activities across Southeast Asia in close consultation with relevant regional partners. Regional engagement will be facilitated through members of the Oceans Consultative Committee and other regional organizations such as and the Regional Plan of Action to Promote Responsible Fishing Practices including Combatting IUU Fishing in the Region (RPOA-IUU) and the ASEAN-SEAFDEC Strategic Partnership (ASSP).



PHOTO: FINI LOVITA

Catch Certificate at the Harbor Master's office in Bitung, Indonesia.

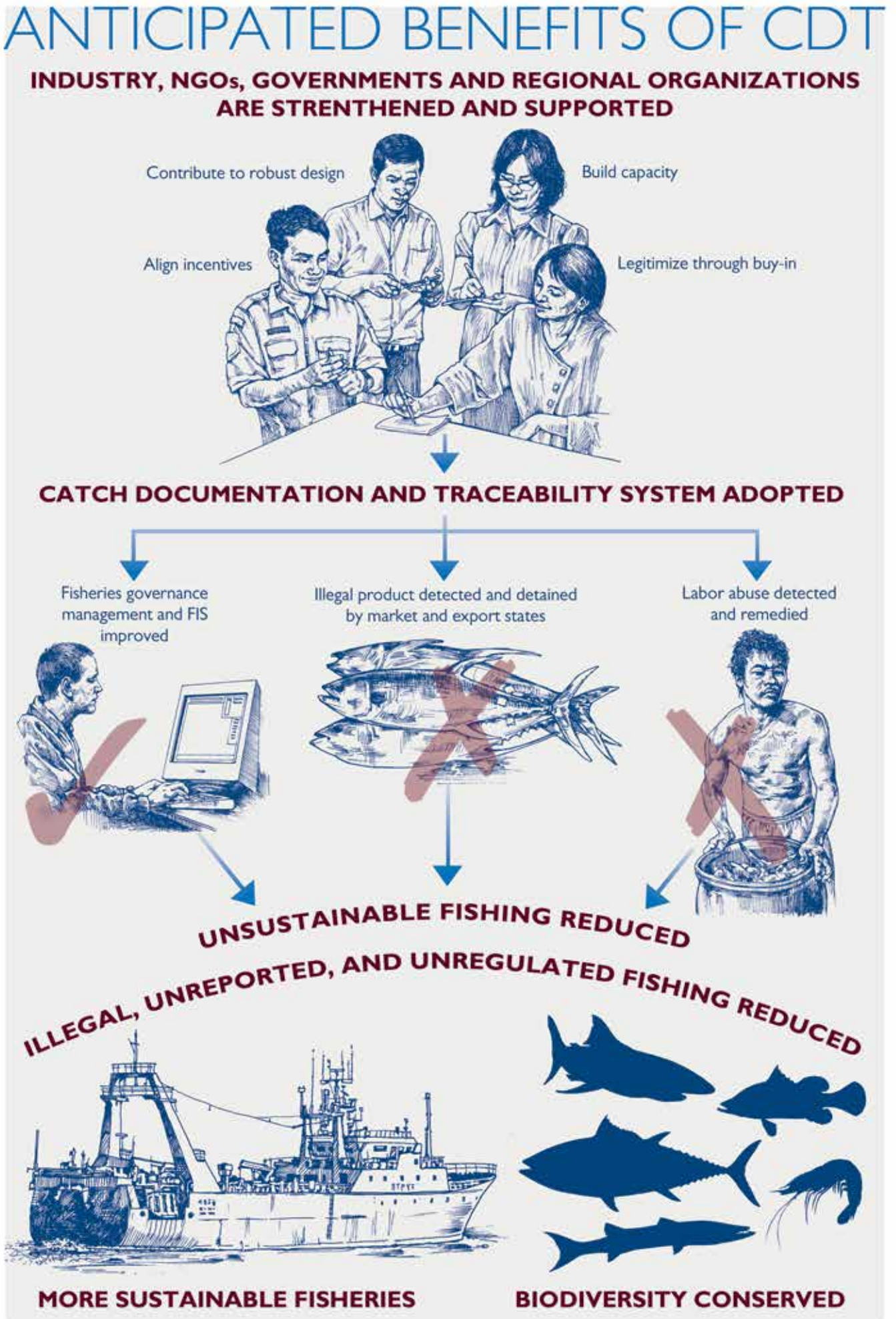
Catch Documentation and Traceability Explained



Defining Catch Documentation and Traceability (CDT)

A foundational concept of the USAID Oceans Project is the documentation and traceability of seafood products after being caught. For project purposes, catch documentation and traceability is defined as recording and sharing verifiable information relating to a specific seafood product throughout the product's movement within the full seafood supply chain; i.e., information captured from the point-of-harvest, throughout the various buyers, processors, shippers, importers, distributors, and retailers that handle the product, all the way to the end consumer. In other words, CDT means that once captured, the full "path" of a traceable seafood product can be followed, from the fishing boat to the dinner plate.

FIGURE 3. The Anticipated Benefits of CDT System Adoption through the USAID Oceans Project



CDT in IUU Fishing

In terms of how traceability will help to address IUU fishing, each aspect must be addressed individually. For illegal fishing, traceability provides a path towards the “proof positive” approach, whereby validated traceability data is required to support the entry of product into commerce, as has been adopted on a limited basis within certain fisheries, is in the process of being adopted for certain at-risk species imported to the US and, under a slightly different structure, is applied to product imported into the EU.^{12, 13, 14}

When combined with strong port-state control measures to prevent the importation and sale of undocumented fish, CDT can significantly limit the market for illegal fish and reduce revenues to illegal operators, while strengthening market access for harvesters who are operating legally.

By involving all actors within the seafood supply chain as partners in the effort to deter unreported fishing, USAID Oceans will encourage trade in legally caught, properly labeled fish. Furthermore, the development of a common set of traceability standards will provide a technical platform for fish processors and exporters to share data and consequently take an increasing role in ensuring that, before they accept seafood products

for processing, their suppliers (fishers) have complied with all relevant regulations. Fortunately, traceability will assist fish processors and exporters to comply with the increasingly stringent policies of international seafood buyers.

For unregulated fishing, traceability serves to strengthen existing methods of regulation. By capturing multiple types of data at a single source, fisheries controls can be applied in an adaptive and informed way at scale. For example, regulators can use the data to monitor threatened or endangered marine species, limit by-catch, or enforce prohibited gear-types in an area.

Additionally, experience with existing electronic catch reporting systems has demonstrated that collecting data from the harvester and processor makes falsification of catch records significantly more difficult and detectable.¹⁵

Capturing data at the point of export goes a step further and assists in verifying country of origin. For example, if large discrepancies are observed between landing records versus later export documentation, this would suggest product is being rerouted on the gray or black market, and possibly re-exported elsewhere.



PHOTO: MELINDA DONNELLY

CDT in Labeling of Seafood Products

Traceability, provided it is implemented throughout all stages of the supply chain, can lead to a reduction in the prevalence of mislabeling; whether intentional (i.e., seafood fraud) or resulting from a lack of proper quality controls.

Mislabeling can occur in several ways, including incorrectly labeled species, inaccurate country of origin records, or repackaging of an IUU product to make it appear to be legitimately caught. There are indications that mislabeling often occurs during the final stages of the supply chain, when the seafood product is

nearing the consumer. At this point in the supply chain, consumers are largely dependent on retailers to trace and verify that each item of seafood is correctly labeled.

DNA testing shows particular promise as a method to detect seafood mislabeling.¹⁶ Although, as discussed in this report, traceability does not necessarily link to DNA testing, the CDT system’s technical infrastructure could be leveraged in the future to support DNA testing results that are digitally associated with traceability records.

CDT in Food Safety

As fisheries regulators have approached the question of traceability from an IUU prevention perspective, the fishing industry and food safety regulators have progressed on a parallel path focusing on food safety.¹⁷ This builds off of similar, successful meat and produce traceability initiatives within the agriculture industry, which are particularly relevant because they involve temperature controlled supply chains. Fisheries management and food safety can be complementary efforts, with key overlapping data needs that can be supported by traceability. While traceability does not guarantee that food safety standards are being met, the electronic traceability system can require and share essential food safety-related documents such as health certificates along the supply chain.

Through the use of the CDT system, USAID Oceans aims to achieve better visibility within the early stages of the seafood supply chain (i.e., harvesting and processing), borrowing from existing processes adopted by the cold storage food supply chain beyond seafood. Doing so will provide a stronger economic incentive for seafood traceability. In particular, traceability that is associated with assurances of high seafood quality and safety will provide assurances back to the point-of-harvest. This may garner more support than an approach based on promoting sustainability benefits alone.



PHOTO: DONALD BASON

CDT in Labor Practices

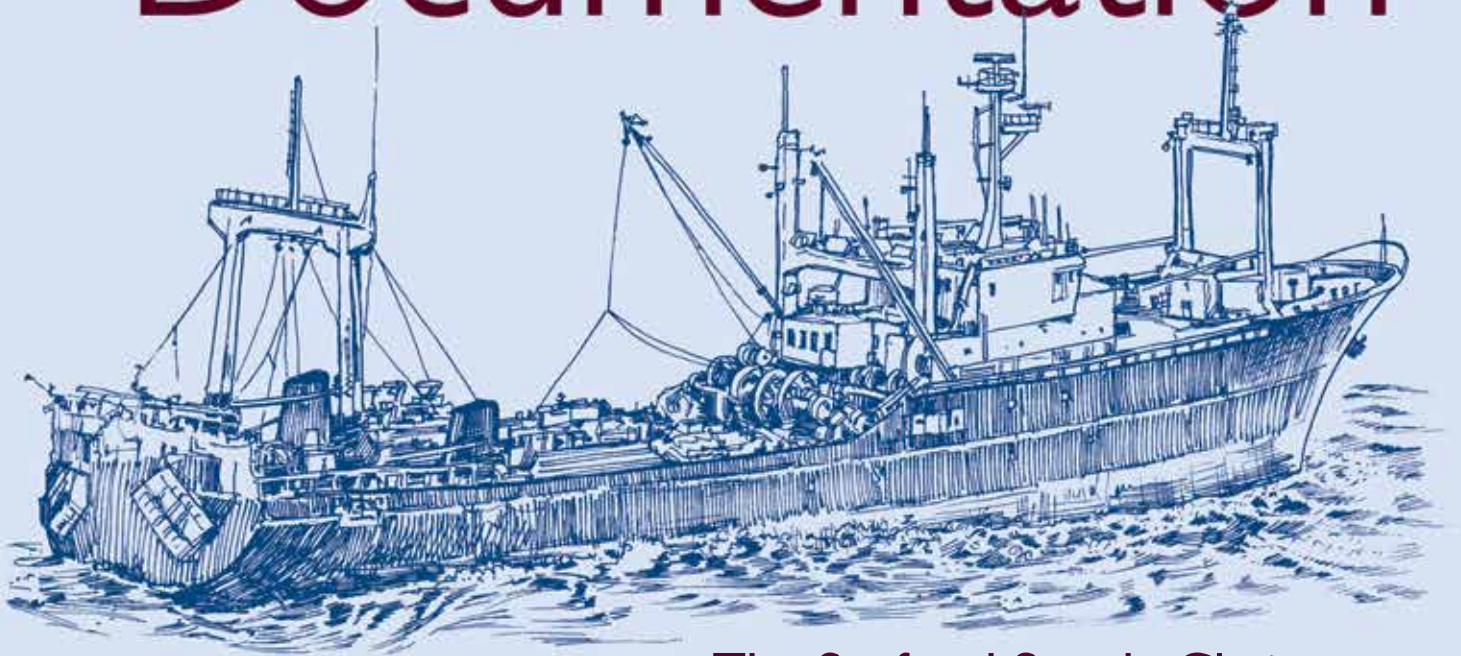
There is an inherent link between those who harvest a product and product traceability. Traceability requires knowledge of the responsible party at point-of-harvest; for example, the captain of a fishing vessel. The use of vessel monitoring systems (VMS) and automatic identification systems (AIS) within commercial fisheries is well-established, providing georeferenced data on vessel position and activity. VMS and AIS are also beneficial in that they enhance maritime safety. Providing basic communication services (e.g., email, phone) to crewmembers can improve their safety and welfare.

In theory, such crew welfare benefits would be further expanded as traceability becomes commonplace. To the extent that new standards are being set by regulators to require catch data collection for traceability, improved crew welfare and communications may also benefit. Where feasible, technology should form an at-sea “communications hub” suitable for use for both traceability reporting and crew welfare.

Additionally, this should improve the monitoring of crew movements, particularly between vessels at sea. Some approaches adopted in other segments of the maritime industry may provide a suitable starting point for considering how worker safety could be improved within high-risk occupations in the fishing industry.¹⁸ For example, the use of electronic reporting systems requiring crew to be regularly in touch with a safety or quality supervisor could provide a path to improved working conditions, enhanced safety, and independent verification of the location and status of crewmembers.

While the USAID Oceans CDT system, at this time, only applies to marine capture fisheries, labor issues affect both those fisheries as well as aquaculture production. A successful electronic traceability system could also be applied to products of aquaculture in the future.

Catch Documentation



The Seafood Supply Chain

The simplest supply chain involving seafood products being shipped to foreign consumers would involve actors in two countries: the country where the seafood product was harvested, and the country where the seafood product is being imported for consumption. Actors involved in such a supply chain would often include: the fishing operator who harvested the seafood product, the handlers and processors, the cold storage shippers, fisheries regulators from both the exporting and importing nations, customs representatives and food safety regulators from the importing nation, retailers, and the end consumer. In some cases, regional and transnational regulators — such as Regional Fisheries Management Organizations (RFMOs) — are also involved in the operations of the supply chain.

To capture and exchange data reliably within such a diverse environment presents a variety of technical, political, and logistical challenges. Additionally, the stakeholders (i.e., harvesters, processors, ports, fisheries regulators, cold chain, customs agencies, wholesalers, retailers, NGOs, and technology suppliers) each bring a unique perspective on the benefits of traceability and where resources should be focused under a risk-based model. The USAID Oceans electronic CDT system must account for and incorporate the diverse needs and perspectives of the full range of relevant stakeholders within the supply chain in order to be successful.

Supply Chain Approaches

There are five relevant approaches to integrate CDT within the seafood supply chain:

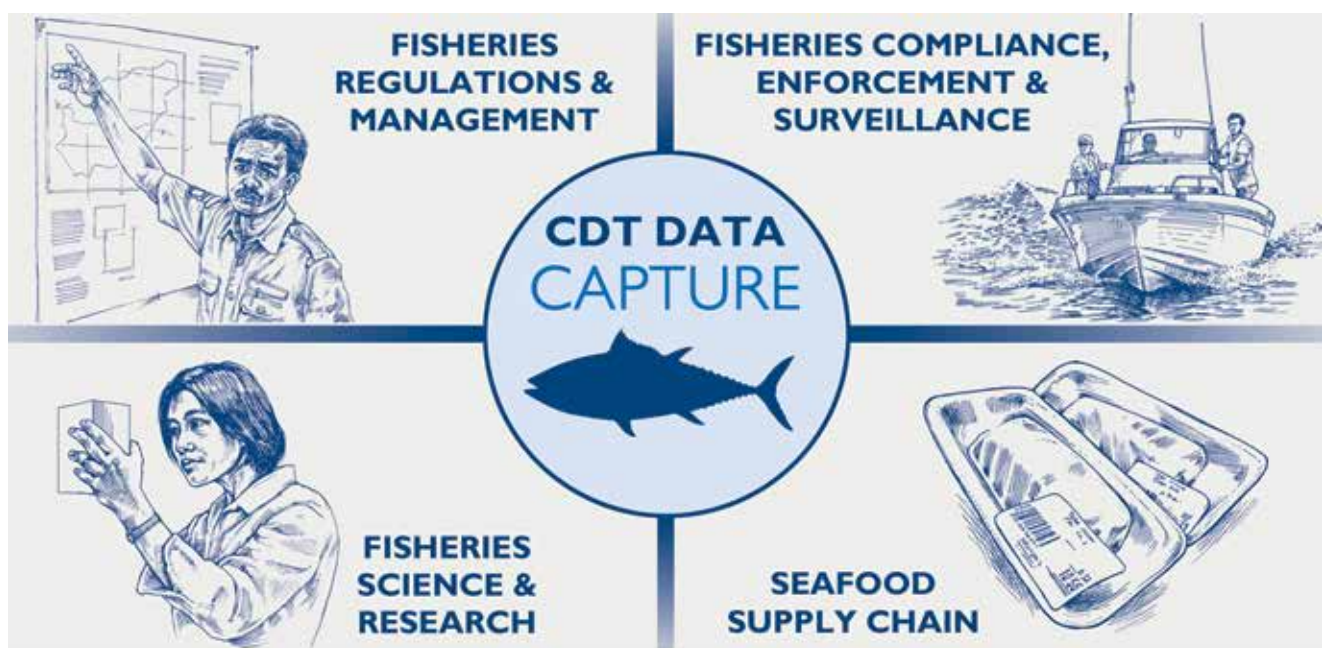
- 1. Supply Chain Initiatives:** Based on food traceability, generally, with a focus on product that has been processed, packaged, and therefore has a bar code or RFID tag attached. There are a number of standard and de facto industry standard data formats already in widespread use.
- 2. Customs Agencies:** “Single Window” electronic clearance initiatives deal with all goods, not specifically seafood. They tend to align, to some extent, with the supply chain data standards and adopt similar approaches.
- 3. Fisheries Authorities:** Various electronic reporting systems, involving web-based data entry, data logging with later upload and, in some cases, real-time reporting via satellite communications exist. The data standards used tend to parallel existing paper logbook formats, and can be highly specific to an individual regulator. Some pan-regional standards exist, primarily at the level of the EU, and for some data exchanges between RFMOs. There is wide variation in approach to data entry, with some regulators specifying an application (for example, using tablets and smartphones rather than laptops), while others define only the data standard and some form of approval process for software vendors.
- 4. Fishing Industry:** Many commercial harvesters use software to manage their production process. This includes, along with other data, detailed catch logs. In many cases the data collected for

internal purposes is more granular than required by regulators; which raises the question of whether such systems might automatically generate regulatory and traceability reports (reducing the compliance burden for industry).

- 5. Independent Certification Bodies (including NGOs, non-profit and for-profit vendors):** Most systems of this nature address points early and late in the supply chain (i.e., harvest and retail) and rely on a database of record maintained by the certifier — with some form of website access provided for the harvester or processor, and separately for retailers and/or consumers.

Within the supply chain, USAID Oceans proposes to facilitate traceability from the cold storage and shipping part of the chain (where standards exist) back to the processor and harvester (where standards are less developed). The CDT system will cover the entire supply chain, but will USAID Oceans will focus efforts on the upstream where data is infrequently collected and integrated. Through partnerships with the Global Food Traceability Center and others, USAID Oceans will also ensure the CDT system aligns with and meets the needs of importers, retailers and the food service industry. The objective is to promote seafood traceability and transparency to be embedded within existing FISs (operated by fisheries regulators), “Single Window” customs and importing systems (operated by customs agencies), and catch reporting, logistics, and Enterprise Resource Planning (ERP) systems (operated by harvesters and processors within the supply chain).

FIGURE 4. Relevant Fisheries Dimensions supported by CDT Capture



CDT Partners



USAID Oceans is engaging multiple stakeholders — governments, intergovernmental organizations, associations, seafood and technology companies, fisher groups, NGOs and others — in the design and implementation of the CDT system. By involving stakeholders throughout the supply chain, USAID Oceans is taking a global approach to the development and implementation of the CDT system.

Developing partnerships in the seafood and other relevant industries grounds the CDT with regional and international realities, and will provide increased scale and sustainability of the system in the long-term. It is critical to keep governments involved in the design, implementation, and management of the CDT system (or components thereof), as they are key providers of some of the key data elements (KDEs) and have a role in ensuring the quality and authenticity of data in the CDT system. Regulations can be a key driver for adequate adoption of the CDT system.

FIGURE 5. CDT in Practice, throughout the Seafood Supply Chain

FROM BAIT TO PLATE

Tracing Seafood through the Supply Chain with Catch Documentation

HARVEST / CAPTURE



Fishing vessels to take only their agreed catch of species from permitted areas.



PORT INSPECTION

License and documentation on the size, volume and location of the catch are checked and certified.



PROCESSING AND SHIPMENT

Authorized catch is sent for processing and dispatched to destination country for sale.



WHOLESALE / RETAIL MARKET

Product labels provide customers with information on the seafood.



BORDER INSPECTION

Customs review documentation and inspect the seafood to ensure the catch is legal.



Traceability helps answer the question of "who, what, where, when and how" your seafood was caught, processed and transported before it reaches your plate.

A public private partnership (PPP) or multi-stakeholder approach is essential to ensure the CDT system is designed to meet the needs of different user groups, and getting inclusive adoption of the CDT system that supports sustainable fisheries management.

Given the scale of the challenge, USAID Oceans will also engage development partners, foundations and other funding partners to support the deployment and expansion of the CDT system. Industry organizations that can identify and develop relationships and engage other business sectors (e.g., telecommunications and shipping) will be important for ensuring the CDT system can benefit from the experience, expertise, practices, and technology already developed in those sectors. In addition, by linking relevant portions of the CDT effort to other industries, it will be possible to create cost efficiencies, economies of scale, and other added value, increasing the potential to engage investors.

Banks, impact investors and other financial institutions can provide more sustainable investment and financing mechanism that can address the cost barriers and support wider adoption of the CDT system.

USAID Oceans will develop strategic market-driven partnerships that take advantage of the industry's technical expertise, market position and capacity to engage their national and local government counterparts. Engaging buyers, seafood companies and NGOs early in the design of the CDT system will be essential to motivate suppliers to adopt and scale the CDT system across multiple countries and fisheries in Asia Pacific, and provide a more common industry voice on traceability standards and requirements.

Leading seafood companies and NGOs can play a key role in promoting the wider adoption of traceability, and build the capacity of small-scale suppliers to adopt traceability and participate in the CDT system.

Strategic Partnerships Approach and Objectives

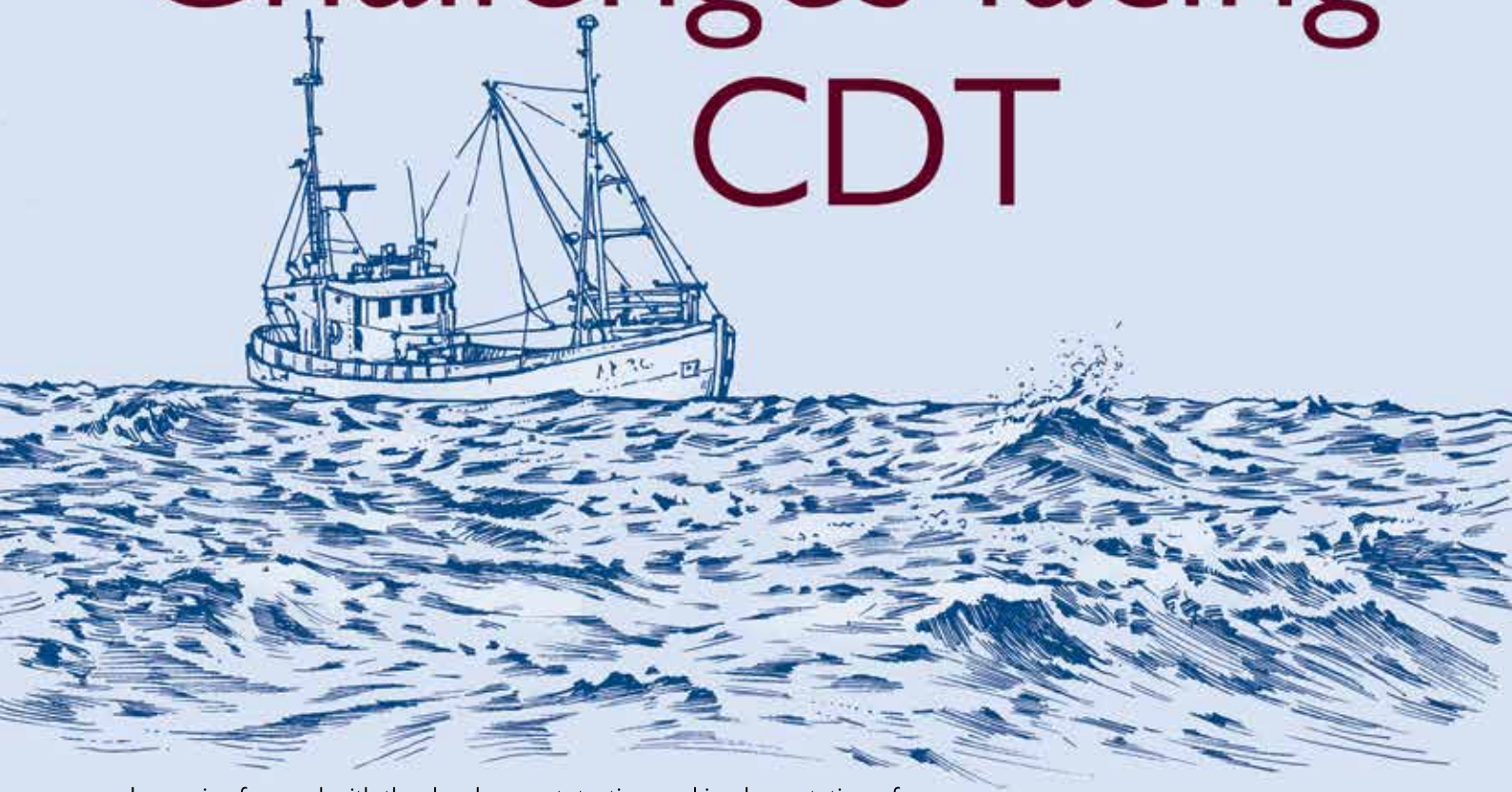
USAID Oceans is looking to develop a number of strategic partnerships with technology providers to harness the latest communication technologies and traceability innovations to ensure the successful development, implementation and adoption of CDT and FIS. For industry and governments, partnerships will play a key role in lowering the risk involved in adopting technologies. Partnerships with technology companies can also demonstrate an interoperable and flexible CDT system that works for multiple value chains, different industry scales and markets. Initially, USAID Oceans will focus on identifying partners that can support the design and development of the technical architecture for the minimum viable product of the CDT system. USAID Oceans will also engage technology partners to:

- Address connectivity issues at sea and in remote landing areas and communities to enable data collection for both traceability and fisheries management;
- Optimize catch reporting mobile applications for electronic data capture and verification anywhere at sea, and remote areas not currently serviced by reliable communication services using existing low cost technologies;
- Demonstrate interoperability between multiple technology providers in the CDT demonstration, and identification of sustainable business modeling to effectively scale the system;
- Develop and deploy mobile application and wireless mobile-to-mobile sensor developments for collecting environmental and traceability data; and
- Develop and deploy cost-effective data collection and communications technologies for small scale artisanal and small scale commercial fishing vessels.

Key components of the USAID Oceans PPP approach include:

- A focus on fisheries industry PPPs;
- Close coordination with regional partners such as SEAFDEC, CTI-CFF, and IUU-RPOA;
- Partner capacity building and technical assistance at national and site levels; and
- Engagement and consultation with partner standards organizations, key companies, industry organizations, and other private sector entities.

Challenges facing CDT



In moving forward with the development, testing, and implementation of an electronic CDT system for Southeast Asia, there are a number of challenges that must be recognized and addressed or managed.

Technological Infrastructure

One major obstacle to adoption of an electronic CDT system is the inconsistent level of available and operable information technology and digital communications infrastructure to meet minimum requirements for real-time electronic reporting. For example, a lack of cell tower availability or inconsistent cellular network service could restrict the range or fully prohibit the use of digital communications by fishing operators within specific areas of coastal waters. The capital investment needs to install and maintain such infrastructure is significantly higher than the budgetary scope of the USAID Oceans project.

RECOMMENDATIONS TO ADDRESS/MANAGE THIS CHALLENGE:

- Test CDT within seafood supply chains that have minimum technological infrastructure needs for realtime catch reporting.
- Recruit project partners who have innovative information technology solutions and can support the development of technological capacity to meet minimum needs.

Traceability Standards

For the CDT system to be credible and accepted, it must incorporate accepted standards for seafood traceability. At present, no universally accepted standards for seafood traceability have been adopted within Southeast Asia. While initial scoping for international standards is underway by credible experts and global standards-setting institutions, traceability standards are not being applied consistently throughout Southeast Asia.

RECOMMENDATIONS:

- Engage with relevant international food product standards-setting institutions to propose regional standards that would be acceptable within the international community.
- Facilitate regional and national partnership discussions on the development of standards suitable for seafood traceability.

Data Collection

At present, most fisheries landings data are typically captured inconsistently throughout the Southeast Asian region, and largely through paper-based data collection and storage systems that are specific to national or sub-national (e.g., provincial) guidance. Commercial operators may be reluctant to invest in electronic CDT technology until there is a proven market for real-time, traceable seafood products. Also, fisheries regulators will likely be reluctant to take on the full cost of developing proprietary electronic data systems specific to their fishery management needs. Moreover, requirements for data security (e.g., encryption), storage, maintenance, and real-time access must be considered in the development and testing of CDT systems within the region.

RECOMMENDATIONS:

- Develop the project's CDT system prototype to build upon shared data needs and common elements within current paper-based collection systems throughout the region, such as ACDS, though it will not completely eliminate all paper-based documentation.
- Recruit of seafood importing partners within US and EU markets to test real-time traceable products with retail consumers.
- Develop and test of proposed data security, storage, maintenance, and access protocols.

Data Interoperability

Fisheries regulators use different management approaches and customs clearance systems based on differing data and management standards. In the private sector, individual vendors may use varying standards for sustainability, safe and fair labor, and quality. The result of such differing data and management standards is that the paperwork and certificates issued are often in different and incompatible formats. This results in a lack of interoperability between data sources, limiting traceability.

Furthermore, absent sufficient safeguards, data can be altered or falsified. Consideration must be given to how traceability data may be shared, accessed, and recombined. Commercial interests must be protected from data fraud or misuse; for example, price information need not be disclosed to obtain confirmation of a labor certification, as has been repeatedly raised by industry representatives.

RECOMMENDATIONS:

- Develop, test, and apply a CDT system that, through an open-source solution, harmonizes existing fisheries data streams and demonstrates interoperability while respecting data sovereignty.
- Consider a standard Digital Traceability Document (DTD) that converts key data elements into a common format.
- Employ strong (verifiable, consistent, and clear) digital signatures as a core component of the interoperable traceability standard designed within the CDT system.
- Build safeguards into the CDT prototype to protect against data falsification or misuse, while protecting product sensitivities and non-traceability related proprietary interests.

Unique Identifiers

The use of unique identifiers in commercial fisheries is of considerable interest, with diverse and multiple approaches used. For example: IMO numbers are used for larger vessels, whereas smaller vessels typically have unique identifiers issued at the country level.¹⁹ Fisheries authorities may also issue their own unique identifiers (i.e., fishing license numbers). Finally, the supply chain operates on unique identifiers assigned by global standards bodies (e.g., GSI, the United Nations, and ISO).

RECOMMENDATIONS:

- Consider national government interests and use of unique identifiers within the commercial fisheries sector in the development of the CDT prototype.
- Test and use adaptive modification of unique identifiers across seafood supply chains throughout the region throughout the project lifetime.

Data Burden

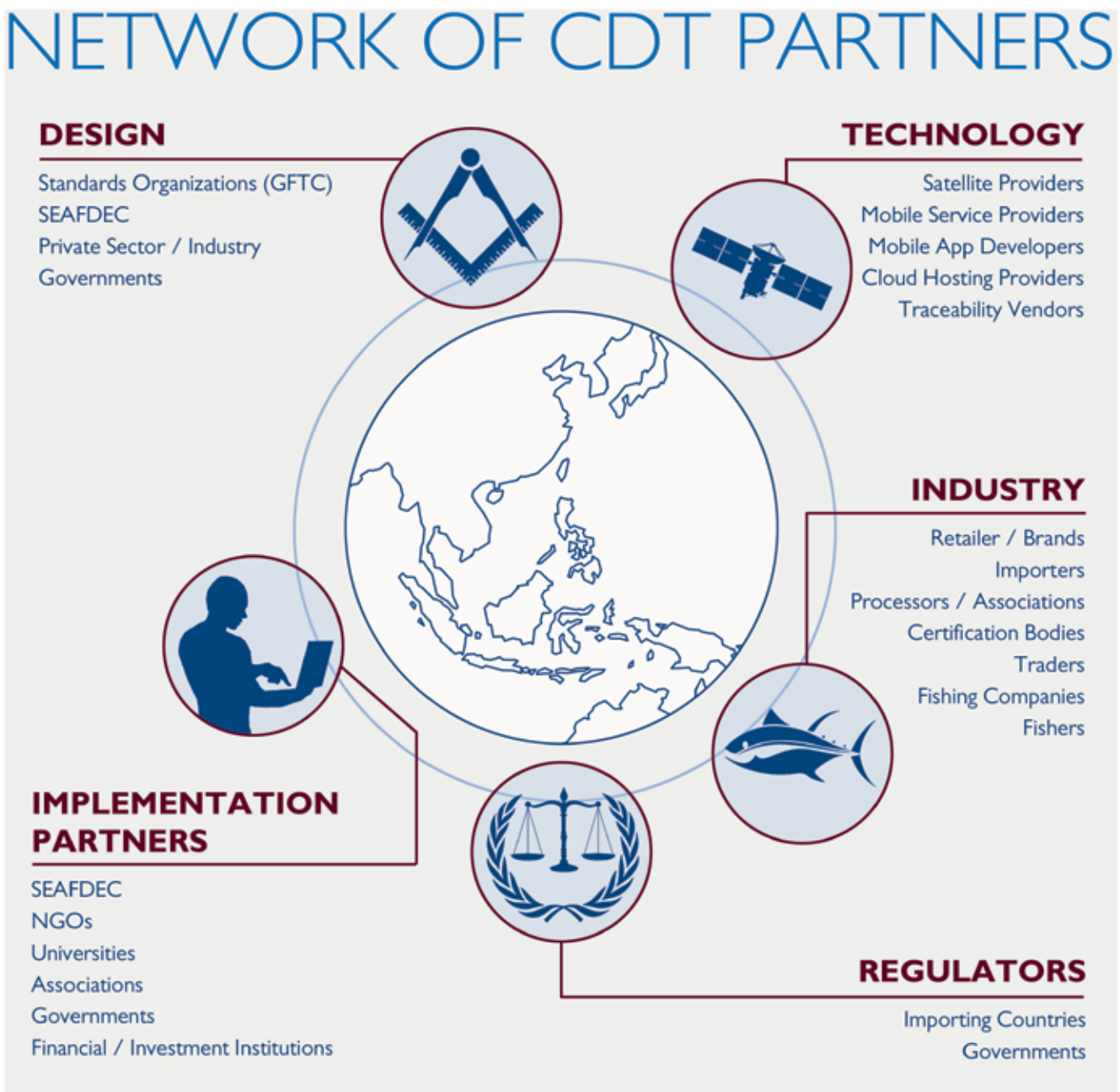
It is important for the project to consider the burden of data collection that is placed on industry under an electronic CDT system approach. While there are several existing data collection systems installed for commercial fisheries operations (particularly as one moves downstream within the supply chain), recruiting willing industry partners to transition these existing data systems to a new one may provide challenges.

In addition, there may be apprehension and/or avoidance by national government authorities in transitioning them out of paper-based catch reporting and data collection schemes into an electronic-based CDT system.

RECOMMENDATIONS:

- As appropriate, give due consideration to existing data collection and reporting systems in terms of how to transition to electronic CDT with the least amount of difficulty and investment.
- Where possible, build the electronic CDT KDEs on and incorporate existing requirements (ACDS, EU, US).
- Where possible, avoid manual data entry or re-entry to minimize data burden.
- Invest the necessary time, training, and testing with industry and agency partners to transition to an electronic CDT system.

FIGURE 6. . Network of CDT Partners



Transparency

At present, there are no established or formally-endorsed legal, policy, or technical mechanisms for collecting and exchanging traceability data within regional or national seafood supply chains. As a result, this limits the effectiveness of other efforts that government and non-government stakeholders are engaged in to promote sustainability, improve labor practices, and increase food safety. Without established mechanisms for traceability data to be collected and exchanged, there will be limited to no transparency within the seafood supply chain.

RECOMMENDATIONS:

- Establish regional and national policy and technical mechanisms to collect and exchange traceability data throughout Southeast Asia.
- Develop an electronic CDT prototype that allows participating industry representatives to select their preferred technology providers, and to capture traceability data as a part of their existing data technology systems, as appropriate. Such an approach could facilitate a competitive market for traceability solutions, encourage innovation, and reduce costs to industry when implementing traceability.

PHOTO: MELINDA DONNELLY



Regulatory Limitations

The regulation of wild capture fisheries as a food supply chain can be highly complex, due in part to fish being a common pool resource sometimes captured beyond national jurisdiction. Conflicting rules, regulations, and other legal instruments (local, national, regional and international) contribute significantly to failures in enforcement. There are few comparable markets where the volume of a product entering into a supply chain has the same varying levels of regulatory controls, variability in harvest locations and/or techniques, and quotas.

RECOMMENDATIONS:

- Test the electronic CDT prototype initially within relatively well-understood, regulatory simple, and non-convoluted seafood supply chains as 'best case' scenarios.

Enforcement

Traceability alone cannot speak to the effectiveness of MCS efforts and fisheries enforcement operations (e.g., limits on the total number of fishing vessels) or enforcement and compliance capabilities. While CDT links to information needs relating to fisheries enforcement information, alone the CDT system cannot serve as a proxy for MCS performance. Rather, CDT systems can serve as contributors to enforcement-related information needs.

RECOMMENDATIONS:

- Demonstrate how the electronic CDT system can contribute toward addressing MCS information needs, and support existing information needs related to national fisheries enforcement efforts and priorities.

Recommended minimum viable approach for CDT



The USAID Oceans project aims to develop and implement an electronic CDT system that would be considered a minimum viable approach to achieve interoperable seafood traceability.

USAID Oceans recommends that the electronic CDT system reflect the following elements of a minimum viable approach:

- Undertaking a selected series of demonstration projects within the Southeast Asia region, ideally involving representative small, medium, and industrial-scale fishing operations.
- Undertaking usability testing in human-centered design uptake and system productivity.
- Incorporating catch reporting (data capture) at both point-of-harvest and point-of-processing, including demonstrating the ancillary crew welfare benefits, as previously outlined, that can also be achieved at-sea.
- Ensuring that data gathered are converted to an interoperable format, and represented within a flexible Digital Traceability Document (DTD).
- Developing and demonstrating an approach to harmonizing technical standards — including key data elements and unique identifiers — as used by the supply chain, fisheries management authorities and customs agencies.



- Demonstrating a single DTD, attached to wild caught catch, containing multiple independently issued certifications of sustainability, labor and quality and further demonstrate that these certifications can be attached and shared, with appropriate safeguards in place, to protect the confidentiality of commercially sensitive data.
- Observing the forgoing data used to electronically clear product for entry to US commerce, via the Customs and Border Protection's Automated Commercial Environment.²⁰
- Observing the forgoing data being used by a US supply chain from point of import, through wholesale, to retail point-of-sale.

In addition, the USAID Oceans team recommends that:

- The purpose, scope, and general parameters of the CDT system be developed with input by relevant stakeholders;
- An electronic document-based architecture serves as the basis for the electronic CDT system;
- VMS and electronic catch reporting be starting point for introducing the wider CDT system;
- A new DTD with key data elements be developed to support interoperable data needs;
- All software tools used to support the CDT system be multi-lingual and support UTF-8;
- Adoption of an existing XML based data entry and exchange standard under the CDT system;
- An open-source operating system and software be used to develop the CDT system;
- XML digital signatures and web-based security protocol be incorporated within the CDT system;
- All data formats be converted to a common XML standard to promote interoperability and ease of data transport (e.g., internet, cellular network);
- For data transport that uses narrow bands where the data payload needs to be small, a complimentary JSON scheme that is later rolled up into a standard XML format will be considered;
- Promote the use of machine to machine (M2M) technology and the internet of things (IoT);
- Satellite network-based communications technologies (e.g., Iridium, Inmarsat) be used to compliment cellular network, especially for out of coverage areas; and
- A digital cloud data storage service is considered over a private server.

FURTHER READING

Electronic Catch Documentation Systems (selected examples)

- United States: [NOAA Fish Information System Program](#) (also, as implemented by the Atlantic States fisheries)
- European Union: [FLUX](#), [Electronic Vessel Reporting](#) (domestic) and [Catch Certification Scheme](#) (for imports: currently paper based, but converted to electronic format upon inspection of documents)
- Asia: [ASEAN Catch Documentation Scheme](#) (ACDS)

Supply Chain Perspective and Existing Data Standards

- IFT: [Assessing the Value and Role of Seafood Traceability from an Entire Value-Chain Perspective](#)
- GSI: EDI XML Electronic Document Interchange Standards ([general](#), for [seafood](#), for [meat products](#))

Customs “Single Window” Initiatives (selected examples)

- United States Customs & Border Protection Automated Commercial Environment (ACE)
- ASEAN Single Window (ASW)
- European Maritime Safety Agency (EMSA) National Single Window Prototype (NSW)

The Global Seafood Market

- [The State of World Fisheries & Aquaculture](#) (United Nations Food & Agriculture Organization)
- [Fisheries of the United States](#) (National Oceanic and Atmospheric Administration)
- [The EU Fish Market](#) (European Commission)

ASEAN Combating IUU Fishing and Seafood Fraud

- [Guidelines for Preventing the Entry of Fish and Fishery Products from IUU Fishing Activities into the Supply Chain](#) (ASEAN)

The Presidential Task Force on Combating IUU Fishing and Seafood Fraud

- [Establishing a Comprehensive Framework to Combat IUU Fishing and Seafood Fraud](#)
- [Recommendations of the Presidential Taskforce on Combatting IUU Fishing and Seafood Fraud](#) (Federal Register)
- [Action Plan for Implementing the Task Force Recommendations](#) (Departments of Commerce and State)
- [Draft principles for determining seafood species at risk of IUU fishing and seafood fraud](#) (NOAA)
- [Determining Types of Information and Operational Standards Related to Data Collection](#) (NOAA)

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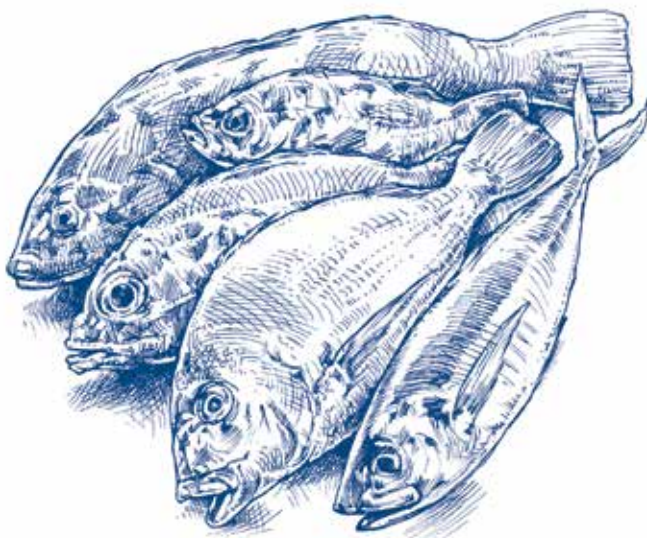
- ¹ SEAFDEC: Oceans & Fisheries Partnership <http://www.seafdec.org/tag/fisheries-partnership/>
- ² Rabobank: Seafood is world's most widely traded animal protein <http://www.seafoodsource.com/news/supply-trade/27854-rabobank-seafood-is-world-s-most-widely-traded-animal-protein>
- ³ NOAA: Illegal, Unreported and Unregulated (IUU) Fishing http://www.nmfs.noaa.gov/ia/iuu/iuu_overview.html
- ⁴ FAO: The State of World Fisheries and Aquaculture 2014 <http://www.fao.org/3/a-i3720e.pdf>
- ⁵ WRI: Reefs at Risk Revisited in the Coral Triangle http://www.wri.org/sites/default/files/pdf/reefs_at_risk_revisited_coral_triangle.pdf
- ⁶ Marine Policy (2014; Vol 28, pp 102-113): Estimates of illegal and unreported fish in seafood imports to the USA <http://www.sciencedirect.com/science/article/pii/S0308597X14000918>
- ⁷ The Washington Post: Seafood study: up to 32% imported to US is caught illegally https://www.washingtonpost.com/national/health-science/seafood-study-up-to-32-percent-imported-to-us-is-caught-illegally/2014/04/20/3ceeabe0-c04d-11e3-bcec-b71ee10e9bc3_story.html
- ⁸ Oceana Study Reveals Seafood Fraud Nationwide http://usa.oceana.org/sites/default/files/reports/National_Seafood_Fraud_Testing_Results_FINAL.pdf
- ⁹ NOAA Fish Information Systems Program <http://www.st.nmfs.noaa.gov/Assets/FIS/documents/FIS%20Brochure%20Web.pdf>
- ¹⁰ DG-MARE: Electronic Reporting and Recording System <http://ec.europa.eu/fisheries/cfp/control/technologies/ers/>
- ¹¹ FAO (2003): Technical Guidelines for Responsible Fisheries: the Ecosystem Approach to Fisheries <http://www.fao.org/docrep/005/Y4470E/y4470e00.htm>
- ¹² NOAA / IUU Taskforce: <http://www.nmfs.noaa.gov/ia/iuu/taskforce.html>
- ¹³ CCAMLR: Catch Documentation Scheme <https://www.ccamlr.org/en/compliance/catch-documentation-scheme-cds>
- ¹⁴ DG-MARE: The EU rules to combat illegal, unreported and unregulated fishing http://ec.europa.eu/fisheries/cfp/illegal_fishing/index_en.htm
- ¹⁵ SAFIS: Electronic Dealer Reporting <http://safis.accsp.org/electronic-dealer-reporting>
- ¹⁶ Seafish: DNA Testing of Seafood http://www.seafish.org/media/publications/SeafishGuidetoDNATestingofSeafood_201312.pdf
- ¹⁷ GSI: Foundation for Fish, Seafood and Aquaculture Traceability Implementation Guideline http://www.gsi.org/docs/traceability/GSI_Foundation_for_Fish_Seafood_Aquaculture_Traceability_Guideline.pdf
- ¹⁸ OSHA: Safety while Working Alone at Shipyards https://www.osha.gov/Publications/OSHA_FS_3591.pdf
- ¹⁹ IMO Identification Number Schemes <http://www.imo.org/en/OurWork/MSAS/Pages/IMO-identification-number-scheme.aspx>
- ²⁰ CPB: Automated Commercial Environment <http://www.cbp.gov/trade/automated>

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