SAFET

SEAFOOD AND FISHERIES
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Impact at Scale for a Sustainable and Resilient Future

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Abstract Book

Combining EM and ER solutions to create an integrated solution with machine learning for improvements in EM review times and bringing advancements that benefit fishers to encourage uptake outside of regulated programs only.

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Abstract

eem Fish and OLSPS have joined together to create an integrated monitoring and reporting solution (iEMR), which will feed EM data into the logbook and logbook data back into the EM review platform.

The electronic logbook will automatically populate the necessary fields using predefined lookup tables, historic values, sensory input and when possible machine learning estimated values. The eLog generated reports will be the skipper's formal and legal declaration of catch and fishing effort & the EM data will be used to verify and confirm the Skipper's report. The iEMR solution will also allow reviewers to easily scrutinize and confirm the skipper reports by automatically linking the reported data to the correct time period in the EM review platform.

In addition to the above described integration, the proposed iEMR solution will also include an image labeling utility that will allow users to easily label objects on the EM frames and feed them into a supervised image processing training model. Our vision is that, with time, our proposed iEMR solution will allow each vessel or fleet of related vessels to build a user specific image processing model that will allow catch to be estimated and critical events such a discarded and marine life interaction to be identified automatically.

Key Advantages

- Allowing EM and ER technologies to work in tandem and by doing so to significantly increase data quality and reports integrity.
- Improved E-Logbook capture using AI learning and imagery to self populate certain fields
- Near real time reporting of critical data, such as fishing effort and catch by species
- Instant images of catch to share with markets for showing quality of catch
- Images linked to catch for improved traceability, which could yield increased value of fish
- Pioneering EM technology with advantages for fishing companies may increase non regulatory uptake of EM.

Presenter Bio

Ali has been involved in the marine industry for over 25 years and has specialized in marine electronics technology for the past 16 years. During this time, Ali has gained extensive experience in designing complete electronics systems for commercial fishing vessels, ranging from inshore vessels to large factory trawlers.

Ali has played a pivotal role in implementing EM (Electronic Monitoring), ER (Electronic Reporting), and VMS (Vessel Monitoring Systems) solutions in New Zealand. Currently, Ali is dedicated to expanding the global reach of Teem Fish and Pinpoint Earth, innovative products made in New Zealand.

Given Ali's extensive background of collaborating with fishers, fishing companies, governments, installers, and manufacturers, Ali is acutely aware of the challenges they face. Ali recognizes the importance of ensuring that advancements in these fields are practical and beneficial for all stakeholders, promoting widespread adoption.

The CatchID-Program

Ole Høstmark, Bjarne Schultz, Pia Jonsson, Thord Monsen

The Directorate of Fisheries, Bergen, Norway

Abstract

The CatchID-Program, launched by the Norwegian Directorate of Fisheries in 2021, aims to support the development of new technological solutions, to address the current and future documentation needs of the fishing industry. The program was initiated as a response to the identified challenges related to self-reporting of catches by the industry, which allows room to circumvent the current regulations with low risk and poses difficulties for authorities in exposing illegal, unreported and unregulated (IUU) fishing and crimes in the fisheries sector. Additionally, increased expectations from consumers, markets and other countries' authorities necessitate improved documentation of the legality and sustainability of fishing activities.

As a response, the CatchID program aims to develop and introduce new technological solutions to be used on board fishing vessels, where the technology represents an independent third party. The approach can be described as a compliance by design architecture, which represent an end-to end process in which information is collected from the source system and distributed to the relevant public agencies and other relevant parties. Successful implementation of this program will lead to enhanced confidence in stock management, accurate deduction of quotas, and improved transparency across the value chain. Consequently, it will foster increased trust among industry stakeholders, managers, scientists and the society as a whole.

Currently, the CatchID-Program is actively engaged in several ongoing national and EU-funded projects that aligns with its objectives. These projects are primarily focusing on development of technological solutions based on artificial intelligence/machine learning (AI/ML) and machine vision for automated weight and species registration in various fisheries. Additionally, the potential use of Distributed Ledger Technologies (DLT) is being explored to enhance traceability and transparency throughout the value chain.

Presenter Bio

Pia Jonsson is an advisor at the Norwegian Directorate of Fisheries. Her current role at the Norwegian Directorate of Fisheries is focused on the CatchID-program which is an initiative that aims to support the development of a fully integrated documentation system for the fishing industry. As a part of this role Pia is involved in several international projects and working groups related to exploring and implementing new technological solutions that will enhance compliance in the fishing industry.

Pia holds a MSc degree in Environmental and Resource Economics from the Norwegian University of Life Sciences and has experience from data processing and statistical modelling at the national statistics institute of Norway.

Crew Welfare Online Key Data Elements (KDE) in the Tuna Industry

Marcelo Hidalgo[1,2], Nialangis Posanau[2]

[1]Seafoodmatter, Utrecht, Netherlands. [2]Fishing Industry Association of Papua New Guinea, Port Moresby, Papua New Guinea

Abstract

The fishing sector is notorious for severe decent work deficits and has come under scrutiny over the past years for the use of forced labour and child labour, as well as links to human traffickers and people smugglers. While the majority of fishing vessel operators comply with existing legal frameworks to avoid decent work deficits, the cases that have occurred tend to tarnish the reputation of the sector as a whole. This is particularly important given that the fishing industry is an important economic sector, both from food security and an employment perspective (ILO 2016).

This research examines FIA PNG's good practices, the FISH standard for Crew certification requirements, and an innovative KDEs' proposal to tackle the FIA PNG labor onboard good practices in compliance with the FIA Responsible Sourcing Policy (RSP), and the FISH standard. The tuna processing industry is not included, we focus solely on work onboard tuna fishing vessels.

In October 2022, we proposed to our tuna fleet members and the iFIMS teams to assess the feasibility to add several events in the Integrated Fisheries Management System (iFIMS) as events of compliance against IUU, RSP, and the FISH for Crew certification on fishing trip basis.

A proposal including ToRs was developed and approved by our chairman. A checklist was developed specifically for this project and several FIA PNG Technical Working Group (TWG) members voluntarily offer to provide feedback and review the proposal, Industry representatives, IT, and National Fisheries Authority representatives, who were part of the KDE feasibility desktop assessment.

Agreements and disagreements in the initial proposed KDEs by Seafoodmatter to FIA PNG, are discussed and rationale assessed the practicality of the KDE, and the strength of the verifiable evidence

The outcomes will be shared as well as reflections in the KDE development process and verifiable evidence support.

Presenter Bio

Marcelo is the founder and director of Seafoodmatter - a Seafood Industry advisor; also the Director of Sustainability & CSR of the Fishing Industry Association (FIA) in Papua New Guinea.

With more than 25 years of experience in the Seafood supply value chain; Marcelo has been advising retail companies, the seafood industry, and NGOs, in responsible sourcing & sustainable matters creating a change that will drive the global seafood industry. He has been working in traceability, Chain of Custody innovation, electronic reporting, and assessing in the seafood supply value chain in more than 60 countries. He is also a member of:

- Stakeholder Technical Advisory Committee – STAC, of Marine Stewardship Council (MSC) in London,
- Steering Board member of the Global Seafood Sustainability Initiative - GSSI,
- Standard Oversight Committee member of F.I.S.H standard for Crew,
- Supervisory Board member of the Global Dialogue on Seafood Traceability – GDST,
- IPAC Marintrust Advisory Committee
- Strategic Advisory Board member of AQUALIT.

Artificial Intelligence (AI) models provide an opportunity to automate detection of catch in the Hawaii longline fisheries

Jennifer Stahl[1], Joshua Tucker[1,2]

[1]NOAA fisheries, Honolulu, USA. [2]CIMAR, Honolulu, USA

Abstract

Artificial Intelligence (AI) models can save cost and time required for reviewing video of electronic monitoring (EM) data through the automatic detection of fishing vessel catch events. Research is ongoing in the Hawai'i longline fisheries to automatically detect catch events including bycatch that are released from fishing gear without being brought on board the vessel. To train AI models, a library of annotated images of fish, sharks, and protected species (sea turtle and cetaceans) is being built. EM video is currently collected from 20 volunteer vessels, and images of catch on both the deck and in the water are extracted. Annotations are created by drawing bounding boxes around catch using VIAME dive desktop software. These annotations and their associated images are incorporated into a YoloV5 object detection algorithm for training, utilizing the computing power of virtual machines and Google Cloud. A successful AI model has been developed that detects fish on deck and sea turtles on deck and in the water using 86,000 annotations. Model performance metrics and tests from running raw video footage through model algorithms indicate good accuracy and confidence with minimal false positives. Currently we are focusing on building a model that can also detect cetaceans by adding annotations of cetaceans to our library from EM video, as well as from video collected by at-sea observers. The ability of AI models to detect protected species will help us design an EM program that incorporates AI with human reviewers.

Presenter Bio

Jennifer Stahl researches solutions to fisheries and bycatch monitoring at NOAA fisheries in the Pacific Islands. She performs research to evaluate the feasibility of Electronic Monitoring (EM) in the Hawaii longline fisheries with a current focus on collecting data to assess protected species interactions and automate video review using machine learning. In addition, she is part of a team that performs mobula research through tagging. She received her M.S. in Fisheries from the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences and prior to coming to NOAA fisheries worked at the Alaska Department of Fish and Game as a groundfish biologist for 11 years. She began her fisheries career as a fisheries observer on Hawaii longline vessels and Gulf of Mexico shrimp trawlers. Her field work continued in Alaska with sablefish longline and tagging surveys, ROV and submersible surveys, and scuba shellfish assessments.

Smart Selective DSF for Tuna Species Discrimination under the FADs. Understanding the technology and application

Javier de la Cal

Satlink S.L., Madrid, Spain

Abstract

In 2023, the European Technology chamber has recognized Satlink smart DSF (Smart Tuna Fishing Buoys), especially design to enhance selective fishing, as the Best European Technology for Ocean Conservation and Life Below Water protection at the SDG Awards 2023.And that has always been Satlink's mission: to develop technological solutions that foster sustainable fishing practices and the preservation of our oceans. The aim of developing smart DSF is to help the fishing industry respect quotas in a simple and efficient way, optimizing their fishing strategy by centering their fishing efforts in healthy stocks and thus protecting tuna resources. Five years ago, Satlink took its technology a step further and launched its Selective DSF for tuna species discrimination, allowing the industry to boost its efficiency and ensuring tuna fishing sustainability. Its usage has been greatly appreciated by the industry, especially in the Indian Ocean, where yellow fin tuna is currently overfished. Satlink would like to present how the double echosounder technology is applied to estimate the different tuna species under the Fish Aggregating Devices (FADs) and cases of success usage. In addition to the fishing data provided by its DSFs, Satlink gathers all available information on oceanographic and atmospheric conditions, allowing informed and efficient decision-making for crews, and a better track of tuna species patterns. Satlink believes we are entering a new era in tuna fishing, where technology is key to achieve selective fishing, reducing bycatch and ETP species interactions and preventing overfishing. Additionally, to support Marine Protected Areas and Marine habitats, Satlink is working in its Project ReCon to give a second life to smart DSFs in coastal fisheries for scientific and research purposes.

Presenter Bio

Mr Javier de la Cal is the Regional Sales Director for the Asia-Pacific markets at Satlink S.L.U. Javier's background includes a degree in Economics and has strong experience in developing business relationships in APAC for over 9 years. At Satlink, Javier specializes in sales, marketing, and leading international projects of Electronic Monitoring for different types of fisheries including tuna purse seine and tuna long line, among others.

Molecular Monitoring in Fisheries Management – Does it work?

Madeline Green

CSIRO, Hobart, Australia. University of Tasmania, Hobart, Australia

Abstract

The United Nations Sustainable Develop Goal (SDG) 14 calls for management action that delivers ecosystem resilience, combats illegal fishing, and provides economic development opportunities for developing states. To successfully achieve this goal, the tools used for Monitoring, Control and Surveillance (MCS) of fisheries need to be improved. Current methods for monitoring fishing activity include logbooks, Electronic Monitoring, on-board observers, and inspections. Each of these methods, though effective tools for MCS, have weak points in the process where non-compliant behaviour can go unmonitored. Where two or more of these tools are used collectively the vessel landings and by-catch interactions are more certain. This presentation will introduce an additional tool to the MCS toolbox discussing how Molecular Monitoring (MM) may benefit fisheries monitoring systems. A novel approach, MM has the capacity to improve fishery landing estimates by providing an accurate record of catch, taxonomically resolved using DNA. This presentation will summarise the current field of MM and its application on different vessels, noting when it is appropriate to use MM and how best to interpret results. Molecular Monitoring while a potentially powerful tool may not be suitable across all fisheries sectors and the nuances of interpreting molecular data requires discussion. Nonetheless, MM is gaining interest from fisheries regulators and offers a possible solution to the challenge that is MCS in fisheries systems. Only with an improved understanding of fisheries landings can we accurately assess the impact fishing activities are having on marine ecosystems and appreciate the steps required to uphold SDG14 commitments.

Presenter Bio

Madeline is a forensic fisheries ecologist with over 10 years of experience using molecular tools to monitor various marine species. Her research involves developing novel molecular tools for estimating fisheries landings and monitoring fishing activities globally.

Global Dialogue on Seafood Traceability (GDST), the business case for adoption of the common language of seafood traceability & data interoperability

Huw Thomas

Global Dialogue on Seafood Traceability, Plymouth, United Kingdom

Abstract

The global seafood market is projected to reach US$350 billion by 2027. The global seafood industry is not homogenous with thousands of individual species either cultured or captured from the marine environment. Each species has names, and information attached to them which makes traceability challenging. But when adding concerns about provenance, legality, labour and environmental impact, the lack of a common language that standardises how data is collected and distributed to seafood market stakeholders becomes more challenging still. GDST was created with the aim of developing a traceability standard for the seafood industry and software providers. This has resulted in the development of the GDST Standards and Guidelines for Interoperable Seafood Traceability Systems. This presentation covers the history of the dialogue process that created the GDST standard, explains the benefits it presents to brands and retailers facing increasing cost, reputation, and supply chain pressures including how adoption of the GDST standards by software and hardware solution providers operating in seafood supply chains will benefit from their use. Reference to how GDST aligns with the FAO, can bring benefit to national catch documentation and import-export schemes and how organizations working with financial institutions have quantified cost benefit of the transparency GDST implementation brings. GDST enables a global seafood trade where seafood buyers use a common language when talking about the seafood they catch, farm, buy or sell and can capture the information in a standardised way so that when digitised it can be used seamlessly for traceability, transparency, enforcement, and validation. The GDST Standard is updated through an annual Dialogue process. Partner companies and stakeholders are invited to Dialogue sessions across the globe where revisions and additions to Key Data Elements (KDEs) and Critical Tracking Events (CTEs) are discussed and formulated into a revision which is voted upon by Industry Partners

Presenter Bio

Huw Thomas founded 3 Pillars Seafood in 2020 to provide responsible sourcing and supply chain advice to seafood processors, retailers, and non-governmental organisations. With a career spanning nearly 30 years in the seafood world Huw has been Fisheries & Aquaculture Manager of a UK retailer, led the market engagement work for a US-based trust aiming to end illegal fishing, the Technical Director of one of the UKs leading chilled seafood processing companies and run a shrimp processing plant in Vietnam.

Recognized as a thought leader in the evolving world that seafood sustainability programmes sit, he brings a unique perspective and insight to supply chain risks, mitigation, and certification efforts.

He works as both a strategic adviser and EMEA Market Development Lead for GDST

Mobile Electronic Recording and Reporting Application for Artisanal and Commercial Fishing Fleets.

Amos Barkai

OLSPS, Cape Town, South Africa

Abstract

Small-scale fisheries struggle with the need to record and report their catches and fishing activities in a simple, effective and affordable way. To overcome these difficulties, OLSPS has developed the Olrac Mobile Dynamic Data Logger (OlracMDDL). Compatible with Android, iOS and Windows devices, the OlracMDDL application is fully customizable to meet the client's specific needs for both regulatory compliance and commercial reporting requirements. OlracMDDL can use the mobile device's GPS or an external GPS so that vessel movements can be tracked at all times. Although OlracMDDL was originally developed for small-scale fisheries, it can also be (and is already) used on large commercial fishing vessels. It is also fully compatible with the shore-system Olrac Dynamic Data Manager (OlracDDM), a web server where data can be stored, analysed and visualized. Data entry in OlracMDDL is simple and typo-free, as all possible data can be entered via predefined lookup tables where known names, values and even images are stored and can be easily selected by the user. Lookup tables and other properties unique to each OlracMDDL version are managed and automatically updated by the OlracDDM webserver so that the lookup tables are always up-to-date and consistent across the fleet.

The recorded information can be transmitted in real-time using a fully integrated and dedicated novel SatCom technology. HiSky's SmartelliteTM terminals are small devices that enable continuous communication in even the most remote locations, at a fraction of the cost of other SatCom units (90% cheaper). Alternatively, OlracMDDL can use any communication network and device, including Wi-Fi, cellular network, broadband and narrowband (SBD) modems. OlracMDDL also includes a mapping component where the vessel's cruising and fishing activities can be marked and stored, a dedicated chat utility, SOS and other enhancements that make the OlracMDDL application a complete reporting solution for small and large vessels.

Presenter Bio

(Presented by Ali Kennard) Dr Amos Barkai obtained his PhD in Biology from the University of Cape Town in 1987. His PhD work was published in Science Magazine and is a regular feature in Marine Ecology textbooks. Dr Barkai received the Oceania group prize for the best scientific publication based on a PhD. In 1989, Dr Barkai received the “South African Foundation for Research and Development Award” for distinguished postdoctoral scientists.

Dr Amos Barkai is the co-founder and CEO of the OLSPS companies' group. OLSPS employs 37 highly qualified staff and has offices in Cape Town and Lisbon. OLSPS specialises, among other things, in the implementation of sophisticated analytical software solutions for the commercial fishing sector. Presently, Dr. Barkai also heading the electronic logbook (eLog) development unit of OLSPS. The Olrac eLog which was developed by OLSPS is now used onboard 100s of vessels in many fisheries around the world.

Innovative, spatially based and real-time, software solutions for fisheries management

Amos Barkai

OLSPS, Cape Town, South Africa

Abstract

Unintentional bycatch is not only damaging to the marine ecosystem but can also have a significant financial impact if "chock" species, i.e. bycatch species, are overfished, resulting in the fishing season for permitted species ending prematurely. The Northeast US scallop fleet decided to address this problem by implementing a real-time electronic bycatch monitoring and reporting system to their fishery. The main objective of this system was for fishers to report their bycatch CPUE, mainly of the primary "choke" species (yellowtail flounder), and scallops catch, in real-time electronic format to a central database. This data is then anonymized and made available to the entire fleet to alert the fishers to areas with high CPUE for bycatch species. In this way, fishers can make informed decisions about where to fish to avoid or reduce the occurrence of yellowtail flounder bycatch which could possibly result in the premature closure of the access area.

The result was an end-to-end bycatch avoidance software tool based on the widely used Olrac commercial fishing eLog system. The Olrac bycatch avoidance utility includes two components: a) an on-board, GIS-based, vessel unit which was used to record and report bycatch CPUE and send that to the shore; and b) a web-based shore unit which is used to aggregate reported CPUE data and convert these CPUE data to a fleet level assembled spatial density map. These aggregated CPUE maps were then sent back automatically to the fleet fishing vessels at sea. This allows fishers to view bycatch CPUE maps while still at sea and use them to avoid areas of high bycatch. The Olrac bycatch avoidance solution was tested successfully on-board 15 scallop vessels and is now waiting for a go-ahead for a full, fleet-wide, commercial deployment.

Presenter Bio

(Presented by Ali Kennard) Dr Amos Barkai obtained his PhD in Biology from the University of Cape Town in 1987. His PhD work was published in Science Magazine and is a regular feature in Marine Ecology textbooks. Dr Barkai received the Oceania group prize for the best scientific publication based on a PhD. In 1989, Dr Barkai received the “South African Foundation for Research and Development Award” for distinguished postdoctoral scientists.

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implementation of sophisticated analytical software solutions for the commercial fishing sector. Presently, Dr. Barkai also heading the electronic logbook (eLog) development unit of OLSPS. The Olrac eLog which was developed by OLSPS is now used onboard 100s of vessels in many fisheries around the world.

Recovering Indonesia's demersal fisheries: a data limited model ensemble approach

Steven Saul[1,2], Ernesto Carrella[3], Fayakun Satria[4], Lilis Sadiyah[4], Aarthi Ananthanarayanan[5], Richard Bailey[3], Chris Dorsett[5], Michael Drexler[5], Diding Efendi[4], Rani Ekawaty[6], Austin Humphries[7], Elle Wibisono[8]

[1]Arizona State University, Phoenix, USA. [2]Environmental Defense Fund, San Francisco, USA. [3]Oxford University, Oxford, United Kingdom. [4]National Research and Innovation Agency (BRIN), Jakarta, Indonesia. [5]The Ocean Conservancy, Washington D.C., USA. [6]CSIRO, Hobart, Australia. [7]University of Rhode Island, South Kingstown, USA. [8]Conservation International, Washington D.C., USA

Abstract

Fishing is a commercially important industry to the Indonesian archipelago, with marine areas comprising two-thirds of its exclusive economic zone (EEZ). Over the past several decades, it has been acknowledged that many fish populations in Indonesia have declined. Formal assessments of Indonesia's fisheries have been limited by sparse data. In 2015, a collaborative data collection system was initiated to obtain catch and length data from commercial fishers who target demersal species. Given industry interest in Marine Stewardship Certification, we applied an ensemble of data-poor fisheries assessment models to evaluate 44 species across 10 management areas within Indonesia. Uncertainty was addressed through the application of several different data-poor modeling approaches, and the sensitivity analysis of different landings scenarios. Current fishing mortality and population size estimates were compared with fishing effort and biomass-based reference points. For most snapper species across most scenarios and modeling approaches, the estimated biomass was below the limit, and current fishing effort higher than the target reference point. Grouper populations were found to have healthy biomasses and low fishing mortalities. Fish families at lower trophic levels were moderately or lightly fished. Overexploited species required between five and 20 years to recover, most within the framework required by the Marine Stewardship Council. The multimodel approach allowed different analytical assumptions to be considered, while the use of different scenarios involving catch integrated landings uncertainty into the analysis. Regardless of the uncertainty, the approach provided meaningful results indicating to managers which species may need more attention, and in which regions.

Presenter Bio

Dr. Steven Saul completed his undergraduate work at the University of Richmond in environmental science and music, doctorate in marine biology and fisheries, and his master's degree in marine affairs and policy from the University of Miami's Rosenstiel School for Marine and Atmospheric Science. After graduate school, Dr. Saul developed stock assessments for commercially important reef fish with the National Marine Fisheries Service in Miami. He then worked as a Khalid bin Sultan Living Oceans Foundation fellow and Nova Southeastern University contributing to the Global Reef Expedition by developing maps of coral reef habitat and depth for resource managers in Small Island Developing States. Dr. Saul's current research assesses data limited tropical fish populations and studies the

interactions and bi-directional feedbacks between fisher behavior and decision-making, fish populations, and ecosystem dynamics. Dr. Saul develops quantitative tools and applies a systems-based approach to support equitable natural resource management.

Promoting Economic and Social Equality: Empowering Small-Scale Fishers in Indonesia through the Perahu App

Eko Octavianus

Sahabat Laut Lestari (SLL Fisheries), Denpasar, Indonesia

Abstract

Indonesia, as one of the largest archipelagos and fishery producers in the world, relies heavily on the fishery industry for its economy. However, the small-scale fishers, who make up the majority of the industry, often face multidimensional poverty while the economic benefits go to larger stakeholders. This disparity can be attributed to bureaucratic issues in fisheries regulation, limited financial knowledge among fishers, and a digital literacy gap. To address these challenges, fishery improvement programs aimed at increasing the economic value of small-scale fishers' catches. By helping them meet legal and market requirements for sustainable fishery practices, some fisheries certification program such as fair-trade certification can raise the price of their catches and pave the way for fair trade and certifications. However, the high cost of fair-trade certification limits its appeal to buyers and markets, and there is a need to ensure the funds collected are effectively managed. To enhance fishers' awareness of proper fund management, we have conducted personal approaches through trial-and-error methodologies, which have been time-consuming and resource-intensive. To address these challenges more comprehensively, we plan to undertake the "Perahu" project as part of the initiatives. Perahu is an integrated application that tackles the main challenges faced by fishers. It provides verified traceable fisheries products and financial data, facilitating access to financial aid such as bank loans and government grants. This promotes production capacity expansion, improved quality of life, and financial inclusion for small-scale fisher communities. Moreover, Perahu Apps will indirectly enhance fishers' personal finance management, bolstering the resilience of vulnerable and remote coastal areas. The long-term goal is to benefit all stakeholders in the fishing industry through the implementation of Perahu Apps. Ultimately, we believe that Perahu Apps will contribute to the development of resilient fishers and fishing communities, fostering economic and social equality among all stakeholders.

Presenter Bio

Eko is the leader of Sahabat Laut Lestari (SLL Fisheries), a start-up social enterprise known as that implementing and focuses on ecological, social, and economic aspects to support sustainable fisheries, particularly in Indonesia. The social enterprise was established in October 2019 through the initiatives of the MDPI Foundation, a national NGO with a mission to empower fishing community organizations and harness market forces. Their vision is to create thriving fishing communities that actively participate in and lead sustainable fisheries management.

Creating a Value Chain - a Model for Artisanal and Small-scale Fisheries and Seafood Producers

Dane Chauvel

Organic Ocean Seafood Inc., Vancouver, Canada

Abstract

Frustrated by the absence of a supply chain that would incentivize sustainable, regenerative and ethical seafood harvest practices, Organic Ocean Seafood Inc. was established by wild capture fishers and culinary professionals to address the need and fill the void. The ultra-premium quality of our seafood enabled us to build a community of loyal customers which included chefs of Michelin starred restaurants throughout the world. This drew the attention of other seafood producers with a common ethos and similar go-to-market challenges, including Indigenous fishers and environmentally responsible aquaculture producers. Working collaboratively, we have developed a sustainable seafood platform from which we provide harvesters and producers the expertise, network and centralized support functions required to scale. Through a convenient, efficient and cost-effective omnichannel - food service, specialty retail and e-commerce - platform, we afford a range of consumers access to a one-stop-shop for the finest sustainable, regenerative and ethically produced seafood. By removing links from the supply chain and achieving scale and efficiencies across back office, fulfillment and logistics functions, we create value that enables us to fairly compensate the harvesters and producers which supply us and free them to focus on what they are good at - growing their supply and telling their story.

Recognizing that optimizing the value of seafood reduces pressure on the resource and increases the incomes of those who harvest and produce the seafood, we are now expanding our production, cold storage, and distribution facility to include an integrated specialized seafood product development lab, modern commercial kitchen, and secondary and value-add processing area.

Presenter Bio

Raised in a fishing family, Dane Chauvel earned Bachelors of Arts (Economics) and MBA degrees, following which he worked in institutional venture capital and later as a senior executive in the technology sector. In 2008, he went back to his roots and, with a team of sustainable seafood evangelists, established Organic Ocean to supply discriminating retailers, chefs and restaurateurs with the finest, natural seafood. On the premise that those who make environmentally friendly seafood choices also receive the best ingredients, the business has flourished and now supports a community of seafood producers – traditional, modern, indigenous – all of whom share a common ethos built upon solving the ocean's greatest environmental challenges and protecting its productive capacity. In addition to being a bona fide fisherman and overseeing the business of Organic Ocean, he is actively involved in industry and public affairs.

The State of Seafood Tech: Trends and Insights

Eric Enno Tamm

ThisFish Inc., Vancouver, Canada

Abstract

ThisFish Inc. has published the most comprehensive directory of technologies used in the seafood industry including more than 350 software applications searchable by some 60 filters. This presentation will provide delegates with a comprehensive overview of the state of technology in the seafood industry from sea to table. The presentation will provide an overview, trends and issues for various supply chain sectors including fisheries, aquaculture, traceability, online marketplaces, quality control and verification, processing, NGOs and government. The presentation will provide comprehensive statistics on the rapid growth in each of these sectors, exploring the adoption of emerging technologies such as blockchain, artificial intelligence and Internet of Things. Data on private equity and venture capital in the sector will also be shared.

The presentation will provide a comparison between the aquaculture and fisheries sector, looking at the rapid adoption of artificial intelligence in fish farming compared to wild capture fisheries. Reasons for this difference will be explored. The presentation will conclude by exploring where technology is headed and where we may see growing adoption of artificial intelligence and IoT sensors in the industry. For example, artificial intelligence offers the opportunity to validate traceability data in the supply chain, analyzing historic data for patterns and flagging statistical outliers to supply chain operators, including data errors and possibly malicious behaviour. The presentation will explore how insights from AI could prove commercially valuable to companies, enabling them to forecast supply and demand better or predict yields and costing as well.

Presenter Bio

Eric Enno Tamm is the co-founder and CEO of ThisFish Inc., a Vancouver-based provider of software and artificial intelligence to the seafood industry. Eric has more than 20 years of experience working in the seafood industry and was one of the early pioneers of electronic traceability dating back to pilot projects in 2010. He's managed seafood traceability projects in Southeast Asia, North America, South America, Europe, and Africa. Eric is a former journalist and author and has written extensively on tech trends and tech ROI in the seafood industry on his company's blog. Eric is born and raised in a commercial fishing family in the Canadian Pacific, and has worked as a fish harvester, fish buyer and processor. He holds masters' degrees from the University of Southern California and Lund University in Sweden.

AI-based Estimation of Labour Working Hours using CCTV Videos on Distant Water Fishing Vessels – A Case Study on Taiwan's Fishing Industry

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[1]National Chung Cheng University, Chiayi, Taiwan. [2]Naional Chung Cheng University, Chiayi, Taiwan. [3]National Chung Cheng University, Chiayi, Taiwan

Abstract

Currently, Illegal Unreported and Unregulated (IUU) fishing has become a major worldwide social issue with at least 200 vessels from 26 countries in the list, as of this writing. Taiwan was ranked 2nd in the IUU country ranking in 2019, and has moved to the 6th in the world due to lower IUU score drop from 3.34 to 2.88 (lower is better). The world average IUU score is 2.24, thus Taiwan is still higher than the average. The main reason for this high ranking of Taiwan is the problem of long working hours of fishermen on some fishing vessels. To address this issue, the Fisheries Agency of Taiwan has already made CCTV cameras compulsory on most distant water fishing vessels. On one hand, currently, these CCTV cameras are only recording videos of the fishermen onboard working or not; there is no automatic analysis. On the other hand, globally, labour exploitation is being monitored based on the Global Fishing Watch (GFW) and Vessel Monitoring System (VMS) open data, which is limited in its accuracy for labour estimations. In contrast, our current work is proposing the automatic real-time analysis of CCTV videos on fishing vessels so that we can obtain a much more accurate estimation of working hours for fishermen in the distant water fisheries industry. Compared to the GFW machine learning results, our proposed AI method using CCTV videos gives a much more accurate estimation of working hours. The error using our method is at most 30 minutes, while that using GFW is 90 minutes. By leveraging the proposed data-driven method, we will improve fishermen's working conditions and well-being in Taiwan's DWF industry, fostering a more sustainable and equitable sector. We hope to reduce Taiwan's IUU scores with respect to the "response" factor of the flag component in IUU score.

Presenter Bio

Pao-Ann Hsiung, PhD, is currently a professor of Computer Science at the National Chung Cheng University (CCU), Taiwan and he is also the Chief Information Officer of CCU. Dr. Hsiung has published more than 300 technical papers and his expertise is in the areas of artificial intelligence, Internet of Things, embedded systems, and smart systems such as cyber-physical systems. He is an IET fellow, an IEEE senior member, and an ACM senior member. He has held the office of the Director-General of the Intelligence Technology Department of the Chiayi City Government, where he has led the team to obtain the Top 7 ranking the ICF forum for smart cities worldwide. He was currently conducting a national project on applying AI technology to protect the rights of fishermen on distant water fishing vessels. His work has been published widely and has been recognized as an expert in AI and IoT applications.

Artificial Intelligence/Advanced Analytics/Machine Learning (AI/AA/ML) in Indo-Pacific Fisheries: A Regional Review of Barriers, Opportunities, and Emerging Tech Solutions for Fair and Sustainable Fisheries Management

Stuart Green[1], Farid Maruf[2]

[1]USAID Sustainable Fish Asia Technical Support, Bangkok, Thailand. [2]USAID Sustainable Fish Asia Technical Support, Denpasar, Indonesia

Abstract

We stand at the threshold of a Golden Age of AI, Advanced Analytics (AA), and Machine Learning (ML), with these technologies holding tremendous potential to disrupt and transform various sectors. With the Indo-Pacific region accounting for about 35% of global seafood trade, there is potential for how AI/AA/ML can mitigate issues related to supply chain complexity, misrepresentation, illegal catch, and labor rights abuses. Drawing upon the findings from the USAID Sustainable Fish Asia Technical Support (SUFIA-TS) project', our 20-minute session will unfold a multi-stakeholder interview landscape assessment of the Indo-Pacific region's fisheries. We will present an overview of the region's challenges and barriers, delve into the promising opportunities ahead, and discuss the emergence of AI/AA/ML solutions to promote fair, legal, and sustainable fisheries management. A 10-minute interactive Q&A session will follow, using a feedback mechanism like SLIDO to encourage rich dialogue. The session aims to deepen understanding of how emerging technologies can be wielded to address hurdles and leverage opportunities in the Indo-Pacific fisheries sector. Key Target Audience: Private sector, government officials (fisheries, labor and immigration), donors, technology companies, NGOs and special interest group.

Format: 30 mins of presentation including 10 mins Q&A

Presenter Bio

As the founder of Blue-Green Advisors, Stuart has been working in the region leading a team of experts in addressing marine conservation challenges through adaptive, innovative, and data-driven strategies.

Combating Forced Labor on the High Seas - Technology opportunities for strategic regional cooperation.

Anny Barlow

USAID Sustainable Fish Asia Technical Support, Bangkok, Thailand

Abstract

Forced labor on the high seas has been a well-documented issue in the offshore fisheries sector. This historic industry standard currently presents compliance problems that risk operational continuance, stable market access, and the health and safety of those employed. The proliferation of forced labor is a significant concern built on a foundation of interlinking dependencies exasperated by decreased fish stocks. It is imperative for fishing companies, relevant government agencies, and civil society to work together to ensure transformation of the sector towards behavior that upholds respect for human rights, i.e., evolving from entrenched practices of violations towards behavior that secure the private sector's license to operate while securing livelihoods and food security for millions of people in the Indo-Pacific region.

Technology has an important role in transforming long-established problematic employment practices in the fishing sector towards fair and equitable labor opportunities. Technology will aid this transition by supporting coordination efforts between regional stakeholders working together to build and implement the strategic, cohesive collaboration necessitated by the complexity this sector's labor market presents. There are key spaces throughout the labor and market supply chains where technology can facilitate system processes and protocols, open dialogue between governments, capture rights violations and create a grievance mechanism that aids the management of a growing, healthy private sector. We will explore these key leverage points where current, accessible technologies may be under-utilized and where new technological solutions could prove useful towards regional cooperation. As a final thought, engaging social media should not be overlooked in this crucial industry-wide metamorphosis.

Key Target Audience: Private sector, government officials (fisheries, labor and immigration), donors, technology companies, NGOs and special interest group

Format: 30 min of presentation with 10 min Q&A

Presenter Bio

Anny Barlow obtained a BS in Oceanography from Hawai'i Pacific University and a Master of Marine Affairs and a MA in International Studies from the University of Washington. She completed a research

fellowship at the Daniel K. Inouye Asia-Pacific Center for Security Studies to study how extreme labor abuses at sea connect with broader maritime security threats.

She is a seasoned commercial fisherman, a practiced professional providing business risk mitigation data to big banks with over a decade of engagement in multicultural collaboration efforts in Southeast Asia.

Located in Hawai'i her consultation revolves around IUUF and the people it impacts. She leads an IUUF Regional Policy Implementation Status assessment for the Indo-Pacific, a Fair Labor Best Practices on Commercial Fishing Vessels study, and an investigation seeking to understand how IUUF, overfishing, and the exasperating effects of climate change affect Stateless fishers in the Sulu-Sulawesi Seascape and the South-China Sea.

A roadmap to regional collaboration to counter IUU Fishing through emerging technology

Alexander Min, Vincent Nguyen

USAID Sustainable Fish Asia Technical Support, Bangkok, Thailand

Abstract

Illegal, Unreported, and Unregulated Fishing is at the intersection of economic, social, and food security in Southeast Asia. Ending IUU Fishing has been the focus of many countries for many years and may be within our reach over the next decade. This is possible through emerging technology, increased unification of reporting, and private-public sector collaboration. As the region's population becomes more digitally connected, awareness around IUU fishing and its negative consequences will continue to increase. We will present an overview of the emerging technology for countering IUU Fishing across different companies and stakeholders. We will focus on maritime domain awareness technologies that have the potential to help increase the effectiveness of government efforts in countering IUU Fishing. We will also share the gaps in these technologies and how they can be improved by growing data sources and including fisher's data.

Through our work with the USAID Sustainable Fish Asia Technical Support (SUFIA-TS) Activity which focused on empowering the private sector and small-scale fishers to participate in countering IUU Fishing, we have identified a need for a regional reporting and documentation method to provide a better understanding of the extent of IUU Fishing, allow for coordination to combat IUU Fishing, and increase the participation of the private sector. With the right technology and the private sector's support, fishers are empowered to monitor, identify, and report IUU Fishing. We will also share a road map for helping build regional collaboration to combat IUU Fishing.

Key Target Audience: RPOA-IUU, AN-IUU, CTI-CTF Private sector, government officials (fisheries, labor, and immigration), donors, technology companies, NGOs, and special interest groups

Format: 30 mins of presentation with 10 mins Q&A

Presenter Bio

Vincent Nguyen is a technical consultant for the United States Agency for International Development Sustainable Fish Asia Technical Services Project (US AID SuFiA TS). He has supported consultancies regarding environmental security with Global Fishing Watch (GFW), the Allen Institute for Artificial Intelligence (Ai2) Skylight program, WildAid Marine, the Canada Department of Fisheries and Oceans, and USG agencies involved with the execution of the "Maritime SAFE Act." Before starting his

consultancy, Vincent served with the U.S. Navy and U.S. Coast Guard for 21 years, managing Intelligence, International Affairs, and Maritime Security missions. His enduring work looks to support both environmental protection and Veterans initiatives globally.

Vincent graduated from the U.S. Defense Language Institute with Associate's Degrees in Vietnamese and Chinese-Mandarin, the University of Hawaii/U.S. Defense Language Institute with a B.A. in Chinese, Hawaii Pacific University with a Bachelor of Science in Military and Diplomacy Studies with a focus on Environmental Conflict, the University of San Francisco with a Master of Arts in Asia-Pacific Studies with a focus on U.S./Asia-Pacific Environmental Policy Conflict, and finally graduate certificates in Project Management, Data Analytics, and Curriculum Design and Instruction.

A Co-creation Workshop: Identifying Challenges, Problems and Unearthing AI/AA/ML Use Cases and Solutions for Resilient, Sustainable Fisheries in the Indo-Pacific Region

Stuart Green[1], Farid Maruf[2], Anny Barlow[1]

[1]USAID Sustainable Fish Asia Technical Support, Bangkok, Thailand. [2]USAID Sustainable Fish Asia Technical Support, Denpasar, Indonesia

Abstract

This Co-creation Workshop at the Seafood and Fisheries Emerging Technologies Summit is devoted to hearing quickly from some innovators regarding their solutions in this space [SA1] and then shifting to engaging the audience in pinpointing crucial challenges and discovering the potential of AI/ML and Advanced Analytics to bolster the resilience and sustainability of fisheries in the Indo-Pacific region. The workshop will provide a hands-on environment for participants to delve into pressing problems related to fair, legal, and sustainable regional fisheries management and to co-design technology driven solutions that align with these issues. By leveraging insights into market drivers, the workshop intends to map out scalable strategies for reducing bycatch, lessening habitat impacts, and enhancing electronic monitoring systems[SA2] , all pivotal aspects of an adaptable supply chain that support Ecosystem Approach to Fisheries Management (EAFM). Furthermore, the workshop endeavors to weave these technology-led solutions into supply chain operations to broaden market access. Through this shared endeavor, participants will be challenged to co-create use cases and potential solutions, fostering a dialogue that merges technological advances with the sustainability imperatives inherent to the Indo-Pacific fisheries sector. This co-creation workshop [SA3] thus seeks to enhance our collective understanding[Mrs4] on the role of AI/ML/AA in promoting the goal of sustainable and legal fisheries management and equipping us with shared, actionable insights for a resilient and sustainable future in the region. The report of this workshop will be shared to raise awareness and interest among potential supporters including donors, government and private sector.

Key Target Audience: Private sector, government officials (fisheries, labor and immigration), donors, technology companies, NGOs and special interest group

Format: Workshop 60 mins

Presenter Bio

Stuart Green, the founder of Blue-Green Advisors, is a fervent problem-solver with a lifelong commitment to ocean conservation and the welfare of coastal communities in the Indo-Pacific region. Over the past three decades, Stuart has worked tirelessly to address the myriad challenges facing fishing

communities across the Indo-Pacific. Stuart's expertise extends to the realm of emerging technologies, including artificial intelligence (AI). As SUFIA's Regional Fisheries Technology Specialist, Stuart leverages his extensive knowledge to promote fair, legal, and sustainable regional fisheries management across the Indo-Pacific, harnessing the power of AI and other disruptive technologies.

The Application of Scenario-Based Table-Top Exercises to Drive Low-Cost Testing and Review of Emerging Technology

Vincent Nguyen, Alexander Min, Anny Barlow

USAID Sustainable Fish Asia Technical Support, Bangkok, Thailand

Abstract

Technology adoption faces many barriers for organizations globally. A framework for understanding the application of technology within an organization can be delivered through "Scenario-Based Table-Top Exercises," where an organization reviews the application of such emerging technology through a discussion with key stakeholders, implementers, and providers. During SAFET 2023, we will provide an introductory workshop on using Table-Top Exercises as a framework to support understanding of technology and how it can apply to one's organization.

While there are many emerging technology solutions to current problems, implementers often need help knowing which tools to adopt and how these new tools would integrate or support their existing systems. This can be a challenge for countries and implementers from a cost perspective to understand what technology to adopt. Therefore, we systematically review and dive into a deeper understanding of technology through a "Scenario-Based Table-Top Exercise" framework. Our aim at SAFET is to give a presentation on:

- What Table-Top Exercises are and their framework[Mrs1]
- Test and review current technology applications in the fisheries space using the Table-Top Exercise framework
- Provide 1-3 target audience-specific scenarios regarding technology acquisition (I.e. Labor and immigration audience: data sources and technology capture that identify forced labor inequalities).

Key Target Audience: RPOA-IUU, AN-IUU, CTI-CTF Private sector, government officials (fisheries, labor and immigration), donors, technology companies, NGOs and special interest group

Format: Workshop - 60 mins

Presenter Bio

Vincent Nguyen is a technical consultant for the USAID SuFiA-TS. He has supported consultancies regarding environmental security with Global Fishing Watch, the Allen Institute for AI (Ai2) Skylight program, WildAid Marine, the Canada Department of Fisheries and Oceans, and USG agencies involved

with the execution of the "Maritime SAFE Act." Prior consulting, Vincent served with the U.S. Navy and U.S. Coast Guard for 21 years, managing Intelligence, International Affairs, and Maritime Security missions.

Vincent graduated from the U.S. Defense Language Institute with Associate's Degrees in Vietnamese and Chinese-Mandarin, the University of Hawaii/U.S. Defense Language Institute with a B.A. in Chinese, Hawaii Pacific University with a B.S. in Military and Diplomacy Studies with a focus on Environmental Conflict, the University of San Francisco with a M.A. in Asia-Pacific Studies focus on U.S./Asia-Pacific Environmental Policy Conflict, and graduate certificates in Project Management, Data Analytics, and Curriculum Design and Instruction.

Enhancing Fisheries Management through Cloud-Based Solutions

Manuel Menchaca

Satlink S.L.U, Madrid, Spain

Abstract

Satlink, an international company founded in 1992, specializes in developing technology solutions for the fishing industry with a focus on promoting sustainable fishing and ocean conservation.

Since the beginning Satlink has been at the forefront of cloud-based solutions, guaranteeing the secure and efficient collection, storage, and processing of fishing data. Satlink's solutions gather reliable data from vessels and the oceans resources, which is then transfer to a secure cloud infrastructure for further use, enabling informed decisions that contribute to improved management of fisheries resources. Besides, they can access information from anywhere and at any time, removing obstacles related to data delivery and ensuring its secure storage.

Satlink will showcase two cutting-edge cloud-based software solutions, developed specifically for governments and regulators. The first is Satlink Horus, an integrated fleet management and data review solution tailored for Electronic Monitoring (EM) systems. The second is Satlink's Fisheries Management Center (FMC) solution, designed for ERS and VMS systems. These innovative solutions empower regulators to effectively analyze and manage data according to their specific requirements. They enable regulators to generate the necessary reports and make informed decisions based on the analyzed data.

Presenter Bio

Mr. Manuel Menchaca currently holds the position of Electronic Monitoring Consultant at Satlink. In his role, Manuel provides technical sales and marketing, working closely with stakeholders in the fishing industry, including government bodies, research institutions, and fishing communities. Manuel has extensive knowledge in cutting-edge technologies, including sensors, Machine Learning (ML), Artificial Intelligence (AI) models, and cloud-based solutions. In addition, he actively participates in workshops dedicated to Electronic Monitoring Systems (EMS) and contributes his valuable technological expertise in various fishing forums.

Enhancing Sustainable Fishing with Electronic Monitoring: One Step Closer to Real-time Automatic Capture Detection

Manuel Menchaca

Satlink S.L.U, Madrid, Spain

Abstract

Satlink, an international company founded in 1992, specializes in developing technology solutions for the fishing industry with a focus on promoting sustainable fishing and ocean conservation. Satlink's mission has always been centered around developing technological solutions that foster sustainable fishing practices and the preservation of our oceans. Satlink's Electronic Monitoring stands out as a reliable and smart solution that not only enables fisheries to attain transparency, traceability, and efficient management but also ensures long-term fishing sustainability from three vital perspectives: environmental, economic, and social sustainability. As a company focused on R&D and cutting-edge technology, Satlink is currently working on new AI/ML models to achieve automatic capture and species detection with very promising results, a game-changer towards catch, bycatch, ETP reporting. Thanks to these promising technologies, Satlink is looking to reduce the review times and the data transfer from vessel to shore. The introduction of this innovative developments will open an intriguing discussion on its application and implementation aiming to enhance the current capabilities of this technology and achieve effective solutions for the fishing industry.

Presenter Bio

Mr. Manuel Menchaca currently holds the position of Electronic Monitoring Consultant at Satlink. In his role, Manuel provides technical sales and marketing, working closely with stakeholders in the fishing industry, including government bodies, research institutions, and fishing communities. Manuel has extensive knowledge in cutting-edge technologies, including sensors, Machine Learning (ML), Artificial Intelligence (AI) models, and cloud-based solutions. In addition, he actively participates in workshops dedicated to Electronic Monitoring Systems (EMS) and contributes his valuable technological expertise in various fishing forums.

The role of satellite buoy companies in the management of dFADs for Indian Ocean yellowfin tuna stocks

Angela Cruz[1], Guillermo Gomez[2]

[1]Ross Strategic, Seattle, USA. [2]Gomez-Hall Associates, Seattle, USA

Abstract

The Indian Ocean Tuna Commission (IOTC) continues to struggle to reach a consensus on adopting effective management measures to halt overfishing of tuna stocks in the region. Catches of juvenile tunas are closely linked to use of drifting Fish Aggregating Devices (dFADs), which are deployed by purse seine vessels and their support vessels. These devices float with hanging pieces of net or rope on which ecosystems develop, bringing micro-organisms, small fish, and eventually tuna that gather around and below the dFADs. The dFADs also have satellite buoys attached to the floating structure which allow fishing vessels to monitor their location via GPS and can carry echo-sounders providing images of the quantity and species of tunas aggregated around and below the dFAD. There are three main companies that manufacture and sell these satellite buoys, including Stalink, Zunibal and Marine Instruments. Aside from sale of satellites buoys to boat owners, these companies provide satellite communication services which allow tuna boats to draw critical information on relative tuna abundance from buoys and decide when to make fishing sets near the dFAD. The IOTC is not effectively managing an increasing number of dFADs deployed by purse seine and support vessels resulting in continued catch of over-exploited yellowfin and bigeye tunas and contributing to other negative ecosystem and non-target species impacts. The actions of companies which supply dFADs and satellite communication services have direct association with the overexploitation of Indian Ocean tuna stocks. As such, it may be necessary for the IOTC to consider management measures and provisions that consider the role of these companies. This paper will discuss potential measures the IOTC can consider to limit the negative impacts on yellowfin tuna stocks in the IOTC area by the coordinated effort between satellite buoy companies and tuna boat owners.

Presenter Bio

Angela Cruz is an interdisciplinary researcher and environmental consultant based in Seattle, Washington. Her past research has focused on social policies in international fisheries management, international development, and climate change resilience. Her current work focuses on collaborative processes, particularly in complicated and high-conflict topic areas, to support effective natural resource management in Washington state and globally. Angela holds a B.S. in Integrative Biology from the University of Illinois and a Master of Marine Affairs from the University of Washington.

Building Routes to Market: A Certification Sponsorship Model Leveraging Traceability to Enable More Resilient Fishery Economies

Claudia Sandell-Gandara

Wholechain, Bloomfield Hills, USA

Abstract

Consumers want more transparency into the sources of their seafood. They are also more likely to buy seafood that is certified sustainable by MSC, ASC, BAP, BSP, or others. The challenge? Implementing traceability technology and earning these certifications is traditionally expensive and inaccessible to small scale seafood producers.

In this presentation, Claudia Sandell of Wholechain, a blockchain-based traceability provider and winner of the FDA's Food Traceability Challenge, will present two case studies for a new model of certification wherein a retail partner sponsors the cost of certification for a seafood producer, enabling the producer to sell its product at a premium in international markets. The partners then leverage traceability technology to: 1) ensure the sponsee's progress toward certification compliance, 2) ensure compliance with the FDA Rule 204, and 3) enable transparency across the value chain, making the product even more attractive to international retail markets.

The first proof of concept for this model resulted in the Best Seafood Practices (BSP) certification of tuna and swordfish products from Cape Fish, a small scale processor in Cape Town, South Africa, which sources from small scale and artisanal fishers. The partners involved were the Global Seafood Alliance (GSA), creator of the BSP and BAP certifications, Envisible, a sustainable sourcing company for US retailers (recently acquired by Levy Restaurants), and Wholechain. Wholechain is now tracing Cape Fish's BSP products from South Africa to US retail stores. The second iteration of the model is underway with members of the Sustainable Fisheries Partnership Mexican Snapper and Grouper Roundtable in Yucatan, Mexico, with the Environmental Defense Fund, Envisible and Wholechain.

The model has shown to create market access for small scale producers that are already improving or intend to improve their sustainability practices, and is expected to continue expanding to fisheries around the world.

Presenter Bio

Claudia Sandell-Gándara leads communications at Wholechain and Envisible, and has worked with leading sustainability brands to implement consumer transparency using real supply chain data. Key customers include Thai Union (Genova and Chicken of the Sea), Estee Lauder (Aveda) and McCormick & Co. (Vahiné). Prior to working at Wholechain, Sandell-Gándara was a founding member of The Farmlink Project, where she worked with farmers and food bank operators in the United States to improve access to fresh produce and reduce waste from surplus food. Prior to Farmlink, Claudia worked at Row 7 Seed Co. She has conducted extensive qualitative research on the ground with farmers and communities in rural Ecuador, Morocco and the Netherlands, and holds a bachelor's in politics from Pomona College.

Establishing a Culture of Traceability for small scale fisheries and aquaculture in the Philippines through the (TrACE AI) Software System

Cherry Murillon-Cubacub, Kathleen Manalo, Amber Clarisse Cubacub

CAWIL.AI Solutions, Makati City, Philippines

Abstract

In the Philippines in particular, there is a digital skill gap that burdens government and private stakeholders, especially in fisheries management. Traditional logbook documentation is still implemented and the availability of devices contributes to the lack of resources and knowledge for documentation. Tangible documents are easily lost and impractical to use in a wet place such as on the sea or ports, for one. On a macro level, paper-based records make it difficult for local Philippine authorities to seamlessly integrate with digitized traceability already adopted globally, and such failure can have a significant impact economically to our seafood export industry. TrACE.AI is the first electronic catch documentation and traceability system in the Philippines with a mobile application for catch recording and fisherman's profile and a web application for public and private stakeholders access to the data for export compliance. Monitoring of the movement of seafood catch is based on the "vessel monitoring system" (VMS) or the report of the vessel based on satellite information and GPS or global positioning system. However, it does not contain information on the activity or catch data to validate the activities of the fishing vessel and the legality of the seafood and verify the sustainability based on the location, species and catch method. The agri-fisheries sector is siloed and the adoption of electronic tools is steep due to the lack of trained personnel to teach and guide the fisherfolks about catch documentation. We are actively establishing the TrACE.AI Data centers in strategic locations (Bataan Province & Occ. Mindoro) to foster the culture of traceability to small-scale fisheries and aquaculture production and create a community that values data for the supply chain. The TrACE.AI Data Center will support the knowledge transfer and adoption of science-based technology solutions and a repository of information for future sustainability.

Presenter Bio

Cherry is a seasoned science research specialist who focuses on environmental management utilizing image processing and machine learning. With more than 10 years of experience in project management and business development in the field of Artificial Intelligence and emerging technology. Currently, she is an impact entrepreneur and innovator in the field of artificial intelligence (AI).

Transforming Maritime Surveillance: Introducing the M5D-Airfox Drone by Marine Instruments

Gabriel Gómez Celaya

Marine Instruments, Vigo, Spain

Abstract

Drones have emerged as a revolutionary technology for maritime applications and have the potential to disrupt and transform the fight against illegal, unreported and unregulated (IUU) fishing. Marine Instruments, a global leader in developing electronic solutions for the marine environment, has created the M5D-Airfox, a solar-powered drone designed for intelligence, surveillance, and reconnaissance (ISR) at sea. The journey began in 2015 with the development of TunaDrone, a fixed-wing drone specifically tailored for the tuna fishing industry to promote sustainable fishing practices. In 2019, Marine Instruments presented plans to further enhance the platform for security and defense applications, focusing on surveillance of vast ocean areas to detect threats and illegal activities. The M5D-Airfox was designed with four key objectives: user-friendliness, extended autonomy, minimal acoustic impact, and a favorable cost-performance ratio. Today, it has accumulated over 2500 flight hours, secured contracts with the Spanish Navy and the Spanish Secretary of Fisheries, and participated in demanding international exercises involving NATO and the US Navy. In a significant milestone, the M5D Airfox won a 2021 public tender from the Spanish Secretary of Fisheries, marking the first utilization of maritime surveillance drones for inspection in Spanish coastal waters. Marine Instruments operates the drones on a full-service 2-year contract for 45 weeks per year on behalf of the Secretary of Fisheries. This ongoing contract has demonstrated the effectiveness of Marine Instruments' solution in combating illegal fishing, offering a reliable and cost-effective alternative to traditional aerial methods. The success paves the way for exporting this experience to international markets. Currently, the project is in the prototyping phase, focusing on developing target-oriented image relationships using learning models and Artificial Intelligence. This research aims to further enhance the capabilities of the M5D-Airfox and its application in maritime surveillance.

Presenter Bio

Gabriel Gómez Celaya (Gernika, Spain – October 25, 1973) is the General Manager of Marine Instruments since 2013. Before joining the company, he worked in national and international companies in both technical and managerial positions. Gabriel has a degree in industrial engineering from the University of the Basque Country and a full-time MBA from HEC Paris Business School.

After 17 years of living and working in various countries in Europe and Asia, Gabriel returned to Spain in 2013 to become the General Manager of Marine Instruments, a world leader in the development and manufacturing of technologically advanced electronic equipment for harsh marine environments, smart oceans, and sustainable fishing.

Technology providers must step up and offer solutions that meet tuna fishing challenges.

Ángel Martínez

ZUNIBAL, BILBAO, Spain

Abstract

Tuna fishing is at a pivotal moment: Sustainability, changing regulations at RFMOs, uncertainty affecting fishing companies and the rest of the chain. Technology providers, such as Zunibal, must step up and offer solutions that meet these challenges.

Zunibal leads the development of technological solutions for sustainable tuna fishing:

- BioFAD
- Electronic_Monitoring_System
- Artificial Intelligence
- Triple frequency buoy

- BioFAD,

RFMOs are regulating the use of drifting FADs to achieve a greater degree of respect for the environment. At Zunibal, we launched a project to offer our clients an industrially produced biodegradable drifting FAD, a product that meets the requirements set out by RFMOs without disrupting fishing companies´ operations, first in its category.

- Electronic Monitoring,

We have created an electronic monitoring solution that is adaptable to all regulations. We are working in partnership with leaders in electronic and physical observation to offer artificial vision systems that will make it possible to review EM data with far greater efficiency.

- Artificial intelligence,

Zunibal's scientific team has collected a massive amount of data, which today feeds the algorithms and MachineLearning behind our Artificial intelligence services: generating maps with recommendations of optimal fishing areas and determining the probability of fish for tuna under a FAD. AI assists the skipper when making decisions and prioritizing routes, improving the ratio of tons caught per nautical mile.

- Triple frequency buoy,

By using the three scientific frequencies, this buoy sounds the same volume of water with three different transducers. This information is compared and processed in the buoy itself, which then communicates the result by satellite.

In the future it will be essential to have the ability to discriminate between the different tuna species prior to fishing, and this will only be viable in compliance with regulations and through ensuring traceability. With this vision, Zunibal's work continues.

Presenter Bio

Ángel Martínez is on a mission to help global tuna fisheries be more sustainable and efficient.

As Zunibal's Commercial Director he is passionate about the opportunities for sustainable growth and technology evolution within the tuna industry. Ángel earned his MBA from IE business school, graduating with honors, and is a member of the Beta Gamma Sigma honors society.

Technology as bottom-up tool to develop a Climate Resilient Multispecies Fishery Management Plan in Los Ríos region, Chile.

Layla Osman[1], Janelle Hangen[2], Chris Cusack[3], Sergio Palma[4], Erica Cunningham[5], Kendra Karr[6]

[1]EDF, Valdivia, Chile. [2]EDF, Jericho, USA. [3]EDF, Corvallis, USA. [4]EDF, Machali, Chile. [5]EDF, Bozeman, USA. [6]EDF, Santa Cruz, USA

Abstract

In Los Ríos Region, sierra is a small-scale traditional and subsistence fishery, which is fundamental for the local economy, culture and identity of fishing communities. Given its importance the regional fishermen's federation started working for sierra to be declared an official fishery in the country in 2017 and in 2021 the fishery was finally closed to new fishermen in order to enable the development of a fishery management plan. Sierra is a data-poor fishery and fishermen requested EDF to launch a FISHE (Framework for Integrated Stock and Habitat Evaluation) process to build a climate-resilient multispecies fishery management plan that includes sierra. To support the development of the management plan we used a smartphone-based application to collect, visualize and analyze fishery data. Five community members (enumerators) from local fishing communities were hired to collect fundamental information like catch amounts and length distribution, fishing effort, sales prices, and marine mammal encounters to enable stock assessments and guide management of the fishery. After two years of data collection, and thanks to the efforts of the local enumerators the Chilean government agreed to fund and administer a monitoring program for the sierra fishery. Technology was key to provide essential information at low cost, employing local observers from fishermen communities and building a robust database to run FISHE and stock assessments. Small-scale fisheries, specifically subsistence fisheries, must be managed where technology can be the turning point in data-collection efforts and community involvement.

Presenter Bio

Layla Osman, PhD: Marine biologist and Doctor in Ecology. More than 20 years of experience working in small-scale fisheries and marine conservation, facilitating processes with multiple stakeholders, designing environmental and capacity-building programs, workshops and national and international conferences. Specializing in research, strategy design, coaching and systematization of learning process, transformation and evolution of systems, organizations and people. Layla is an expert in learning networks and human-centered tools to innovate and advance in fisheries and ocean sustainability. Working experience in Chile and Latin America.

Bring on the data wave: Catalyzing electronic fisheries monitoring by breaking down barriers to uptake.

Benjamin Woodward[1], Christopher Cusack[2]

[1]CVision AI, Boston, USA. [2]EDF, San Francisco, USA

Abstract

Electronic fisheries monitoring has significant potential to enable the widespread collection of information necessary for science based fisheries management However, due to legal, institutional, cost and technical barriers that limit its application in many fisheries, electronic monitoring is not growing fast enough to enable good management in the face of rapidly changing ocean ecosystems. We discuss the main technical and cost barriers that are limiting the uptake of electronic fisheries monitoring and present the results of a project in the United States west coast groundfish fishery aimed at breaking down these barriers. The multi-year project included the development of machine learning algorithms aimed at facilitating the wireless transmission of monitoring data through reductions in the amounts of data needing to be transmitted to, and reviewed by, fishery managers. Our results demonstrate that the main technical barriers to widespread implementation of electronic monitoring are presently surmountable, and that if monitoring programs embrace the use of machine learning and wireless transmission significant cost reductions are possible. We also discuss areas of future research and engagement that are needed to maximize the uptake of electronic monitoring systems in fisheries globally.

Presenter Bio

Benjamin Woodward is the CEO of CVision AI, a firm specializing in using computer vision and machine learning to solve engineering problems in video and image analysis. He has 15 years of experience designing, testing, and deploying sensor and algorithm systems including EO/IR, LIDAR, Radar, Acoustic, and optical. He worked at BAE Systems in the Signal and Information Processing Lab, the Survivability, Targeting and Sensor Solutions group, and the Advanced Reasoning Technologies group, as well as at Draper Labs Machine Intelligence group. As the co-founder of CVision, he has worked to bring deep learning solutions to different domains, including the marine sciences where he and his partner Jonathan Takahashi have developed multiple systems for automatic video processing in both underwater and electronic monitoring workflows. Mr. Woodward has a B.S in physics from the University of New Hampshire, and a M.S. in Electrical Engineering from the University of Massachusetts.

Addressing Transparency at Sea: Electronic Monitoring Solutions to Social Responsibility and Environmental Sustainability.

Natalie Tellwright

Conservation International, Arlington, USA

Abstract

Opacity and the lack of digital infrastructure in global fisheries has long created the conditions under which illegality can thrive, which encompass both IUU fishing and a wide range of human rights violations, including forced labor and human trafficking. Electronic monitoring (EM) has been increasingly employed on fishing vessels over the past 2 decades for the purpose of providing detailed catch and effort data. More recently EM has been applied as a useful transparency tool, to fill science and compliance monitoring information gaps where observer coverage is poor. However, the application of EM for monitoring social and labor conditions on vessels is less understood, and has yet to be independently tested, applied and evaluated in the context of worker-driven social responsibility models. The Nature Conservancy, Conservation International, Global Fishing Watch and industry partners are collaborating on a project to prototype and trial electronic monitoring technologies in the fisheries sector to combat both illegal fishing practices and human rights abuses. Through a science-driven and human-centered approach, the project will build upon investments in EM systems, human rights due diligence tools, WiFi at sea, and artificial intelligence to understand:

- How EM data when applied to social issues might help better protect fishers and support a wider worker-driven social responsibility system, and how it might cause harm?

- How might EM data contribute to social responsibility assessments?

- How can EM technologies integrate with connectivity at sea solutions to better protect fishers.

- How can innovations in artificial intelligence (AI) and data infrastructure improve efficiency and accuracy of EM while ensuring data security and privacy protection.

Presenter Bio

Natalie Tellwright is the Ocean Innovation and Human Rights Program Manager at Conservation International, with 10 years of experience working with governments, seafood industry, civil society, NGOs and academia to enhance fisheries and labor compliance. Prior to CI, Natalie worked for OceanMind leading the monitoring, control and surveillance (MCS) and analysis programs in south-east Asia and Pacific, and also worked as a Commercial Fisher and Fisheries Observer.

Understanding and Improving Electronic Reporting in Small-scale Fisheries

Janelle Hangen[1]

[1]Environmental Defense Fund, Jericho, USA.

Abstract

Small-scale fisheries make up 40% of the global catch and contribute to livelihoods of more than 500 million people around the world. Managing these fisheries can be extremely challenging given limited resources, governance, and data. Climate change is making this challenge even greater through shifting stocks, changes in stock-recruitment relationships, and increased variability in ocean conditions and has increased the importance of effective management as the populations in developing countries will become increasingly dependent on these fisheries for food security. Effectively managing fishery resources in a changing climate depends on quickly detecting, understanding and responding to shifts in fish abundance, size and species composition. This makes fast and efficient collection of catch data essential.

Electronic reporting programs have become quite prolific and many small-scale fishery managers have begun to implement electronic reporting programs. While this initial momentum is encouraging, these efforts have not always gone smoothly. There have been significant obstacles in terms of cost, reliability, connectivity, and data management and access among others. Understanding and learning from the challenges these programs have faced is essential to designing new programs in a way that maximizes their benefit and has the potential to scale to other fisheries and regions, offering invaluable tools for collecting fisheries information. Through literature review and interviews with small-scale fishery managers and stakeholders with hands-on experience designing and implementing ER programs, this research seeks to identify lessons learned in electronic reporting programs in small-scale fisheries around the world. It also provides select case studies from Africa, Central and South America, Asia and other regions that help highlight common challenges and innovative solutions. Finally, it synthesizes these experiences into a set of considerations and best practices to help small-scale fishery managers and participants navigate pitfalls and design and implement effective new electronic reporting programs in their fisheries.

Presenter Bio

Janelle has been following fish around since she commercial salmon fished in Southeast Alaska in 2006. She has worked as a fisheries biologist and manager in Alaska and Maryland, supported fisheries projects at NOAA and helped launch Rare's Fish Forever program. Most recently, she led ending illegal fishing research and analytics for Pew's International Fisheries team. Janelle currently works remotely from northern Vermont playing a key role on EDF's Ocean Technology Solutions team advancing solutions for climate change resilient fisheries around the world.

Overcoming Challenges in Latin American | Scaling Technology Lessons Learned

Janelle Hangen[1], Layla Osman[2], Kendra Karr[3], Berenice Garcia[4], Almendra Mendoza[5], Daniela Thorne[6]

[1]EDF, Jericho, USA. [2]EDF Chile, Valdivia, Chile. [3]EDF, Santa Cruz, USA. [4]EDF Mexico, Monterrey, Mexico. [5]EDF Peru, Lima, Peru. [6]ProDelphinus, Los Organos, Peru

Abstract

The goal of this session is to share, learn, and understand the successes and challenges of technology projects in Latin America to address comprehensive and sustainable fisheries management. It will include presentations of lived experiences from small-scale fisheries in Chile, Peru and Mexico. Presenters will showcase real world examples of overcoming a myriad of challenges with varied success of technology implementation. Next steps will include further collaboration: a working group and potential publication.

We will discuss how technology was used to launch a Chilean observer program that led to the development of a government funded monitoring program to inform future management plans. This session will share how technology is increasingly becoming the catalyst for fishers, communities and local governments to implement science-based management that accelerate scaling of climate resilient solutions. We will include details of how a digital tide is rising in Mexico, where technology is helping advocate for public policies that utilize data-driven fisheries management and more. We will share how northern Peruvian communities came together to elevate voices of small-scale fishers so that the government would recognize the fishery and designate resources to support its management. Additionally, a global study of electronic reporting applications will share results around best practices for implementation and highlight Latin American examples.

Presentations Include:

- Understanding and Improving Electronic Reporting in Small-scale Fisheries: Examples from Latin America

- Digital Scaling and Innovation for Sustainable Fishing in Mexico: Overcoming Challenges through Collaboration

- Technology in a changing ocean: accelerating solutions that scale the implementation of science-based fishery management for individuals, communities, and governments in Latin America

- A participatory monitoring program as tool to develop community based management plan for the Peruvian Hake artisanal fishery in Piura, Perú

- Technology as bottom-up tool to develop a Climate Resilient Multispecies Fishery Management Plan in Los Ríos region, Chile.

Presenter Bio

Janelle Hangen, M.S.: Janelle has been following fish around since she commercial salmon fished in Southeast Alaska in 2006. She has worked as a fisheries biologist and manager in Alaska and Maryland, supported fisheries projects at NOAA and helped launch Rare's Fish Forever program. Before joining EDF's Oceans Technology Solutions team, she led ending illegal fishing research and analytics for Pew's International Fisheries team. Janelle currently works remotely from northern Vermont playing a key role at EDF advancing solutions for climate change resilient fisheries around the world.

Layla Osman, PhD: Marine biologist and Doctor in Ecology. More than 20 years of experience working in small-scale fisheries and marine conservation, facilitating processes with multiple stakeholders, designing environmental and capacity-building programs, workshops and national and international conferences. Specializing in research, strategy design, coaching and systematization of learning process, transformation and evolution of systems, organizations and people. Layla is an expert in learning networks and human-centered tools to innovate and advance in fisheries and ocean sustainability. Working experience in Chile and Latin America.

Kendra Karr, PhD: Senior Scientist as the Regional Fisheries Science Lead for the Fisheries and Oceans Program of EDF. She works with international partners on identifying gaps in science at local and regional levels, building knowledge and capacity, developing and implementing climate-smart fishery management approaches that result in better ecological, social and economic outcomes. Kendra's work with local communities and partners supports the co-developed of scalable science-based solutions for a sustainable and resilient future. She works through Latin American and the Caribbean, Asia Pacific, and in Africa – using the best available science to empower and support the implementation of realistic management solutions.

Berenice Garcia: Internationalist with experience in developing projects and strategies that integrate social development, sustainability, and innovation. She has worked as an advisor for startups at Impact Hub and Startup México. Currently, she is a member of the strategic partnerships team at EDF Mexico, where she has been collaborating for the past four years.

Almendra Mendoza: Fishing Engineer of National Agrarian University with a young career advocated to bring her capacity for implementing better rights and livelihood conditions in small- scale fisheries

communities ensuring sustainable management. As a Fisheries Specialist Consultant she has been working with several artisanal communities, designing, leading and coordinating participatory processes like Learning Networks, Formalization, Monitoring and fisheries research in Peruvian communities.

Daniela Thorne: Peruvian Marine Biologist and research associate at Pro Delphinus NGO. She started her professional career co-leading the creation and implementation of a participatory monitoring program and fishers network in northern Peru. Currently it has scaled to be a collaborative project with EDF that seeks to enhance co-management in communities of Piura-Peru. Also she is leading a project that seeks to gather information, generate social capital and empower local management of ecosystems in artisanal free divers in northern Peru through the development and implementation of the first monitoring initiative of this fishery.

Advancing marine domain awareness: Real-time IUU fishing risk assessments through behavioural analytics and data fusion

Fernando Cagua, Kelly Rummins, Heather Deacon, Joseph Corbett, Andy Hovey

Starboard, Alexandra, New Zealand

Abstract

Government agencies, RFMOs, NGOs and analysts working to uncover IUU fishing need to manually make connections across multiple sources of information. RFMO authorisations, ownership information, international sanctions and agreements, historical incidents, among others, all play an important role when assessing a vessel's IUU fishing risk. Not only is this time consuming but the complexity of then combining this intelligence with on-water information such as vessel positions means indicators of IUU fishing risk may remain hidden. Starboard has recently developed a risk assessment framework that automatically integrates on and off-water information to provide analysts with a near-real time assessment of the IUU fishing risk of vessels globally. First, vessel positions are analysed to generate a history of vessel behaviour. From simpler events like port visits and vessel encounters to complex analyses such as machine-learning based anomalous movements and network linkages to IUU listed vessels. Then, we contextualise these behaviours against a wide variety of off-water datasets, including those from our collaboration with S&P Global Market Intelligence, one of the richest and most reliable sources of vessel information available. Starboard's risk assessment framework builds upon the research literature and processes developed by leading analysts in their daily jobs. Starboard's data fusion makes it possible to visualise risk indicators geospatially, integrate them into a team's own risk model, and interrogate the behaviours that led to a particular risk score. By automatically filtering through large volumes of data, our solution helps teams identify high-risk or non-compliant vessels for closer scrutiny and inspection. By translating on and off-water information into risk assessments, Starboard supports customers to make informed decisions, ensure sustainable and legal fishing practices, and protect marine resources for a resilient and sustainable future.

Presenter Bio

With over 10 years of experience working with data at multiple government, not-for-profit, and research organisations, Fernando Cagua (PhD) is responsible for designing and implementing machine learning and data intensive solutions for Starboard. Starboard allows Fernando to combine his passion for the ocean with his background in data science, engineering and marine research.

Operationalizing Computer Vision in the Cloud and at the Edge for Fisheries Electronic Monitoring

Jimmy Freese[1], Justin Kay[2]

[1]Ai.Fish LLC, Kailua, USA. [2]Ai.Fish LLC, Chicago, USA

Abstract

Electronic monitoring (EM) is a promising solution to the problem of unsustainable fishing practices globally. But, EM has a significant data problem. Currently, even a single fishing trip can produce a thousand hours of video that require human review. At a global scale, the current approach to EM cannot work. Computer vision (CV) is an AI field that enables computers to derive information from still images, video and other inputs. Ai.Fish LLC is a start-up in development and solely focused on the opportunity of CV in EM and other ocean conservation applications. We have created cloud-based CV solutions to support AI-assisted EM review which saves as much as 80% of the time required by a human reviewer with equivalent or better accuracy. This technology presents an opportunity to affordably scale EM across global fishing, a critical step toward a sustainable and resilient future in commercial fishing.

We will begin with an overview of our technology which automatically counts and classifies tuna in longline EM footage. We will discuss our experiences to date in operationalizing CV at scale in the cloud. This will include a summary of the key challenges to commercializing artificial intelligence (AI), the significant opportunities AI presents in EM, and a discussion of the remaining commercialization barriers. We will explore our recommendations and learnings around interoperability. We will also present our latest research exploring AI at the Edge in support of fisheries monitoring which includes work supported by the Environmental Defense Fund and the National Fish and Wildlife Foundation.

We will end with a practical discussion of the opportunities for collaboration between industry and fisheries management and regulation entities to expand the use of AI in EM through a case study of our contract work with the Department of Fisheries and Oceans of the Government of Canada.

Presenter Bio

Jimmy is co-founder and Chief Executive Officer of Ai.Fish. His secret sauce is cultivating businesses in ultra niche markets. To date Ai.Fish has raised over $1 million USD in grant funding and secured almost $1 million USD in contract work with industry partners. Before co-founding Ai.Fish, Jimmy was the founder and CEO of AkuShaper, where he built the company from inception to notoriety in the surfboard manufacturing industry. During his almost 20 years in that role, James made thousands of customer acquisitions, dozens of strategic alliances, and developed the standard for computer-aided surfboard design. Prior to founding AkuShaper, Jimmy worked as a Software Product Manager for hotU, where he gained extensive experience in user-centred software design. He received his M.S. from the University of Texas in Chemical Engineering with an emphasis on Control Engineering, and his B.S. from Carnegie Mellon University in Chemical Engineering.

Innovative Applications of Artificial Intelligence Toward a Sustainable and Resilient Blue Economy

Justin Kay[1], Jimmy Freese[2]

[1]Ai.Fish LLC, Chicago, USA. [2]Ai.Fish LLC, Kailua, USA

Abstract

According to the World Wildlife Fund more than 3 billion people worldwide rely on seafood as their primary source of dietary protein. In 2020, 51% of the global production of aquatic animals was provided by capture fisheries. An estimated 60 million people are directly employed in fisheries and aquaculture with an estimated 600 million livelihoods relying on this. 90% of the employment in capture fisheries are within small-scale fisheries. There is a massive opportunity for low-cost intelligent technology to support sustainable and resilient fisheries, protecting these livelihoods. In this presentation we will provide an overview of applications of artificial intelligence and computer vision techniques to support ocean conservation and fishing sustainability for a successful Blue Economy.

Ai.Fish has the largest library of annotated EM video supporting artificial intelligence development in the world. We will begin by discussing the challenges and key learnings from training high-quality computer vision algorithms using this library and the work that remains to foster continued development on the frontiers of the technology. We will present a summary of different dataset and algorithm approaches in the context of sustainability challenges we have supported to date. We will discuss the importance of real-world exposure for algorithm performance but also the pitfalls and potential biases that may result from this. We will provide an overview of artificial intelligence challenges across different fishing contexts and modalities. We discuss remaining opportunities for innovation and the barriers to exploring these areas which include bycatch, sizing, and protected species surveillance. Finally we will present a comprehensive review of edge systems as they apply to fishing innovation opportunities including our experience with the latest technologies and the opportunities and challenges of AI onboard fishing vessels.

Presenter Bio

Justin is co-founder and Chief Technical Officer at Ai.Fish. As the Principal Investigator on Ai.Fish grants, Justin has led the development of our technology to date. Justin previously worked in the Computational Vision Lab at the California Institute of Technology where he focused on computer vision methods for automated salmon counting in sonar videos. Prior to co-founding Ai.Fish, Justin spent several years as a Lead Software Engineer at AkuShaper, helping to design and implement CAD/CAM software responsible for the design and manufacture of over half the world's surfboards. In that role he led the development of advanced computational geometry libraries and oversaw a wide range of software projects including a novel machine learning system for classifying 3D surfboard designs. Justin received a B.S. (Honors) in Electrical Engineering and Computer Sciences from the University of California at Berkeley where he also performed research in machine learning.

Exploring AI for Fisheries in Depth: Challenges and Opportunities

Justin Kay[1], Jimmy Freese[2]

[1]Ai.Fish LLC, Chicago, USA. [2]Ai.Fish LLC, Kailua, USA

Abstract

Artificial intelligence (AI) is a hot topic of 2023. However, while many people are interested to apply AI across various industries, these implementations are missing the mark due to a lack of understanding of the nuances of the technology.

In this session we will bring together experts in fishing and AI to dive deeply into the challenges and opportunities of AI for a sustainable and resilient future for the world's oceans.

This event will cover the following 3 topics:

1. What is AI and what can it do for me? This topic will introduce common concepts and terminology in artificial intelligence and machine learning to support understanding by fishery and industry stakeholders. We will cut through jargon to come to a shared understanding of the capabilities of AI. We will introduce participants to promising key advances in artificial intelligence, machine learning, and computer vision for fisheries.

2. Creating and evaluating better AI systems. This topic will explore what goes into creating "accurate" AI systems. Concepts covered will include:

- The importance of high-quality data, and common pitfalls in dataset creation. For example: the difference between a training set and a test set; and how to establish valid datasets.
- A breakdown beyond "accuracy" of important statistical metrics such as precision, and recall and the uses and tradeoffs of these.
- How changing conditions lead to changing data distributions that cause AI systems to break down in the real world. We will build upon what we've learned about high-quality datasets and evaluation metrics to discuss prevention strategies.

3. Emerging opportunities. This topic will foster discussion and exploration of opportunities for AI within a sustainable and resilient future. We will present some case study examples from our work to date and discuss audience driven inquiries at the frontiers of AI in the industry.

Presenter Bio

Justin is co-founder and Chief Technical Officer at Ai.Fish. As the Principal Investigator on Ai.Fish grants, Justin has led the development of our technology to date. Justin previously worked in the Computational Vision Lab at the California Institute of Technology where he focused on computer vision methods for automated salmon counting in sonar videos. Prior to co-founding Ai.Fish, Justin spent several years as a Lead Software Engineer at AkuShaper, helping to design and implement CAD/CAM software responsible for the design and manufacture of over half the world's surfboards. In that role he led the development of advanced computational geometry libraries and oversaw a wide range of software projects including a novel machine learning system for classifying 3D surfboard designs. Justin received a B.S. (Honors) in Electrical Engineering and Computer Sciences from the University of California at Berkeley where he also performed research in machine learning.

The Moana Project - Ensuring a sustainable and resilient sea food sector for New Zealand.

Joao Souza, Julie Jakoboski

MetService NZ, Raglan, New Zealand

Abstract

New Zealand has the 9th larger oceanic Economic Exclusive Zone and is the 52nd-largest national economy in the world. Therefore, it is key to efficiently use resources to support the development of a blue economy, that is sustainable and resilient to climate change. While the seafood sector alone brings $4.18B to NZ annually, oil and gas offshore exploration provide about 30% of the country's consumption. Ocean circulation and other environmental properties drive the transport of larvae, determine population connectivity and impact fisheries recruitment. The Moana Project objective is to provide state of the art science to revolutionise ocean observing and modelling in New Zealand to support the Blue Economy by providing accurate ocean observations, models and data products. We built a robust view of the past ocean behaviour to improve the understanding of the drivers of variability that impact ocean activities, such as commercial fishing and aquaculture. But to do this in an efficient way we need to partner with the communities that have been exploring these very resources for centuries, and we need to observe the ocean. By deploying a New Zealand developed water temperature and pressure sensor – the Magōpare sensor – in partnership with the fishing industry we are building a new "nationwide ocean observing capability". These observations are integrated into our open-access ocean models to understand the past and provide forecasts for the near future (7 days), increasing our capacity to plan and respond to emergencies and changes in the ocean environment. The data generated is transformed in fit-for-purpose products aiming to provide key information for decision making to help manage and ensure a resilient sea food sector. Here we present an overview of the project results and derived products as it reaches it is reaching its conclusion.

Presenter Bio

Dr. Joao Souza is a physical oceanographer with vast experience in coastal studies and hydrodynamic modelling, and an expert in data assimilation with more than 20 years of experience in oceanographic research. He is the science leader of the Moana Project, that developed a new temperature and pressure sensor that is deployed in partnership with the fishing fleet in NZ.

Enhancing Transparency and Trustworthiness in Distant Water Fishing Administrative Operations: The Solution of Blockchain

Pao-Ta Yu, Cheng-Yu Tsai

Dept. of Computer Science & Information Engineering, National Chung Cheng University, Chiayi, Taiwan

Abstract

Regarding the current issues in Taiwan's distant water fishing labor, including insufficient transparency in maritime administrative operations, unreliable documentation records, and low credibility of work hour entries and fishing logs. Introducing blockchain technology is of significant importance to address these problems. The characteristics of blockchain technology, including decentralization, anonymity, encryption security, and immutability, can ensure that the process of relevant data recording can be traced and tracked, thereby enhancing transparency in the entire administrative operations process.

However, the "traceability" and "immutability" of blockchain technology are built upon the costly process of information reconstruction. Therefore, if blockchain operates independently at sea or provides only a single application service, it may result in lower-than-expected costs and consequences when intentionally making "appropriate modifications" to the data already recorded on the blockchain.

This implies that if blockchain applications are limited to a small number of users with a single application, they may be able to reconstruct data at a very low cost, thereby reducing the effectiveness of immutability. However, when there are more participants and diverse life application services in the blockchain, reconstructing the entire blockchain becomes more challenging. In this study, besides constructing a blockchain system suitable for distant water fishing, it is necessary to improve and develop life application services that allow the participation of crew members, such as blockchain-based encrypted communication software. This will ensure the involvement of users continuously utilizing application services in the blockchain, thereby aligning the blockchain application in maritime administrative operations with the spirit of blockchain.

Presenter Bio

Professor in Dept. of Computer Science and Information Engineering, National Chung Cheng University, Chiayi, Taiwan.

iCatch: Integrating Genomics and AI to Make Species Identification Possible from Point-of-Capture to Marketplace

Nadya Mamoozadeh[1], Nihar Mahapatra[1], Shannon O'Leary[2], David Portnoy[3], Mariah Meek[1]

[1]Michigan State University, East Lansing, USA. [2]Saint Anselm College, Manchester, USA. [3]Texas A&M University - Corpus Christi, Corpus Christi, USA

Abstract

Accurate species identification plays a fundamental role in our ability to effectively manage wild capture fisheries and support sustainable seafood supply chains. However, reliable species identification is challenging within species groups that exhibit conserved morphologies and becomes even more difficult when diagnostic morphological features have been removed, such as with fillets and fins, and when features change developmentally, such as with juvenile vs. adult stages. Difficulty distinguishing species poses problems throughout seafood supply chains, where accurate species identification is crucial to quantify and monitor levels of harvest, prevent protected species from entering consumer markets, and infer and monitor species conservation status. In particular, accurate determination of species identity is central to tracing seafood products throughout complex supply chains and to enforcing regulations designed to combat IUU fishing. We aim to solve these problems with iCatch, an emerging technology that integrates genomics and artificial intelligence (AI) to enable fast, accurate, and field-deployable species identification practical for implementation from point-of-capture to the marketplace. iCatch supports both visual and genetic species identification via an AI-powered smartphone app and equipment-free test kits analogous to at-home tests for COVID-19. iCatch is low-cost and easy-to-use, allowing users from observers on boats, inspectors at ports, and buyers at markets to verify the species identity of diverse seafood products, including whole fish, fillets, and other parts. Additionally, the cloud-based database behind iCatch will ultimately offer a repository of information describing species distributions and IUU fishing events in real-time, supporting future management planning. In this talk, we describe how iCatch works with use cases from high-value wild capture fisheries. By equipping users with smart species identification technology, iCatch is poised to revolutionize our ability to sustainably utilize marine fisheries resources, protect seafood supply chains, and strengthen the global blue economy.

Presenter Bio

Dr. Nadya Mamoozadeh is a research scientist in the Department of Integrative Biology at Michigan State University in East Lansing, Michigan, USA. Her expertise is in fish ecology and evolution, biodiversity conservation, and applied genetics and genomics. In her current role, Dr. Mamoozadeh conducts research that employs genomic methods to address ecological and evolutionary questions central to freshwater and marine fisheries management.

Using Vessel monitoring technologies and PGIS to detect the fishing footprint in the Kanyakumari coastal region, India

Abhishek .[1], Divya Karnad[1], Claire Collins[2], Ana Nuno[3]

[1]Ashoka university, Sonipat, India. [2]Zoological Society of London, London, United Kingdom. [3]NOVA University, Lisbon, Portugal

Abstract

Understanding the regional and global ecological impacts in marine ecosystem is directly linked with the patterns of human activities in the ocean. From a scientific perspective mapping and monitoring of these dynamic human patterns has played a crucial role in sustainably managing the oceanic activities. Use of vessel monitoring technologies has assisted in enforcing management measures to ensure the ecological and biological sustainability of the marine areas. AIS (Automatic Identification System) has been used in past for detection of fishing ships however, data for the Indian Exclusive Economic Zone (EEZ) is very limited due to small number of fishing vessels having AIS installed. Therefore, this study uses both AIS and SAR (Synthetic Aperture Radar) satellite images to detect the fishing vessels in the Kanyakumari region. This poster will highlight the results of detected fishing ships using SAR and AIS data for the Kanyakumari coastal region. In addition, the study will use PGIS (Participatory Geographic Information System) to incorporate local ecological knowledge of the fishermen community to get to more accurate results of the fishing locations. The poster is presenting the initial research works conducted in Kanyakumari will serve as a foundation for long-term research focused on the Indian EEZ area, informing policy decisions and management strategies promoting the sustainability and conservation of marine ecosystems. Additionally, the study addresses the conference objective of emerging technologies for marine biodiversity and examining current conservation and policy feasibility to tackle illegal fishing by foreign fleets.

Presenter Bio

I grew up in one of the most culturally diverse, and ecologically rich regions of the world, Rajasthan, India. Before joining Ashoka University, I earned a Bachelor's and Master's degree in History from the University of Delhi, followed by Masters in Heritage Conservation and Management (with specialization in Natural Resource Management and Cultural Anthropology) from the Wildlife Institute of India, UNESCO C2C. Previously, I have worked with the Range-wide River Dolphin and Tiger project, the National Mission on Clean Ganga project, fishermen of Gangetic plains, in the Himalayas, and other protected areas of India. Individually, I undertook two projects titled "Relocation and Resilience of Communities: A study of Sariska Tiger Reserve" and "Storied Landscape: Ecological Narratives of the Bhotiya". Currently, I am working as a research scholar at the Biology Department, Ashoka University.

A participatory monitoring program as tool to develop community a based management plan for the Peruvian Hake (Merluccius gayi peruanus) artisanal fishery in Piura, Perú

Almendra S. Mendoza J.[1], Samuel Amoros[1], Daniela C.S Thorne[2], Joanna Alfaro[2], Vania Arrese[2], Ruben Torrejón[2], Adrian Custodio[2], Janelle Hangen[3], Christopher Cusack[4], Erica Cunningham[5]

[1]Environmental Defense Fund, Lima, Peru. [2]Prodelphinus, Lima, Peru. [3]Environmental Defense Fund, Jericho, USA. [4]Environmental Defense Fund, Corvallis, USA. [5]Environmental Defense Fund, Montana, USA

Abstract

The artisanal Peruvian Hake fishery has been undergoing a formalization process for 20 years. In 2003, it was closed excluding artisanal fishermen, who were not included in the official state registry due to lack of knowledge of administrative procedures. This decision directly affected more than 3,000 families.

EDF has been working to make these fishers visible, as well as to legitimize their fishing rights. In 2022 an alliance was formed with the NGO ProDelphinus, which had been implementing an electronic monitoring fisher network in northern Peru using the mobile application "Appescar". Participatory monitoring of the hake fishery was promoted in Cabo Blanco, Ñuro, Organos, and Talara, located in Piura, Peru. Objectives were: i) Collect information to support the formalization of Hake ii) Support implementation of a sustainable management plan based on local knowledge.

As a first step, stakeholders were convened in a workshop to agree on the monitoring processes and the data collection in each cove, then APPESCAR's technology was adapted to these agreements and monthly analysis of the information were published in bulletins pasted in each port. After a year of monitoring, a landing of 1,034 tons of Hake was reported with an average price of 0.6 dollars per kilo, with a length frequency between 10 to 35 cm. Other species with representative landings like Caulolatilus princeps have landings over 68 tons/year, and Cypcelurus heterurus over 18 tons/year; but both with prices upper than 2 dollars/kilo.

After reviewing results, fishermen look for management strategies that allow them to increase their incomes. So as a next step, EDF proposes to use FISHE, a tool that has 11 steps allowing users to understand their information, set objectives for their fisheries, and obtain a scientific guide for sustainable multi-species management and resilience to climate change.

Presenter Bio

Almendra Mendoza, fishing engineer of National Agrarian University with a young career advocated to bring her capacity for implementing better rights and livelihood conditions in small- scale fisheries to ensure sustainable management. Passioned for her profession, involve in volunteering, teaching and research. In her role in EDF as Small Scale Fisheries Specialist she has been working with several communities in the Northern of Peru for more than 5 years, leading and coordinating participatory processes like Learning Networks, formalization, monitoring and fisheries research in Peruvian communities.

Fully Documented Fisheries

Angelo Mencarelli[1], Edwin van Helmond[1], Maria Sokolova[2]

[1]Wageningen Research, Wageningen, Netherlands. [2]Wageningen University, Wageningen, Netherlands

Abstract

Over the last decades, Electronic Monitoring (EM) has emerged as a successful and cost-efficient technology to improve catch monitoring programs of fisheries around the world. Through enhanced registration of fishing efforts and location and the ability of 100 % video monitoring coverage, EM has the potential to provide high-quality catch information. Currently, manual review of the vast amount of video data is still the standard to generate catch information from EM. However, the manual review process is labor-intensive and time-consuming. In an attempt to automate the process of video review a consortium of Wageningen University and Research (WUR) and partners from the fishing industry, investigates the possibility to integrate computer vision technology into EM. Although it is necessary to cover the fisher's working area, it is difficult to obtain sufficiently accurate estimates of catch compositions due to low image quality, Illuminance variation, camera dirtiness, and occlusions, where parts of the catch are hidden by crew processing the catch, lead to a severe reduction in precision and accuracy. By integrating a high-resolution camera in combination with 3-D images in a system where the image acquisition scene is semi-closed to ensure stable lighting conditions, prevent dirt on lenses, and blocked view (e.g. hands of the crew) we are able to automatically record length-and-weight- by species of discarded catch on Dutch bottom trawlers (Sokolova et al. 2023). The ability of the developed algorithms to handle cluttered catches on the sorting belts enables the recording of the complete catch without disturbing the process on board (van Essen et al., 2021). We apply a Continuous Leaning method to process training data sets by avoiding unbalanced class composition (Blok et al., 2022).

During an oral presentation we would like to present, our results and share our experiences in developing this innovation in monitoring fisheries.

Presenter Bio

Angelo Mencarelli is a researcher in Robotics and Computer Vision at Wageningen University and Research, Wageningen, the Netherlands. He is a researcher in different National and European projects, such as InnoRays, EveryFish, and Fully Documented Fisheries, for the development and application of innovative solutions in computer vision and artificial intelligence in fisheries.

Digital Scaling for Sustainable Fishing in Mexico: Overcoming Challenges through Collaboration

Berenice García[1], Rafael Ortiz[2], Silvia Yee[2], Dora Ramos[3], Nadia Olivares[4], Juan Manuel Calderón[5]

[1]EDF de México, Monterrey, Mexico. [2]EDF de México, La Paz, Mexico. [3]ECOSUR, Tuxtla Gutiérrez, Mexico. [4]EDF de México, Yucatán, Mexico. [5]Edf de México, Ciudad de México, Mexico

Abstract

Globally, integrating digital tools has been recognized as a trend and top-priority strategy to promote environmental justice, sustainability, and the development of climate-resilient food systems.

However, the scaling of digital technologies in sustainable fishing in Mexico encounters cultural, political, and economic barriers. Limited access and adoption of these technologies in small-scale fishing communities due to connectivity and digital literacy issues create a significant digital divide. Insufficient funding, political integration, and lack of support for innovation hamper the implementation of technology solutions by the fishing sector. To address these challenges and identify opportunities, Environmental Defense Fund Mexico (EDFM) and its partners, developed a diagnostic on the digital capacities of small-scale fishers across Mexico and then facilitated collaborative and just opportunities for digital scaling. Marea Digital: Technology Solutions for Sustainable Fishing event, held in February 2023, gathered stakeholders from the fishing sector, technology companies, NGOs, and innovation and research centers. Key learnings from the event highlighted several areas for technological scaling, including technical training to enhance digital skills, infrastructure investment to improve connectivity in ports, digital integration through vertical markets, fostering exchange platforms for mutual learning among users and stakeholders, and advocating for public policies that utilize data for informed decision-making in fisheries management. To achieve this will require public-private collaboration. By joining forces, stakeholders can overcome existing barriers and establish an inclusive and sustainable digital ecosystem for small-scale fishing communities. This talk focuses on integrating digital tools to enhance sustainable fishing in Mexico. It explores the key areas of opportunity identified during the forum Marea Digital (Digital Tide) and discusses strategies to approach them.

Presenter Bio

Experienced internationalist adept at integrating social development, sustainability, and innovation into projects and strategies. Advisor for startups at Impact Hub and Startup México, with a current role in EDF Mexico's strategic partnerships team for the past 4 years.

Embark with MDPI on a six-year technological journey: Implementing innovations on board of small-scale handline vessels in Indonesia

Putra Satria Timur, Kai Garcia Neefjes, Yasmine Simbolon

Yayasan MDPI, Denpasar, Indonesia

Abstract

MDPI, founded in 2013, aims to promote responsible and sustainable fisheries activities for the well-being of fishing communities and fishery resources in Indonesia. Recognizing the importance of empowering and involving coastal communities in fisheries management, MDPI focuses on enhancing their participation, accessing domestic and international markets, and improving the sustainability of their fishing livelihoods. While traditional initiatives like onboard observers and paper logbooks are still prevalent, MDPI has actively embraced new technologies since 2017 to support responsible fisheries and community well-being. These technologies include time-lapse cameras that are able to condense an entire fishing trip into a one-hour video file, the Ministry of Marine Affairs' e-logbook system enabling real-time input of catch landings by vessel captains, the I-Fish app facilitating port sampling with direct data upload to the data base, and Spot Trace® technology, a real-time satellite GPS tracking system. Despite this, the experience during the Cyclone Seroya event in 2021 highlighted the need for improvement, as some observers and fishers went missing for some time despite having spot trace® technology onboard due to device battery depletion, providing an important lesson learnt. Overall, it is understood that safety is the crucial primary benefit for small-scale fishers when deploying technologies, while for MDPI understanding fishers' behaviour at sea is key to prioritize capacity-building trainings beneficial to sustainable fisheries practices. For instance, by obtaining information on catch and ecological interactions with endangered, threatened, and protected species (ETP) and socioeconomic data derived from operations, MDPI can tailor appropriate training programs for the coastal communities. With a six-year experience deploying technology devices, MDPI would be pleased to share its journey, reflect on encountered technology related gaps and challenges for small scale fishers in the field, and learn more from SAFET experts and other attendees that will congregate in Bali from October 3-5, 2023.

Presenter Bio

Putra Satria Timur (Fisheries Lead)

Timur is MDPI’s Fisheries Lead and has been working with MDPI since 2015. Timur had a wide range of experience, starting as a field staff in North Buru. From 2018, Timur joined our Bali office, working first as a Data Collection Officer then Data Analyst Officer. During this time, he helped develop several key protocols for MDPI, including fish identification, fisher and ETP logs, and port sampling data methodology. His expertise and contributions have been crucial in the successful implementation of MDPI's sustainable fisheries management programs in Indonesia, and as such, he was appointed Fisheries Lead in early 2023.

Scaling Systems for Coastal Waters

Wm. Patrick McGrath

Navcast Asia, Manila, Philippines

Abstract

Scaling coastal systems

The challenge is the high number of vessels and low production per. All the systems to address coastal issues be they fishery, safety, environmental, security, etc. all have to come to grips with the numbers.

In the Philippines for instance, the coastal fishery (<15km offshore) and the commercial fishery (>15km offshore) land about the same tonnage of fish per year. But the coastal is via 300,000 plus small vessels, and the commercial is 5000-8000 larger vessels. Many useful devices can be trialed in the coastal waters, but who will shoulder the burden of going from trial to 300,000? Indonesia, SriLanka, India, Thailand, Coastal Africa, South America, all have similar math.

Alon was designed to service many constituents. One device, many users:

Fishing Regulators

Fishermen

Fishing Companies, such as Processors of fleet owners

Coastal Safety authorities

Coastal Security authorities

Coastal environmental and scientific research groups.

The basic argument is that no one party can shoulder the cost of equipping and operating a system for this large a number, so alliances between parties to have one device that can service different agendas is the Alon path. The different constituents need not build out 300,000 systems each, but in total, 300,000 are equipped, and the agendas are met.

A different way to look at scaling.

Presenter Bio

Pat McGrath is President of Navcast Asia and VP of Navcast Inc, a Toronto based company with multiple satellite data based systems for marine environments, including VMS for fisheries. Pat is a founder and principal of Navcast and is leading the company's initiative to expand outside North America. He has been working from Manila since 2018.

Utilising technology to establish a human-centred ecosystem for the protection of labour rights and the sustainable development in Taiwan's distant water fisheries.

Li-Chuan Liuhuang, Pao-Ta Yu, Pao-Ann Hsiung, Cheng-Yu Tsai, Wen-Ching Ting

National Chung Cheng University, Chiayi, Taiwan

Abstract

In the past decade, controversies have arisen regarding the employment of foreign migrant fishers in Taiwan's distant water fisheries. These include issues such as inconsistent labour contracts, falsified documents, improper wage deductions, long working hours, and physical abuse etc. The study aims to develop possible implementation strategies and provide evidence-based policy recommendations to government agencies. Researchers adopt a participatory action research approach to establish a transnational recruitment and management ecosystem that improves the labour rights of migrant fishers and promotes sustainable business management. Over a 22-month period from August 2022 to June 2023, the researcher team conducted multi-site fieldwork in Taiwan and Indonesia on the employment processes of migrant fishers. Through in-depth interviews and focus groups, the team sought the perspectives and consensus of various stakeholders. Firstly, the team assisted and facilitated the signing of a binding Collective Bargaining Agreement between employer associations in Taiwan's distant water fisheries (TTA & TSSFA) and the Indonesian Fisheries Workers Union (SPPI). The agreement ensures that both parties commit to providing suitable working conditions and transparent information about the working environment on fishing vessels. Migrant fishers trained by SPPI would be placed on member fishing vessels of Taiwan fisheries associations, thus completing the establishment of a human-centred ecosystem. Secondly, blockchain technology is introduced to provide evidence preservation for the recruiting systems, offering a reliable management solution. Thirdly, AI and statistical analysis are employed to analyse CCTV footage on fishing vessels and calculate the daily working hours of migrant fishers, including identifying hazardous actions through an early warning system. The outcomes of combining these approaches will contribute to a transparent and accountable ecosystem for fair employment and safe return of foreign migrant fishers in distant water fisheries is established, ensuring human-centred and decent work, and improving the well-being of foreign migrant fishers.

Presenter Bio

Li-Chuan Liuhuang is associate professor and chair of the Department of Labour Relations, National Chung Cheng University. Her current research includes cross-national migration and labour rights protection, and collective labour relations and social dialogue.

FishTech by Ocean Eyes

Yusuke Tanaka[1], Masafumi Kamachi[1,2]

[1]Ocean Eyes Co., Ltd., Kyoto, Japan. [2]JAMSTEC, Yokohama, Japan

Abstract

Ocean Eyes is a marine AI venture company that was established by researchers of Kyoto University and JAMSTEC (Japan Agency for Marine-Earth Science and Technology) in 2019.

The missions of Ocean Eyes are to develop physical oceanographic technology (ocean general circulation numerical models and data assimilation methods) to make "ocean state estimation and forecasting"; to combine it with fisheries data and advanced AI techniques for "forecasting potential fishing ground (PFG) or positions of Fish Aggregating Devices (FAD)" for FishTech widely available. FishTech is a coined terminology that combines fisheries and technology, and refers to the field that combines traditional fisheries services and new technologies. These FishTech results are provided through services of SEAoME and Fishers Navi. These Ocean Eyes technologies have been developed as a result of a 10-year research project. We provide these two FishTech services (SEAoME and Fishers Navi) for fishing and marine industries; SEAoME : Highly accurate sea state prediction system for each customers. Fishers Navi : Fishing ground determining support system. Tokyo and some local governments in Japan already used our services and technologies for fishermen. Ocean Eyes services (FishersNavi & SEAoME) can save operating costs and labor time of fishing vessels, and can reduce disaster risks such as quick tide and other sudden environmental hazards.

Presenter Bio

Yusuke Tanaka is the CEO of Ocean Eyes. He also has worked for JAMSTEC. His specialized fields are developments of ocean numerical modeling and service providing for social implementation. Masafumi Kamachi is a director of Ocean Eyes. He also has worked for Japan Meteorological Agency and JAMSTEC. His specialized fields are developments of ocean data assimilation methods and operational systems.

Using the Comprehensive Traceability Principles to Initiate an Electronic Catch Documentation and Traceability (eCDT) Program for a Tanzanian Small-Scale Octopus Fishery

Nina Rosen, Kate O'Rourke, Sara Lewis

FishWise, Santa Cruz, USA

Abstract

The Seafood Alliance for Legality and Traceability (SALT), implemented by FishWise, brought global stakeholders together to develop the Comprehensive Traceability Principles and Pathway – guidance supporting governments to initiate, design, and implement comprehensive traceability programs. In the past year, the Tanzanian Ministry of Livestock and Fisheries, Aqua-Farms Organization, and SALT used the Principles and Pathway to initiate and begin to design the electronic catch documentation and traceability (eCDT) program in the small-scale octopus fishery (SSF) in Kilwa, Tanzania. This marks the first application of the Principles and Pathway, serving as a guide for future initiatives developing similar programs in SSFs to advance supply chain traceability and transparency.

Tanzanian SSFs contribute 98% of total fish landings and provide a vital source of food, income, and employment for coastal communities. Insufficient enforcement, minimal control mechanisms, and a growing local and international demand make Tanzanian SSFs vulnerable to overfishing and environmental degradation. Kilwa District's octopus fishery was selected for the application of the Principles and Pathway due to the importance of the fishery to local livelihoods, continued and forecasted growth, the role of women and youth, its reliance on export markets, and opportunities for improved conservation and fisheries management through improved data collection. Over the last three decades, implementation of resource management measures closely involving the community, such as Beach Management Units, fishery closures, paper-based traceability, and more recent digital data collection (2017), make the octopus fishery an ideal location for maximizing the benefits sought by the users of an eCDT program. The first major milestone achieved is a comprehensive eCDT strategy based on the Principles and Pathway guidance, harmonizing user desires and data and transparency needs, and involving fishers, fishers' organizations, industry, non-governmental organizations, and local and central government actors. The process and tools used will be shared for global learning.

Presenter Bio

Nina Rosen is a Senior Project Manager at FishWise where her work focuses on engaging governments and supply chain stakeholders to prevent illegal, unreported, and unregulated (IUU) catch from entering the market by sharing traceability best practices and facilitating multi-stakeholder collaborative discussions. Prior to joining FishWise, Nina worked at the intersections of science communication, fisheries, and research coordination. She has experience working with small-scale fishers during her past research to understand how co-management strategies provide structure to sustain marine resources

and livelihoods. Nina holds a Bachelor of Science in Oceanography from Humboldt State University, a Master of Advanced Studies in Marine Biodiversity and Conservation from Scripps Institution of Oceanography. Nina's interdisciplinary background gained through academic and professional experiences allow her to view seafood security through an environmental, economic, and social lens.

EM systems advances on monitoring activities on board transshipment vessels

Javier de la Cal

Satlink S.L.U., Madrid, Spain

Abstract

As a worldwide EM leading company, with more than 290 installations deployed and being a main provider in the Pacific Islands, Satlink wants to share its experience on tracking fishing operations on board transshipment vessels. In the last years, Satlink has deployed EM projects on transshipment / cargo vessels to monitor the activities both at sea and in port.

A key objective of these projects is to integrate a crane scale to monitor the weights of the fish and goods transferred from the fishing vessels to the transshipment vessel, as well as to analyze the behavior of the crew on board the vessel. All weight measurements are stored locally in the system's drives on board the vessel, and the information is sent in real time to shore for activity notification to project managers.

Satlink has deployed 3 main projects in the Pacific Ocean, Mediterranean Sea, and Atlantic Ocean with three different purposes:

- Monitoring of Long Line and Purse Seine transshipment in the Pacific Ocean.
- Monitoring of transshipment and processing of blue fin tuna farms.
- Monitoring of cargo (any commodity) from the port to the vessel.

Additionally, the projects have been testing different technologies for data transmission, and include different sensors for the real time monitoring of the activities.

Satlink would like to present these projects, the work done, show the results obtained and the future steps in each of them.

Presenter Bio

Mr Javier de la Cal is the Regional Sales Director for the Asia-Pacific markets at Satlink S.L.U. Javier's background includes a degree in Economics and has strong experience in developing business relationships in APAC for over 9 years. At Satlink, Javier specializes in sales, marketing, and leading

international projects of Electronic Monitoring for different types of fisheries including tuna purse seine and tuna long line, among others.

Genomic Technologies offer Disruption of Illegal, Unreported, and Unregulated (IUU) Fishing.

Peter Grewe

CSIRO Environment, Hobart, Australia

Abstract

Next Generation Sequencing (NGS) platforms are transforming the capability of DNA profiling to reveal detailed population genetic structure on an unprecedented scale. Our team at CSIRO Environment has investigated DNA based methods to deliver approaches that are inexpensive, high throughput, forensic grade, and deliver at scale. For example, a tissue biopsy device was developed that delivers a 10-20mg tissue sample that has been integrated into robotic handling procedures to permit rapid and high throughput DNA extraction. In addition, sampling of bigeye and yellowfin tuna across their pan-tropical distributions has revealed DNA fingerprints can now deliver high throughput DNA profiling for identification of demonstrate great potential through

Presenter Bio

Peter works within CSIRO's Environment Business Unit as a Principal Research Scientist leading and directing a number of collaborative fisheries research projects using cutting edge genomic technologies. These projects focus on high throughput abundance monitoring of marine populations of highly migratory stocks and threatened species (e.g. tropical and temperate tuna and billfish as well as endangered species of sharks including white shark) for determining the provenance and chain of custody of fisheries and wildlife products. Using genomics-based approaches to deliver fisheries independent assessment data, his work promotes sustainable fishing through better management practices and focusses on reducing the negative impact of illegal unreported and unregulated (IUU) fishing.

Optimizing Data Portability for AI Integration + in Seafood Supply Chains

Ryan Taylor, Celeste Leroux, Emily Zimmerman

Goldfish Inc., San Francisco, USA

Abstract

A prevailing aspiration among software solution providers is to craft a product that is not only captivating to prospective clientele but also induces sustained engagement from existing users. Paradoxically, fostering interoperability may seem at odds with the inherent impetus of securing and maintaining a dedicated user base. This conflict may well be an underlying contributor to the lethargic progression of innovation in this domain. In an era dominated by tablets and smartphones, the hurdle to access affordable and straightforward digital tools for supply chain data remains inexplicably formidable. Alarmingly, a majority of the global seafood industry continues to rely on paper-based records, unstructured spreadsheets, or insular data models. Mere digitization, devoid of strategic intent, fails to unlock the full spectrum of utility. Our discourse will center on how the introduction of standardization can catalyze a sweeping enhancement in both the caliber and volume of actionable supply chain data for Large Language Models and Data Analytics, while simultaneously alleviating the reporting onus on the pivotal “first mile” stakeholders.

Presenter Bio

Ryan Taylor is the Co-Founder and leads Product, Research and Development at Goldfish, a software company committed to accessible legal global market access through design and technology. His 18 years of work in minerals sourcing facilitated the first legal exports of artisanal gold from the Democratic of Congo and Colombia.

Addressing the Data Integrity Dilemma in Seafood Traceability

Celeste Leroux, Ryan Taylor, Emily Zimmerman

Goldfish Inc., San Francisco, USA

Abstract

Over the past ten years, there has been a notable surge in the development of traceability solutions for seafood supply chains, bolstered by the collaborative efforts of industries, governments, and philanthropic entities. However, despite these advancements, the efficacy of the tools produced remains questionable, as evidenced by the persistent 50% failure rate in industry audits conducted by the US government to curb the influx of unlawfully harvested seafood. Data precision within traceable supply chains is neither a recent nor an isolated issue; the mining and forestry sectors have grappled with these challenges for decades. Traceability solutions have tried to solve this problem with internal validation, which inadvertently perpetuates the fallacy that immutable data is equivalent to accurate data. Goldfish.io will offer invaluable insights gleaned from the conception and development of its systems aimed at streamlining regulatory compliance. The discussion will delve into articulating and structuring data-driven approaches to confront the enduring 'garbage in, garbage out' conundrum plaguing traceability systems. The complexity of this issue is undeniable, but overcoming it is imperative for the long-term well-being of our oceans, coastal societies, and fishing communities globally.

Presenter Bio

Celeste Leroux is the Co-Founder and Chief Executive Officer of Goldfish, a software company dedicated to eradicating the trade of illegally harvested seafood while increasing market access for legal fishers. She previously worked in the US Government, serving in both the White House and National Oceanic Atmospheric Administration where she worked extensively on combating IUU fishing and seafood trade, including leading the Seafood Import Monitoring Program from 2016-2020.

The Role of Markets in implementation of electronic monitoring in global fisheries: Why you should care and how you can help

Katy Hladki[1], Esther Wozniak[1], Eric Walton[2]

[1]Pew Charitable Trusts, Washington D.C., USA. [2]Pew Charitable Trusts, Washington, USA

Abstract

Thousands of vessels are catching tuna around the world with the global tuna market worth more than US$ 40 billion dollars. Many of these fishing vessels lack independent observation, making it hard for companies to truly know how and where the fish they buy are caught and/or if its caught legally. Electronic monitoring (EM) technologies can expand data collection and verification on vessels of various sizes and gear configurations. Resulting in more transparency and improved sustainability of tuna stocks. Electronic monitoring can improve reporting of catch, bycatch, and fishing effort and demonstrate compliance with RFMO rules, fishing company regulations, and seafood sourcing policies. Its use may also reduce the occurrence of illicit activities onboard vessels and help detect if illegal, unreported, and unregulated (IUU) products are entering the supply chain. While stakeholders are increasingly recognizing the benefits of EM, adoption by the global fishing fleet has been relatively slow. Pew proposes to host a panel on the benefits of EM for markets and supply chain actors and the role they can play in catalyzing EM implementation. The panel will discuss the current development of EM programs at RFMOs and how members of the supply chain can best advocate for adoption and implementation of this technology at the regional and international level.

Presenter Bio

(Presented by Huw Thomas)

Eric Walton supports Pew's engagement with the marketplace through the international fisheries project. He works with seafood supply chain members to advocate for key policies and management measures aimed at ensuring the long-term health of fisheries and ocean ecosystems. Before joining Pew, he led high-end sales to chefs and retail outlets and processed fish for a traceable seafood startup in Maine and taught at various environmental and marine education organizations. Walton holds a bachelor's degree in environmental policy and creative writing from Colby College and a master's degree in marine biodiversity and conservation from the Scripps Institution of Oceanography.

Digitisation of seafood supply chains – A perspective from a voluntary eco-certification program

Shen Yan Liow

Marine Stewardship Council, London, United Kingdom

Abstract

The Marine Stewardship Council (MSC) is a global standard setting organisation for sustainable fishing and traceable seafood. The MSC Chain of Custody (CoC) Standard ensures fish caught certified to MSC environmental standard are managed through seafood businesses with effective segregation, product species and origin identification systems in place, and that they are traceable back to source.

The MSC is on a journey to modernise its global supply chain auditing through digitisation, with a multi-year vision to devise digital auditing tools, promote standardisation of product key data elements and systems interoperability to strengthen supply chain verification, assurance and get closer to real-time end-to-end market risk detection and resolution. Later in 2023, global MSC seafood businesses' CoC audits will become fully digitised. This means digitisation of over 8,000 annual CoC audit data, bringing significant efficiency and consistency in verification process and helping to better inform policy development. During the Covid-19 pandemic, international certification programs including the MSC were prompted to rapidly innovate policies around remote auditing. While the MSC CoC Standard limits remote audit to lower risk trading only businesses with minimum physical product handling, in 2020-2022 43% of MSC annual CoC audits was conducted remotely which under normal circumstance would have been on-site; In 2023, remote audit continues at 27%. To align with global digitisation and hybrid operation trends, the MSC continues to explore tools to better integrate remote and digital supply chain verifications. This presentation provides an overview of the MSC CoC audit approach, supply chain surveillance trends and important lessons from the pandemic. We will examine the potential and effectiveness of the tools proposed as part of MSC's digitisation vision; and how they enable best practices in seafood traceability, and tackling of product mislabelling and fraud.

Presenter Bio

Shen Yan Liow is Senior Supply Chain Standards Program Manager at the Marine Stewardship Council (MSC), overseeing and maintaining the MSC Chain of Custody program which forms the backbone to be able to trace over 20,000 labelled MSC products in 100 countries back to certified sustainable source. Yan has over 10 years experience in international seafood value chain assurance, policy development and ocean conservation. She has worked in both Europe and Asia, with rich experience tackling and devising solutions for supply chain risk mitigation and small scale operations.

Scaling Wireless EM via Starlink, Edge AI, and Virtual Observers for Realtime Monitoring at sea

Joshua Wiersma[1], Iain Hayes[2]

[1]Integrated Monitoring, Boston, USA. [2]Integrated Monitoring, Bangkok, Thailand

Abstract

Nowadays, regulators, NGOs, and fishing organizations are now demanding a wireless model, with cloud based storage and a video review platform that lives online and uses web-based tools like backend APIs, JSON forms, and https encryption protocols. Integrated Monitoring has focused exclusively on developing and operationalizing this type of wireless EM model over the last five years using advanced compression and AI tools to optimize video transfer over local 4G/5G networks. We have proven this model in multiple fisheries and gear types around the world, with major (fleet wide) programs in New Zealand, Chile, Denmark, the Maldives, and the US (NOAA). The only constraint has been real-time monitoring while the vessel is offshore. Until recently, the cost of video transfer over satellite internet has been too cost prohibitive using traditional VSAT antennas. And only the largest fishing vessels could afford them in the first place. This all changes about 3 months ago when Starlink announced their new maritime antennas and ocean data plans, which now provide internet offshore that's 100 times faster than VSAT antennas for a small fraction of the cost. This revolution in low earth orbiting satellite internet technology will soon be followed by OneWeb, Viasat, and Amazon's Project Kuiper. For global EM programs, Starlink is a paradigm shift of what's possible. Integrated Monitoring will show the results of Starlink trials conducted in the New England regulatory EM program (uploading up to 5 cameras at 15 fps); Starlink trials conducted in the Ghanian industrial trawl fishery that combine AI with AIS data to send video verified alerts of transshipments and the ability to login via Virtual Observer using PTZ cameras ; and Starlink trials in the Danish Pelagic fishery, where the combination of edge AI and Starlink allow only 'in-scope' fishing activity to upload for review.

Presenter Bio

I am active at work and recreating around the ocean environment, and keeps in touch with the ocean through open ocean swimming, open ocean standup paddle (SUP) boarding, surfing and with a background in professional ocean racing while working to enable technology integrated solutions targeted at sustainable fisheries, seafood supply chains, regulatory monitoring control and surveillance demands across government and industry stakeholders. I bring more than 25 years of experience developing , applying technology and capacity building in offshore operations and applying real-time Global Navigation Satellite Systems (GNSS), satellite-based systems and Internet based telecommunications across the Indo Pacific Region. My work has focused in the development of real-time IoT technologies and integrated monitoring requirements technology and more recently the adoption of secure communication based on remote Edge AI and machine vision Electronic Monitoring (EM) wireless terrestrial and satellite communication infrastructure projects. These recent developments have evolved from experience based on maritime domain awareness ship and vessel monitoring developments for global government programs. In addition to establishing the early (mid 90's) adoption of national and regional VMS programs, he was

instrumental in reestablishing the International Maritime Organization Long-Range Identification and Tracking Program for the largest shipping registries. Based in Asia, I have managed and participated in project assignments across the Asia Pacific region, Australia, New Zealand, North America, and Europe for governments, commissions, RFMO's, multinational corporations, and industrial customers. Mr. Hayes is a highly skilled leader and communicator, and understands the nuances and politics of working with regulatory agencies and fishing vessels across the Indo Pacific region. I have served as a Director of Absolute Software, a Director of Polestar and more recently a co-founder of Integrated Monitoring Inc. and where he provided business support for regional operations and oversaw the development and installation of satellite- based VMS in over 20,000 vessels. In addition to being a leader in the field of marine IoT applications, I have developed excellent project management, business development skills, and how to build strategic, regional alliances to meet project goals and needs.

Integrating Technology to Combat IUU Fishing: Creating an Environment to Maximize its Impact

Mark Young[1], Sarah Lenel[2], Damian Johnson[3], Gary Orr[3]

[1]IMCS Network, Florida, USA. [2]IMCS Network, Bangalow, Australia. [3]IMCS Network, Christchurch, New Zealand

Abstract

The IMCS Network was established in 2001 to promote and facilitate communication, cooperation, coordination, and capacity development across the fisheries MCS, compliance and enforcement community. The IMCS Network is an informal, voluntary organization that supports members from national, regional and international fisheries agencies and organisations. The Network also includes observers from IGOs, NGOs and academic institutions that support the objective of the Network.

The IMCS Network facilitates a range of initiatives that support members to access, understand and effectively apply emerging technologies to enhance their national MCS measures and compliance activities. A core part of this work is to ensure that the opportunities and challenges associated with technology are clear and that the application to MCS and compliance is targeted and fit-for-purpose. We work with members, observers and partners to ensure there is a robust, ongoing exchange on emerging technology and the sharing of lessons learned and opportunities to collaborate. When seeking to maximize the value of technology to support efforts to combat IUU fishing, it is vital that the broader context in which technology is being deployed is considered. This includes the compliance approach, regulatory environment and, most importantly, the officers that are using, interpreting and responding to the data and information produced. The IMCS Network will present on what we have learned through our collaborative efforts on what is needed to maximize the value of technology to support fisheries MCS and effectively combat IUU fishing.

Presenter Bio

Gary is the Director Investigations & Compliance Support at the Ministry for Primary Industries in New Zealand, a government agency that has responsibility for the enforcement of all legislation relating to primary industries such as fisheries, forestry, food safety and biosecurity. He leads a team of 60 specialist investigators and analysts including a digital forensics unit. Gary started in fisheries enforcement 21 years ago and specialised in investigations and international fisheries enforcement. He was also a member of the Board of the Interpol Fisheries Crime Working Group for many years and is currently the Chair of the International, Monitoring, Control and Surveillance Network which has over 80 members including several regional fisheries management organisations and regional fisheries bodies, including the Southeast Asian Fisheries Development Centre.

Using cloud-based technologies, big-scale data, and ML to create an effective prevention tool to counter IUU fish from entering ports and supply chains.

Natalie Tellwright, Martina Masanova, Tia Hobson

OceanMind, Oxford, United Kingdom

Abstract

The Agreement on Port State Measures (PSMA) is the first binding international agreement to specifically target illegal, unreported, and unregulated (IUU) fishing. Its objective is to prevent, deter and eliminate IUU fishing by preventing vessels engaged in IUU fishing from using ports and landing their catches. OceanMind assists Port States with the effective implementation of the PSMA through PSMART, a web-based tool custom built to enable government officers and enforcement agencies to independently identify and review risks of foreign-flagged vessels requesting to enter their ports. The tool can also assist buyers, processors, and retailers to identify and mitigate high risk shipments from foreign-flagged vessels, enabling buyers to see clearly that there was no illegal fish in the shipment.

PSMART combines cloud-based technologies handling planetary scale big data with vessel behaviour machine learning technology that identifies fishing, fishing related activities and suspicious vessel behaviour to provide a single application where all parts of the PSMA reporting requirements can be completed. OceanMind's AI understands many different types of fishing operations using a varied range of gear types, and can identify the differences between setting, soaking, or retrieving gear. This level of accuracy allows for high confidence in compliance assessment. Thanks to this technology any suspicious behaviours like fishing in closed areas, fishing without a license, possible meetings and transhipments, AIS transmission gaps etc. are flagged by the tool. The outputs of the tool are presented to users for further investigation and comparison with observed AIS activity, reported activity declared in the AREP document, to identify and subsequently mitigate against risks. All PSMA reports including Advanced Request for Port Entry (AREP), Notification Report, Port Inspection Report (PIR) are generated in the tool and available for the relevant port authorities.

Presenter Bio

Software engineer Martina Masanova works in C# development for Azure Cloud, focusing on the migration of the on-premises system to cloud. She also develops web based and desktop tools working with various other technologies in our software stack.

Automated analysis of fisheries data through ML to Identify Labour Rights Abuses At Sea, Inform Inspections and Support Prosecutions.

Emma Seal, Natalie Tellwright, Trevor Thomas

OceanMind, Oxford, United Kingdom

Abstract

Labour abuse issues in fisheries have become increasingly recognised in recent years, but the true extent and depth of the problem remains poorly understood. One key challenge is the remote nature of work in capture fisheries, which makes identification of cases and delivery of enforcement complex and costly. Where cases of likely abuse are identified, many existing response mechanisms are disjointed and under-resourced, and limited by a lack of clarifying data. OceanMind uses satellites, artificial intelligence and cloud computing to analyse human activity on the ocean and produce risk-based intelligence for partners. We have been building on our existing capability to identify risks of illegal, unreported and unregulated (IUU) fishing, to also identify indicators of forced labour in vessel tracking data. Our ML algorithm is being developed using extensive training and ground-truthing to identify three indicators which highlight risks of labour abuse: estimated hours of work, overall trip length and transhipment activity. The algorithm identifies each activity conducted by a vessel and assigns estimated working hours, crosschecking it against rosters and regulations. All these activities have the potential to risk crew welfare through extended working hours, extended trip lengths and perpetual transhipment at sea with unmonitored transfers and avoidance of port inspections where labour abuses may be recognised, reported and resolved. Our work demonstrates how ML can be used to identify high risk activities within fisheries data to recognise potential labour abuse at sea, support authorities to build capacity and improve risk assessment processes. The outputs from these algorithms are intended to help fisheries and labour authorities to target high risk vessels for inspection, share data, and improve responses to cases. Where civil society organisations are working on the ground, the algorithm's outputs can support them with case identification and progression.

Presenter Bio

Expert I&C Analyst Emma Seal has worked across Latin America, Africa and Asia in conservation and social science. She uses her experience to investigate and provide actionable intelligence about IUU fishing and labour and human rights issues.

Automated Analysis of Vessel Tracking Data to Monitor Fishing Activity

Trevor Thomas, Brett Mayes, Martina Masanova

OceanMind, Oxford, United Kingdom

Abstract

AIS data enhances the visibility of vessels that are at sea and can be used for much more than its original intended use of collision avoidance. Globally, there are over half a million vessels transmitting their positions at any given moment. This volume of data can be difficult for flag states to effectively process, who are required to monitor vessel's compliance against the complexities of fishing regulations. This challenge of manually monitoring vessel activity can limit enforcement against illegal, unreported, and unregulated (IUU) fishing which can tie in with forced labour, and significant reduction of fish stocks and marine environments.

At OceanMind, we have built an engine using a variety of data processing and machine learning techniques to extract insights about the activity of fishing vessels using various types of vessel tracking data (AIS, VMS, GSM). The engine uses various pattern matching and signal processing techniques that allow the prediction of vessel activity based on known patterns that have been observed. Our engine allows for the automated analysis of vessel tracking data, and the identification of suspicious fishing vessel behaviour, detecting and distinguishing between 19 different fisheries. The algorithm is applied to local fisheries rules and regulations to identify high-risk and non-compliant behaviour. Alerts are produced close to real time, which enables government authorities to quickly take enforcement action and focus resources on the higher risk vessels. To provide these insights in real time, the solutions need to be scalable and efficient, which is a process which requires constant development and improvement. Upgrading to a Cloud-based system can allow scalability and speed providing alerts to more people faster, at a lower cost. By taking these actions, it is possible to develop monitoring support for entire fleets or areas of interest which may otherwise require significant monitoring resources.

Presenter Bio

Brett's areas of interest are researching machine learning, data analysis and neutrino physics. His particular interest extend to how artificial intelligence is changing the way everyone lives their lives and the effect on the current working culture.

Selecting suitable technologies tailored to MPA monitoring, control, and surveillance.

Samantha Elliott[1], Greg Brown[2], Julian Engel[1], Andrew Richardson[1], Stella Bartolini Cavicchi[1]

[1]OceanMind, Oxford, United Kingdom. [2]Oceanmind, Oxford, United Kingdom

Abstract

OceanMind conducted the UK MPA project is collaboration with the Becht Foundation, working with key partners responsible for MPA protection and enforcement to identify a range of new Monitoring, Control and Surveillance (MCS) tools for use in English waters. This partnership was able to provide cost-effective, high-impact, deterrent-through-detection solutions that are scalable and can be applied to all MPAs around the globe. Various satellite sensors were evaluated for their use and benefit during the early phases of the project including the capabilities and limitations of each technological option as well as current management solutions and their effectiveness. The remote sensing techniques field tested over selected MPAs included, applying ML algorithms to vessel tracking data (AIS, VMS and I-VMS) to create alerts of high-risk and potentially non-compliant activity and analysing satellite imagery (SAR Imagery and EO Imagery) to identify 'dark vessels' within high risk areas. A key component of the project was also testing the applicability and practicality of deploying UAVs (drones) within different MPAs, testing both the technology and the regulatory process in relation to their use for fisheries MCS. Prior to the project, limited testing of this technology had occurred directly in the fisheries space, for both short range UAVs and fixed wing drones capable of beyond visual line of sight flight. The solutions and technology tested increased the visibility of activity, including non-compliant behaviour. Cost benefit analysis was undertaken for the suggested technology solutions to ensure proportionate and implementable solutions with an understanding of the financial impact and benefits to each MPA.

The evaluations of these remote sensing techniques can provide valuable insights into how specific MPA characteristics and management measures need to be considered when selecting the most suitable remote sensing techniques for supporting effective, cost efficient MPA management.

Presenter Bio

Sam Elliott Intelligence & Compliance Manager with OceanMind works with Partners supporting the Blue Belt Project helping protect marine reserves in UK Overseas Territories. She has run onboard data capture projects where results have informed quota policy decisions.

Supporting FAD Free Fishing Supply Chain Due Diligence in Response to Growing Market Pressures

Julian Engel[1], Jasper Laurente[2], Oliver Ashford[3]

[1]OCeanMind, Oxford, United Kingdom. [2]OceanMind, General Santos, Philippines. [3]OceanMind, Oxford, United Kingdom

Abstract

Fish Aggregating Devices (FADs) are floating objects primarily used by industrial purse seine vessels to catch skipjack tuna more easily. They result in five times the bycatch of other fishing methods, as species become entangled and injured in the ropes and nets of FADs, and lost FADs become ghost gear. Bycatch species caught through FAD fishing include non-target tuna species and other finfish, and vulnerable species of concern, such as sharks, rays, sea turtles and other megafauna.

As awareness about the ecological toll of FADs is growing, an increasing number of retailers realise that fishing vessels should be held accountable for FAD use. OceanMind is supporting those wanting to ensure that the fish they buy is not sourced from vessels using FADs. OceanMind analysts determine the risk associated to FAD use for fishing trips by incorporating data from sources including AIS, Vessel Monitoring System (VMS), vessel logbooks, vessel hatch plans, fishing vessel traceability documents and fishing licenses.

OceanMind validate FAD-free claims by:

- Cross-referencing VMS/AIS track data and the positions of declared fishing sets in vessel logbooks
- Searching for any indicators of likely FAD fishing and correlating all known FADs to the vessel track
- Looking for vessel tracks indicative of night fishing
- Checking the possible mixing of fish originating from free-school and FAD-associated fishing sets on board by cross-referencing the vessel stowage plan, logbook, fishing vessel traceability form and segregation documentation
- Searching for any other indicators of possible IUU activity

The market pressures against FAD fishing could help reduce this fishing practice and make it uneconomical to operate. Sharing our work on the analysis of FAD fishing could increase the fishing industry's knowledge on the high level of damage that this fishing activity is creating and promote change in the sector by providing transparency throughout the supply chain.

Presenter Bio

Senior I&C Analyst Julian Engel investigates IUU fishing vessels with stakeholders to end the practices. He has worked in fisheries in Honduras and the Philippines and enforcement support on large scale fisheries in West Africa.

Technology in a changing ocean: accelerating solutions that scale the implementation of science-based fishery management for individuals, communities, and governments in Latin America.

Kendra Karr[1], Layla Osman[2], Janelle Hangen[3]

[1]Environmental Defense Fund, Santa Cruz, USA. [2]Environmental Defense Fund, Valdivia, Chile.
[3]Environmental Defense Fund, Jericho, USA.

Abstract

Fisheries are critically important for hundreds of millions of people's nutrition, food security, and livelihoods. Many of the world's fisheries catch multiple species or stocks. These multispecies fisheries tend to be complex, as they may involve commercial, artisanal, and recreational sectors and can be large, medium, and small-scale, using multiple gear types. This complexity hinders monitoring and assessment from establishing adaptive science-based management for resilient multispecies fisheries and puts food sources, jobs, profits, and coastal community livelihoods and culture at risk. Furthermore, climate change is impacting marine systems and fisheries, altering existing fishing patterns and threatening access to fish stocks in some areas, including some of the most vulnerable fishing communities. The reality is that climate change impacts on fisheries require new solutions and ways of thinking. How can small-scale multispecies fisheries transition to science-based, climate-resilient fishery management while meeting stakeholders' needs and incorporating their local knowledge? Technology for monitoring, enforcement, and safety is increasingly becoming the catalyst for fishers, community members, and local government to implement and enforce science-based management. We will share lessons learned from practitioners and fishery stakeholders, including fishers, cooperatives leaders, local partners, and government scientists, on how technology has accelerated the local buy-in and implementation of science-based management through collaborative tools, approaches and technologies that move forward climate resilient multispecies fisheries in Latin America.

Presenter Bio

Kendra Karr, Senior Scientist, is the Regional Fisheries Science Lead for EDF's Fisheries and Oceans Program. She works with international partners to identify local and regional scientific gaps, build knowledge and capacity, and develop and implement climate-smart fishery management approaches that result in better ecological, social, and economic outcomes. Kendra's work with local communities and partners supports the co-developed of scalable science-based solutions for a sustainable and resilient future. She works throughout Latin America and the Caribbean, Asia Pacific, and Africa – using the best available science to empower and support the implementation of realistic management solutions.

Harvesting ship-based AIS for more affordable data on vessels at sea

Leslie Roberson[1], Denise Hardesty[2], Adrien Ickowicz[3], Christian Moeseneder[1]

[1]CSIRO, Brisbane, Australia. [2]CSIRO, Hobart, Austria. [3]CSIRO, Hobart, Australia

Abstract

There have been significant advances in the use of data from Automatic Identification Systems (AIS) to map and track vessels at sea. The number of vendors providing AIS-based products has proliferated, for instance, Global Fishing Watch and Marine Traffic. Many of these providers use AIS data from satellite or land receivers. While some of the aggregated outputs of these products are available for free, their scale and resolution often fall short of meeting the needs of end users in the management and enforcement space. Higher resolution data are available, but at a cost that is prohibitive for many institutions. Furthermore, there are several limitations with these AIS data sources, such as aggregated time intervals, noticeable holes in spatial coverage, and difficulty of processing data.

To address these problems, we developed a new tool to harvest data directly from ships' AIS receivers. We built a low-cost data logger from a Raspberry Pi microcomputer and other commercially available components. The logger saves outputs from a ship's AIS receiver and pushes it to a server using 5G or the ship's Wifi. We trialled the system on fourteen volunteer host ships, including patrol boats, yachts, and fishing vessels. The data we harvested surpassed commercially available products both in terms of data quality and quantity, at significantly lower cost per data point.

One important application of this technology would be collecting and combining ship-based AIS data from networks of host vessels in key surveillance regions, such as fleets of patrol vessels in protected or high traffic areas. Harvesting data that is already being collected with ships' existing equipment could greatly reduce the barriers to access for many end users that need high-quality AIS data.

Presenter Bio

Dr. Leslie Roberson is a Postdoctoral Research Fellow at the University of Queensland working to reduce fishing impacts on marine biodiversity and improve global seafood sustainability. At the CSIRO she is part of a team in the IUU space which develops new technologies to detect illegal fishing activity.

RadarTrac navigation radar-based system to detect vessels at sea

Christian Moeseneder[1], Leslie Roberson[1], Denise Hardesty[2], Adrien Ickowicz[2]

[1]CSIRO, Brisbane, Australia. [2]CSIRO, Hobart, Australia

Abstract

Monitoring vessels at sea is a major challenge, especially in areas with many small vessels lacking transponders. Existing observation systems are often prohibitively expensive or fail to detect smaller vessels that are not equipped with AIS or VMS. To address this, we developed RadarTrac — a low-cost system based on ship's existing navigation radar. It consists of a stack of commercial, industry-grade hardware and software, including an industrial computer running Furuno's TimeZeroPro navigation software, all packaged in a weatherproof case the size of a small backpack. RadarTrac is compatible with vessels using Furuno FAR 2xxx series or DRS dome or open-array radars and meets the International Maritime Organization's requirements for large, cargo, or passenger vessels. After trialling an earlier model on 13 active vessels ranging from small yachts to large research vessels, we are now testing the improved system.

RadarTrac saves data from the host ship's navigation radar and AIS receiver, then uses the ship's communication system to transmit the compressed data to a secure server, where the data are further processed and analysed. Radar targets are compared to AIS to detect dark (non-transponding) vessels. Target data are further analysed to predict vessel presence, trajectories, and activity over space and time.

A key difference between RadarTrac and other vessel monitoring systems (VMS, AIS, onboard cameras) is that the focus is not on the host ship, which simply acts like a satellite, but on detecting transponding and non-transponding targets within that ship's radar range. It is an outward-facing Voyage Recorder Device that uses the host ship as a moving sensor platform. Thus, participating host ships help fill an important gap in the current vessel monitoring network, making valuable contributions to better ocean governance by donating data streams that they are already receiving during their normal operations.

Presenter Bio

At the CSIRO, Chris Moeseneder develops new technologies to detect and monitor vessels, based on radar and AIS harvesting and satellite imagery.

Artificial Intelligence for Fisheries and Monitoring: A Pragmatic Look at Unlocking the Future of the Industry

Alexander Dungate

OnDeck Fisheries AI, Vancouver, Canada

Abstract

Artificial Intelligence has unlocked unprecedented opportunities for the seafood industry which have largely gone untapped. This presentation delves into the practical role of AI in reshaping the commercial fishing and monitoring landscape, drawing on examples from OnDeck Fisheries AI, a startup making monitoring scalable and accessible with artificial intelligence. As the industry undergoes a paradigm shift driven by AI, we shed light on actionable tips to attract top AI talent and avoid superficial solutions. Dive into the remarkable results attained by OnDeck in the past year, including groundbreaking accomplishments in technology, tangible impacts, and real business outcomes. Explore the critical difference between AI projects and AI products, and why both public and private entities need to re-frame their approach to AI modernization. This presentation is designed for seafood businesses, public & private monitoring programs, NGOs, and government representatives. This presentation offers a platform to spark collaborative efforts in leveraging AI to address the most critical challenges in the seafood and fisheries domain.

Presenter Bio

As the Co-Founder of OnDeck Fisheries AI, Alexander is making fisheries monitoring scalable and accessible with artificial intelligence. Born & raised on the West Coast of Canada, Alexander witnessed firsthand the importance of fisheries and the impacts overfishing can have on ecosystems and communities. Alexander holds a B.Sc. (Computer Science + Biology) from the University of British Columbia, he has been awarded the title of Young Ocean Leader from the Sustainable Ocean Alliance, and has won 10+ awards for his impactful work with OnDeck Fisheries AI.

Regional standard for longline EM data

Malo Hosken

Pacific Community, Noumea, New-Caledonia

Abstract

Background:

The Pacific Community (SPC) has been collaborating with its member countries since 2016 to develop data fields collected from longline fishing vessels equipped with electronic monitoring systems. This work has resulted in the development of a draft JSON formatted standard for the minimum data fields required for longline EM. https://pacificcommunity.github.io/tufman2-json-standard/longline-EM/

This standard is still in development, but it is intended to be used by SPC/FFA member countries when embarking on trials or implementation of EM for longline vessels.

Presentation:

This presentation will provide an overview of the development of data fields for longline EM and present the JSON formatted Data Collection Committee Longline EM Minimum Data Fields Standard. The presentation will also facilitate discussions between EM vendors and SPC member countries representatives.

Benefits:

The adoption of this standard will improve the quality and consistency of data collected from longline fishing vessels. This will enable SPC/FFA member countries to better monitor their fisheries and ensure compliance with fisheries management regulations.

Presenter Bio

We are yet to determine who from SPC will attend SAFET to present this if accepted

The potential of standardized, decentralized data sharing for full supply chain traceability in the seafood industry. *Out-of-the-box thinking with in-the-box-tools.*

Natalie Hunter[1], Margreet Brinxma[2]

[1]Marine Stewardship Council, Seattle, USA. [2]Marine Stewardship Council, Amsterdam, Netherlands

Abstract

The seafood industry has made great lengths in the past decade to advance the traceability of product supply chains. However, most successful implementations to date are limited in that they are independent implementations for internal traceability purposes. Where boat-to-plate traceability has been achieved, it is often limited to vertically integrated companies, or short supply chains, where a single, centralized software is utilized by all supply chain nodes, often transparently and driven by the digital data requirements of an end retailer. The challenge with this model is that it lacks scalability given the reality of the seafood industry's global and disparate nature, where data privacy and security are of the utmost value. The emergence of countless traceability software companies in the past decade has created an open market for businesses to choose a provider that fits their business needs. Interoperability of these diverse software systems is now the key challenge that needs to be overcome. Luckily, solutions do exist with established technology if utilized in a unique choreography of decentralized, but secured, push and pull of data. By combining established tools like GS1's EPCIS standard for interoperability of data with the data standardization guidelines of the Global Dialogue on Seafood Traceability CTE/KDE matrix, a solution for decentralized data sharing in a common language becomes available to us. The missing pieces are industry cooperation and accessibility of technology. Establishing a cohesive network of supply chain businesses willing to conform to these standards can enable full supply chain traceability. A simple solution to a complex problem. This is out-of-the-box thinking with in-the-box-tools, that has the potential to solve digital supply chain traceability challenges facing the seafood industry today.

Presenter Bio

Natalie Hunter serves as the Head of Supply Chain Innovation at the Marine Stewardship Council and is responsible for evolving the MSC program to focus on traceability and traceability technology. She has ten years of experience in traceability technology for seafood and has co-authored multiple white papers on traceability, including: Taking the First Steps Towards Full-Chain Seafood Traceability: A Preliminary Guide for Industry (2017). Natalie is a passionate environmental sustainability and technology specialist dedicated to influencing positive and transformative change in globally traded resource commodity industries.

Embracing Fisheries Transparency: The Future of Sustainable Seafood Innovation

Roberto Echols

WSP, Juneau, USA

Abstract

Presidential Task Force on Combating Illegal, Unreported, and Unregulated Fishing and Seafood Fraud" in 2014 set the stage for Seafood transitioning to sustainable fishing practices. The objective was clear: To eradicate the issues of seafood fraud and IUU fishing issues threatening the industry. In the world of seafood, fraud signifies the misrepresentation or mislabeling of products, misleading consumers, and hampering sustainable fishing efforts. IUU fishing, on the contrary, involves activities that breach national or international laws that aim to safeguard marine ecosystems and the livelihoods they sustain. By 2016, significant progress had been made in implementing the Seafood Import Monitoring Program (SIMP), headed by the US Secretary of Commerce. The initiative adopted a "third-party audit" design by World Seafood Producers (WSP) Target species Fleet support working design from trial and error built on a solid SIMP framework to trace and combat IUU fishing and seafood fraud. The advent of cloud-based network adapters facilitated traceability and secure data communication, further strengthening the beginning of the F/V settlements initiatives and ending F/V landing(s) and Artisanal offload supply chain building register measures originating equity dividend incentives. Representatives from various departments, such as U.S. NOAA fisheries science & enforcement, USCG, the Department of Justice, and the Office of Technology Policy, have contributed invaluably to this ongoing battle against seafood fraud. leading to updates in the priority species list. The digitization of administrative processes is poised to enhance our capability to enforce existing laws and regulations, a significant step forward to winning the IUU fish battle The future health of our oceans, the species they support, and the communities they sustain rests on our ability to counteract IUU fishing and seafood fraud. Innovations like WSP's contribute to the SIMP design, allowing for a more sustainable and transparent future for the fishing industry

Presenter Bio

Robert Scott Echols Fisheries Governance Officer and Seafood Supply Chain Management Expert Summary: Robert Scott Echols is a highly experienced executive professional with extensive knowledge in electronic monitoring, international fisheries industries administration, and supply chain management. He has a degree in International Business from the University of Georgia and a Master's degree in Digital Communication Engineering from the University of Hawaii. Echols is also a Legacy Systems Analyst, Digital Information Key Encryption Packet External Extensions Engineer, and Handler, and a secure internal Cloud Communications Network Protocol Adapter Decryption Designer. He is a bilingual communicator, proficient in English and Spanish, with experience working with multicultural and indigenous communities.

Applying LEO CubeSat and IoT technology to improve fisher safety and gear recovery

Benjamin So

Zeal Industries, Hong Kong, Hong Kong

Abstract

The advent of LEO CubeSats has made affordable satellite internet available for widespread use. At the same time, the current state of IoT infrastructure greatly facilitates the implementation of scaleable cloud-based applications that operate robustly under intermittent low-bandwidth conditions.

One such example is our Uptime suite of solutions that enables the real-time tracking of fishers, as well as their vessels and gear. As a result, accidents such as MOB events can be reported instantaneously with the precise time and location of occurrence, as well as real-time positional updates.

Similarly, fishing gear can be tracked accurately when lost at sea, greatly diminishing the cost of recovery. In the case of a medical emergency, the patient's vital signs can be collected and shared with land-based experts for rapid diagnosis and treatment. This presentation will describe the Uptime technical architecture, including the hardware units, as well as the software components that make it all possible.

Presenter Bio

Benjamin So is Chief Inspiration Officer for Zeal Industries, a company focused on delivering social impact through technological innovation.

Protecting essential fish habitats: net modifications in trammel net fisheries off the Portuguese coast

Monika J. Szynaka[1], Pedro Rocha[1], Jorge M.S. Gonçalves[1], Aida Campos[2]

[1]CCMAR - Center of Marine Sciences, Faro, Portugal. [2]IPMA-Portuguese Institute for the Ocean and Atmosphere, Lisbon, Portugal

Abstract

Trammel nets are commonly used in Portuguese fisheries to target, both economically important and traditionally consumed species. This results in large quantities of by-catch of bottom invertebrates such as sponges and corals, creating a loss of habitat for many local species and largely contributing to net damage. Within the project TECPESCAS (IPMA/CCMAR, Financed by Mar2020/EMFF) experimental fishing was conducted in South Portugal with the objective of comparing standard trammel nets targeting cuttlefish (*Sepia officinalis*) and various sole species *Solea* spp. and *Microchirus* spp., with modified nets rigged with a net section the fishers call "aranha", which lifts the net off the bottom. A significant ($p<0.05$) decrease of 36% was achieved in the capture of sponges and corals, making it a good option to contribute to the protection of essential habitats. Further developments in net design and testing are planned at the scope of the project TramSel (CCMAR/IPMA, financed by the Schmidt foundation). The main objective of the project is to involve fishers in net development and testing, increasing the probability of voluntarily adoption of this type of net in other fisheries and in other regions. The first results will be presented, including interviews with fishers regarding the project utility and results from a first workshop to draw their attention to fishing impacts on sensitive species and VMEs (Vulnerable Marine Ecosystems).

Presenter Bio

Monika Szynaka is presently a Project Coordinator in CCMAR, Portuguese Centre for Marine Sciences as of May 2023, soon to complete her PhD in Marine, Environmental, and Earth Sciences with a focus on Fisheries and Aquaculture and finished a Masters in Marine Biology in 2017 in the University of Algarve, Portugal. She has studied the reduction of by-catch through gear modifications and analyzed the fishing effort, selectivity, and discards in different métiers of the coastal multi-gear fleet in south Portugal. Currently she is focusing on reducing the by-catch of invertebrates in trammel nets in Portugal by making simple modifications in the standard net with the local fishers.

Navigating Barriers and Scaling SmartPass: Addressing Challenges in Expanding a Shore-Based Camera System for Fishery Monitoring

Dustin Colson Leaning

Environmental Defense Fund, Boston, USA

Abstract

Collecting accurate and timely data is challenging in many of the world's marine recreational fisheries because of the immense size of recreational fishing fleets, the heterogeneity of those fleets, and the seasonality of recreational fishing. Recreational fishery managers around the globe face the tremendous task of managing a limited natural resource on limited budgets while attempting to generate maximum opportunity and value for the public. Robust data collection is one of the most challenging yet important responsibilities that managers must tackle. Over the past four years, experts at Environmental Defense Fund, CVision AI, the Oregon Department of Fish and Wildlife, Teem Fish Monitoring, and Snap IT have developed, improved and scaled an innovative fishery monitoring approach called SmartPass. This approach uses shore-based camera systems to record and wirelessly upload videos of fishing vessels moving through a coastal bottleneck such as a pass, river mouth, or harbor. The footage can be processed with artificial intelligence and image analysis automation techniques to provide resource managers with accurate and timely estimates of fishing effort. When paired with dockside surveys, this approach can also yield timely and accurate total catch estimates. Overcoming barriers to scaling SmartPass for application in US recreational fisheries has required a carefully constructed scaling strategy and innovative problem solving. Every obstacle encountered thus far has presented a learning opportunity that can be used to inform other technology implementers intent upon scaling their own technological solutions for the betterment of resilient fisheries. This presentation will focus on the various barriers – geographical limitations, funding restrictions, computer learning challenges, incompatibility with existing effort estimation methodologies – and the current efforts as well as plans to overcome these challenges moving forward.

Presenter Bio

Dustin Colson Leaning is a fisheries innovations and policy senior specialist at the Environmental Defense Fund working to advance innovative tools and technologies for the betterment of climate resilient fisheries. Prior to working at EDF, Dustin graduated from the Duke Nicholas School of the Environment with a Masters in Environmental Management and has experience working with fishing communities during his time coordinating fishery management plans for the Atlantic States Marine Fisheries Commission.

Enhancing Fisheries Resilience in Lampung Province: Integrating Science and Technology for Effective Action

Harlisa .[1], Dustin Colson Leaning[2], Abdul Halim[1]

[1]Environmental Defense Fund, Jakarta, Indonesia. [2]Environmental Defense Fund, Boston, USA

Abstract

The Blue Swimming Crab (BSC) fishery is Indonesia's third most lucrative seafood export producing over $300 million USD annually and employs about 100,000 fishers and 180,000 supply chain workers. Lampung is the third largest port by landings, hence BSC is vital to the economy of local fishing communities. Recognizing the significance of this fishery, the governor of Lampung implemented a BSC management plan and appointed a management committee to oversee data collection.

Three key technologies - electronic reporting, SmartPass, and vessel tracking systems - play a crucial role in efficient and streamlined data collection to improve our understanding of the BSC fishery. Data collection takes place at five major BSC landing sites, where gillnets and traps are used by fishermen to target BSC. Initially, enumerators recorded catch and biological data on paper forms, which were later transcribed into Excel spreadsheets. A year later, a transition was made from paper to smartphone-based data collection, resulting in a more efficient and accurate process. This modernization of fisheries monitoring has significantly expedited the data collection process while reducing errors. Additionally, the AI-based camera system SmartPass is being used to gather data on fishing effort by automatically calculating the number of vessels entering and leaving port. Lastly, to better understand the vessel activity in the protection areas for juvenile crabs, vessel trackers have been installed on several small-scale fishing vessels.

By combining the outputs of these tools, fisheries managers can obtain essential data for assessing fisheries performance, monitoring BSC stock health, tracking the efficacy of protection measures for juvenile crabs, and generating improved recommendations for adaptive fisheries management. Furthermore, the goals and the outcomes of these efforts are being communicated to the local communities with the added benefit of increasing community awareness and buy-in, which is crucial for long-term sustainability of the BSC fishery.

Presenter Bio

Harlisa has been working for EDF Indonesia as Manager for Climate Resilient Fisheries. She served as EDF key member to manage outreach and advocacy efforts to advance scientific, policy and technological solutions to build climate resilience fisheries in Indonesia.

Multi-channel and multi-product digital marketplaces backed by traceability technologies that can support small-scale fishers to rebuild their fisheries

Grizelda La Cock[1], Eric Enno Tamm[2]

[1]ABALOBI, Cape Town, South Africa. [2]This.Fish, Vancouver, Canada

Abstract

Confronted with mounting global consumer demands for sustainable, traceable products, small-scale fishers struggle to gain access to essential technologies for traceability and verification of value-added goods. These fishers, categorized as data-poor and often plagued by Illegal, Unreported and Unregulated (IUU) fishing activities, are marginalized within marketplaces and governance, reducing their price influence and undervaluing their significant ecological knowledge.

ABALOBI, a globally-reaching non-profit organization based in South Africa, is committed to nurturing sustainable, resilient, and equitable small-scale fishing communities. We achieve this by implementing data-driven and technologically-forward approaches within fisheries rebuilding and value chain framework.

Our approach involves: (1) crafting fisher-centric technology; (2) offering comprehensive training; (3) enhancing community infrastructure; (4) establishing fair-pricing market connections; (5) initiating food security programs; and (6) promoting fisheries improvement projects.

Over the past year, we have successfully integrated the ThisFish Tally platform with ABALOBI operations, significantly accelerating our impact and enhancing market resilience. We aim to discuss the pivotal role of emergent technologies in scaling supply chain operations and facilitating market access, specifically highlighting ABALOBI's strategy in leveraging multi-channel and multi-product marketplaces to assist small-scale fishers. Moreover, we will scrutinize the integration of ABALOBI's technology with Tally, sharing the lessons learned, the challenges faced, and the opportunities that lay ahead for expansion.

Presenter Bio

Grizelda is the Operations and Systems Manager for ABALOBI ICT4Fisheries. With 8 years of experience in people, process, and system operations, armed with a strategic mindset and fostering collaboration she brings a wealth of expertise to the table. Her background in the dynamic world of hospitality has honed her ability to navigate complex operational challenges, while her keen focus on optimizing efficiency and delivering excellence has been the driving force behind ABALOBI's growth.

Advancing India's Sustainable Fisheries through Technological Innovation

Dustin Colson Leaning

Environmental Defense Fund, Boston, USA

Abstract

Sustainable fisheries are vital to the health of India's economy and coastal communities. India's vast and ecologically diverse coastline is home to more than 3,000 fishing communities, and its fisheries sector, which includes inland and marine capture fisheries and aquaculture, provides roughly 13 million jobs. However, India's fisheries face numerous challenges, including overfishing, climate change impacts, and poverty within fishing communities. Despite India's strong foundation in fisheries science and coastal resource management, the country has yet to realize its full potential in ecological and community resilience.

Empowering fishers as stewards of their resources, equipping fishing communities with technological solutions, and providing fishery managers with data from small-scale fisheries are critical missing components needed to support a sustainable and climate-resilient future for marine fisheries and seafood production in India. The SAFET conference has a proven track record of creating an innovative forum that fosters collaboration between technology providers, fishery stakeholders, NGOs, and government to resolve the biggest challenges in sustainable fisheries management worldwide. By encouraging collaboration among these groups, we can address topics such as artificial intelligence, cost effective electronic reporting, and the modernization of the seafood supply chain to support sustainable fisheries management and improved access to seafood in India.

This special session aims to share knowledge and experiences on the application of technologies for ocean conservation, fisheries, aquaculture, and seafood markets. This India-focused session will provide a platform to identify unique and shared challenges, showcase technological innovations already applied within country, and match technology needs with successful solutions applied in other countries around the world. The momentum generated from this special session will catalyze dialogue among fisheries managers, technologists, and NGOs in attendance and we hope that these conversations will help inform the design of potential technology implementations in India.

Presenter Bio

Dustin Colson Leaning is a fisheries innovations and policy senior specialist at the Environmental Defense Fund working to advance innovative tools and technologies for the betterment of climate resilient fisheries. Prior to working at EDF, Dustin graduated from the Duke Nicholas School of the Environment with a Masters in Environmental Management and has experience working with fishing

communities during his time coordinating fishery management plans for the Atlantic States Marine Fisheries Commission.

Dr Sunil Mohamed is the current Chair of the Sustainable Seafood Network of India, an organisation that helps fisheries engaged with and moving towards sustainability certification. He is a marine fisheries researcher with many years of experience in tropical fisheries management and conservation.

Dr. S Velvizhi, a seasoned scientist and practitioner, has 21 years of expertise in small-scale fisheries development, holding a Ph.D. in Marine Biology and Oceanography. Since 2002, she has focused on South East India's marine fishing communities, delving into diverse areas such as coastal livelihoods, biodiversity conservation, post-harvest management, climate change adaptation, and gender mainstreaming. She played a vital role in developing the Fisher Friend Mobile Application through participatory research and advocacy working with the public and private stakeholders to achieve nationwide implementation. Her active involvement in fishery advisory services since 2009 has emphasized participatory research and empowerment of fishing communities, particularly women, through training and commercializing value-added products. With extensive at sea and community fisheries research, she's garnered numerous accolades, including the Dr. Ambedkar Award (2010), Spark Pancharatna Award (2020), and the Women in STEM Award (2023) for her outstanding contributions to small-scale marine fisheries.

Dr. Aaron Savio Lobo, a seasoned conservation scientist, specializes in assessing the environmental and socio-economic impacts of aquatic food production systems. With over 20 years of experience across Asia and West Africa, he excels in effective communication within diverse stakeholder environments. Collaborating with governments, NGOs, academia, and local communities, he devises tailored solutions for marine sustainability challenges.

Mr. Xavier Lawrance is a founder of Odaku Online Services Private Limited. Mr. Xavier has over 19 years of IT experience and comes from a family of fishermen. He founded this new venture to bring digitization into the fisheries sector. His focus is to bring safety, sustainability and traceability to fisheries.

Dive into Traceability: Empowering Coastal Communities with Digital Solutions and Innovation

Sarah Harding, Manfred Borer, Ainu Rofiq, Meg Phillips

Koltiva, Jakarta, Indonesia

Abstract

Koltiva is a leading agritech company strongly focusing on making global supply chains traceable, inclusive, and climate-smart. Backed by our human-centered technology and boots-on-the-ground services, we support multinational agribusinesses and MSMEs in digitizing and verifying their supply chains while improving producers' livelihoods. Since our establishment in 2013, we have successfully provided tailored solutions and services to over 6,500 agribusinesses and MSMEs globally, spanning 47 commodities, from plantation to aquaculture and livestock.

Within seascapes, we are actively engaged in projects involving seaweed and shrimp in Indonesia, Madagascar and Philippines. Our approach includes providing capacity-building support through our boots-on-the-ground services, traceability with our end-to-end technology solutions, and a loan management platform that facilitates capital expenditure (CAPEX) and working capital loan provisions for smallholder producers.

Through this session, audiences can understand the value and opportunities of integrating digital traceability:

- The value and opportunities of integrating digital traceability, especially in enhancing market access for smallholder producers and promoting inclusion of resource-limited SMEs.
- Koltiva's holistic approach to providing traceability to the industry, helping to tackle sourcing concerns related to social and labour issues, antibiotic or chemical use, certification, labeling, and more.
- The utility of digital mapping tools in promoting transparency, boosting the efficiency and oversight of protected areas and other conservation zones.
- A deep-dive case study examining the implementation and success factors of digital traceability within the context of Aquaculture.

Our expertise in digital solutions and traceability can greatly benefit coastal fisheries by enabling robust traceability systems, facilitating data-driven decision-making, promoting collaboration, enhancing compliance monitoring, and supporting market access. Through these contributions, Koltiva can help build resilience in coastal fisheries and facilitates the long-term sustainability of these vital ecosystems and communities that depend on them.

Presenter Bio

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Sarah Harding, Program Manager Koltiva, has 8+ years of experience in aquaculture systems and water quality management with a key understanding of cultivating various aquatic species in controlled and natural environments. She has worked in both large-scale operations and small-scale fishing environments with local indigenous groups. She holds a M.Sc. In Marine Studies Fisheries Resource Management from Memorial University, Canada.

MAST Human Intelligence App: Empowering Workers for Safety and Well-being

Dornnapha Sukkree

MAST Human, Bangkok, Thailand

Abstract

The Problems:

The fishing industry has been marred by instances of labor exploitation, including forced labor, human trafficking, and hazardous working conditions. Workers in the fishing sector endure abusive treatment, long working hours, and inadequate wages, violating their fundamental human rights and jeopardizing their well-being and dignity. It is essential to recognize the importance of providing workers with technology specifically designed for their safety and well-being. Empowering vulnerable fishing workers with access to such technology, right in the palms of their hands, is crucial for their protection.

The Solution:

The MAST Human Intelligence App is a groundbreaking mobile application. With a worker-centric approach, the app aims to prevent labor rights violations and human trafficking by empowering workers and targeting criminals.

Key features include:

- Utilizing crowdsourcing tools to combat human trafficking.
- Providing a vessel worker review system, enabling workers to access information about vessels before boarding.
- Facilitating a communication forum for fishers and workers to connect and share information.
- Alerting emergency contacts in case of safety concerns.
- Implementing an automatic warning/alert system based on job details to ensure worker safety.
- Enabling two-way communications between users, MAST, and nearby workers.
- Allowing users to easily create and submit eyewitness reports of illegal activities, safeguarding their safety during the reporting process.
- Gathering evidence of criminal activity to support investigations and prosecutions.
- Serving as a platform for disseminating educational materials on worker's rights, survival tips for migrant workers, and other essential information.

The MAST Human Intelligence App revolutionizes the fight against human trafficking, offering real-time assistance, education, and empowerment to vulnerable fishing workers. By harnessing the power of

technology, the app aims to create a safer and more equitable working environment, ensuring the protection and well-being of those who contribute to the fishing industry. The App has the potential to use in other industries.

Presenter Bio

Dornnapha Sukkree, founder and executive director at MAST Human, is a legal expert with a focus on combating labor abuses in the fishing sector. Her invaluable insights and experience have contributed to the development of the MAST Human Intelligence App, offering innovative solutions to address human trafficking in the seafood supply chain. Dornnapha's unwavering dedication ensures the protection of workers' rights and the promotion of sustainable practices in the industry.

Exploring the intersection of technology, equity, and justice in a growing blue economy

Melissa Garren[1], Kate Wing[2]

[1]Working Ocean Strategies, Monterey, USA. [2]Intertidal Agency, Oakland, USA

Abstract

The blue economy has gained attention globally; however, conversations about the social impacts of rapidly growing investment in the sector have lagged behind. Technology and fisheries each offer an important lens through which social impacts (both positive and negative) can be considered for investments in the blue economy. This facilitated dialogue will consist of an expert panel providing short case studies on a variety of different facets of the intersections of technology, fisheries, equity, and social justice followed by a generous Q&A/discussion with audience participation. We anticipate hosting a diverse panel of speakers who can illuminate issues relating to both technology and data access, investments in technological capacity, supply chain pressures and opportunities, community engagement and multi-stakeholder considerations, and key opportunities for technology to support a more just blue economy in the near future.

Presenter Bio

If this session is accepted, bios will be submitted for all speakers once the list has been finalized. We anticipate that both Melissa and Kate would be present to either co-facilitate the session or for Melissa to facilitate and Kate to be one of 3-5 speakers.

Assembling the Building Blocks for Scaling Electronic Monitoring Technologies

Brett Alger[1], Lisa Borges[2]

[1]NOAA Fisheries, Gloucester, USA. [2]FishFix, Lisbon, Portugal

Abstract

Electronic monitoring (EM) technologies can exponentially expand the ability of fishery managers to collect high-quality data in near-real time to monitor commercial fisheries. However, decades of local and regional fisheries management has created jurisdictional boundaries within and across countries that greatly inhibit the ability to lower the costs of developing technology and scale EM more broadly. For technology to proliferate, governments, regional fishery management organizations (RFMOs), and other management bodies must examine the trade-offs of autonomy and local decision-making against the opportunity to expand EM systems through the standardization of technology requirements, policies, and data collection. In this talk, I will highlight the work of NOAA Fisheries and the ICES Working Group on Technology Integration for Fishery-Dependent Data (WGTIFD), both of which are developing important building blocks for the EM community to leverage and expand EM technology.

In the United States, we have developed several national policies that align data storage requirements and the application of Federal laws to raw EM data (i.e., confidentiality) across all EM programs. Additionally, our EM programs have developed template vessel monitoring plans, a tool which provides the backbone for standardizing EM data collection across diverse vessels and fishery operations, within a single fishery. WGTIFD was formed in 2019 and has recently focused on developing guidance that would align different components of implementing an EM program. WGTIFD will be publishing a standardized data model for data collected from EM systems, to include a framework of how the information could be considered for science advice. Additionally, WGTIFD is developing procurement guidance for governments to utilize when soliciting technology providers for hardware, software, and other services associated with implementing an EM program. These collective efforts are vital to establish national and multinational marketplaces with clear requirements and expectations for EM technology to scale around the world.

Presenter Bio

Brett is the NOAA Fisheries' Electronic Technologies Coordinator in the Office of Science and Technology; he works on technology and policy development to support the implementation of electronic monitoring and reporting programs in U.S. fisheries. He has been a member of NOAA's Artificial Intelligence Executive Committee and currently serves on NOAA's Data Dissemination Team. He earned a Bachelor of Science degree in Natural Resources from Central Michigan University in 2003 and Master of Science degree in Fisheries Management and Science from Michigan State University in 2009. Brett helped develop the ICES Working Group on Technology Integration for Fishery-Dependent Data in 2019 and currently chairs the group with Lisa Borges.

Emerging Technologies for Scaling Effective Recreational Fisheries Management

Sepp Haukebo[1], Kieran Hyder[2], Warren Potts[3]

[1]Environmental Defense Fund, Austin, USA. [2]Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Norwich, United Kingdom. [3]Rhodes University, Makhanda, South Africa

Abstract

Participation in recreational fishing is growing around the world and in some areas, recreational effort and catch exceeds that of the commercial sector. Recent global studies call for institutions to better integrate recreational fisheries into broader fisheries management. When managed effectively, recreational fisheries can provide important socio-economic and cultural benefits, food security, pathways to diversifying coastal livelihoods, and a pipeline of champions for conservation. In this special session participants will develop a greater understanding of how to effectively manage recreational fisheries, technological solutions that support such management, and strategies to scale those solutions at the national and international level.

Experts will present case studies on emerging technological solutions for the following elements of effective recreational fisheries management:

- monitoring, control and surveillance
- data collection (e.g., total catch, effort, and mapping important habitats)
- license structures, license marketplaces and the use of resulting funds
- adaptive management and building climate resilience in recreational fishing and guiding communities

Presenter Bio

Sepp works with anglers, fishing guides, fishery managers and scientists to develop and implement long term solutions to recreational fisheries management. His objectives are to strengthen community resilience, community benefits from recreational fisheries, and ensure sustainability for generations to come.

Kieran's research is centered on the application of science to support policy and management of fisheries. He focuses on the social, economic, and biological impacts of marine recreational fisheries, and novel approaches to support fisheries monitoring, modelling, assessment, and management.

Warren is a researcher, lecturer, supervisor and course coordinator at Rhodes University's Department of Ichthyology and Fisheries Science and heads the Southern African Fisheries Ecology Research Lab. Warren research includes economic evaluations of recreational fisheries, understanding the social dimensions of recreational fishery compliance and optimizing the survival of released fishes.

How cross-sector collaboration can leverage existing solutions to strengthen supply chain assurance and market due diligence

Margreet Brinxma[1], Shen Yan Liow[2], Huw Thomas[3], Marcelo Hidalgo[4], Kara Birkenmayer[5], Shinta Yuniarta[6]

[1]Marine Stewardship Council, The Hagye, Netherlands. [2]Marine Stewardship Council, London, United Kingdom. [3]Global Fishing Watch, London, United Kingdom. [4]Fishing Industry Association, Port Moresby, Papua New Guinea. [5]ABALOBI ICT4Fisheries, Cape Town, South Africa. [6]Yayasan Konservasi Alam Nusantara (YKAN), Jakarta, Indonesia

Abstract

Technical, digital and technological innovations offer new horizons to strengthen seafood market assurance and compliance. Yet the array of tools, their complexity, and interconnected dependencies limit sector-wide adoption. This increases the divide across the global seafood marketplace in who can demonstrate and verify compliance and how. Zooming out from the intricate and ever-expanding web of tools, we believe that sustainable seafood and supply chain assurance can be achieved through the smarter and more creative use of existing tools and data. This panel gathers cross-sector market actors and assurance providers to explore each other's experiences, barriers they've faced, and where they see the greatest opportunities to drive market-wide adoption of digitisation and strengthened sustainable seafood assurance. It aims to create a more compatible global seafood marketplace through the power of collaboration and innovative use of solutions already at our fingertips.

We are joined by the following panel members, each representing unique sector's perspective:

- (Assurance Provider/ Standard Setter) Marine Stewardship Council – Margreet Brinxma & Shen Yan Liow
- (Technology Provider) Global Fishing Watch – Huw Thomas
- (Technology Provider) ABALOBI ICT4Fisheries – Kara Birkenmayer
- (Industry/ Technology Provider) Yayasan Konservasi Alam Nusantara (YKAN) – Shinta Yuniarta
- (Industry) PNG Fishing Industry Association – Marcelo Hidalgo

Each panelist is given 8 minutes to explore the subject from their perspectives followed by a moderated discussion and audience Q&A.

Presenter Bio

Margreet Brinxma is a key member of the supply chain innovation team at the Marine Stewardship Council (MSC). Her work is focused on advancing digital innovations and seafood traceability requirements within the MSC program. Margreet researched traceability mechanisms across commodities such as wood, palm oil and fisheries. She transitioned to a commercial role at the market

development arm of the PNA tuna fishery, gaining with hands on experience with managing and advancing a full chain tuna traceability system. Working with leading brands and processors, she has strong knowledge in identifying traceability challenges and opportunities, and communicating technical solutions to a broad audience. Her work has led to the first, GDST tested and recognized, interoperable full chain traceability tool for tuna. At MSC Margreet leads work on 'all things traceability', overseeing global operational of the MSC supply chain program, and the innovation of first mile traceability solutions to future proof MSC's assurance mechanisms and future value-added services.

[We have confirmed in person participation from each panelist and their bio readily available upon request.]

Phone based AI assessment of tuna freshness and grade

Sivam Krish

GoMicro Ltd, Adelaide, Australia

Abstract

The rapid evolution of AI technologies now offers the ability to accurately evaluate both the grade and freshness of seafood using mobile devices. The high-quality cameras found in modern smartphones, coupled with their capacity to support AI applications, provides a significant opportunity for the fisheries industry to increase efficiency and minimize waste via AI-assisted assessments. Successful trials involving the assessment of Skipjack Tuna in Sri Lanka, Sear in India, and Big-Eyed Tuna have demonstrated the validity of these techniques. Remarkably, the freshness of tuna can now be determined to within an hour of being caught. Commercial-scale assessments have been performed on tuna and spearfish in Sri Lanka and India, while more recent work in the Maldives has focused on grading and freshness evaluation for Big-Eye Tuna. This research conclusively shows that smartphone-based AI technologies possess the capability to determine seafood freshness across a variety of fish species and geographical locations. Despite numerous attempts to leverage AI for assessing fish quality, GoMico's patented pending technology stands out. Its unique approach, which centers on the management of illumination conditions, enables training AI models with fewer images, yielding higher accuracies compared to conventional methodologies. AI technology has immense potential to revolutionize the fisheries sector. It can empower artisanal fishers to secure fair compensation for their catch, allow fishing companies to segregate fish based on freshness and transport times, and enable supermarkets to guarantee the freshest produce for their customers. Through accurate freshness assessment, seafood spoilage and waste can be significantly reduced, driving sustainability in the industry.

Presenter Bio

Dr.Sivam Krish is developing AI assessment technologies that exceed human assessment abilities. He is an Educator, Research & Entrepreneur developing sustainability solutions through accurate AI assessment.

Supporting small-scale fisher communities through ABALOBI Monitor: A Tech-Infused, Grassroots Approach to data collection and use

Casha de Vos

ABALOBI, Cape Town, South Africa

Abstract

ABALOBI Monitor is an innovative, technology-driven platform that aims to revolutionise fisheries management by fostering active participation and collaboration between fishing communities and local fisheries monitors. Developed through a co-design process with the fishers, ABALOBI Monitor provides a standardised tool for data collection and visualisation across various small-scale fishing communities. The platform is a comprehensive solution that includes a customisable mobile app for data entry, a web-based user management system, and real-time data analytics dashboards. These components work together to enable swift data feedback, often within hours as opposed to months. We present key insights aligning technology with community involvement. By transforming the perception of monitoring amongst fishers, ABALOBI Monitor instils a sense of value in their data, ultimately encouraging community-driven decisions and policies. One of the key elements of ABALOBI Monitor is its emphasis on co-designed visualisations. The visual elements not only streamline management tasks but also enhance comprehension within communities by consistently presenting key metrics for comparison over time. The platform is deployed in four countries – South Africa, Kenya, Comoros, and Madagascar – with each location providing distinct deployment criteria, challenges, and successes.

For instance, in Comoros, the visuals have evolved significantly and are employed for managing local octopus harvesting reef closures. Moreover, the platform's co-design aspect extends beyond visualisation to include the goals of data collection. Involving the Kenya community in defining their management objectives and the tools employed for monitoring progress has been instrumental in establishing data ownership and community engagement. In South Africa, long-term data collection through ABALOBI Monitor has proven invaluable in supporting fishers in substantiating their livelihood during permit applications and legal battles against mining within their fishing areas.

Presenter Bio

I am an International Projects Manager at ABALOBI, where my work has been primarily focused on the deployments of the ABALOBI Monitor platform. I have always had a strong interest in the application of new technologies for challenges in the marine environment. Since starting my work at ABALOBI in 2020, I have been fascinated by the unique approach to electronic data collection to the benefit of small scale fishers worldwide. My background is rooted in Marine Ecology, through the University of Cape Town, where I worked on coastal phytoplankton projects.

Harnessing technology solutions to support coastal fishing communities and fisheries rebuilding

Kara Birkenmayer

ABALOBI ICT4Fisheries, Cape Town, South Africa

Abstract

Coastal fishing communities face numerous complex challenges that hinder their livelihoods and threaten their survival. Challenges include limited access to fishing grounds, inadequate infrastructure and equipment, fluctuating fish stocks, regulatory barriers, and unequal market dynamics. Additionally, climate change impacts, such as rising sea levels, changing ocean currents, and extreme weather events, further compound these difficulties. Empowering small-scale fishers and fostering resilience in coastal communities requires developing bespoke solutions that address the unique social, economic, environmental, and policy dimensions of each community in an integrated way.

ABALOBI's mission is to develop and deploy Tech for Good. ABALOBI leverages technology to enhance data collection and analysis, build fair and transparent supply chains, and enable market access, giving fishers the commercial autonomy to reduce their vulnerability to unstable buyer arrangements.

However, adoption of new technologies, particularly in remote environments, can be slow. To maximise engagement with our traceability tech we have devised tools that tackle common issues encountered by small-scale fisheries worldwide, while remaining adaptable to unique local contexts.

For example, extensive scoping tools were developed to aid in understanding local value chains, existing trade practices and demand for change in a Palau deployment aimed at stimulating trade through fair supply chains. In Kenya, objective mapping tools were deployed for a project about data collection and data empowerment. Finally, co-design workshops have informed tech configurations in a project about vessel tracking and documenting fisheries in Seychelles.

We maintain a flexible international deployment approach, absorbing knowledge from each new site and continually refining our tools. Our aim is to strike a harmonious balance between universality and contextuality, ensuring that fishers are equipped with tools that address the challenges they face in a changing world, while also accommodating the unique cultural, economic, and political factors at play in their context.

Presenter Bio

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Kara is an International Projects Manager at ABALOBI ICT4Fisheries with a background in marine biology. Her work is aided by her experience in navigating between the worlds of academia, commerce, and government. Kara joined ABALOBI ICT4Fisheries in 2022, where she specializes in FISHER to MARKETPLACE deployments. She is leading projects in diverse locations, including Chile, Palau, Seychelles, Ireland, and the Mediterranean, giving her a broad knowledge of sustainable seafood technologies available internationally.

Lessons Learned from Implementing Participatory Monitoring in Artisanal Fisheries through the Appescar Mobile Application

Daniela Thorne[1], Eliana Alfaro-Cordova[1], Adrian Custodio[1], Joanna Alfaro-Shigueto[1], Almendra Mendoza[2], Janelle Hangen[3]

[1]Pro Delphinus, Lima, Peru. [2]Environmental Defense Fund, Lima, Peru. [3]Environmental Defense Fund, Jericho, USA.

Abstract

The Appescar mobile application, developed by the NGO Pro Delphinus, serves as a tool for facilitating participatory monitoring in artisanal fisheries. This presentation aims to share valuable insights and lessons learned from diverse implementation experiences, providing guidance for similar initiatives. The focus of the discussion encompasses various aspects, including historical and cultural differences, design gaps, monitor selection, stakeholder engagement, project dissemination, and incentivization strategies.

Initially designed for the San Jose (Lambayeque) fishers' association (ADLA), the Appescar application was introduced as a means to report fishing trip data and promote good practices through the "onboard-fisher" user interface. A buyer interface was also developed to encourage responsible fishing. However, challenges emerged as fishers encountered difficulties in fully adopting the reporting practices due to the time-consuming data uploading process. Similarly, the buyer interface did not yield the desired level of effectiveness.

In response, an alternative approach was undertaken to support participatory management efforts among fishers in northern Peru. Representatives known as "Observers" were selected from each community to monitor daily landings at the port. Through virtual focus groups, the "in port observer" user interface was collaboratively designed and is currently being utilized in five communities. Challenges were encountered in raising project awareness within the community and ensuring the effective utilization of the provided data.

Another user interface, the Diver's user, is currently undergoing testing. This interface aims to address the logistical challenges associated with tracking divers' fishing activities. By empowering coastal artisanal divers in northern Peru and providing them with the necessary tools, the Diver's user interface seeks to enhance divers' participation in local management.

Presenter Bio

Daniela C.S Thorne is an early careen Peruvian marine biologist and research associate at Pro Delphinus NGO that has dedicated her professional career to fostering collaborative partnerships with fishers in

northern Peru. Her primary focus lies in enhancing participatory approaches and facilitating local management initiatives.

How Technology and Data Support Resilience in Remote Alaska Fishing Communities

Kelly Harrell[1], Nancy Munro[1]

[1]Saltwater Inc., Anchorage, USA

Abstract

The remote, fishery-dependent communities in the Western Gulf of Alaska (WGoA) are home to a group of small-boat fishermen who fish year-round for pollock, cod, sablefish, and salmon. These forward-thinking fishermen have demonstrated how technology and good data can improve their fishing operations and support the resilience of small fishing communities. The pollock trawl fishery is a mainstay of the WGoA fishing year and is constrained by a "hard cap" on salmon bycatch. When the cap is reached the fishery is closed —resulting in lost income to the fleet and the communities. Traditionally, onboard observers monitored a very small percentage of the fleet's fishing trips taking random basket samples for bycatch estimates that were extrapolated for the entire fishery. Both fishermen and fishery managers questioned the accuracy of these bycatch estimates and shared a desire for better data. In a collaborative effort between the fleet, Saltwater, Chordata, and the Aleutians East Borough, fishermen volunteered to use electronic monitoring (EM) for 100% of their fishing trips to collect better data. Increased monitoring has led to more accurate data, and the introduction of new technology has benefited the fishermen. In addition to the EM systems, Saltwater/Chordata developed an electronic logbook and a data portal that integrate and make accessible diverse data streams. The fishermen are using this technology and increased data access to enhance their fishing operations across fisheries. In the pollock fishery, they share near real time data on salmon bycatch locations to avoid "hot spots", thereby reducing bycatch which can mean expanded fishing opportunities. Fishermen are testing the EM systems to collect data on pot and longline trips, and during the summer salmon season, fishermen are using the portal and catch information to better track salmon data in season.

Presenter Bio

Kelly is a dedicated and passionate systems thinker with 17 years of diverse experience working towards policy and market-based change in support of fishermen, communities, and conservation in both nonprofit and for-profit organizational leadership roles. She has an advanced education in social science, natural resource management, and business including an M.B.A. with an emphasis on seafood business. She is based in Anchorage and focused on partnerships, innovation, and advancing practical, tech-driven monitoring solutions in her role at Saltwater Inc.

Advancing Electronic Monitoring and Improving Fishery Data through a Centralized Data Platform

Stephanie Stockwell[1], JT Mudge[2]

[1]productOps, Santa Cruz, USA. [2]productops, Seattle, USA

Abstract

As we introduce more technology to fisheries, the need for effective management of the resulting data has become increasingly apparent. But what is to be done with all of that data, and how do we maintain effective data management strategies? Going one step further, how do we make sense and use of this new abundance of data? Managing the impending wave of fisheries and fishing data is one of the next big challenges for the effective implementation and use of these new technologies at scale.

Over the past few years, alongside multiple industry partners, productOps has developed one such solution for enabling EM data to be collected, utilized, and applied to effective decision-making processes at scale. This solution has taken form in the development of a cloud-based data platform with robust data governance, combined with specialized data management services. We have developed platform architecture, data standards, and program guidelines to facilitate multiple stakeholders and user groups across several fisheries and countries.

While the platform itself is not available via open source, we would like to discuss our learnings, takeaways, and recommendations for data management solutions for general application, as well as discuss how this data might be best applied to the future of EM and fisheries management.

Elements to be addressed will include:

- Current gaps in EM data management
- Interoperability
- Trust in data and data governance
- Data Standards
- “Real Time” Decision making and the importance of data (accuracy, management, access, insights)
- Facilitating high speed data transmission

Presenter Bio

JT Mudge and Stephanie Stockwell are specialists in data and sustainability, and are currently leading multiple data-centric projects focused on driving innovation in EM and fishery sustainability forward.

Stephanie and JT have co-developed the sustainability team at productOps, a data consulting and implementation firm that helps clients leverage data and technology and a long standing partner to conservation and sustainability organizations.

Developing and Deploying an at-sea Assessment Model Combining ML, AI, EM, and Edge Computing

Stephanie Stockwell[1], JT Mudge[2]

[1]productOps, Santa Cruz, USA. [2]productOps, Seattle, USA

Abstract

In response to current industry needs and desires, we are nearing the end of a proof of concept designed to test the plausibility, hurdles, and opportunities of conducting assessments of various fishing activities at sea in near real-time, using AI and edge technology. We would like to share some of our early takeaways and insights regarding implementing these new technologies at sea, as well as the value in future use cases. This project has consisted of the building, testing, deployment, and evaluation of an at-sea assessment model, with the goal of discovering and documenting how EM, AI, eLogs, and other sources of data can be tied together to determine the risk of a vessel for further review outside of submitted logs. Our algorithm is hosted and computed in near-real time on the vessel while at sea, using edge processing technology. In addition to the algorithm itself, this project has made significant strides towards the interoperability of first mile data collection systems. AI models, e-logs, and EM footage are all connected to and contribute data towards our algorithms. The potential benefits of a near-real-time risk analysis include increased efficiency of EM review, catch quality verification, and expedited responses or remedies to potential compliance issues. Additionally, a program using this technology has the potential to bridge many of the existing gaps in first mile traceability and data verification. The final product of this project will be a report on the feasibility of deploying a risk assessment at sea, which will be completed in November 2023.

Presenter Bio

JT Mudge and Stephanie Stockwell are specialists in data and sustainability, and are currently leading multiple data-centric projects focused on driving innovation in EM and fishery sustainability forward.

Stephanie and JT have co-developed the sustainability team at productOps, a data consulting and implementation firm that helps clients leverage data and technology and a long standing partner to conservation and sustainability organizations.

Ourfish: Building Data Accessibility for Fishers, Buyers, and Managers

Courtney Cox

Barefoot Ocean, Houston, USA

Abstract

Small scale fisheries are generally comprised of household enterprises, that catch, process and trade in fish. Many data collection efforts focus on generating high resolution data to inform management, but often overlook the broader economic condition of the fishery and struggle to build up comprehensive data on the volume and value of fish and shellfish being landed at a community level through time. While enumerator-based data collection is extremely valuable, it is also challenging to deploy long-term or across significant scales, often resulting in a trade-off to focus solely on a few key species. Our solution to this problem is to support community-based fish buyers to record their transactions with the fishers who sell to them. We developed a simple and free android app called Ourfish which was designed to improve data availability for both fish buyers and fishers. Ourfish is essentially a small business management tool for community-based fisheries which generates real-time data on the production of the community fishery in terms of catch volume, composition, and value. Individual user data is analyzed and pushed directly back to the user on the app itself helping buyers monitor their purchase costs and income from sales and other financial obligations such as debt relationships with fishers. Fishers in turn can receive transaction receipts and income statements through time to build up their own record of their productive livelihood. Managers and local organizations can access collated data, shielding personally identifiable information and individual business information, through a simple dashboard that can help monitor fisheries and measure results of management actions. Through time these data demonstrate the combined value of the resource and how the fishery is responding to management, providing easy to understand information relevant to both individuals and managers alike.

Presenter Bio

Dr. Courtney Cox is the Founder of Barefoot Ocean, a social enterprise that provides targeted technical support through a suite of simple tools and approaches that solve for the common challenges of collecting, analyzing, interpreting, and sharing community-based fisheries data. Dr. Cox holds a PhD from the University of North Carolina at Chapel Hill and has over 15 years of experience supporting communities and organizations to use science and data to make informed decisions.

The right fit: How emerging technologies can adapt to small-scale fisheries, lessons from implementation

Shannon Hardisty[1], Martin Purves[2], Maskur Tamanyira[3], Azizah Charir[4]

[1]International Pole and Line Foundation, Denpasar, Indonesia. [2]International Pole and Line Foundation, Cape Town, South Africa. [3]IPNLF, Makassar, Indonesia. [4]IPNLF, Bitung, Indonesia

Abstract

Small-scale tuna fisheries face various barriers to market ranging from access rights to meeting certification and market requirements. Globally, there is growing demand for greater transparency and traceability throughout supply chains with existing technologies adapting and new technologies emerging - within the tech space there seems to be rapid adaptation. But there are key questions that need to be carefully considered:

1. What are the impacts for the fishers in remote areas or operate at a smaller scale?

2. What is the financial burden and who carries it?

3. Who is the technology being created for and can it be adapted across scales?

4. When does technology need to be scale specific?

The International Pole and Line Foundation (IPNLF) has been working with one-by-one tuna fishers in the Maldives and Indonesia (as well as other areas around the world) for over a decade and has experience in what it means for technology to be implemented and sustained (or not). This talk will consider the challenges and successes IPNLF has had and what the future market demands may mean for small-scale fishers, focusing on a practical and solution-oriented discussion.

Presenter Bio

Shannon is the Strategy Manager for Yayasan IPNLF Indonesia and has been working with IPNLF for 3 years, just over 1 of which has been with the Indonesia programme. Her socio-ecological background allows for her to question the effectiveness and impact of technologies from different angles. The IPNLF team works closely to share it's decades worth of knowledge and experience within and without the organisation. We are passionate about the balance between people and nature.

Scale-Up Ocean Monitoring Using Artificial Intelligence & UAVs

Badr Idrissi

ATLAN Space, Rabat, Morocco

Abstract

In this panel discussion, we will highlight the ground-breaking impact of AI-powered drones in achieving Sustainable Development Goal number 14, which aims to create a safer and more sustainable ocean.

ATLAN Space will host this panel event with guest speakers on board to discuss some of the most pressing issues governments and communities face when it comes to sustainable maritime activities such as IUU Fishing and IMO 2020 Sulfur emission to name a few.

It will also highlight the ways in which the combination of Artificial Intelligence, Data, and UAVs can enable decision-makers to act faster thanks to larger coverage, easier fleet management, real-time detection, identification, and reporting, and much more.

Joins us to know more!

Presenter Bio

Badr Idrissi is the Co-founder and CEO of ATLAN Space, an award-winning startup that builds Artificial Intelligence to mimic human navigators aboard drones, allowing institutions to perform safe, cost-efficient, and Beyond Visual Line Of Sight (BVLOS) monitoring missions.

Prior to founding ATLAN Space, Badr held different sales, marketing, and technical positions in Fortune 500 companies. His last tenure was a senior account executive at Microsoft.

A Future Prospect of Marine Biotechnology to Enhance Community Resilience

Kustiariyah Tarman

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Abstract

Marine organisms such as seaweeds, microalgae, sponges, echinoderms, and other invertebrates are rich in bioactive compounds. These resources can be developed for foods, pharmaceuticals, biomaterials and other products in various industries. With the application of scientific and engineering principles to the processing of marine resources allows us to obtain products and services. Marine biotechnology products cover nutraceuticals, pharmaceuticals, enzymes, chemical products, etc. Since marine resources are rich in protein, vitamins, minerals and bioactive compounds, such as antioxidant, marine based foods have important role in increasing the community health. The activity to process marine resources into table or pharmacy will contribute to elevate the economy of coastal people who produce the raw materials or involved in the production process. However, there are some challenges in developing marine biotechnology into commercial products, especially in Indonesia. First, marine industry produces high volume of liquid and solid waste. These can be processed into numerous valuable products, such as collagen from fish scale or skin. Second, quality assurance and food safety, these are related with the characteristics of marine resources which are perishable and cause allergy. Third, continuity for scaling up and commercialization process, this because some resources have not been cultivated. Hence, collaboration interdisciplinary among scientists and all the stakeholders is a must.

Presenter Bio

Dr. Kustiariyah Tarman is faculty member at the Department of Aquatic Product Technology (APT), Faculty of Fisheries and Marine Sciences, IPB University. Currently, she is head of APT for master program. She leads the Division of Marine Biotechnology, Center for Coastal and Marine Resources Studies (CCMRS), at the same university. Since October 2023, she acts as Secretary of International Research Institute of Maritime, Ocean and Fisheries, IPB University.

She received her doctoral degree in Natural Sciences from Institute of Pharmacy, Greifswald University, Germany in 2011. Her research interests are marine natural products and marine microbiology, especially marine fungi. Currently she is president of DAAD Alumni Association for Marine Resources Studies (DAMARS). She provides service to several national associations including Indonesian Society for Mycology (Mikoina), Indonesian Society for Fisheries Product Processing (MPHPI) and Indonesian Forum for Bioremediation. She is member of the editorial board for the Indonesian Journal of Fisheries Product

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