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Boosting data collection in Pacific Island's coastal fisheries using artificial intelligence technologies

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1. The purpose of this Information paper is to outline the emerging use of artificial intelligence (AI) technologies and Ikaavea to improve SPC member countries and territories' fishery assessment programmes for coastal invertebrate and finfish fisheries.
2. As populations in the Pacific are expected to grow by more than 60% over the next two decades (Bell et al. 2009), the collection of accurate fisheries data to inform sustainable fisheries management is now more urgent than ever.
3. Rapidly emerging artificial technology (AI) has the potential to collect vast amounts of accurate data on single or multiple species that are caught in subsistence or commercial fisheries (Andriamanirina et al. 2020; Barbedo 2022; Marrable et al. 2023). However, these solutions are either underdeveloped, unsuited to collecting robust fisheries-dependent data, or only available to limited or small groups in developed countries.
4. In the Pacific, many species of finfish and invertebrates are consumed or sold at markets and form an intrinsic part of the lives and cultures of coastal communities (Kronen et al. 2010; Steenbergen et al. 2019; Farmery et al. 2020). However, to-date few fisheries management programmes have proven successful in producing long-term or viable data to inform solutions that will reduce overfishing or increase sustainability outcomes (Purcell and Pomeroy 2015; Bell et al. 2018; Cooke et al. 2021).
5. AI-assisted data collection programmes can remove some of the technical and financial barriers in fisheries monitoring programmes that have historically plagued management of small-scale fisheries (SSF) (Andrew et al. 2007). Well-developed AI-assisted programmes provide diversified access to data-collection and assist in the interpretation of data that directly reflects a change in the resource. For example, automating species identification, length and weight, and calculations of the quantity of key fisheries species, can be analysed in near real time. As technological advancements grow, particularly in mobile and satellite linked communications, access to these technologies become more prevalent across once isolated fisheries authorities and communities in the Pacific. By leveraging these technologies, the synergies between government and community-led data collection programmes can be realised, transforming coastal fisheries management in the Pacific islands region.
6. By combining these advanced technologies in fishery-dependent survey programmes at landing sites or across market systems, SPC members have significantly increased the volume of species-specific stock assessment data (e.g., lobsters, freshwater mussels, finfish, bivalves) being collected across the Pacific islands region. This technology has proved to be both robust and accessible, paving the way to continued data collection for informed management. These data may also be used to complement existing fishery-independent stock assessment data and AI powered habitat assessment, leading to a more holistic understanding of the coastal fishery, and ultimately, better informed, evidence-based management decisions for these important fisheries.
7. As these data collection programmes mature, linking automated data collection with automation in stock analysis and reporting, will have profound implications for making timely management decisions for sustainable fishing practices. The critical shift lies in the seamless connection between data collection and automation-driven stock analysis. The fusion of these processes streamlines the entire

data collection system, reducing the need for manual, time-consuming procedures, because these technologies expedite the compilation and analysis of essential data, ensuring they are both comprehensive and up to date. For example, automation of collected data can be delivered to an automated stock analysis system using length-based indicators (LBIs), which can then produce auto-reports on trends in stock condition. This information will feed directly to decision makers who can quickly act on changes in key fishery species.

Conclusions

8. AI-assisted data collection in the context of coastal fisheries management has revealed exciting prospects for the future. It is evident that fisheries monitoring programmes in the Pacific are progressively aligning with the growing trend of AI-assisted data collection. This trajectory signifies a collective understanding of the potential these tools hold in enhancing the accuracy and efficiency of data collection within the complex domain of fisheries science and management.
9. However, it is crucial to continue to identify species of significant fisheries value, particularly invertebrates, within each jurisdiction. Incorporation of these species into AI-assisted government or community-led programmes will lay the groundwork for more informed decision-making and sustainable evidence-based resource management.
10. Continued investment to assist member countries in initiating or advancing AI-aided data collection programmes is needed. These resources should include comprehensive best practices, guidelines, accessible training materials, and equipment to facilitate the seamless adoption of AI technologies in fisheries management. Furthermore, there is a demand to allocate resources to research and development focused on integrating AI-assisted data collection with accessible automated stock assessment and reporting systems. This holistic approach has the potential to revolutionise how coastal fisheries are managed and pave the way for more informed, sustainable, and inclusive resource management practices across the Pacific region.

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