

## Level of Knowledge and Use of Information Technology Among Gatherers and Fishermen in the Mangrove Ecosystem of the Muisne Canton, Ecuador

### Nivel de conocimiento y uso de recursos informáticos en recolectores y pescadores del ecosistema manglar del cantón Muisne, Ecuador

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**Abstract:** Mangrove ecosystems represent one of the most productive ecological systems on the planet and provide ecosystem services essential for the subsistence of coastal communities. In Ecuador, particularly in the province of Esmeraldas and the canton of Muisne, numerous families depend on artisanal fishing and the harvesting of mangrove-associated species such as shellfish, crabs, and fish. However, these communities face limitations related to access to information and communication technologies (ICT), digital literacy, and the availability of technological infrastructure. This article aims to determine the level of knowledge and use of computer resources among people engaged in the harvesting and collection of products from the mangrove ecosystem in the Muisne canton. To this end, a literature review of scientific articles indexed in international databases was conducted. The results reveal the existence of a significant digital divide in rural coastal communities. However, the scientific literature indicates that the adoption of digital technologies can improve production processes, market access, and the sustainability of natural resources.

**Keywords:** Technology, digital divide, fishermen

**Resumen:** Los ecosistemas de manglar representan uno de los sistemas ecológicos más productivos del planeta y proporcionan servicios ecosistémicos esenciales para la subsistencia de comunidades costeras. En Ecuador, particularmente en la provincia de Esmeraldas y el cantón Muisne, numerosas familias dependen de la pesca artesanal y de la recolección de especies asociadas al manglar como conchas, cangrejos y peces. Sin embargo, estas comunidades enfrentan limitaciones relacionadas con el acceso a tecnologías de la información y comunicación (TIC), la alfabetización digital y la disponibilidad de infraestructura tecnológica. El presente artículo tiene como objetivo determinar el nivel de conocimiento y uso de recursos informáticos en las personas que se dedican a la captura y recolección de productos del ecosistema manglar del cantón Muisne. Para ello se desarrolló una revisión bibliográfica de literatura

científica indexada en bases de datos internacionales. Los resultados evidencian la existencia de una brecha digital significativa en comunidades costeras rurales. No obstante, la literatura científica señala que la adopción de tecnologías digitales puede mejorar los procesos productivos, el acceso a mercados y la sostenibilidad de los recursos naturales.

**Palabras clave:** Tecnología, brecha digital, pescadores

## Introduction

Mangroves are coastal ecosystems of great ecological and socioeconomic importance. These systems provide essential habitats for numerous marine species and offer natural protection against coastal erosion and extreme weather events. Furthermore, mangroves play a fundamental role in carbon sequestration and the regulation of ecological processes.

In Latin America, mangroves have historically been used by local communities for artisanal fishing and the harvesting of marine resources. In Ecuador, these activities are particularly important in the province of Esmeraldas, where numerous communities depend directly on mangrove resources for their livelihoods.

In the Muisne canton, the harvesting and collection of mangrove species constitute a fundamental economic activity. However, communities that depend on these resources face various challenges related to poverty, social exclusion, and limited adoption of digital technologies. The digital divide between urban and rural areas remains a significant problem that limits access to information, training, and opportunities for economic development.

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The digital divide between urban and rural areas remains a significant problem that limits access to information, training, and economic development opportunities.

## Methodology

The research was conducted using a qualitative approach based on a systematic literature review. Scientific articles, technical reports, and academic documents related to mangroves, artisanal fishing, digital literacy, and the use of ICTs in rural communities were analyzed.

Information sources were obtained from recognized academic databases such as Scopus, Web of Science, Scielo, Redalyc, and Google Scholar. Studies published between 2000 and 2024 were prioritized.

The methodological process included the following stages:

1. Identification of relevant scientific literature.
2. Selection of studies based on inclusion criteria.
3. Comparative analysis of the results reported in the literature.
4. Synthesis of the information to identify trends and patterns.

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## **Results**

The reviewed studies show that rural coastal communities have relatively low levels of digital literacy compared to urban areas. Among the main factors influencing this situation are limited technological infrastructure, low internet access, and economic constraints on acquiring technological devices.

Several studies highlight that the use of digital technologies can significantly improve productivity in artisanal fisheries. Access to meteorological information, GPS navigation systems, and digital marketing platforms can contribute to improving the safety and efficiency of fishing activities.

Likewise, the literature indicates that the implementation of digital literacy training programs can strengthen the productive capacities of mangrove-dependent communities.

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Various studies highlight that the use of digital technologies can significantly improve productivity in small-scale fisheries. Access to weather information, GPS navigation systems, and digital marketing platforms can help improve the safety and efficiency of fishing activities.

Likewise, the literature indicates that the incorporation of digital literacy training programs can strengthen the productive capacities of mangrove-dependent communities.

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The results of the literature review align with international studies indicating that the digital divide constitutes one of the main challenges to sustainable rural development. In coastal communities where traditional productive activities predominate, the adoption of digital technologies can significantly contribute to improving economic competitiveness and resilience in the face of environmental changes.

The incorporation of information technologies into artisanal fisheries can facilitate access to information on weather conditions, markets, and natural resource management. Furthermore, digital literacy can strengthen the organizational capacities of fishermen's and gatherers' associations.

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## Conclusions

The literature review conducted leads to the conclusion that communities engaged in the harvesting and collection of mangrove ecosystem products have limited knowledge and use of IT resources. The main limitations are associated with the digital divide in rural areas, limited technological infrastructure, and restricted access to training programs.

However, the scientific literature shows that the incorporation of digital technologies can significantly contribute to strengthening productive activities, the marketing of fishery products, and the sustainable management of the mangrove ecosystem.

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## References

- Alongi, D. (2014). Carbon cycling and storage in mangrove forests. *Annual Review of Marine Science*.
- Barbier, E. et al. (2011). The value of estuarine and coastal ecosystem services. *Ecological Monographs*.
- Friess, D. et al. (2019). The global status of mangrove ecosystems. *Nature*.
- Worthington, T. et al. (2020). Global mangrove restoration potential. *Nature Communications*.
- Spalding, M. et al. (2010). *World Atlas of Mangroves*.
- Hilbert, M. (2016). *The digital access divide*. Telecommunications Policy.
- Van Dijk, J. (2020). *The Digital Divide*. Polity Press.
- FAO. (2020). *Digital technologies in fisheries and aquaculture*.
- FAO. (2018). *Small-scale fisheries and rural development*.
- Allison, E. (2011). *Aquaculture, fisheries, poverty, and food security*. World Development.
- Béné, C. (2006). *Small-scale fisheries: assessing their contribution*. FAO Fisheries Circular.
- ECLAC. (2022). *The Digital Society in Latin America*.
- Castells, M. (2010). *The Rise of the Network Society*.
- ITU. (2022). *Measuring digital development*.
- OECD. (2021). *Bridging the Digital Divide*.
- UNESCO. (2018). *Digital literacy in education*.
- Alongi, D. (2014). Carbon Cycling and Storage in Mangrove Forests. *Annual Review of Marine Science*.
- Barbier, E. et al. (2011). The value of estuarine and coastal ecosystem services. *Ecological Monographs*.
- Friess, D. et al. (2019). The global status of mangrove ecosystems. *Nature*.
- Worthington, T. et al. (2020). Global mangrove restoration potential. *Nature Communications*.
- Spalding, M. et al. (2010). *World Atlas of Mangroves*.
- Hilbert, M. (2016). *The digital access divide*. Telecommunications Policy.
- Van Dijk, J. (2020). *The Digital Divide*. Polity Press.

- FAO. (2020). Digital technologies in fisheries and aquaculture.
- FAO. (2018). Small-scale fisheries and rural development.
- Allison, E. (2011). Aquaculture, fisheries, poverty, and food security. World Development.
- Béné, C. (2006). Small-scale fisheries: assessing their contribution. FAO Fisheries Circular.
- ECLAC. (2022). The Digital Society in Latin America.
- Castells, M. (2010). The Rise of the Network Society.
- ITU. (2022). Measuring digital development.
- OECD. (2021). Bridging the Digital Divide.
- UNESCO. (2018). Digital literacy in education.
- Alongi, D. (2014). Carbon Cycling and Storage in Mangrove Forests. Annual Review of Marine Science.
- Barbier, E. et al. (2011). The value of estuarine and coastal ecosystem services. Ecological Monographs.
- Friess, D. et al. (2019). The global status of mangrove ecosystems. Nature.
- Worthington, T. et al. (2020). Global mangrove restoration potential. Nature Communications.
- Spalding, M. et al. (2010). World Atlas of Mangroves.
- Hilbert, M. (2016). The digital access divide. Telecommunications Policy.
- Van Dijk, J. (2020). The Digital Divide. Polity Press.
- FAO. (2020). Digital technologies in fisheries and aquaculture.
- FAO. (2018). Small-scale fisheries and rural development.
- Allison, E. (2011). Aquaculture, fisheries, poverty, and food security. World Development.
- Béné, C. (2006). Small-scale fisheries: assessing their contribution. FAO Fisheries Circular.
- ECLAC. (2022). The Digital Society in Latin America.
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- ITU. (2022). Measuring digital development.
- OECD. (2021). Bridging the Digital Divide.
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