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GIS and Remote Sensing in Fisheries Management

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Abstract

Fisheries managers face many problems, most of which involve changes across space and time. Because of this, GIS can be a helpful tool for managing fisheries. It briefly reviews how GIS is currently used in fisheries, then focuses on the practical barriers to adopting GIS and how these can be solved. Overfishing, pollution, habitat damage, and climate change have all contributed to a decline in global fish productivity during the past 40 years. Fish must be properly monitored and managed in order to be protected and used responsibly. This work is aided by remote sensing technology. Ocean conditions such as sea surface temperature, ocean colour (which indicates productivity) and ocean fronts can be measured by satellites and aeroplanes. Where fish congregate is impacted by these circumstances. Scientists can comprehend changes in fish populations by examining this data. Near-real-time information sharing takes place. It saves time and fuel by assisting fishermen in finding fish more quickly. Additionally, it aids researchers in forecasting fisheries and developing more effective plans for sustainable fisheries management. Models are used in conjunction with acoustic, optical, and radar sensors on ships, satellites, and aircraft to enhance fish conservation and harvesting. The paper ends by highlighting how GIS and Remote Sensing are likely to be used soon to help improve fisheries management.
Keywords: GIS, Remote sensing, Overfishing, Climate change, Fisheries management

Introduction

The use of geographic information systems, or GIS, in fisheries management is gradually growing in importance. Information regarding fish, water bodies, and environmental conditions can be gathered, stored, analysed, and displayed with its assistance. Fish populations are closely linked to their surroundings, including water temperature, habitat, and pollution, as scientists now know. GIS is essential for researching these links and facilitating improved decision-making. GIS can assist managers in better planning fishing operations, safeguarding critical ecosystems, and keeping an eye on fish stocks in light of the current

issues facing the world's fisheries, such as overfishing and environmental changes. Additionally, it can be used to create maps that highlight places that require conservation, breeding grounds, and fishing zones. However, technology and conditions in fisheries are rapidly evolving. In order to stay up to date with new information and difficulties, those that promote GIS must update their databases and systems on a regular basis. For commercial fishing to continue to be a viable and significant human activity in the future, GIS must be adopted quickly and used appropriately.

In order to provide Earth observation data to support the Sustainable Development Goals (SDGs), remote sensing is crucial. Approximately thirty of the 231 SDG indicators are either directly or indirectly supported by remote sensing (Estoque, 2020). Additionally, it supports early warning systems for wildfires and other natural calamities. Furthermore, remote sensing can be used to assess the effectiveness of conservation and reforestation initiatives (Barmpoutis *et al*., 2020). Remote sensing aids in the long-term, large-scale monitoring of climate, water quality, and vegetation health in protected areas. Analysing patterns also aids in determining the efficacy of conservation and management initiatives. Numerous studies demonstrate how remote sensing and Earth observation can be used to monitor the SDGs' progress. But there are still certain difficulties, particularly when measuring production with remote sensing. For instance, SDG 15 (Life on Land) uses land degradation as a gauge of progress. However, it is unclear how satellite data, such as vegetation indices, may be directly linked to human lifestyles. It is unclear how satellite observations of plant health relate to the advantages that humans derive from nature. Therefore, additional effort is required to establish a clear link between environmental health and human well-being, even though remote sensing is helpful for monitoring SDG development.

Fields in which GIS and Remote sensing is currently used for fisheries management:

1. ***Matching fish distributions to environmental parameters***: Understanding the relationship between fish distribution and environmental circumstances is crucial for fisheries scientists and managers. Fish typically inhabit locations that correspond to their ideal habitat. Water temperature (particularly thermal fronts), upwelling, water depth, chlorophyll levels (which indicate food availability), bottom soil type, and salinity are frequently investigated environmental parameters. Where fish are likely to reside and congregate is explained by these criteria.
2. ***Modelling fish activity and movement***: This GIS application is still in its infancy. Connecting numerical models with GIS to simulate, characterise, or forecast various

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processes is the primary goal. Models can be used, for instance, to analyse fish movement, compute economic expenses and comprehend the distribution of fishing effort over time. Additionally, raster or vector GIS maps can be utilised for testing models and various statistical studies.

3. ***Analysis of fisheries catch and effort***: Fishery managers are interested in learning where the majority of fishing occurs, the number of fish taken in various locations, and the relationship between catch and fishing effort. These subjects are currently the subject of several investigations. These questions can be addressed with statistical results from GIS programs. Fish life cycle stages or environmental factors such as temperature and water quality can explain fish harvests.
4. ***SDG 15:*** It focuses on protecting land, forests and biodiversity. Monitoring forest loss, land degradation, vegetation health, and climate impacts is made easier with the use of remote sensing (satellite data). It can identify changes brought on by farming, deforestation, fires, and a drop in rainfall. It is helpful for monitoring ecosystem changes and assessing the efficacy of protected areas.
5. ***SDG 14***: It focuses on Life below Water. Since many aquatic habitats, such as mangroves, coral reefs, and lagoons, are difficult to access, satellite data—or remote sensing—is a valuable tool for monitoring them. Sea surface temperature, water quality, seagrass loss, coral bleaching danger, hazardous algal blooms, and habitat changes can all be measured by satellites. Additionally, they aid in the mapping of coral reef habitats and the identification of appropriate locations for coral conservation and growth. Using AIS and radar, remote sensing can detect illicit fishing, track the disappearance of coastal forests (ghost forests), and keep an eye on fishing operations. Additionally, it assists in locating marine pollutants, such as plastic garbage and oil spills.
6. ***SDG 13***: It focuses on Climate Action. In protected regions like national parks and IUCN Category I and II areas, remote sensing (satellite data) aids in the monitoring of climate change. Temperature, precipitation, snowmelt, drought, and vegetation growth variations can all be monitored by it. The NDVI, or vegetation index, is used in many research to quantify carbon storage, growing season, and plant health. The findings indicate that seasonality is shifting due to rising temperatures, spring is arriving earlier, and vegetation greenness has risen in many parks worldwide. Additionally, research on wetland degradation, snowpack variations, and the effects of drought is aided by

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remote sensing. For instance, in several parks, wetlands and amphibian populations have decreased due to drought and rising temperatures.

Conclusion

By offering precise, timely, and extensive environmental and geographical data, GIS and remote sensing have revolutionised fisheries management. These tools enhance conservation planning, aid in stock assessment, direct fishing operations, and deepen our understanding of the linkages between fish and the environment. They are essential to encouraging the sustainable use of aquatic resources and preparing for the effects of climate change.

Even if there are financial and technological obstacles, these instruments are becoming more useful and efficient because to ongoing developments in satellite technology, data accessibility, and modelling techniques. Adoption and appropriate use of GIS and remote sensing are critical for the long-term viability of fisheries. These technologies have the potential to greatly support the development of sustainable fisheries and the preservation of aquatic ecosystems when paired with good management practices and stakeholder involvement.

References

Barmpoutis, P., Papaioannou, P., Dimitropoulos, K. & Grammalidis, N. (2020). A review on early forest fire detection systems using optical remote sensing. Sensors, doi:10.3390/s20226442

Estoque, R. C. (2020). A review of the sustainability concept and the state of SDG monitoring using remote sensing. Remote Sensing, 12(11), 1770.

Klemas, V. (2013). Fisheries applications of remote sensing: An overview. *Fisheries Research*, *148*, 124-136.

McCarthy, M. J., Herrero, H. V., Insalaco, S. A., Hinten, M. T., & Anyamba, A. (2025). Satellite remote sensing for environmental sustainable development goals: A review of applications for terrestrial and marine protected areas. *Remote Sensing Applications: Society and Environment*, *37*, 101450.

Meaden, G. (2009). Geographical Information Systems (GIS) in fisheries management and research. In *Computers in fisheries research* (pp. 93-120). Dordrecht: Springer Netherlands.

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