Application of remote sensing in monitoring fishery resources.

Ananya Mishra*

Department of Aquatic Biology and Fisheries, University of Kerala, India.

Introduction

The application of remote sensing technology in monitoring fishery resources has transformed the way marine ecosystems and fisheries are managed. Remote sensing uses satellite and aerial data to collect information about oceanographic conditions, fish distribution, and habitat health, providing valuable insights that enhance sustainable fisheries management [1]. By integrating spatial and temporal data from various sensors, fisheries scientists and managers can monitor fish stocks, detect illegal fishing activities, and assess environmental factors that influence marine productivity [2].

One of the primary uses of remote sensing in fisheries is monitoring sea surface temperature (SST), a critical factor that affects fish behavior, migration, and spawning [3]. Satellites equipped with thermal sensors continuously measure SST across vast ocean areas, providing real-time data that helps predict the distribution of commercially important species. For example, tuna and other pelagic fish are highly sensitive to temperature changes, and SST data enables fishers and managers to identify productive fishing zones, improving efficiency while reducing bycatch and fuel consumption [4].

Chlorophyll concentration, an indicator of phytoplankton biomass and primary productivity, is another key parameter monitored through remote sensing. Satellites like the MODIS and SeaWiFS platforms measure ocean color to estimate chlorophyll levels, which directly correlate with the abundance of fish species dependent on planktonic food chains. Maps of chlorophyll-rich areas guide fishing efforts and inform ecosystem-based management approaches by linking fish availability to ocean productivity patterns [5].

Remote sensing also plays a vital role in mapping and protecting critical fish habitats. Coral reefs, mangroves, and seagrass beds are essential for the lifecycle of many marine species, and high-resolution satellite imagery allows for detailed mapping of these habitats. By monitoring changes in habitat extent and health, remote sensing tools provide early warnings of environmental degradation caused by factors such as coastal development, pollution, or climate change. Conservation efforts can be prioritized based on this information to protect key areas that support fisheries sustainability [6].

Another significant application is the detection of illegal, unreported, and unregulated (IUU) fishing. Synthetic Aperture Radar (SAR) and vessel monitoring systems (VMS) combined with satellite-based Automatic Identification Systems (AIS) enable continuous surveillance of fishing activities in remote and vast oceanic regions [7]. These technologies track vessel movements, detect fishing gear deployment, and identify unauthorized operations in protected zones, helping governments and international agencies combat IUU fishing, which undermines sustainable fisheries and marine conservation [8].

Remote sensing also provides valuable data for predictive modeling and forecasting fishery resources. By integrating oceanographic variables such as SST, chlorophyll, and salinity, models can predict fish stock distribution and abundance, allowing managers to set dynamic fishing regulations and avoid overfishing. Seasonal forecasts of environmental conditions help fishers plan their activities, optimizing catch efficiency while minimizing environmental impact [9].

Technological advances continue to improve the accessibility and accuracy of remote sensing data. Cloud-based platforms and open-access initiatives have democratized the use of satellite information, enabling more countries and small-scale fisheries to benefit from these tools. Combining remote sensing with artificial intelligence and machine learning enhances data processing and pattern recognition, providing more precise and actionable insights for fisheries management [10].

Conclusion

In conclusion, remote sensing technology has revolutionized the monitoring of fishery resources by providing comprehensive, real-time data on oceanic conditions, habitat health, and fishing activities. Its integration into fisheries management enhances sustainability, efficiency, and conservation efforts. As technology evolves, remote sensing will play an increasingly important role in addressing global fisheries challenges and ensuring the long-term health of marine ecosystems. Expanding access to these tools and investing in capacity-building for data interpretation will further strengthen their impact on sustainable fisheries management worldwide.

References

1. Thompson FL, Iida T, Swings J. Biodiversity of vibrios. Microbiol Mol Biol. 2004;68(3):403-31.
2. Chapin Iii FS, Zavaleta ES, Eviner VT, et al. Consequences of changing biodiversity. Nature. 2000;405(6783):234-42.
3. DeLong Jr DC. Defining biodiversity. Wildl Soc Bull. 1996:738-49.

***Correspondence to:** Ananya Mishra, Department of Aquatic Biology and Fisheries, University of Kerala, India, E-mail: samantha.reed@oxforduniv.edu

***Received:** 03-Feb-2025, Manuscript No. AAJFR-25-157842; **Editor assigned:** 04-Feb-2025, PreQC No. AAJFR-25-157842(PQ); **Reviewed:** 18-Feb-2025, QC No AAJFR-25-157842; **Revised:** 21-Feb-2025, Manuscript No. AAJFR-25-157842(R); **Published:** 28-Feb-2025, DOI:10.35841/ aajfr -9.1.249*

***Citation:** Mishra A. Application of remote sensing in monitoring fishery resources. J Fish Res. 2025;9(1):249.*

4. Pimm SL, Russell GJ, Gittleman JL, et al. The future of biodiversity. Sci. 1995;269(5222):347-50.
5. Jenkins M. Prospects for biodiversity. Sci. 2003;302(5648):1175-7.
6. Lovejoy TE. Biodiversity: what is it. Biodiversity II. Understanding and protecting our biological resources. 1997:7-14.
7. Bowker GC. Biodiversity datadiversity. Soc Stud Sci. 2000;30(5):643-83.
8. Sarkar S. Defining" biodiversity"; assessing biodiversity. The Monist. 2002;85(1):131-55.
9. Scholes RJ, Biggs R. A biodiversity intactness index. Nature. 2005;434(7029):45-9.
10. Rands MR, Adams WM, Bennun L, et al. Biodiversity conservation: challenges beyond 2010. Sci. 2010;329(5997):1298-303.

Citation: *Mishra A. Application of remote sensing in monitoring fishery resources. J Fish Res. 2025;9(1):249.*