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Use Of Innovative Technologies For Fisheries Resource Management

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Introduction

Since we are all aware, Innovation is essential to the future. At present, Innovation needs to reconstruct our ecosystem as fisheries resource management. The movement toward this goal may represent the only hope for fisheries. Innovation is the deliberate process of utilizing or adapting invention and improved practices for practical use at an individual, organizational or national level. Practices that contribute to the research, development, and design of new goods, procedures or to improve existing results and produce new technical skills are referred to as technological Innovation. There are different innovative technologies like GIS, GPS, Remote sensing, Radar, Sonar, Drones, Vessel Monitoring Systems (VMS), Automatic Identification Systems (AIS) etc. which are utilized in fisheries resources management.

Fisheries resource management is the activity of protecting fishery resources sustainably. Innovation will play an essential role in meeting global challenges such as environmental conservation and sustainability of the fishery sector. Innovation is the deliberate process of utilizing or adapting invention and improved practices for practical use at an individual, organizational or national level. Examples of fisheries and aquaculture innovations include harvesting technologies, conservation technologies, aquaculture technologies, new products and markets, and institutional Innovation. There are different innovative technologies like GIS, GPS, Remote sensing, Radar, Sonar, Drones, Vessel Monitoring Systems (VMS),

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Automatic Identification Systems (AIS) etc. which are utilized in fisheries resources management.

The gap between Innovation and Technology is significant. Innovation leads to new ideas, methods, things, or restructuring, remodeling, creative thoughts, and new imagination in a device or process. Still, Technology is the application of scientific knowledge for practical purposes, especially in industry.

Innovation is not the same as invention. Innovative technologies have a high impact in that they contribute to a sustainable (optimum exploitation) harvest of marine resources and fisheries management.

Different Types of Innovation Technologies Used in Fisheries:

1. **Geospatial technologies**

Geospatial technologies acquire and handle location-specific data about the Earth surface. Global positioning system (GPS), Remote sensing, the and Geographic information systems (GIS) are essential geospatial technologies. Remote sensing and GPS are methods for collecting information about Earth's surface; GIS is a mapping tool for organizing and analyzing data.

1. **Remote Sensing (RS)**

Branch of science derives information about objects from measurements made from a distance, i.e. without coming into contact with them. Remote sensing refers to identifying earth features (objects) by detecting the characteristics of electromagnetic radiation reflected by the earth surface. Everything reflects a portion of electromagnetic radiation incident on it depending upon its physical properties. In addition, objects also emit electromagnetic radiation depending upon their temperature & emissivity. The reflectance pattern at different wavelengths for each object is different. Such a set of characteristics is known as the object's spectral signature. An example of remote sensing is the Visual perception of objects (Cracknell, 2007).

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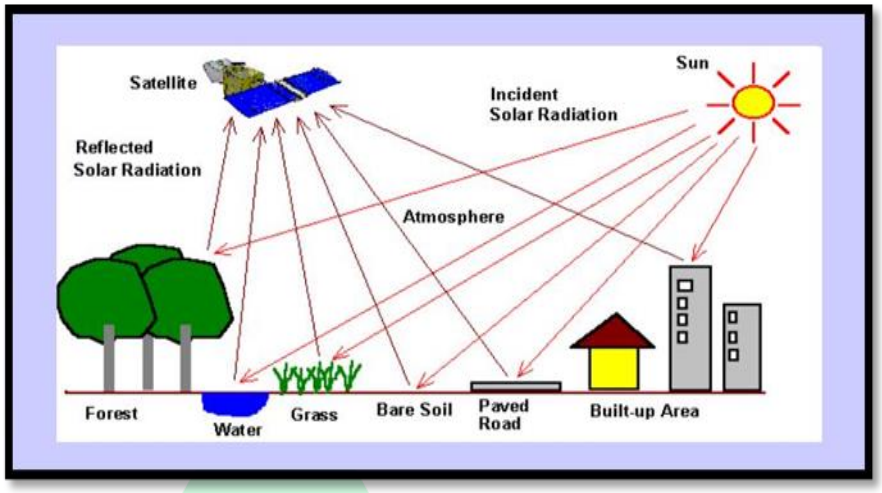

Applications of Remote Sensing in fisheries:

- These techniques are used for the detection and monitoring of the water pollution
- Information regarding offshore engineering activities, fisheries surveillance, ocean features, coastal regions and storm forecast operations.
- It provides the necessary spatial data on suspended sediments, dissolved organic matter, phytoplankton, algal blooms & oil slicks etc.
- For monitoring changes on coastal erosion, shoreline monitoring & management, loss of natural habitat, sea-level rise, wetland mapping urbanization, sewage disposal and aquatic population etc
- Remote sensing techniques help find different types of bio resources like.
- Remote sensing is very useful in identifying Potential Fishing Zones (PFZ) under INCOIS. This data is beneficial for the fishermen community.

a. **Global positioning system (GPS)**

GPS or Global Positioning System determines the position, course, and speed from signals sent from the satellites. NAVSTAR GPS (Navigation Satellite Timing and Ranging Global Positioning System) was developed, operated and maintained by the United States department of defense. The service is available to the public free of cost.

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The position is computed by getting the data from three or more satellites. The Global Positioning System (GPS) is a constellation of twenty-four satellites that allows the precise measurement of any place on or near the Earth's surface. At least four GPS satellites are visible at all times from any place on the Earth's surface because they are uniformly spaced across the globe. As one satellite sets below the horizon, another always raises somewhere else. GPS has only been widely used since more affordable GPS receivers first became available in the early 1990s (Jules, 2002).

GPS consist of three major segments:

i) Space segment (SS), ii) Control segment (CS) and iii) User segment (US)

Indian and Global Scenario:

The Indian Regional Navigation Satellite System (IRNSS), with the operational name of NAVIC, is an autonomous regional satellite navigation system that provides accurate real-time positioning and timing services.

The Global Positioning System (GPS), originally Navstar GPS, is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

b. **Geographical Information system (GIS):**

- Geographical information system (GIS) may be defined as a collection of computer hardware, software, data and personnel designed to collect, store, update, manipulate, analyze and display geographically referenced information. A system of integrated computer-based tools for end-to-end processing like capture, storage, retrieval, analysis, display of data using location on the Earth's surface for interrelation supports operations management, decision making, and science (Chang, 2016).

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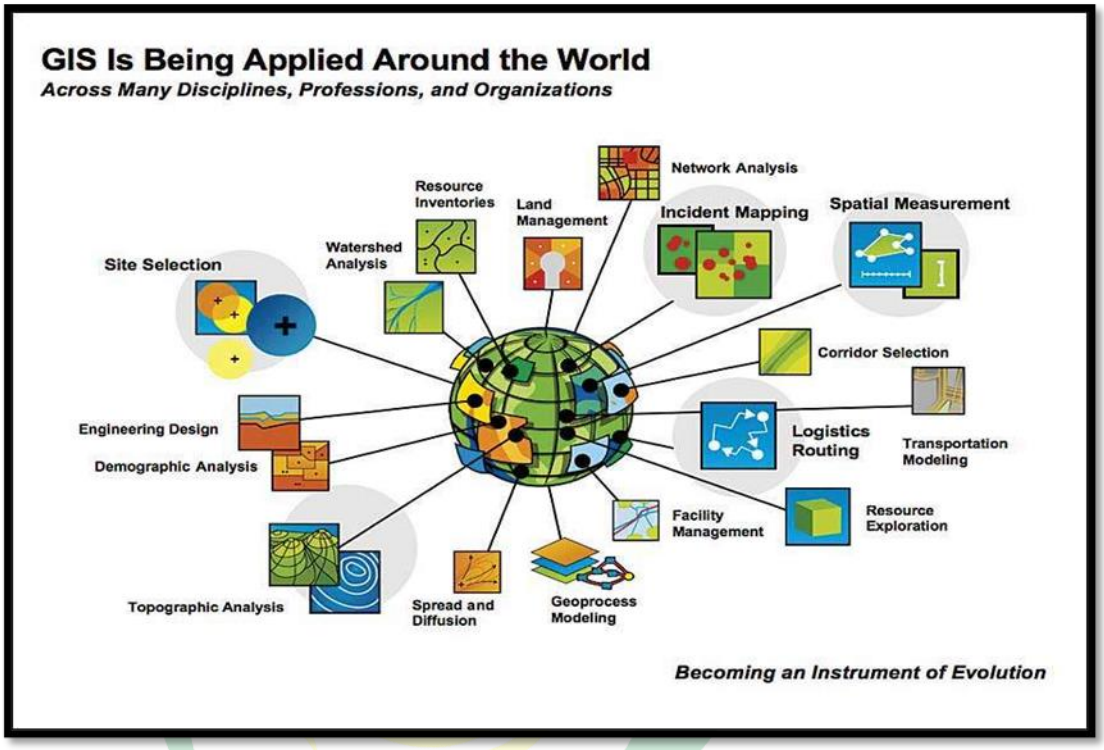
- The first known use of the term "geographic information system" was by **Roger Tomlinson** in the year 1968 in his paper "A Geographic Information System for Regional Planning". Tomlinson is also acknowledged as the **"Father of GIS".**
- GIS technology enables high-quality output.



Applications of GIS in Fisheries:

- ✓ Identification of suitable sites for freshwater &brackish water aquaculture.
- ✓ Management of marine fisheries & coastal regulation zone.
- ✓ Study the land-use pattern, including mangroves & forest cover of a particular area.
- ✓ Planning for water body resource zonation & mapping of aquatic species.
- ✓ Fish disease modelling & management.
- ✓ Study of temporal/spatial changes in fish production & consumption.
- ✓ Distribution of different fish species with physical habitat characteristics.
- ✓ Environmental Impact Assessment.

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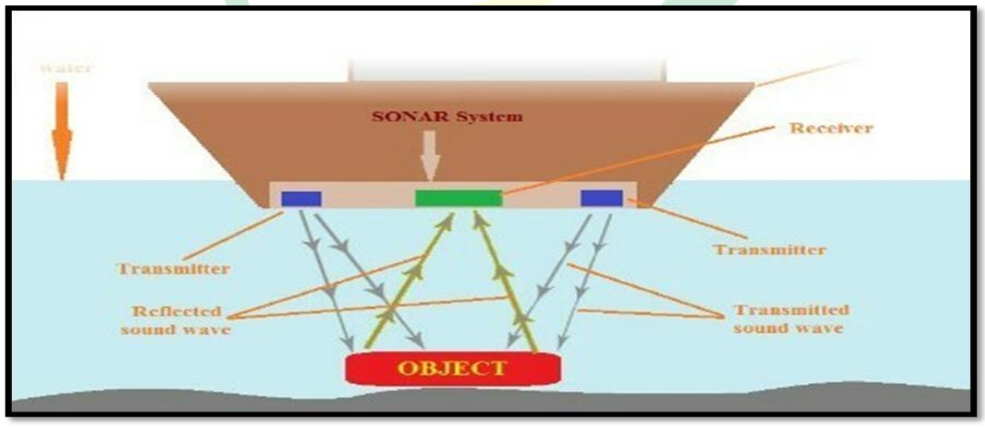
- ✓ Study of spatial variations in demand/supply balance.

Advantages of GIS:

- ➢ It helps the planners inefficient & cost-effective decision making based on multiple scenarios available.
- ➢ GIS allows integration of all types of data together based on geographical & locational components of data.
- ➢ GIS is application-oriented.
- ➢ Frequent revision of digitized GIS data is possible.
- ➢ Changes over time can easily & rapidly be monitored through GIS.

I. Sonar

Sonar (Sound navigation and ranging) is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels. The Sonar is used for Navigation purposes, Fish finding, Wreck location and salvage, detecting, track and destroying enemy ships and submarines etc.



II. Echosounder

Echo sounding is the technique of using sound pulses to find water depth. The interval from the emission of a pulse to the reception of its echo is recorded, and the depth is

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calculated from the known speed of sound propagation through the water. Echosounder is used for navigation purposes, measuring the depth of water and to find the fish beneath the vessel, fish biomass estimation. Echo sounding can also refer to hydroacoustic "echo sounders", defined as active sound in water (Sonar) used to study fish. The difference between echosounder and Sonar is the use of (high-frequency ultra-) sound to detect and range targets underwater. Usually, Sonar is used in connection with imaging targets (like fish or wrecks), while echosounder refers to just seeing the bottom and is used for body scans.

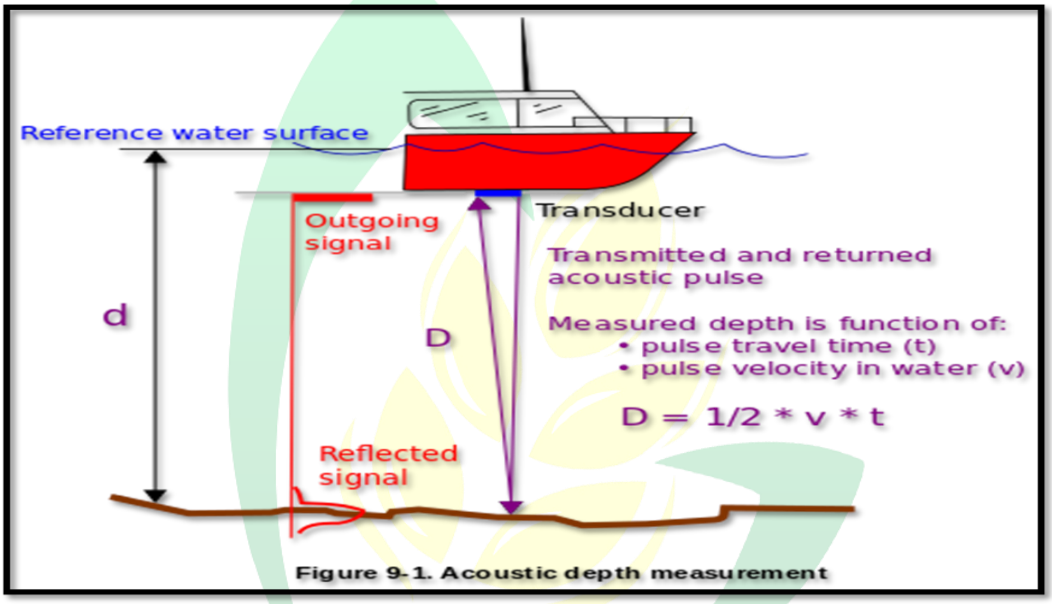

Figure 9-1. Acoustic depth measurement

III. Radar

Radar (radio detection and ranging) works by sending radio pulses toward objects and recording how long the echoes take to return. Radar observations of water waves give information on winds and currents; satellite-based radar also has mapped subtle variations in sea level due to irregularities in Earth's gravitational field. Radar detects ships and landmasses, even during periods of low visibility such as mist, snow or even sandstorms. Radar can also be used in clear visibility for navigation or collision avoidance purposes.

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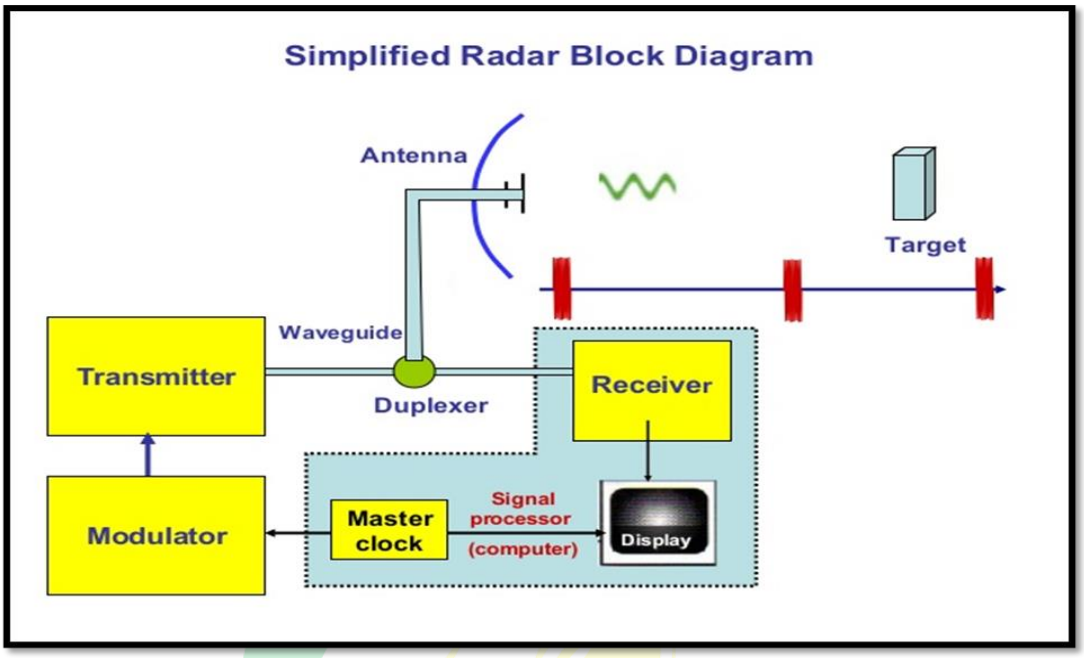

Conclusion

Innovative technologies enable a broader learning process, such as incorporating best practices inadequate training, education, and advice programmes for the entire value chain. Fisheries are also becoming more visible due to new technologies, particularly in remote fishing communities. Significant hurdles have limited support for new technologies in much of the world's fisheries, as per Innovation and acceptance of new technology.

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