

# MANGROVE ECOSYSTEMS

A MANUAL FOR THE ASSESSMENT OF BIODIVERSITY

A follow up of the  
**National Agricultural Technology Project (NATP.), ICAR.**

*Mangrove Ecosystem Biodiversity :  
Its Influence on the Natural Recruitment of  
Selected Commercially Important Finfish and Shellfish  
Species in Fisheries*

Edited by :  
**Dr. George J. Parayannilam**



भारत  
ICAR



**Central Marine Fisheries Research Institute**  
(Indian Council of Agricultural Research)

P.B. No. 1603, Ernakulam North P.O; Cochin – 682 018, Kerala, India







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## **A Manual for the Assessment of Biodiversity**

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# Instruments for Siltation and Sedimentation Analysis

Bindu Sulochanan

## Sedimentation and Siltation

Land clearing and grading have adverse effects on lagoon, mangrove and other estuarine coastal ecosystems due to sediment transportation. Experiments have shown that the erosive power of water flowing with a velocity 'V', varies as 'V<sup>2</sup>' while the transporting ability of water increases to a velocity of 'V<sup>6</sup>'. Sediments, which move as bed load at one section may be in suspension at another section.

As the silt originates from the watershed, the characteristics of the catchment area such as its aerial extent, soil types, land slopes, vegetal cover and climatic conditions like temperature and intensity of rainfall have great significance in the sediment production in the form of sheet erosion, gully erosion and stream channel erosion.

## Instruments for analysis

### 1. Automatic sediment analyzer

This instrument estimates the percentage content of grain sizes in a given sample (20 g) automatically.

Principle of operation: Settling time of particles in water is related to their sizes as given by Stoke's law

$$mg = 6\pi a\eta v$$

where  
 m- mass of the particle,  
 g-acceleration due to gravity  
 a-area of cross section of particle  
 η-viscosity of water  
 v-velocity of the particle

If the settling time is known, the grain size can be estimated from known relationship between settling time and grain size. From a calibrated graph, percentage grain sizes are obtained easily.

### Methodology:

The instrument consists of settling tube filled with

water and attached with a settling pan at its bottom for collecting the sediments. The sample is dropped gently at the top of the column and the particles travel at different speeds depending on their sizes. The weight of materials in water settled in the pan is sensed electronically and indicated in the meter as weight in water. The sediments settle at different times and correspondingly the weight is indicated proportionally. The reading can be noted down against time. Alternatively, a paper chart recorder is used to record the readings and prepare a graph automatically with weight of materials in Y-axis and settling time in X-axis. The graph is characteristic of the sediments giving percentage content of the grain sizes contained.

### Remote silt meter

The Instrument indicates the quantity of suspended silt at different depths of water body. The meter consists of an under water probe and an electronic meter, connected by long cable.

### Principle of operation:

The under water probe is designed for operation in saline as well as fresh water. It senses the suspended silt in relation to density of water. The sensor consists of a submerged float, which undergoes weight loss proportional to density of water as per Archimedes principle. The change in weight loss is converted to inductive pulses and conveyed instantaneously to the meter.

### Operation and data display:

The sensor is immersed in still water from the survey boat/bridges/structures etc. with the sensor attached to long sensor cable.

### Data display:

#### Fresh water

- 1) Data is displayed in digital LCD meters as suspended silt of 0-100gms/l.

- 2) The meter displays water density in the range of 1-1.1 g/l.

### **Saline water.**

The meter makes digital indication of water density in the range of 1-1.2 g/ cc from which silt is estimated.

The recent developments in electronic instrumentation has shown that it is possible to make systematic studies on the influence of siltation, erosion and sediment transportation to mangrove ecosystems. This can reveal significant indications leading to restoration and conservation of the mangrove ecosystems.

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