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Indigenous Instrumentation for Collection of Field Data

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Technology developed in Central Institute of Fisheries Technology to meet the instrumentation needs in fisheries and agriculture are highlighted. Standardisation of sensors with associated electronics in modular approach has resulted in high flexibility in the selection of different combinations for specific applications. Controls and systems have been developed for operation in single or multichannel format with automatic or manual mode using memory or computer.

Key words: Instrumentation, agriculture, environment, control systems

Sustainable exploitation of natural resources includes activities connected with monitoring and evaluation of numerous multidisciplinary parameters (Cox and Filby, 1972). Information on parameters pertaining to soil, air, water, atmosphere, plant, machinery etc. are needed individually and collectively to decide their contributions to, and interaction with, the natural phenomena and resources. While some of the parameters can be estimated only from the samples collected, many can be monitored continuously directly from the field. Success of these environmental studies depends largely on the data collected directly from the sites. There are different approaches like theoretical studies, model studies and simulation studies using computer-based systems and exploratory activities. All these are supported with field data for making them more realistic. In the absence of these time series field data model and computer simulations may become unrealistic

Common environmental and functional parameters in fisheries and agriculture

Meteorological parameters applicable to agriculture and marine sciences are similar except for differences in the range of measurements and selection of constructional materials with stringent requirements in marine conditions (Sivadas *et. al.*, 1993). Water quality and resource parameters like water level, current, discharge, salinity, temperature, conductivity, sedimentation, silt etc. are routine requirements in agriculture and aquaculture. Similarly measurement of load, draft, strain etc. are common to fishing technology and agricultural tillage (Sivadas, 1996, 1997 a).

Instrumentation technology as applicable to environmental sciences is highly location specific. Sensors exposed to the open environment are liable to corrosion and physical damage. Their design and operational features must consider the site conditions like water quality, ambient temperature, humidity, shock and vibration, atmospheric pressure, installation facilities and power availability. In fishing, size of the vessel and nets, nature of the area of operation etc. are important.

Instrumentation technology developed in CIFT

Integrated studies combining physical, chemical, biological and meteorological parameters of the environment are required in the study of many fisheries problems. This necessitated the development of special sensors, electronics and data acquisition systems with uniform signal characteristics and operational features for standardisation of measurement systems (Sivadas, 1995). The efforts were further extended by system peripherals including memory module, computer interface and wireless telemetry net works resulting in flexible combination of different models matching to different site conditions and requirements (CIFT, 1997). The technology has been made available for monitoring and assessment in different aspects of fisheries, agriculture, coastal engineering and ecological studies.

The sensors and signal processing techniques which have been developed with features and flexible facilities for various needs are given below.

- Salinity Temperature Depth Meter (Sivadas, 1981 a)
- Underwater Radiation Meter (CIFT, 1997)
- Insitu Turbidity Meter (CIFT, 1993)
- Ocean Current Meter (Sivadas, 1981 b)
- Insitu Silt Meter (CIFT, 1993)
- Ocean Tele Lab (Sivadas, 1984)
- Ship Borne Data Acquisition System available in 3 models (Sivadas et. at., 1993)
- Tide and Wave Telemetering System (Sivadas, 1981 c)
- Tide Recorder (CIFT, 1997)
- Water Current Meter for model tanks, estuaries and feeder canals (CIFT, 1998 a)
- Automatic Sedimentation Analyser (Sivadas, 1992 a)
- Environmental Data Acquisition system made available in different models and facilities for acquiring 16 channel data from the environment (Sivadas, 1984)

These equipment have facilitated several new studies connecting the environmental parameters with living and non-living resources of the aquatic environment.

Extension and application of the instrument technology to agricultural studies

These instruments could be extended to several thrust areas in agriculture like water management, agro-climatology, hydrometreorology, agronomy etc. because of the similarity of the requirements. Sutton et. at., (1984) have provided detailed accounts of the applications of various measurement techniques for agricultural applications. The following are some of the important measuring systems developed in CIFT having applications in agriculture.

- Hydrometeorological Data Acquisition System in different models with special facilities for automated data collection from large areas (Sivadas, 1995).
- Irrigation Management system (CIFT, 1998 a)
- Solar Radiation Monitor and Integrator (Sivadas, 1997 b)

- Wind Energy Integrator (CIFT, 1997)
- Micromet Data Logger (CIFT, 1997)
- Remote Operated Soil Moisture Meter (Sivadas, 1992 b)
- Water Level Recorder (CIFT, 1998 a)
- Multichannel Soil Moisture Meter (Sivadas, 1996)
- Wireless Data Telemetry System with facility for wireless transmission of multichannel data to distant points and for applications in irrigation management, flood forecasting, and large scale hydrometeorological studies. (CIFT, 1998 b)

Similar requirements and activities have been projected by Central Water Commission (CWC, 1996), Department of Electronics (DoE, 1989) and Department of Science and Technology (DST, 1990).

The technology is being extended to different research activities through field demonstrations, training courses and technology evaluation programmes.

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