

RESEARCH PLANNING IN MANGROVE ECOSYSTEM – MULTI-DISCIPLINARY RESEARCH MANAGEMENT

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Introduction

Research effort in mangrove ecosystem in Sri Lanka is spread among several individuals who are mostly from the Universities. Research work was largely carried out in the areas of taxonomic studies and general ecological aspects.¹ The distribution patterns of mangrove was studied by several researchers.² Their findings have generated a considerable enthusiasm on the protection and conservation of mangrove in Sri Lanka. Several state agencies such as NARESA, CEA Coast Conservation Department, Forest Department and NARA have shown interest to understand the dynamic of this complex ecosystem.

Previous research has increased the knowledge of the importance of mangroves in the productivity of the coastal ecosystem. Research work carried out in Sri Lanka was not sufficiently strong to look beyond the distribution of mangroves, classification and other taxonomic studies. A very limited knowledge exists on biotic and abiotic parameters which influence the sustenance of the entire ecosystem. Although

previous studies have provided valuable information on some aspects of mangrove flora & fauna in Sri Lanka, there was no concerted effort being made to study the mangrove ecosystem on a systematic basis. Funds have not been allocated sufficiently to conduct research. There are several reasons for this. Such systematic studies involves co-operation of several agencies, commitment of substantial human and financial resources as well as bringing multi-disciplinary research approach to deal with various aspects of mangrove ecosystem.

A firm support to mangrove research other than basic ecological and taxonomic study was given with the inception of the UNESCO programme on mangrove research in the Asia Pacific region. There was also no consistent national programme to support research on mangroves from the national funding agencies. Therefore most of the researchers confined their work to the collection of basic data. A few site specific studies were carried out by enthusiastic researchers (Pinto, 1980). Researchers in universities have made valiant efforts to increase the stock of knowledge of mangrove ecosystem in Sri Lanka with limited

1. See Pinto (1982), Pinto & Wignarajah (1980) for taxonomic and ecological studies.

2. See Aruchelvam (1977) for early estimates and Shagananthan (1980) for recent estimates of mangroves.

resources at their disposal. This however is not a satisfactory approach to study a complex ecosystem such as mangroves. Research has to be oriented towards studying the ecosystem in a systematic manner with available financial and human resources. One of the best approaches to deal with such a situation would be to proceed with multi-disciplinary research. In this context it is important to identify a problem which has wide interest to many scientists and build up a research team on specific problem areas.

Management of Multi-disciplinary research

There are very few occasions of undertaking multi-disciplinary research projects in Sri Lanka. NARESA has encouraged team work as an alternative to individual research effort in order to draw expertise of several people to solve a common problem. However, multi-disciplinary research is not previously attempted on a complex ecosystem such as mangroves. There are numerous problems in conducting multi-disciplinary research. It is not easy to identify a common problem which will serve the interest of several researchers and satisfy their intellectual quest. Defining of the exact role of each person in the project could be also be difficult. The success of the research programme depend on the dedication and commitment of each researcher and their willingness to corporation in different aspects of the programme. The allocation of resources to various parts of the problem area need to be examined with great care. The advantage of undertaking multi-disciplinary research would be the optimum utilization of scarce resources. A considerable amount of resources can be efficiently utilized with the consultation of a research team. For example, transport can be wisely used in the implementation of a project by selecting a common site for research. The team research will also be useful in the exchange of ideas and mutual help among several researchers.

Research Direction in Mangroves

The research on mangroves in Sri Lanka has been given a big boost through the UNESCO/UNDP regional programme which intends to strengthen the capabilities of researchers in the mangrove ecosystem in the region. Sri Lanka has actively participated at the programme and remained committed to increase the research capability. One of the significant landmarks in mangrove research is the establishment of the National Mangrove Committee (NATMANCOM) in Sri Lanka under this regional programme. The NATMANCOM is the focal point for international collaboration and research planning in each country. UNESCO has funded a modest research project through the NATMANCOM in Sri Lanka to assess the status of Mangrove Ecosystem in the West Coast of the island. The Forest Department was involved in the initial planning and designing of the programme which has concentrated on three major activities involving four agencies in the country.

- Activity 1 — Inventory and distribution of existing mangroves in the West Coast of Sri Lanka — Forest Department
- Activity 2 — Socio economy status of human selected mangroves areas on the West Coast of Sri Lanka — NARA
- Activity 3 (a) — Studies on mangrove community structure and condition in selected locations on the project area
 - (i) Mangrove along the South West Coast of Sri Lanka with special reference to the Islets of Mangroves in Bentota Estuary — University of Colombo.
 - (ii) Survey of Flora & Fauna of Mangroves in the West Coast of Sri Lanka — University of Peradeniya

These activities were successfully carried out and research results are now available for future activities. It has been estimated that the mangrove areas amount to nearly 8000 hectares, of which a large extent is covered with severely disturbed mangroves and mangrove associate vegetation types. UNESCO envisages to strengthen the research programme to support research in mangroves and to demonstrate site-specific pilot projects for rational management of mangrove areas in different countries in the region. The major objective of this approach is to upgrade the knowledge and experience acquired from present activities and to increase the stock of knowledge about the ecosystem. It is expected to encourage more site-specific studies which helps to generate excellence in particular aspects of the mangrove ecosystem in different regions and to share this experience with other countries.

Development of Multi-disciplinary Research in Mangroves

The National Mangrove Committee of NARESA has developed an integrated programme of research in the Negombo Lagoon with the consultation of mangrove researchers in the country. The integrated project intends to direct research efforts of mangrove researchers to a common objective with a systematic and concerted plan of action. The major objective and rationale for the development of the project was based on the suitability of the site and the location of site around the research performing agencies. The major critical issue for the project formulation was the diminishing mangrove land in the lagoon, its impact on traditional fishery and need for the development of a rational management plan which could attract a number of economically important uses of mangroves in the project area. The objectives of the project was primarily developed according to the economic and management consideration and scientific and technical consideration. Therefore the integrated project will not lose sight of both the commercial and the scientific application of the project.

The major economic and social consideration of the integrated project is the examination of sustenance of fishery industry, retention of aesthetic values, generation of employment through the alternative sources of employment based on mangroves resources.

The health and other social factors commonly linked with mangrove ecosystem will be also analysed in the project.

The scientific consideration of the project covers multi-disciplinary fields ranging from sociology, medical and physical to biological sciences.

The site of Negombo apart from being closer to project executing agencies provide a rich source of data for researchers. The lagoon is well known for high fishery production and was largely covered by mangrove vegetation sometime ago. The mangrove vegetation is now under serious threat and near total destruction. The lagoon is subject to two monsoonal rainy seasons so that the physical cycles repeat twice a year. This provides adequate opportunities to speed up research studies.

The abiotic factors to be studied include salinity, pH levels, turbidity, temperature, sedimentology, river discharges, currents and wave action and other physical parameters. These studies are envisaged to carry out with the assistance of the Irrigation Department and the other research agencies and universities. A study of biotic factors of the lagoon are separated according to (a) primary producers and (b) consumers.

Under the study primary producer of mangrove ecosystem, several aspects including an inventory of mangrove plants with critical taxonomic evolution with the emphasis on pollen structure has been proposed. Palynological study to trace the history of occurrence of mangrove will be also undertaken. The project will also cover the distribution of mangroves with special reference to their diversity and dominance. Some physiological characters such as phenology, germination and nutrient requirement and ionic

balance for growth of mangrove seedlings has been already undertaken by Dr. Samarakoon of the Colombo University. The productivity of mangroves in the lagoon will be studied by NARA and it will include litterfall, litter decomposition and transport. Microbial studies on mangroves ecosystem to study phytoplanktons and phyobenthos, algae and flagellates will be also undertaken. The lagoon also commonly used by fisherman for brush-pile fishery. The economic benefit of brush-pile fishery and related studies will be undertaken by the University of Kelaniya.

The studies of consumers in the integrated project include investigations on the juvenile fish and prawns occurring in seagrass beds and mangroves, which is already being undertaken by Dr. Pinto at the Open University. The studies on commercially important penaid prawns in the Negombo lagoon in relation to catching methods are also carried out by Mr. Jayasinghe, NARA under this programme. Among other aspects of fauna related studies use the ecology and bionomics of mud crab, biology and production of mangrove moluscs and polychaetes. Other studies in mangrove flora proposed in the project include productivity and occurrence of phytoplanktons, seagrasses, algae and benthic productivity in the lagoon. In relation to management studies, the effects of aquaculture, human interaction with mangrove ecosystem, aspects of health and science education in mangrove areas will be undertaken.

The project includes a variety of scientific disciplines which will have to be emerged in the execution of the project. A large number of specialists in a wide range of fields of biological sciences, physical sciences, medical and social sciences need to bring together to accomplish the segments of the project. The agencies which are involved in the project range from government departments and research institutions to the universities. The project will be executed by different individuals who will be undertaking a particular area of problem in the integrated project. A considerable amount of preplanning

of the integrated project was carried out with assistance of research team to identify potentially useful areas and avoid possible duplication of work and determine priority areas. The results of previous research has been also carefully integrated in designing the project.

The execution of such an integrated project obviously need high level of manpower allocation and financial resources. Some of the areas mentioned above require basic research inputs and the areas such as nutrient cycling and food-chain studies need a considerable amount of financial resources. These areas are carefully investigated and will be carried out after cost-benefit analysis. The major objective of a multi-disciplinary research project is the simultaneous study of various aspects of the ecosystem intensely so that the knowledge generated will be horizontally applied to study the similar sites elsewhere.

Previous research work conducted in mangrove research is scanty and diffused because they were concerned with individual aspects. The proposed integrated programme expects to utilize the previous knowledge and bridge the gaps in the understanding of the ecosystem in a systematic manner.

Advantage and Pitfalls in Multi-disciplinary Research

Some of the advantages conducting such multi-disciplinary research is the greater interaction among experts in different branches of sciences so that, the application of research results become more meaningful. The target set by the research groups may be easy to realize and a team spirit will enhance the success of the project. It is however too early to postulate the benefits of such a programme. The publications of research results may pose some problems and the areas of overlaps need to be negotiated carefully without prejudices. It is important to generate co-operate research effort and to sustain the interest of researchers. The selection of priority areas and funds allocation to various parts of research

projects have to be carried out with care. The cost of some expensive research areas needs to be reduced with the consultation of the research group. However, the entire programme is expected to generate a rich source of information for multiple users.

Conclusions

Research priority selection in a complex ecosystem such as mangroves is a rather difficult process. There is much demand for academically interesting problems, however, the available resources for a large number of such projects are limited. A concerted effort has to be made to study site specific studies of an ecosystem in order to understand interacting forces. The

dynamics of such an ecosystem can be well understood by considering a multi-disciplinary research approach rather than conventional problem specific and uncoordinated series of research projects on the topic. Scientists in third world countries cannot afford the luxury of conducting research in isolation without forming critical masses. Mangrove research in Sri Lanka is now beginning to bring together a 'critical mass' of scientists who will be effectively working together towards a common objective rather than competing for scarce resources. However, the effectiveness of such a programme, needs to be evaluated with time and perhaps may offer an alternative approach to study a complex ecosystem in a systematic and cooperative manner.

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