Ministry of Fisheries & Aquatic Resources Development Sri Lanka

and

IUCN, International Union for Conservation of Nature & Natural Resources (Sri Lanka)

WORKSHOP OUTPUTS & A FRAMEWORK FOR ACTION

Consultative Workshop on Sustainable Management of Lagoons

23rd June, 2016 at Water's Edge, Battaramulla

July, 2016

Contents

1. Introduction

1.1 Background

Lagoons are an integral part of the coastal landscape, and feature the transition from the land to the marine environment. Sri Lanka has about 80 lagoons located along its 1,338 km coastline. These lagoons are diverse in size, shape, hydrology, ecosystem values and the services they provide. The diversity in lagoons is primarily determined by geomorphology of the connected landscapes, tidal fluxes, fluvial inputs, monsoons, hydraulic features and human interventions impacting the lagoons.

Lagoons have many values. The use values (fish, shrimp, fuel wood, salt, fodder, ecotourism, anchorage, recreation, etc.) and non-use values (habitat preservation, mangroves, sea-grass beds, biodiversity, ecosystem linkages, etc.) contribute significantly to human well-being of coastal communities, constituting about 12% of Sri Lanka's population. This means 1 in 8 Sri Lankans live in locations connected directly and indirectly with lagoons. However, currently more attention is paid to extractive values of lagoons (e.g. food production) in national and regional level planning. Additionally, they generate a range of non-extractive use values and non-use values (e.g. ecosystem services) that needs to be considered in planning. Lagoon management and ensuring their sustainability and resilience are therefore complex processes that require active involvement and cooperation of all stakeholders of lagoons.

The Ministry of Fisheries and Aquatic Resources Development (MFARD), having given due consideration to the current status of the lagoons and their potential for the well-being of people, has decided to launch a medium-term, ecosystem-based lagoon management programme using a multi-stakeholder approach. In response to this need, IUCN, International Union for Conservation of Nature and Natural Resources, Sri Lanka Office (IUCN Sri Lanka) has decided to prepare a project proposal for sustainable management of lagoons in Sri Lanka as requested by MFARD.

1.2 The Workshop held on 23 June 2016

This workshop was organised by IUCN Sri Lanka on 23 June 2016 at the Water's Edge Hotel, Battaramulla to identify measures needed to strengthen Sri Lanka's lagoon management efforts by better understanding the lagoon environmental processes and current coordination practices between the stakeholders, and explore partnerships with other agencies and academia to assist in this process. The workshop was also expected to identify the areas of work that are required to respond to the needs of the MFARD, which will form the core elements of the proposed project proposal.

The Agenda of the Workshop developed in consultation with MFARD and its research and advisory arm, the National Aquatic Research and Development Authority (NARA), is in Annex 1. The participants are listed in Annex 2.

The Workshop was inaugurated by lighting the traditional oil lamp by the dignitaries, led by the Mrs W M M R Adhikari, Secretary, MFARD and Dr A Mallawatantri, Country Representative, IUCN Sri Lanka.

In her welcome address, **Mrs W M M R Adhikari, Secretary, MFARD** briefly outlined the lagoon systems in Sri Lanka and their importance to people. She also highlighted the traditional management of lagoons presently in practice and focussing largely on fisheries, and the declining productivity of the lagoons. There was much concern expressed at various quarters on the current state of the lagoons, and the Ministry has decided to examine better management options beyond fisheries and encompassing all services of lagoons to ensure that lagoons are well maintained for sustainable production and to provide the resilience required. In this context, she has requested IUCN Sri Lanka to prepare a project proposal.

Dr Jayampathi Samarakoon, Consultant, IUCN Sri Lanka provided an overview of the lagoons in Sri Lanka. By and large, lagoons are not always considered as important by agencies other than those directly connected to lagoons. For example, the *National Adaptation Plan of Action* (NAPA) of the Ministry of Mahaweli Development and Environment does not mention lagoons in the body of the text, although a significant proportion of deaths and loss of property caused by the 2004 India Ocean Tsunami occurred at lagoons. He then dealt with the services given by the lagoons; Provisioning services (Food Supply – fisheries), Regulating services (Drainage & Flood Protection), Cultural services (Scenic quality – tourism), and Supporting services (Maintaining the trophic cascade). He described the natural change processes in lagoons, how people use lagoons, and how the national policies have impacted changes in lagoons over time. He also explained the need to change our thinking and behaviour with emphasis on lagoon communities, how we sustain benefits, and how we should deal with the development challenges facing the lagoons. Dr Samarakoon then briefed the workshop on planning and implementation of integrated management of lagoons and the challenges faced in the past in doing so in pilot areas like Negombo, Chilaw and Puttalam lagoons. Special Area Management (SAM) plans have been very useful in demonstrating the concept of co-management. In today's context, lagoon ecosystems are at the frontline, unforgivingly at risk from climate change impacts. As a result, life and livelihoods of a lagoon-dwelling population of about 2.5 million are directly and indirectly exposed to that risk. The scientific literature shows that sudden events associated

with climate change are becoming predictable. Given this scenario, it is imperative that a national process of planning and implementation for adaptation is a must; otherwise Sri Lanka will not be able to cope with the impacts of climate change, in particular the displacements that will occur as sea level rises and low-lying coastal settlements become permanently inundated. The important conclusion is that the different ways we think about lagoons must be anchored to coherent physical principles (geomorphological) in order for meaningful policies to be developed.

Dr Ananda Mallawatantri, Country Representative, IUCN Sri Lanka opened his address highlighting the need for a multi-agency coordinated approach based on scientific and ecological principles for effective lagoon management. The Government envisages a rapid development and new markets for lagoon products and services, extending beyond fisheries. Being natural water bodies, lagoon management requires an extensive ecological and science base. Lagoons are influenced by land activities (nutrient supply, erosion, pollution), lagoon reactions (mixing, eutrophication) and international waters (invasive species, debris, climate effects). He also noted that there is already a wealth of knowledge available including those in our own agencies and universities. Dr Mallawatantri then briefed on the international and local concerns on lagoon products and services including quality standards, technologies, ability to supply produce un-interrupted, benefits to the community, and safety and risks. He proposed the Blue Economy principles for sustainable livelihoods and resilient ecosystem services in managing the lagoons. Dr Mallawatantri concluded his remarks by introducing the project concept developed by IUCN Sri Lanka to address sustainable lagoon management. The proposed project, expected to be guided by a Steering Committee and supported by a number of Technical Committees, will support the MFARD with a knowledge portal, training and capacity development, Monitoring and Evaluation, partnership development, resource mobilization, and international inputs. Of particular note is the proposed University – Industry collaborative support to lagoon management. In summary, the project will support to develop and implement a comprehensive, multi-stakeholder, ecosystem-based approach towards sustainable and resilient lagoon management, based on a long-term vision, appropriate policies and strategies.

The **Minister of Fisheries and Aquatic Resources, Hon. Mahinda Amaraweera** participated in the workshop during this presentation but had to leave the workshop due to other urgent commitments.

Mr N B M Ranatunge, Director General (Technical), Department of Fisheries & Aquatic Resources (DFAR) proposed **t**he Vote of Thanks.

Consultation Process

The organisers of the workshop identified the following six key areas for consultation, based on the social-ecological-political system model that has emerged from recent international discussion on management of ecosystems for resilience in development and sustainable multiple uses:

a. Policies/Regulations (fishery, biodiversity, climate change adaptation, environment etc.)
b. River basin and coastal processes (freshwater abstraction and ecological flows, tides, waves, industry/settlements, waste discharge, land clearing and sediment loads)
c. Lagoon resource system – interactions and outcomes (hydrodynamics, hydrogeomorphology, sedimentation, fishery, biodiversity)
d. Resource users including entities producing direct and indirect impacts (fishers, anchorage users, urbanization, tourism, infrastructure developers)

e. Resource units and their values (fish, housing, infrastructure, drainage and flood protection, agricultural value, protection from salt intrusion)

f. Governance (decision-making systems) (formal, informal, customary cultural etc.)

Based on the expertise of the participants, they were pre-selected for six groups corresponding to the above six areas (Annex 2). Groups 1 and 2 discussed variables arising from ecosystem organizational levels situated outside of lagoons' topographic boundary, while groups 3-6 discussed variables situated within topographic boundaries.

Each Group was supported by a Facilitator and two Rapporteurs. In order to facilitate a structured discussion and deliberations, a set of questions was provided to the Facilitators (Annex 3). After the Group work, their findings were presented in plenary for further discussion and clarification.

Section 2 captures the perspectives of the participants on the health of the lagoons; this is meant to be a summary of their impressions. These are valuable insights given that all the participants have a considerable knowledge on the lagoon system in Sri Lanka. Section 3 provides a briefing on the current status of lagoons, examined from the point of view of the key areas described above, and the Groups' views on the expected desirable changes in lagoon management. Section 4 provides key areas of work (*A framework for Action*), distilled from Section 3, as possible components in the proposed project.

2. Health of the Lagoons

The health of the lagoons depends on a number of factors. The ability to maintain the 'naturalness' including biodiversity and sustained productivity are key indicators of health of the lagoons. When a lagoon is healthy, its stakeholders should be satisfied about the water body, the surrounding environment and its physical status. These water bodies are not static; rather they are subjected to perpetual changes in response to outside forces, particularly environmental and anthropogenic factors. Water quality is one of the main determinants of the health of a lagoon. The natural rates of sea water and freshwater entry into a lagoon help maintain stable salinity levels of the lagoon water. Freshwater enters a lagoon as land drainage or as river flow and seawater by the tidal process. Both these are affected by human activity and climate change.

Furthermore, health of lagoons in Sri Lanka is intimately related to rainfall during the monsoons; lagoons get fresh water and the water becomes less saline. Due to tidal effects, there is intrusion of sea water into the lagoons thereby maintaining the salinity of lagoon water. However, preventing timely breaching of sand-bars can make lagoon water much less saline than desired, thus transforming the dynamics of the lagoon. Nevertheless, most economic development including public infrastructure situated within and contiguous with lagoons have caused imbalance in 'naturalness'. From this contradiction arises the need for development policies that are in balance with structure and functioning of lagoons as ecosystems.

Overall, the participants were of the view that the lagoons are not in a good state of health. The participants noted that those lagoons near urban areas are in very poor state of health whereas those in Protected Areas were comparatively better.

2.1 Causes for the current state of lagoons

The participants were of the view that the stakeholders including the regulatory institutions, are responsible for the current state of the lagoons. A number of key causes were identified, as follows:

- Lack of a clear policy on lagoon management;
- Lack of clarity on what is meant by 'lagoon' and how it differs from 'estuary';
- Inadequate understanding about processes of change (natural, anthropogenic and interaction between them), and as a consequence fragmented approaches to 'managing change';
- Inadequate understanding of the complexity of lagoon ecosystems and their inherent uncertainties and unpredictability;
- Inadequate understanding of lagoons as supportive of food webs and life cycles coupled to pelagic and benthic food webs on the continental shelf;
- Absence of a dedicated agency to manage the lagoons;
- Insufficient coordination amongst the multitude of institutions with legal responsibilities for lagoon management[1]. There have been pilot management

[1] An example cited by a Group demonstrate this issue of multiple government agencies having different jurisdictions regarding lagoons. The Coast Conservation Department declares 2 km from lagoon mouth to the water body of lagoon and 100 m land areas along the 2 km also as the coastal zone. The UDA has gazetted 1 km belt around the country including water bodies within one km as urban areas. The DFAR has gazetted several lagoons as lagoon management areas and all water areas of lagoon is come under their jurisdictions.

systems at selected lagoons, but these have not been extended. There are also unplanned development activities arising from inadequate coordination between national and local level institutions;

- Absence of well-marked lagoon boundaries which makes it difficult for the duty bearers to enforce laws;
- Lack of appreciation of the economic values of lagoon systems and inadequate knowledge on values attributed to fishing, tourism, aesthetic aspects, biodiversity, transportation, ecological services etc.
- Over exploitation of resources including user conflicts, and the use of illegal fishing gear;
- Inadequate knowledge and awareness amongst the policy-makers, administrators and communities on the importance of maintaining lagoon health, and the absence of tools (e.g. manuals and work-books) for training all levels of society on problems and solutions in lagoon management;
- Poor law enforcement. There are a multitude of laws and regulations relating to lagoon management but their enforcement is limited due to a variety of reasons including exerting external pressure on officials who are not always supported by their managers, and lack of regard for law and order.
- Political interference in lagoon management (allowing the use of lagoon reservations, extraction of rich biodiversity of the lagoons, providing patronage to unauthorized occupation of lagoon reservations for commercial purposes including tourism);
- Anthropogenic interventions affecting natural hydrodynamics of the lagoons;
- Lack of coordination between river basin management and coastal management. Activities such as construction of dams and reservoirs, river diversions, irrigation water extraction and releasing of excess irrigation water into lagoons have detrimental effects on lagoons;
- Encroachments and pollution created by agriculture and industries including hotels, communities (dumping garbage) and government agencies;

2.2 Management of the Lagoons

The participants were of the view that there is no effective mechanism in place for lagoon management. There has to be a collaborative management system that includes all stakeholders. The main indicators of satisfactory management should include sustainable livelihoods, maintaining the ecosystem integrity, equitable sharing of benefits from the use of lagoons, and a conducive environment for collective decision-making in lagoon management.

There has to be active participation of all parties with their individual and collective responsibilities clearly spelt out supported by political leadership.

3. Situation Analysis and the Desired Changes

3.1 Current Situation

The Groups deliberated on the current status of lagoon management from the context of the areas allotted to them. The following narrative provides a summary of the current situation.

(a) Institutions, Policies & Regulations

The group exploring institutions, policies and regulations was concerned with processes that emanate from national and regional law-making processes that occur at a level situated outside the spaces occupied by lagoons. As an example the centralized Road Development Authority plans and locates road development that may disregard the hydraulic attributes of lagoons. National roads thereby may compartmentalize and fragment lagoons resulting in degradation of ecosystem services. Similar outlooks characterize planning of National Housing Development, Urban Development among others. Special Area Management (SAM) may restore balance between centralized planning and local (lagoon-level) spatial needs in regard to ecosystem services.

In terms of institutions, policies and regulations, there have been a number of positive developments in Sri Lanka. There is a strong legislative background for lagoon management; however there are some overlapping areas in these legislative instruments. There is also a wealth of socio-economic and ecological information gathered over a period of time. A considerable number of lagoons have been identified as Special Area Management (SAM) sites or as Lagoon Management Sites and therefore environmental profiles for these sites have been prepared and are available. Additionally, several lagoon management plans are also available. In terms of management, the positive aspects include the availability of a legal background and a basis for co-management, and satisfactory community awareness on co-management.

However, there are a number of concerns. These include: inadequate enforcement of laws, lack of political commitment, conflicting mandates of multiple agencies, and activities undertaken by the state agencies without considering their overall impact on the health of the lagoons (e.g. tourism, aquaculture, mangrove planting) and without satisfactory coordination amongst them. Often, these agencies will not yield to other's views. Inadequate funding was also identified as a cause for poor coordination amongst the agencies.

(b) River basin and coastal processes

This group explored physical processes emanating from outside the space occupied by a lagoon, but drive physical changes within it. As an example a lagoon such as Negombo Lagoon (surface area 30 km^2 is situated in the river basin of Dandugam Oya (surface area 720 km^2). The seasonal drainage from the Dandugam Oya determines the food web structure within the downstream lagoon. Likewise the tides and waves determine the extent of mixing of seawater and the brackish water in the lagoon and flushing of material in it. The interaction of freshwater land drainage from the river basin and tidal inflow determine fundamental physical changes including infilling by sediment deposition and health of a lagoon.

Lagoons and river-basins are intrinsically and inextricably connected. Some lagoons receive freshwater, nutrients and sediments from rivers and streams. When a lagoon is situated in an inter-basin area, land drainage provides these inputs at a much reduced scale. In the urban areas, industries located in the lagoon catchments discharge

sewerage and industrial waste into the lagoon systems; in addition there is also domestic sewerage discharged into the lagoons. The Dry Zone river basins provide much less river flow into the sea/lagoons due to use of water for irrigation.

The policies and laws in regard to river basin and coastal management are well founded. The key instruments include the Soil Conservation Act, National Environmental Act (EIA Process), Land Use Planning policies, River-basin management policies, and the Fauna and Flora Protection Act. As stated above, lagoons cannot be managed independently of the river-basin management.

There is also a certain amount of awareness of the need to manage the lagoons amongst the government agencies as well as coastal communities and other stakeholders. Over time, capacity development programmes have been undertaken by various government agencies to enhance the knowledge of staff of selected government agencies. In addition, there have been awareness programmes targeted at the communities.

Notwithstanding the above, there are a number of areas needing improvements, as follows:

- Improved coordination in river basin management and coastal zone management;
- More effective research and monitoring of lagoon and river basin management;
- Improving law enforcement, and managing political interference;
- Poverty mitigation actions for lagoon users;
- Enhanced environmental awareness among stakeholders;
- Improving stakeholder consultation before undertaking work programmes in lagoons and river-basins;
- Introducing better information sharing mechanisms between government agencies mandated for river-basin and lagoon management; and
- Effecting long-term investments in environmental protection.

The current situation can be attributed to a number of reasons. From a management perspective, it would be noted that many Government officials are not assertive enough in discharging their duties. Often, officials succumb to the illegal 'orders' of politicians rather than acting within the law. As a result, their ability to think and act innovatively has been blunted. By and large, the officers responsible for lagoon management do not work in an environment where they are able to work effectively and efficiently.

(c) Lagoon resource system – interactions and outcomes

This group focused on attributes of a lagoon within the confines of its physical boundary as generally designated in topographic maps. This included the water body and the peripheral land. The boundary between water and land is indistinct, since much encroachment has occurred into lagoons situated in urban areas where inter-tidal areas may be filled with ease, thereby resulting in edge-effects that squeeze the lagoon's hydraulic functioning. A lagoon has materials and/or opportunities which can be exploited for economic gain (i.e. resources) including fish (food), flowing water (useful in waste disposal, discharge of drainage that may otherwise cause floods), minerals (salt, ilmenite as in Kokkilai lagoon), and space (for building anchorages, aquaculture facilities, recreation), etc. that are in competition for material and spatial resources. The

competition is intensifying because of population pressure driven by a threefold increase since Independence of the country in 1948. The lagoons are a commons (public good) faced with the 'tragedy of the commons'. Making resource users accountable for ecosystem health is impossible in the face of weak law enforcement. There is much diversity among lagoons in regard to health and resource status. Therefore a clear classification based on structure and functioning of lagoons in Sri Lanka based on actual observations is urgent.

There are a number of positive areas in regard to lagoon resource systems. The engineering interventions and hydrodynamic changes are fairly well understood, and data and information on these are available. Where buffer zones are identified, their boundaries have been demarcated. Capture-based culture-based fisheries management protocols are available, and there are good case studies on successful livelihood options for sustainable utilization of lagoon resources. The major challenge arises from changing the patterns of ownership of commons (public good) to private property unless balanced by compensation for customary users.

However, lagoon health is deteriorating; there is pollution, in particular in urban areas and there is unhindered dumping of solid waste and discharge of sewerage into the lagoons. The lagoons are also becoming smaller due to sedimentation, often resulting from anthropogenic actions. Overall, there is inadequate coordination mechanism amongst institutions responsible for managing the lagoons.

(d) Resource users including entities causing direct and indirect impacts

There is adequate legal foundation (Fisheries Act, CCD Act, CEA Act) for establishing a multi-stakeholder coordination mechanism for lagoon management, to declare 'closed season' and 'closed areas', regulate the extraction of resources, and for registration and issuing operating licenses. There are also recognised Fisheries Organisations and Fisheries Societies.

In spite of the above, there is over exploitation of lagoon resources. Tourism industry and aquaculture farmers are two categories challenging the sustainable state of lagoons. The situation can be improved by addressing poverty of the lagoon stakeholders, improving institutional coordination, effective law enforcement, establishing clear lagoon boundaries, and improving the awareness and attitudes of stakeholders.

(e) Resource units and their values

The current state is characterised by an inadequate recognition, respect and appreciation of ecosystem services and their values by all stakeholders. There is an urgent need to ensure that all stakeholders understand the interrelationships between different uses of lagoons, respective values, and the value of keeping the ecosystem integrity when extracting benefits from the lagoon.

There is a weakness in estimation of values, compounded by the anthropocentric nature of the concept of value. Often times, value is defined narrowly, considering just the value of provisioning services.

The science of valuation has to be inculcated in the minds of policy makers and other stakeholders. The current practice of considering short-term or current values need to be changed to values in perpetuity. There is a need to recognise the value of maintaining the natural resource (stock), improve awareness and attitudes towards common property.

(f) Governance (decision-making)

Lagoon governance is currently not effective, due to three main reasons. Firstly, lagoon boundaries have not been clearly marked on the ground, which is a key requirement in managing the lagoons. Even if co-management is established, lack of boundaries will hinder operation of such a scheme. Secondly, there is no land use plans for lagoons and for the lagoon catchment areas. In the absence of zoning guidelines supported by a legal framework, both permissible and non-permissible activities are carried out in lagoon areas. Thirdly, there are a multitude of organisations with conflicting objectives trying to manage lagoons. These organisations are often influenced by politicians. Absence of a strong single body to coordinate and implement management activities in lagoons in Sri Lanka is clearly felt.

Where legal instruments are available, they are not implemented properly. Finally, work in lagoon areas is often undertaken without adequate consultation with the stakeholders.

In order to have effective management mechanisms, the level of awareness on lagoon management and governance amongst the stakeholders has to be elevated; adequate human resources will have to be deployed, and an effective monitoring mechanism has to be set in place.

3.2 The Desired Changes in Lagoons

The Groups identified the changes required in lagoon management vis-à-vis their allotted areas, as follows:

(a) Policies/Regulations

In order to overcome the current poor state of the lagoons, a well-defined single body with necessary legal mandate has to be established for lagoon management. This entity should also have the authority and resources to inter-link work programmes of different agencies and coordinate with all agencies and stakeholders in effective lagoon management.

In order to establish this body, certain parallel or prior actions are needed. The key actions are as follows:

- Review the existing policies and laws to identify overlapping areas and gaps, and introduce new policies/regulations where needed to ensure that this body has a clear legal mandate to manage lagoons;
- Review the current co-management options to strengthen and legalise co-management to ensure that it is practiced at the lagoon level, and the co-management concept is well understood by the local level officials.

(b) River basin and coastal processes

In terms of addressing the river-basin and coastal processes, a number of changes have to be introduced, as follows:

- Developing and implementing land use plans for hinterlands of the lagoons, and connecting them with river basin management. The land use plans should encompass zoning, and also identify low lying areas as flood protection areas;
- Establish a central database on lagoons and river-basins with unrestricted access to the public;
- Ensure that waste, pollutants and sewerage are not dumped into lagoons;

- As river-basins and lagoons are currently the responsibility of a multitude of agencies, the mind-set and culture of these agencies and officials have to be improved to enable inter-agency/inter-disciplinary research together with adequate funding, free exchange of data and information, and creating a data depository/ data portal with public access;
- School and University curricula should include components on coastal lagoons and environment.
- Educational institutions should also be encouraged to get involved in the lagoon protection programmes and educational programmes. Lagoons can function as outdoor laboratories for students.

(c) Lagoon resource system – interactions and outcomes

Establishing a lagoon management mechanism similar in character to Special Area Management is needed. Such a mechanism requires a strong base, provided by:

- Adhering to ecosystems approach for management with site-specific interventions for optimal SAM-type management;
- Providing the necessary funds and human resources for management;
- Improving institutional coordination and stakeholder consultation mechanisms;
- Developing a classification of lagoons based on actual observations in Sri Lanka's national and regional contexts that would enable shared understanding of relevant management concepts.

(d) Resource users including entities producing direct and indirect impacts

From the perspective of resource users, the ideal condition would be to establish co-management arrangements for lagoons with the active participation of all stakeholders as an integrated management body. The optimal situation for lagoon management will also be characterised by high biodiversity, healthy habitats, efficient water dynamics and sediment transfer in the lagoons.

The remedial measures include:

- Effective training and increasing awareness of all stakeholders including grass root level organisations;
- Introduction of an integrated development and management plans for lagoons with mechanisms for bottom-up approach for planning, and using, where feasible, indigenous knowledge;
- Conduct focused research to improve co-management systems;
- The Lagoon Management Unit (LMU) of the Department of Fisheries & Aquatic Resources should be strengthened and linked with other agencies such as CEA, Forest Department, Wildlife Department and Irrigation Department. Additionally, the Fisheries Management Committees, District Co-governance Committees (formed by 12 Rural Government Committees) should be linked to the LMU; and
- Effective enforcement of existing legislation.

(e) Resource units and their values

The expectations in regard to lagoon management are to ensure long term sustainability of lagoon ecosystem while optimizing social benefits. In order to achieve these changes,

all stakeholders must recognize, appreciate and respect the different values of lagoon ecosystems in decision-making in lagoon management. It is also necessary to introduce mechanisms to incorporate natural resource (lagoon ecosystem) values in to national accounts.

There are a number of difficulties; lack of national level policy directives for considering different types of values in lagoon management, lack of expertise in capturing and incorporating those values to the decision-making process, and lack of ecosystem-based valuation for management decision-making.

In order to remedy the situation, several key actions are necessary, as follows:

- Introduce and enforce national level policy directives for considering different values (direct, indirect use, non-use values) for lagoon management, build capacity of staff, introduce ecosystem-based valuation for management decision-making, and promote inter-institutional programmes.
- Strengthening of the Lagoon Management Unit and develop and operationalise mechanisms for coordination and collaboration of all institutions related to lagoon management;
- Enhance the capacity of officials of these institutions in valuation science;
- Introduce measures to assess cost of externalities and internalize them in lagoon management decision-making. Some of these measures are:
    - Any development activity in the lagoons should be assessed in terms of their costs to lagoon ecosystem/social well-being.
    - Develop polluter pays mechanisms in lagoon management;
    - Develop incentive and disincentive mechanisms;
    - Incorporate innovative research to capture other values (option values);
    - Capture the value of traditional knowledge.

(f) Governance

In order to address the current poor state of lagoons, an integrated sustainable lagoon ecosystem development programme is required with an effective central mechanism to coordinate and implement the programme. Such an effort will also address the social issues and resource user conflicts.

This process will be facilitated by implementing the 2013 Amendment for Fisheries Act, and strengthening the Lagoon Management Unit.

4 Lagoon Management: A Framework for Action

The outputs from the six Groups were analysed to identify actions needed for establishing a lagoon management system in Sri Lanka. These may be considered as a framework for the proposed project on sustainable management of lagoons.

4.1. Adopt an ecosystem-based approach for lagoon management

In order to follow such an approach, some key requirements should be met, as follows:

- Establish a central depository/data portal on lagoons and river-basins with unrestricted access to the public;
- A continuously updatable centralized, mapped, information system, accessible to regulators, researchers and public to monitor natural, resource use changes, and locations of hazard/risk (including sea level rise);
- Engaging other professional agencies and academia in generating the required data and information for lagoon management;
- inter-agency/inter-disciplinary research together with adequate funding, and free exchange of data and information;
- Actions to improve the health of the lagoons (managing encroachments, intrusion of waste and pollutants, over-exploitation);
- Development of integrated management plans for lagoons.

4.2. Establish a well-defined agency with the necessary legal foundation for lagoon management

This agency should also have the authority and resources to manage the lagoons and to inter-link work programmes of different agencies and coordinate with all agencies and stakeholders in effective lagoon management [***The Lagoon Management Unit of the DFAR could be appropriately upgraded for this purpose***]. The key considerations are:

- install mechanisms for coordination and collaboration of all institutions related to lagoon management;
- Review the existing policies and laws to identify overlapping areas and gaps, and introduce new policies/regulations to ensure that this body has a clear legal mandate to manage lagoons;
- Establishing linkages between this agency (e.g. upgraded LMU) with other agencies mandated/ interested in lagoon management, and also linking the relevant non-governmental entities such as the Fisheries Management Committees and the District Co-governance Committees;
- Incorporate the following five principles into an overall management scheme for individual lagoons as appropriate and adjusted to integrate the many spatial scales:
  - User organizations based on shared interest and entry restrictions;
  - Mechanism for benefit-sharing such as by rotation such that all users acquire equal benefits in the long term (although this may not be obvious when only the short term is considered);

- A constitution that provides for operation of democratic principles including periodic election of office bearers by secret ballot;
- A code of conduct incorporating penalties and unavoidable enforcement mechanisms;
- Firm arrangements to eliminate free-riding by ensuring that benefits from a particular resource-sharing organization accrue only to participating membership.

➢ Provide the necessary human resources and funds to discharge its duties.

4.3. Establish co-management system for lagoons:

Strengthen and fully operationalise co-management systems for lagoons (with the participation of all stakeholders) to ensure that co-management is practiced at the lagoon level. The key actions required are:

➢ Review the current co-management options and identify gaps, and provide any additional legal basis as necessary;

➢ Formation of multi-stakeholder fora for lagoon management (at the lagoon level) and establish mechanisms to have a bottom-up approach for planning and stakeholder consultation;

➢ Enhancing the understanding of co-management principles amongst both officials and communities;

➢ Incorporating gender considerations in co-management.

4.4. Introduce ecosystem-based valuation for management decision-making for lagoons.

Key actions required are:

➢ Introducing measures to assess cost of externalities and internalize them in lagoon management decision-making such as assessing development activities in the lagoons in terms of their costs to lagoon ecosystem/social well-being, developing polluter pays mechanisms in lagoon management, introduce incentive and disincentive mechanisms, launch innovative research to capture other values (option values), and assess the value of traditional knowledge;

➢ Enhance the capacity in valuation knowledge;

4.5. Capacity Development and Awareness Creation

The envisaged lagoon management approach described above will require human resources with the requisite capacity. The key actions proposed are:

➢ Identify capacity needs, including specialised needs (e.g. valuation) to adopt an ecosystem approach to lagoon management, and to establish and operationalize the proposed Lagoon Management Agency;

➢ Establish a mechanism to engage other professional and academic bodies (e.g. Universities) for capacity development;

➢ Establish a mechanism to develop the capacity of all stakeholders including grass root level organisations for lagoon management

- Creating awareness on indigenous knowledge of communities on lagoon management;
- High level awareness creation (at the Political level);
- Mentoring programmes for officials and communities in order to ensure that the concept of co-management is inculcated in the minds of all stakeholders.
- School and University curricula should include components on coastal lagoons and environment.
- Educational institutions should also be motivated to get involved in the lagoon protection programmes. Lagoons can function as outdoor laboratories for students.
- Develop training tools (e.g. lagoon management manual, work books, monitoring methodologies, etc.)

4.6. Risk Management

There are number of risks that will have to be managed to establish an efficient and effective lagoon management system in Sri Lanka. The key considerations are as follows:

- Conflicting national and provincial policies affecting lagoons[2], and inconsistent policies, laws and regulations are obstacles to operate an efficient mechanism for lagoon management. These need to be resolved;
- Coordination amongst institutions dealing with lagoon management has to be improved;
- Conflict of interest: Conflict of interest is observed particularly in the EIA process, which has become a 'mere ritual and another barrier to project approval'. Often, the EIA/IEE recommendations are not followed due to conflict of interest;
- Unabated waste disposal into lagoons and other environmentally sensitive areas will negate lagoon management efforts. Chemical and hazardous waste disposal remains a challenge. Illegal sand mining will also affect the lagoons. The penalties imposed on violators are not adequate as a deterrent. The effectiveness of the regulations is negated by corruption and political interference;
- Official commitment for lagoon management has to be well demonstrated in the relevant agencies;
- Equally, support from the community and community-based organizations has to be sought and enlisted;
- Capacity in the agencies concerned with lagoon management has to be improved;
- Political support for lagoon management is a *sine qua non.*
- Establishment of 'coastal vulnerability indices' (CVIs) for each lagoon incorporating key variables (tide, waves, land slope, bathymetry, tidal inlet – intermittently closing and opening nature, flood death histories, irrigation tanks in watershed, etc.);
- Identification of resettlement locations combined with livelihood options for communities that may be displaced by sea-level rise.

[2] An example cited is the laws enacted by the Eastern Provincial Council to develop fisheries, which are claimed to be conflicting with the provisions of the Fisheries Act of 1996 and principles of co-management.

Annexes

Annex 1: Agenda

23 June 2016 at the Eagles Ballroom, Waters Edge, Battaramulla

08:30 – 09:00	Registration
09:00 – 09:20	Welcome Address: Mrs. W.M.M.R Adhikari, Secretary Ministry of Fisheries and Aquatic Resources Development
09:20 – 09:50	"Changing lagoon ecosystems: opportunities, limitations and risks" Dr Jayampathi Samarakoon, Consultant IUCN
09:50 – 10:05	Optimizing development opportunities through science and partnerships Dr Ananda Mallawatantri, Country Representative IUCN
10:05 – 10:20	Vote of thanks Mr N B M Ranatunge Director General (Technical) Ministry of Fisheries and Aquatic Resources
10:25 – 10:45	Refreshment Break
10:45 – 12:30	Group Work in Six Groups (a) Policies/Regulations (b) River basin and coastal processes (c) Lagoon resource system – interactions and outcomes (d) Resource users including entities producing direct and indirect impacts (e) Resource units and their values (f) Governance (decision-making)
12:30 –13:30	Presentation of Group work in the plenary and Discussion
13 30	Lunch

Annex 2: List of Participants

Group 1: Policies/Regulations

Facilitator: Dr. Anil Premaratne

Resource Person: H J M Wickramaratna

Rapporteurs: Ms.Kumari Vithana & Mr. S.A.M. Azmy

Participants:

Name	Designation	Agency
Asanka Wijewarnasuriya	Assistant Marine Env. Officer	Marine Environment Protection Authority
Ms Himali Gamage		Ministry of Mahaweli Development & Environment
H D Sisira Happuaarachchi	Assistant Director	Land use Policy Planning Department
W M Shantha Muhandrium	Senior Assistant Secretary	Ministry of Land
Isuru Alawatte	Assistant Conservator	Forest Department
Dr H M P Kithsiri	Deputy Director General	National Aquatic Resources Research and Development Agency
S A M Azmy	Head- Env. Studies division	National Aquatic Resources Research and Development Agency
Prof. P K S Mahanama	Professor/Consultant	University of Moratuwa/ IUCN Sri Lanka
R A S Ranawaka	Deputy Director	Coast Conservation and Coastal Resource Management Department
Channa Suraweera	Assistant Director (marine)	Department of Wildlife Conservation
N V Kumi.	Legal Officer	Department of Fisheries & Aquatic Resources
C Jayasinghe	Env. & Landscape Division	Urban Development Authority
Chandana Kalupahana	Director, Environment & Landscape	Urban Development Authority

Group 2: River basin and coastal processes

Facilitator: Dr K Arulananthan

Resource Person: Professor P Wickremagamage

Rapporteurs: Dr W D N Wickramaarachchi & Mr M Marcus

Participants:

Name	Designation	Agency
K Ranoshi Siripala	Ecologist	Land Reclamation & Development Corporation
Dr Niroshana Wickramaarchchi	Senior Scientist	National Aquatic Resources Research and Development Agency
Dr M.P.E.K.Gunathilaka	Senior Lecturer	Sabaragamuwa University
Mr Arjan Rajasuriya	Coordinator, Marine and Coastal Thematic Area	IUCN Sri Lanka

Group 3: Lagoon resource system – interactions and outcomes

Facilitator: Mr P Nimal Chandraratne

Resource Person: Prof. Ivan Silva & Dr J Samarakoon

Rapporteurs: Dr Vasantha Pahalawattaarachchi & Mr H S Haturusinghe

Participants:

Name	Designation	Agency
S U P Jinadasa	Head of National Institute of Maine Science	National Aquatic Resources Research and Development Agency
H S Hathurusinghe	Quality Control Officer	Department of Fisheries & Aquatic Resources
Dr A Sivaruban	Senior Lecturer	University of Jaffna
N Sri Rajarathna	Assistant Director	Coast Conservation and Coastal Resource Management Department
Nilan Miranda	General Manager	Ceylon Fisheries Corporation

Group 4: Resource users including entities producing direct and indirect impacts

Facilitator: Mr M C L Fernando

Resource Person: Mr Leslie Joseph

Rapporteurs: Dr R P P K Jayasinghe & Mr Nuwan Gunawardana

Participants:

Name	Designation	Agency
Prof Mrs S Kuganathan	Professor & Head	University of Jaffna
K Gunaalan	Lecturer	University of Jaffna
N P P Liyanage	Senior Lecturer	Uva Wellassa University
A S Mahaliyana	Lecturer	Uva Wellassa University
D G K Kamil	Engineer	Department of Irrigation
N M U Kumudinie	Senior En. Officer	Central Environment Authority
Chandima Gamage	Junior Manager	Sri Lanka Tourism Development Authority
D D Dias	Lecturer	University of Peradeniya
Tilak Dharmaratne	Vice- Chancellor	Ocean University
D S Nandasena	Director Management	Department of Fisheries & Aquatic Resources
R P P K Jayasinghe	Senior Scientist	National Aquatic Resources Research and Development Agency
N D P Gunawardena	Assistant Director	Department of Fisheries & Aquatic Resources
B A Sampath	Irrigation Engineer	Department of Irrigation
D Abeysiriwardena	Deputy Director	Department of Irrigation

Group 5: Resource units and their values

Facilitator: Mr Shamen Vidanage

Resource Person: Dr D B T Wijeratne

Rapporteurs: Mr Nihal Palitha & Mr L Amaralal

Participants:

Name	Designation	Agency
Lakshman Wijeyewardena	Director	National Enterprise Development Authority
Ajith Tennakoon	Director	Sevalanka Foundation
W Roland Peiris		National Federation of Fisheries co-op society LTD

Name	Designation	Agency
M M Krishantha	General Manager	National Federation of Fisheries co-op Society Ltd
Dr Prasanthi Gunawardena	Senior Lecturer	University of Sri Jayewardenapura
Dr Terney Pradeep Kumara	General Manager	Marine Environment Protection Authority
E G Rosairo	Coordinator – policy lobby	National Fisheries Solidarity Movement
Pradeep Laksiri Fernando	Coordinator	National Fisheries Solidarity Movement
Sashika Manorathne	Lecturer	University of Colombo
S A G Anuradha	Deputy Director	Export Development Bored
K H M L Amaralal		National Aquatic Resources Research and Development Agency
W P J Perera	Director Administrator	Small Fishers' Federation – Chilaw
Douglas Tissera	Project Manager	Small Fishers' Federation - Chilaw
J A Saminda Lakmal	Aquaculturist	National Aquaculture Development Authority

Group 6: Governance

Facilitator: Mr N B M Ranatunga

Resource Person: Mr L H Indrasiri

Rapporteurs: Mr A B A K Gunaratne & Mrs Sinesha Karunarathne

Participants:

Name	Designation	Agency
Thilani Munaweera	Researcher	Hector Kobbekaduwa Agrarian Research and Training Institute
M R K Samarakoon	Director	Ministry of Mahaweli Development & Environment
Dr Roshan Perera	Senior Lecturer	The Open University
A B K Gunaratna	Director - Monitoring & Evaluation	National Aquatic Resources Research and Development Agency
Ms Eriko Nakanishi	Project Advisor	JICA
N J Liyanarathna	Monitoring & Learning Officer	Janathakshana
A N D Perera	Chief Hydrograph	National Aquatic Resources Research and Development

Name	Designation	Agency
		Agency
Sinesha Karunaratna	Quality Control Officer	Department of Fisheries & Aquatic Resources
RearAdmiral Piyal De Silva	Commander Northern Naval Area	Sri Lanka Navy

Other Participants

Name	Designation	Agency
Dr Ananda Mallawatantri	Country Representative	IUCN Sri Lanka
Mr Damith Chandrasekera	National Coordinator, MFF	IUCN Sri Lanka
Ms Kumudini Ekaratne	Senior Programme Officer	IUCN Sri Lanka
Ms Sandamali Pathirage	Consultant	IUCN Sri Lanka
Ms Dinithi Samaratunga	Consultant	IUCN Sri Lanka
Ms Harini Nishshanka	Intern	IUCN Sri Lanka
Ms Matheesha Katuwawala	Intern	IUCN Sri Lanka
Dr Ranjith Mahindapala	Consultant; Workshop Facilitator	IUCN Sri Lanka

Annex 3: Group Work Questions/sub questions[3]

Desired State: A*n integrated, ecosystem-based participatory national lagoon management approach, based on the Blue Economy principles.*

Question 1. Does the Group think that lagoons are in a good state of health and are now currently not managed/ poorly managed/ satisfactorily managed/well managed now? If not why do you think they are not? (20 min) **[This question seeks the personal views of the participants on their general knowledge of the current state of lagoons]**

a. What is the Group's perception on 'good state of health' of lagoons? [lot of fish? Clean water? etc.]

b. If the state of health is not to the expected standards, what are the causes and who are responsible?

c. In terms of management, what does the Group think on management? Is it Government? Or is it community? Or whom? And what are the main parameters of good management?

d. If the Group thinks the lagoons are satisfactorily managed/well managed, on what basis does the Group come to this consensus?

e. Likewise, if the Group thinks the lagoons are not managed/ poorly managed, on what basis does the Group come to this consensus?

If there is no consensus in the Group, please record the majority views, and the reasons of the minority on their disagreement.

Question 2. In terms of the topic allocated to your Group, what is the current status? (20 min) **[This question is a follow-up from the general question 1, and should be focussed on the Group's allocated topic]**

a. What are the positive attributes **on your topic** which contribute to sustainable lagoon management?

b. What are the negative attributes **on your topic** which impact on sustainable lagoon management?

c. What are the reasons for the negative attributes – Give the most important 3-4 reasons.

Question 3. In terms of the topic allocated to you, what is the desired state? (10 min)

a. **On the topic allocated** for your Group, what is the optimal situation to achieve sustainable lagoon management?

b. Does the Group envisage any difficulty in getting to the desired state? If yes, identify those constraints/blocks.

Question 4. How would you achieve the desired state? (30 min)

a. Describe the important steps that should be taken in relation to your **Group's allocated topic** to achieve the desired level.

b. Is there currently a functional institutional mechanism with the necessary legal authority to achieve the desired level? If not, what does the Group suggest as

[3] The sub-questions are only for the Facilitators.

a workable and acceptable institutional mechanism for achieving the desired level?

c. In addition to the institutional mechanism, are there rules and regulations that are required to achieve the desired level? Please identify those.

Question 5. What are the main obstacles/blocks to achieving the desired state, and what are the suggestions to overcome them? (30 min)

a. Examine:

- Policies, laws and regulations;
- Institutions with overlapping mandates;
- Inadequate coordination amongst stakeholders;
- Inadequate Government or Official commitment;
- Inadequate community and/or community-based organisation support;
- Inadequate capacity with the relevant agencies;
- Political interference;
- Other.