

**Coastal Conservation through Enterprise
at Rekawa Lagoon, Sri Lanka**

S. U. K. Ekaratne

S. S. Jinendradasa

M. D. Abeyisiri Gunawardana

John Davenport

**Community Based Conservation in South Asia:
Case Study No.5**

Kalpavrikshi

and

International Institute of Environment and Development

2000

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Published by:

Kalpavriksh,
c/o Pradeep Malhotra,
B-25 Defence Colony,
New Delhi - 110024,
India

Contributory Amount:

Rs. 60
US \$ 6

Cover:

Fisherman guarding his fishing grounds, Rekawa Lagoon.

CREDITS

Authors

S.U.K. Ekaratne, Dept. of Zoology, University of Colombo, Sri Lanka
S.S. Jinendradasa, Dept. of Zoology, University of Colombo, Sri Lanka
M.D. Abeysirigunawardana, Dept. of Zoology, University of Colombo, Sri Lanka
John Davenport, Dept. of Zoology & Ecology, University College Cork, Ireland

Series Editors

Ashish Kothari and Neema Pathak, Kalpavriksh, Pune, India

Editorial assistance for this monograph

Jyotsna Sekhar and Gita Vasudevan, Pune

About the Study

This case study is part of a regional and global process of understanding and documenting community-based conservation of natural resources, in particular biodiversity. The global project, called Evaluating Eden, is sponsored and coordinated by the International Institute of Environment and Development, London. The South Asia Regional Review of Community Involvement in Conservation, which was part of this global project, was coordinated by a group of individuals associated with the environmental action group Kalpavriksh: Ashish Kothari, Neema Pathak and Farhad Vania. Support for publishing this booklet has come from the National Tree Growers Co-operative Federation (NTGCF), Anand. However the views expressed herein do not necessarily reflect the views of NTGCF.

About the Authors

The first author is a Professor in Zoology in the University of Colombo and Director of the Staff Development Centre, University of Colombo. He is also the coordinator of the NGO March for Conservation, based in the University of Colombo, Sri Lanka. The second and third authors are doctoral students in Aquatic Ecology working under him. The fourth was the collaborating scientist who was Professor of Marine Biology at the University of London and Director of the Millport Marine Laboratory, UK when this project was earned out. He is now Professor at the Department of Zoology & Animal Ecology at University College Cork in Ireland.

About Kalpavriksh

Kalpavriksh (KV) is a 20-year voluntary group in India, working on environmental education, research, campaigns, and direct action. KV believes that a country can develop meaningfully only if ecological sustainability and social equity are guaranteed. To this end its activities are directed to ensuring conservation of biological diversity, challenging the current destructive path of 'development', helping in the search for alternative forms of livelihoods and development, assisting local people in empowering themselves to manage their surrounds, and reviving a sense of oneness with nature. Over the last few years it has increasingly focused on community based conservation and management of natural resources, and is currently putting together a Directory of Community Conserved Areas in India.

Kalpavriksh,

Apartment 5, Shree Dutta Krupa,
908 Deccan Gymkhana, Pune 411004,
India Tel/fax: 91-20-5654239,
Email: kvriksh@vsnl.com.

or

c/o Pradeep Malhotra,
B-25, Defence Colony,
New Delhi - 110024.

Tel: 91-11-4624197;

Email: harmony1@del2.vsnl.net.in

International Institute of Environment and Development,

3 Endsleigh Street, London WC1H 0DD,
United Kingdom.

Tel: 44-171-3882117;

Fax: 44-171-3882826;

Email: mailbox@iied.org.

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Acknowledgements

The authors are grateful to the Rekawa Lagoon Fishermen's Cooperative Society, D.A.L. Nimal (Divisional Secretary, Tangalla, during project implementation), Tissa Ariyaratne (ex-Project Officer, Rekawa SAM site), M.M. Ranjith of Netalpitiya and the fisherfolk of Rekawa for their cooperation and goodwill throughout the project period. Dan Lee and S. Walgama assisted in the collection of field data for the restocking programme. Financial support for the restocking project was provided by the Department for International Development (DFID) via MRAG Ltd at Imperial College London. Sponsorship for the case study and this report came from the International Institute of Environment and Development, London, under the auspices of the project South Asia Regional Review of Community Involvement in Conservation, coordinated by a team from India consisting of Ashish Kothari, Neema Pathak, and Farhad Vanla. Financial provision from the MacArthur Foundation for coastal biological diversity research and education is also gratefully acknowledged. The authors are particularly grateful for the advice and encouragement of Professor J. Beddington of Imperial College in relation to the restocking project. With regard to the case study report, we thank Ashish Kothari and Neema Pathak, for their helpful comments and encouragement, and Jyotsna Sekhar and Gita Vasudevan for editorial inputs. Dilys Roe of IIED is also thanked.

LIST OF ABBREVIATIONS

AGA	Assistant Government Agent
CCD	Coast Conservation Department
CEA	Central Environmental Authority
CRMP	Coastal Resources Management Program
CZMP	Coastal Zone Management Plan
DAC	District Agricultural Committee
DS	Divisional Secretary
DWLC	Department of Wildlife Conservation
EIA	Environmental Impact Assessments
GA	Government Agent
GN	Gnattaseva Niladhar
IIRDEP	Hambantota Integrated Rural Development Project
MFARD	Ministry of Fisheries and Aquatic Resources Development
NARA	National Aquatic Resources Research & Development Agency
PC	Provincial Councils
PL	Post-larvae ppt parts per thousand (units used to express salinity)
RLCC	Rekawa Lagoon Coordinating Committee
RLFCS	Rekawa Lagoon Fishermen's Cooperative Society
SAMP	Special Area Management Project
USAID	United States Agency for International Development

SUMMARY

Sri Lanka is a relatively small tropical island situated off the southern tip of India. Of its present population of 18 million people, about a third is concentrated along coastal areas. Unemployment has made these areas a target for vigorous development programmes, which often do not incorporate long-term sustainable strategies and invariably lead to adverse impacts on coastal natural resources. The exigencies for socio-economic improvement of coastal communities, as perceived through these development programmes, will force resource conservation and management practices to be relegated to a secondary position of importance. Conventional management practices that are imposed on the user community through a top-down approach from outside, through legal instruments, will therefore have little chance of success, except where the user community deems them desirable for its sustenance and development.

The present case study reports on successes that were achieved in natural resource management where a low-income traditional-type village stakeholder coastal community was motivated to unite and self-regulate fishing pressure on the resource so that the entire community benefited. It also reports on the spillover of this exercise which brought about environmental awareness and community-based habitat conservation. The study reviews the factors that contributed to this success and the constraints that were experienced. It demonstrates how the economic value of a coastal lagoon habitat was enhanced by stocking the lagoon with the economically valuable shrimp resource. And, it describes how this led the community to protect the coastal habitat to ensure high levels of shrimp production.

Sri Lanka's coastal habitats — brackish-water mangroves, lagoons and estuaries — have been overexploited, and vastly altered through human pressure. In northwest Sri Lanka, brackish-water coastal habitats have been converted into farm ponds for the culture of the exported tiger shrimp, *Penaeus monodon*. Effluents from these prawn farms pollute brackish waters making farmed prawns

susceptible to diseases such as white spot disease and resulting in the closure of many of the farms. Present prawn farming techniques have proved unsustainable in the long run; the recurrence of disease makes this clear. Still, no effective long-term management measures have been adopted to stem such environmental mismanagement and the subsequent destruction of coastal biodiversity.

This export-oriented industry has a high return on investment. But large-scale farmers, usually businessmen from other areas with short-term profit motives, have not deemed it necessary to change over to resource-sustaining, environment-friendly management methods. The result has been depressed prawn farm production due to increasing levels of pollution. Subsequently, those entrepreneurs who are not native to the farm localities, shift their operations to other coastal areas where commercially low-priced, but ecologically sensitive, land is owned by low-income traditional-type village communities such as those around Rekawa lagoon on Sri Lanka's southern coast. This is the location of the present case study.

The Rekawa lagoon hosts a community of traditional fisherfolk engaged in seven-month shrimp fishery using traditional non-mechanised boats, nets and various traps. 17% of the traps used are kral traps — passive traps made from thin interwoven bamboo panels; 9% are cast nets; and 74% gill nets. Predominantly *Penaeus indicus* and smaller quantities of *Penaeus monodon* are harvested. This local community has resisted prawn farming fearing a disruption of their traditional lifestyle. The people also believe that pollution and habitat degradation will deplete the lagoon's resources eventually depriving them of a means to earn their livelihood.

To sustainably manage their aquatic resources, the fishing community of Rekawa lagoon has adopted several community-based participatory measures. They have got together to form the Rekawa Lagoon Fishermen's Cooperative Society (RLFCS) that now stores the shrimp catch in a community freezer for direct sale to consumers. This eliminates middlemen at the landing sites. The community periodically reviews the status of their shrimp resources and adopts resource management practices through the regulation of fishing effort and fishing gear.

A programme of stock enhancement of lagoon shrimp was discussed with RLFCS and implemented with their participation. Through awareness programmes, RLFCS members were made aware of the fact that the quality of lagoon water had to remain good to ensure rapid growth of the shrimp resource. Also, that ecological links had to be conserved through biodiversity conservation. Using experimental fishing, the community was taught to gauge the growth of stocked shrimps and impose fishing

restrictions on themselves so that harvesting could be carried out when the shrimp was big enough to command a better market price. This afforded the community greater incomes as well as helped improve social cohesion. It also boosted confidence and turned the community into an empowered social unit capable of dealing directly with government bodies. This empowerment has led to the establishment of other institutional structures such as the Rekawa Development Foundation (RDF) that now serves as a focal point for advancing socio-economic aspects of the community. The RDF has already attracted funds and has initiated several programmes for the improvement of the community's social wellbeing. For example, the restoration of water tanks, construction of toilets, establishment of child-care units, provision of boats and houses, as also schooling facilities and self employment programmes for women.

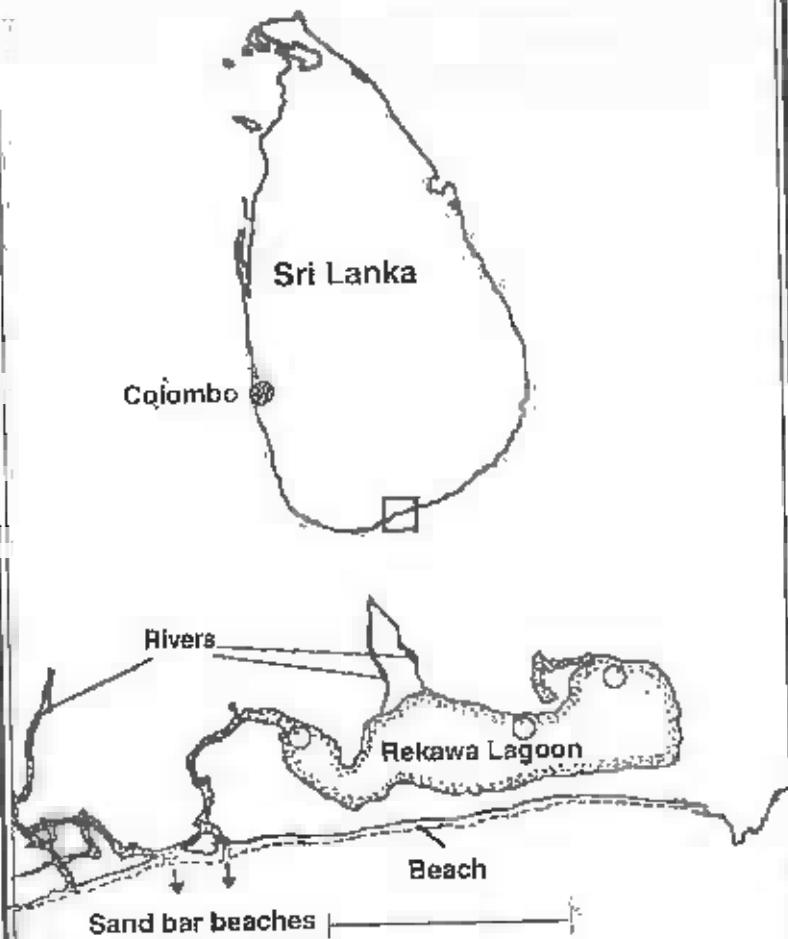
Important elements that contributed to the success of the Rekawa lagoon project included:

- ◆ Socio-economic benefits.
- ◆ Creation of formalised structures for regular meetings at different levels.
- ◆ Retention of a flexible structure at each level of the formalised meeting structures.
- ◆ Regular meetings which helped resolve conflicts among the stakeholders, and maintain communication and discussion between the various partners of the project, including a variety of facilitators.
- ◆ Empowerment of the stakeholder community.
- ◆ Establishment of communication channels for effective rapport and linkages.
- ◆ The existence of committed leadership.
- ◆ Openness and transparency at every stage of the project to ensure active supportive participation by all or the majority of stakeholders.
- ◆ A well formulated plan of action and excellent project management skills by the Principal Investigator together with empathy and commitment amongst project personnel
- ◆ Disseminating the success achieved in working together with the local community and of its replicability, so that potential funding agencies are drawn into supporting the community and extending similar initiatives to other coastal locations/communities.

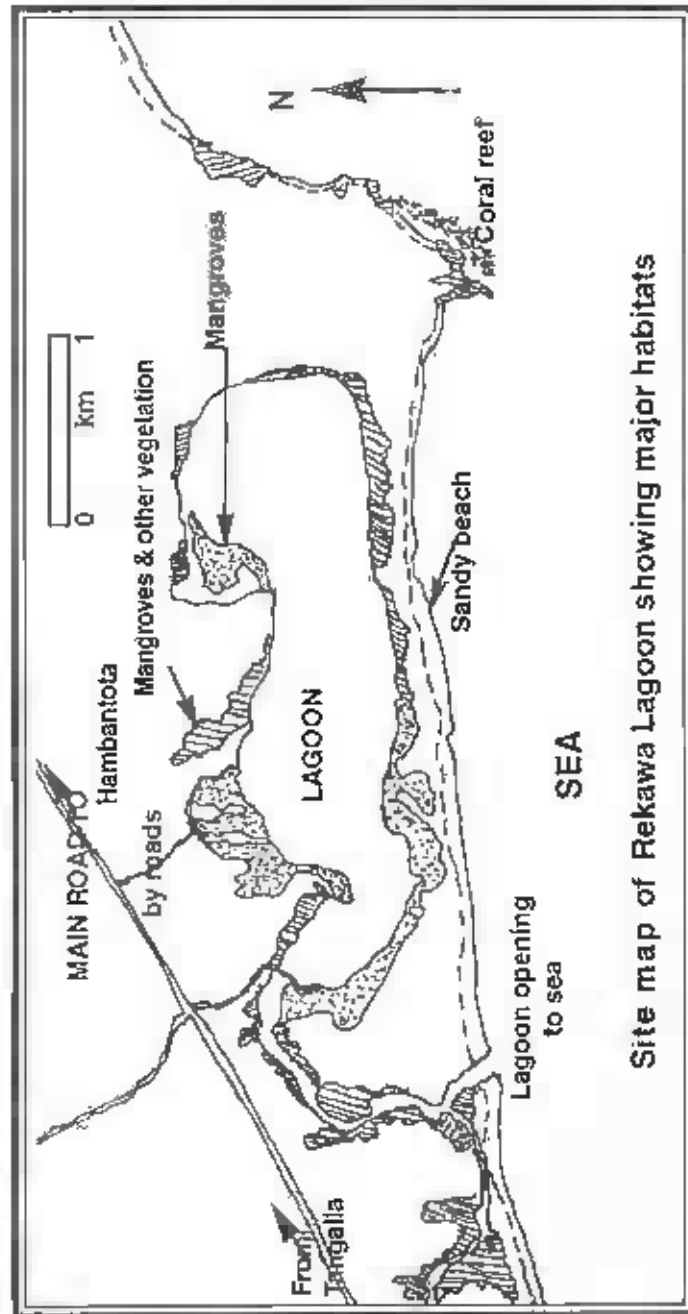
The main constraints included identifying and evolving mechanisms to ensure sustainability beyond the project period. This included exercising prudence in financial management, developing expertise in long-term planning and management skills in local community members.

The success of this project demonstrates that it is possible to move away from the common view that it is extremely difficult to get economically-impooverished communities to practise sustainable management of 'common property' resources. This study demonstrates that with the proper framework to ensure acceptable levels of commitment, motivation, capacity-building and awareness, even the most impoverished communities can be harnessed to embrace sustainable biodiversity management. It is therefore gratifying to report a success in one of Sri Lanka's least developed districts where 54% of families are officially designated as 'low-income' family units.

Country map showing location of Case Study Site



Above: Sri Lanka showing location of study site (open square) Below: Rekawa Lagoon. Open circles show the three sites of release of *Pen. monodon* post-larvae. Scale bar = 2 km.



Site map of Rekawa Lagoon showing major habitats

1. INTRODUCTION

1.1. Brief description of case study site

Rekawa is situated near the southernmost tip of Sri Lanka, a relatively small tropical island (10° N latitude and 80° to 82° E longitude) of 65,610 km² with a coastline of 1,585 km (NARESA, 1991). Sri Lanka is located off the southern tip of India (National Atlas, 1988). Rekawa is a village about 200 km south of the capital of Sri Lanka, Colombo, along the southern coast in Hambantota District in the Southern Province. Hambantota is the least developed district in Sri Lanka (Ganewatta *et al.*, 1995). The 250 ha Rekawa lagoon, encircled almost entirely by about 200 ha of mangrove vegetation and scrub forest, is a dominant feature of the case study site. On its seaward side is a 10 km long sandy beach and landwards of the lagoon are 500 ha of rice fields, most of which now lie fallow and neglected.

The present population of Sri Lanka is 18 million people, a third of which is concentrated along the island's coast (CCD, 1992). Increasing pressure on the natural resources of these coastal habitats has led to overexploitation, degradation and alteration.

Rekawa's major resources include its villagers, a beach environment with its associated biological resources, the lagoon, its water supply and fishery resources, mangroves and contiguous scrub forest with its wildlife, agricultural land and the aesthetic resources associated with these habitats.

Both terrestrial and aquatic habitats are prominent features of the Rekawa area. These sea, lagoon and mangrove habitats comprise the most used marine and brackish-water habitats. Coral reef habitats occurring off the shore have been exploited for coral lime by the villagers, although this illegal practice increases and decreases periodically. Man-made tanks and rivers draining into the Rekawa lagoon make up freshwater aquatic habitats. On land, we see scrub vegetation and habitats closely associated with agricultural land and home gardens.

Rekawa is blessed with a calm serenity that reflects its village setting. Such an aesthetic resource is therefore open to exploitation by the tourist trade; the pressures of commercial enterprises related to tourism and the exploitation of natural resources is increasingly being felt here. All this could very easily alter the traditional beliefs and practices of the people of Rekawa if they are not empowered to realise the inherent value of their surroundings.

1.2. Objectives of case study

This case study came about when the first author realised that the Rekawa lagoon was being identified and targeted as a possible site for the felling of mangroves to make way for prawn farms set up by entrepreneurs from outside Rekawa, despite stiff resistance by the local fishing community (Eknratne *et al*, 1998). Similar prawn farm expansion practices in the northwest coastal regions of Sri Lanka had already resulted in the destruction of natural resources and biological diversity of the associated lagoon and estuarine habitats of those areas and displaced the resident villagers. Resistance against prawn farms has, in fact, been widespread in other Asian countries and a "cost-benefit analysis commissioned by the Indian Supreme Court concluded that shrimp aquaculture in two states caused more economic harm than good" (Island, 1995).

The objectives of this case study are to review the degree of success that was achieved in a community-based management exercise and to identify the factors that facilitated this success. It is hoped that such an assessment will make it possible to replicate and/or improve the approach whereby rural stakeholder communities are shown how their natural resources can be harnessed in a sustainable manner so as to improve their socio-economic wellbeing. And also empower them to manage and protect the biological diversity of their surroundings.

1.3. Methodology

The case study is based on a research project that was carried out to determine whether the management of lagoon biological diversity can be facilitated by enhancing the economic value of the lagoon environment to the stakeholder fisherfolk community by:

1. Restocking the lagoon with high-value shrimp.
2. Devolving harvesting rights on the local fisherfolk thereby also ownership of the restocked shrimp. They would therefore be induced to protect the lagoon environment against adverse environmental impact on productivity and growth rates of stocked shrimp.

3. Bringing about a favourable environment and protective benefit to lagoon biodiversity, leading to biodiversity conservation and management through stakeholder interest.

The research initiative was also aimed at discovering whether the restocking-harvesting exercise resulting in biodiversity conservation and management was economically viable by realising a direct economic benefit in terms of sale prices of harvested shrimp when weighed against costs of restocking.

The origins of the concept for the study were largely based on personal observations, mainly by the first author, who had worked for a number of years with coastal communities and coastal aquatic fauna. This experience made him realise that common property resources in developing countries could not be effectively protected only through legal instruments. Particularly where we lack the wherewithal to monitor adherence to the laws it was felt that communities that lived in biodiverse areas would themselves be motivated to safeguard resources. This could be achieved by making them understand that the existing biodiversity was intrinsic to their own long-term socio-economic wellbeing.

The methodology involved interacting with stakeholder groups within the community as well as those related to restocking and harvesting, as detailed below.

The methodology adopted for continuously interacting with stakeholder groups within the community was by establishing avenues for discourse and direct interviews. Community leaders and leading personalities whose counsel was often solicited by community members, in this case relating mostly to fishery, were identified for discussion and informal interviews. Formal interviews were usually carried out with a section of the community, such as members of the Fishery Cooperative.

One significant problem was to win the confidence and trust of the fisherfolk. The procedures outlined above helped address this. Discussions and workshops contributed towards training the community in the fundamentals of shrimp biology, ecology and culture on which the success of the restocking-harvesting project largely depended.

The methodology during and prior to the restocking-harvesting exercise involved:

- ◆ Monitoring catches of naturally-recruited shrimp and lagoon conditions over a one-year cycle.
- ◆ Determining the fishing intensity within the lagoon through mark-recapture methods.

- ◆ Raising awareness of the stakeholder fisherfolk with regard to shrimp stocking and planned harvesting to maximise economic benefits.
- ◆ Winning the confidence of the stakeholder fisherfolk so that they would follow our advice, sometimes even straying slightly from traditional practices.
- ◆ Purchasing, transporting and stocking shrimp young (post-larvae) in net cages in the lagoon until they grow to a size suitable for stocking, involving about two weeks of feeding and cage culture.
- ◆ Releasing the shrimp young into the lagoon.
- ◆ Monitoring shrimp growth until they have reached a size suitable for maximum economic return.
- ◆ Motivating the fishing community to develop mutually agreeable socially-binding guidelines to withhold fishing until restocked shrimp reached a suitable size.
- ◆ Monitoring catch rates in the fishery and sale prices.
- ◆ Conducting discussions and questionnaire-based surveys before, midway and after the restocking exercise to assess changes in attitudes, income and socio-economic effects of the restocking exercise.

Although the project closely monitored shrimp catches from the lagoon before and after the exercise, manpower and other constraints made it impossible to monitor the ecological effects including changes in biological diversity. Information on these aspects were gathered through discussions with the fisherfolk and local inhabitants. This is a limitation of the study.

2. ECOLOGICAL PROFILE

2.1. Physical/geographical description

Rekawa is situated in the coastal plain of Sri Lanka. Some 6,000 years ago, the Rekawa lagoon area was submerged under water (TEAMS, 1994). Today, it is located on the lowest peneplain in Sri Lanka, gently sloping from an inland elevation of 300 metres to sea level. Rekawa lagoon itself is shallow its depth averaging 1.4 metres. The widest point is approximately 2.5 km (Jayakody and Jayasinghe, 1992). The surrounding area is defined by hills, ridges and outcroppings of less than 50 metres above sea level. Scattered along this coastal area are granite outcroppings, though most of the land forms an undulating coastal plain (Ganewatta *et al.*, 1995).

The area is subject to strong winds, especially along the coast from June to September, when the average wind speed is 23 km hr⁻¹ (Samaranayake, 1983). An average wind speed of 18 km hr⁻¹ occurs during the rest of the year. Winds and constant wave action on the shoreline give rise to depositional sand dunes along the coast. Such sand accumulation results in periodic closure of the lagoon mouth to the sea as very little sand is supplied by river deposits. Beach erosion is caused mostly by long-shore currents and wave action (Ganewatta *et al.*, 1995).

Average temperatures range between 26.6° and 27.2°C. The area receives nearly seven hours of sunlight on an average per day with March averaging the highest monthly sun exposure (Samaranayake, 1983).

The Rekawa lagoon area lies on the border of the climatic wet zone and dry zone of southern Sri Lanka, known as the intermediate zone. The wet zone receives an average of 191 cm of rainfall per year; the dry zone approximately 127 cm. Climatic characteristics of the Rekawa lagoon area include periods of "low rainfall, severe sunlight, and seasonally strong winds," (McCall, 1990).

6 The two monsoon seasons dictate the weather and rainfall in and around Rekawa. From May to October, the southwest monsoon predominates — this is the 'Yala' or low cultivation season in the Rekawa area. From November to April the northeast monsoon influences weather patterns bringing about the 'Maha' or high cultivation season. Of these two, the northeast monsoon tends to bring the most rain to the area. Because Rekawa lies in the intermediate climatic zone, rainfall cannot be strictly predicted. Heavy rains may occur throughout the year during both wet and dry monsoon seasons, though some years see very little rain. Thus, the average rainfall over the past 15 years — 204 cm of rain per year (Jayakody, 1994; TEAMS, 1994) — does not present a true picture as this is the average figure of the wet zone.

Rain falling inland provides the water for the main watershed and rivers flowing into the immediate Rekawa surroundings and the Rekawa lagoon itself. The hydrodynamics of this area play a critical role in the natural resources of Rekawa and its inhabitants.

Rekawa lagoon receives most of its water from inland watersheds draining into two main rivers, the 32 km long Kirama Oya and the 42 km long Urubokka Oya. The Kirama Oya is the principal water source for the Rekawa area, with a catchment basin of approximately 225 sq km, which receives an annual average of approximately 11.5 million cubic metres (mcm) of water into its 14 sq km drainage area. The Kirama Oya ultimately flows into the Rekawa lagoon, controlling many of the hydrological processes of the lagoon and its channels (TEAMS, 1994).

Much of the water flowing through the Kirama Oya is diverted and used for agricultural purposes before it finally reaches the Rekawa lagoon. The 162 ha Kirama tank, constructed by the British between 1805 and 1812, was the first major diversion of water from the Kirama Oya and irrigates about 200 ha of agricultural fields. Eighteen weirs have since been built by the Irrigation Department along the river's path further diverting water into an additional 2,000 ha of adjacent agricultural lands (TEAMS, 1994).

The Urubokka Oya, that has a catchment basin of approximately 352 sq km and flows from the northeast, is less used in Rekawa (TEAMS, 1994). Irrigation tanks have been constructed along this river too. The two main ones, the Murutawela and the Udukiriwila, retain the most amount of water for agriculture. These two reservoirs have holding capacities of approximately 48 mcm and 4 mcm

7 respectively. Additional smaller tanks hold still more Urubokka Oya runoff, further reducing the amount of water reaching Rekawa lagoon and its surroundings.

A third and smaller river the Rekawa Oya, with its catchment basin of approximately 78 sq km, also provides some water to the area. This river has two major tanks, the Pattiyaapola and the Netolpitiya, which store 700,000 and 180,000 cubic metres of water respectively (TEAMS, 1994). Four minor tanks have also been constructed along the Rekawa Oya. Fresh water reaching the Rekawa lagoon enters into its main body. The mixing of fresh and sea water brings about a brackish-water environment in certain parts of the lagoon. There is seasonal variation in salinity from zero to 34 ppt, with high salinity being experienced during the dry southwest monsoon season and low salinity during the wet northeast monsoon. The pH of the lagoon varies between 6.13 and 8.60, with readings in the 8.6 range occurring in March 1994, when the lagoon mouth was closed to the sea (Jayakody, 1994). Due to its narrow range, however, the pH factor has not been shown to greatly affect the lagoon ecosystem (Jayakody, 1994).

The tides and currents affecting coastal areas of the Rekawa site are strong. Currents have been known to reach speeds of upto 1 m. sec⁻¹ and average about 0.25 m. sec⁻¹ (Swan, 1983). These currents influence beach geology, offshore water depth, shelf morphology, and the direction and incidence of waves offshore of the Rekawa lagoon area. Tidal range reaches a maximum of about 70 cm and tidal currents tend to move eastward along the coast away from the Rekawa site and then northward once they flow around the southeast tip of the island (Ganewatta *et al.*, 1995).

2.2. Details of habitat types, resources and uses

The coastal resource systems of the Rekawa lagoon and its surrounding areas are rich and diverse, supporting a number of coastal ecosystems and habitats typical of Sri Lanka's southern coasts.

The water supply and its movement, both from the watershed and the sea, are important to local communities and the integrated ecosystem as a whole. Limited water resources are the key to the area's productivity. Fresh water from the rivers is essential to maintain the productivity of the agricultural areas and the brackish nature of the lagoon. The quantity of fresh water draining into the lagoon also dictates the extent of lagoon 'flushing' and the

periodicity with which its mouth opens naturally into the sea, permitting the recruitment of marine shrimp and fish. Likewise, the flow of seawater into the lagoon is crucial in order to maintain the water's salt content and ensure a productive lagoon shrimp fishery.

Prominent habitats relevant to this study were those associated with the lagoon. The mangrove and lagoon systems sustain lagoon, nearshore and offshore fisheries for prawns/shrimp and a variety of fish. Mangrove and lagoon habitats are nursing grounds that allow small shrimp and fish to grow to a marketable size. The mangroves and swamps are home to resident and migratory birds; they also stabilise sediments and produce organic matter for lagoon fisheries. Some of the surrounding land supports productive agriculture, though other areas have become too saline for most commercial crops. The sandy beaches of Rekawa provide nesting grounds for several species of sea turtle, besides being growing tourist attractions.

The few coral reefs that do occur at Rekawa are not very healthy because of the coral mining that has been practised here for some time. The reef, which lies at a depth of two to three metres is about 100-150 metres wide and 300 metres long and is found at the base of the rocky headland. It is not well developed as the coral grows intermittently on the sandstone and crystalline rock substrate (Ganewatta *et al.*, 1995).

Although coral mining is illegal, the villagers do go out to the reef during the dry season and sell the mined coral to kiln operators for conversion into wall-plastering material.

It is suspected that the mangroves of the Rekawa area have increased and that the water area of the lagoon has diminished over the years, from around 339 ha in 1983 (Samaranayake, 1983) to nearly 250 ha (Jayakody and Jayasinghe, 1992) in 1992. Although various reasons have been cited for this (see Section 2.4), none have been validated or scientifically tested. Mangroves are a source of wood fuel for lime kilns, cooking and house construction materials, agricultural and medicinal resources. A few hectares of mangrove around the lagoon have been felled for these purposes. More recently, however, the villagers have begun to realise the ecological importance of mangroves, an awareness created through workshops conducted by NARA (mainly Dr Jayakody) and the authors of this study who have shown the villagers the ecological links between the mangrove/estuarine habitat and aquatic productivity, particularly in relation to shrimp production.

Water salinity in the lagoon is dependent on water flowing into the lagoon as well as on whether the lagoon mouth remains open or closed. Water from the lagoon ultimately reaches the sea through the mouth located on the southwestern coastal side of the lagoon. Breaching of the sand barrier at the lagoon mouth opens it and this can occur naturally during the rainy northeast monsoons, when water levels in the lagoon increase. Manual breaching of the mouth also takes place when villagers open the lagoon outlet to let out the water threatening to flood inland paddy fields, particularly during the monsoons. It is when the mouth is open to the sea that shrimp larvae enter the lagoon from the sea. The larvae grow within the lagoon and form the basis for the shrimp fishery which is the main source of income for the lagoon fisherfolk.

A causeway that was built by the Road Development Authority (RDA) in 1984 was suspected of impeding the migration of shrimp larvae into the lagoon (Jayakody and Jayasinghe, 1992) as well as restricting water exchange between the sea and the lagoon. This Kapuhewaala causeway has, however, been removed in 1998. The initiative for the removal of this causeway was taken collectively by the villagers and district-level committees, once they were made aware that limited flow into the lagoon hampered the shrimp recruitment process. Other habitats include scrub jungle, rice fields and home gardens.

2.3. Biological diversity

Mangroves and lagoon areas are rich biodiverse coastal habitats. They serve as rich mangrove ecosystems and are home to numerous local and migratory birds, fish and shellfish, reptiles, mammals and invertebrates.

Mangroves are restricted to very narrow areas along the coast and are easily subject to degradation. Mangrove and scrub vegetation plants that are present in the Rekawa lagoon area (CCD, 1991; Ganewatta *et al.*, 1995) are listed in Annexure 1. Commonly found fish and shellfish species, non-migratory and migratory bird species, coral species and marine turtle species found in the Rekawa lagoon area are given in Annexures 2, 3, 4, 5 and 6, respectively.

2.4. Major threats to wildlife

Since Rekawa is situated in the intermediate, relatively dry, climatic zone water supply to the area is unpredictable. Further, the construction of irrigation tanks, weirs, and causeways make water

management a particular requirement. What's more, the lagoon surface area appears to be shrinking, the causes for which have only so far been adduced. These include sedimentation, spread of mangroves into the lagoon water area, reduction in water supply to the lagoon and an overload of nutrients from agricultural runoff (pers. com.; Ganewatta *et al.*, 1995).

There is speculation that runoff into the lagoon may contain high levels of pesticide and fertilizer from agricultural use. This could cause slow eutrophication of the lagoon creating blooms of filamentous green algae, which block sunlight to benthic organisms and deplete oxygen levels. However, the lagoon's chemical levels have not been measured.

The limited areas of coral reef that occur could be further destroyed if coral mining continues. Coral mining (see previous section for details on mining) destroys the living coral and also the physical three-dimensional structure of the reef that hosts a rich diversity of fish and invertebrates.

Then, there is the impending threat of prawn farms and ponds that would change the lagoon's water quality and depress aquatic productivity to an unprecedented degree, were intensive prawn farming to be carried out here. This has happened in the northwest coast where deterioration of water quality due to intensive prawn farming has led to the outbreak of prawn disease and the subsequent closure of prawn farms.

3. SOCIO-ECONOMIC PROFILE

3.1. Population

There are 20 villages within the seven Grama Niladhari Divisions of the Rekawa site (see Administrative Profile below). In 1994, 1,184 families comprising 5,373 people lived in the Rekawa area. The average household size was 4.5 people (Ranaweera Banda *et al.*, 1994). Overall, the Hambantota District, which includes the Rekawa area, has experienced a decrease in birth and death rates since 1952.

Females comprise 51 percent of the population (HIRDEP, 1990). Overall, Rekawa's population is young — over 40 percent is 18 years old or less. Nearly 90 percent of the people are under 55 years of age, while 30 percent are between five and 18 years old. The youngest age group, (less than five years old) makes up about 12 percent of the population and the oldest age group (55 years and over) makes up about 10 percent. The age group between 19 and 55 is the most productive and represents nearly half of the population (Ranaweera Banda *et al.*, 1994).

3.2. Social/ethnic profile

The majority ethnic group is Sinhala (about 98 percent), most of whom practise Buddhism as their religion. Muslim and Hindu religious groups comprise only 1.6 and 0.4 percent of the population respectively (HIRDEP, 1990).

The Hambantota District, in which Rekawa is located, is the least developed district in Sri Lanka. The people of Rekawa face a number of economic, social and health problems. Unemployment is high with low occupational diversity and income. Over 70 percent of the population was receiving Rs 700 per month in food stamps from 1980 until 1990. In 1991, the central government started the Janasaviya (Community Strengthening) Program (JSP) to replace the food stamp scheme.

Public assistance programs are provided for people in the Rekawa area who are old, chronically ill and infirm. These people have little or no income and no social support. They represent the neediest of the community. Those availing of public assistance also require medical support which they cannot get on their own.

Health problems prevalent in this area include malaria, bowel diseases, helminth infestations, typhoid, malnutrition, and complications from poisonous snake bites. These are further aggravated by the lack of proper drinking water and sanitation facilities, medical care and adequate nutrition.

Drinking water is a primary concern in the Rekawa area for it is scarce and supplied mostly from wells, pipes, tanks and waterways. By prior arrangement, villages have their cement water tanks filled on stipulated days. Still, though this service does provide drinking water, quantities are limited and the water is not adequately treated. Approximately 62 percent of Rekawa's population receive water in this manner while 25 percent get their water from wells which are mostly unprotected and improperly constructed (Mall, 1993). Traditionally, drinking water here has been obtained from wells. But, an ever-increasing population with no corresponding improvement in infrastructure, coupled with a decline in water supply to the Rekawa area (with the enhanced diversion of water for agriculture in upstream areas) have diminished traditional water supplies, both qualitatively and quantitatively.

Insufficient safe drinking water and inadequate sanitation has led to bowel diseases and worm infestations. Due to the absence of latrine facilities, the Health Department undertook an intensive latrine construction project in 1990 along with a latrine subsidy scheme, funded by HIRDEP (McCall, 1990). Many people use unsanitary temporary latrines or pit latrines which form breeding grounds for flies and mosquitoes. In 1998, water-seal latrines, adequate as a sanitary system, were provided to a number of families in an assisted scheme that was coordinated by the Rekawa Foundation. This scheme aims to provide similar facilities to more families (President, Rekawa Foundation, pers. com.). Malnutrition in the Rekawa area is acute in children under the age of five.

There are 3,213 children and 183 teachers in the Rekawa area. All the schools are primary and junior schools, with the exception of one each in the Medilla and Netolpitiya administrative divisions,

which offer secondary education. If students wish to receive a higher education (GCE Advanced Level) they have to move to a Maha Vidyalaya school. The nearby town of Tangaila has three such schools. Families that can afford to do so, send their children to schools outside the Rekawa area.

3.3. Major sources of livelihood

Four main types of occupation provide employment for the working population of the Rekawa area. A majority of the villagers are self-employed. About half the village community at Rekawa is engaged in agricultural pursuits (47%) while over a quarter (28%) work in fisheries. 10.4% of Rekawa's inhabitants fish in the lagoon; 9% are engaged in coral mining. Other occupations include carpentry, masonry, labour and local government service. A number of people in the Rekawa area are engaged in more than one occupation (Ranaweera Banda *et al.*, 1994).

The workforce of the three administrative divisions of Rekawa — Netolpitiya, Medagama and Wellaodaya — is primarily engaged in agricultural activities including livestock, paddy and chena (slash and burn) farming. In these three divisions 94, 80, and 55 percent of the total working population, respectively, are involved in agriculture. Rekawa West, Rekawa East and Wellaodaya administrative divisions support the largest fishing populations with figures of 72, 36, and 22 percent of the total workforce, respectively. Although these occupations provide some income to the people of the Rekawa area, many of them still depend on government social welfare (Ranaweera Banda).

The low income status of the Rekawa villagers can be gauged from the high percentage of families (54% of the 1,184 families) that receive government assistance under the Janasaviya Programme. Housing-related facilities such as sanitation, pipe water, electricity, etc. are available only to a few houses. Rekawa is therefore a low-income traditional type of village, where about half the population (48%, Ranaweera Banda *et al.*, 1994) falls within the 19-55-year age group.

Because of the low-income status of many villagers, the women in the community engage in whatever activities are possible to supplement their meagre family incomes. In particular, they make use of the readily-available natural resources around them such as mangrove fuel wood and coral lime. For example, 8.5% of the villagers

extract coral lime from the sea (Ranaveera Banda *et al.*, 1994), even though the mere possession of coral has been a punishable offence for over 20 years (Ekaratae, 1990). Enhanced incomes from the shrimp restocking exercise, along with environmental awareness programmes, helped reduce the unsustainable exploitation of these natural resources. Although quantitative supportive data was not gathered with respect to the reduction of such destructive practices, interviews with the community revealed that community members preferred not to indulge in activities such as coral lime extraction from the sea, this was provided their families' earnings from fishery, which constitutes the main source of income, were sufficient.

3.4. Legal status of land and resources

With regard to the legal status and the legal framework of the land and natural resources, there are both private and public lands: most home gardens and houses are on privately-owned land whereas natural resources such as mangroves, lagoons and waterways are on public land.

The management of coastal resources in Sri Lanka, as with the management of other natural resources, involves several government institutions. Responsibilities may therefore overlap and/or in conflict, or are unclear. Even so, the primary management responsibility for coastal resources devolves upon the Coast Conservation Department (CCD), presently placed within the Ministry of Fisheries and Aquatic Resources Development (MFARD). The CCD faces financial constraints and a lack of equipment and adequate staff. It is assisted by the Coast Conservation Advisory Council, which advises the Director of Coast Conservation on all development activities in the coastal zone and reviews the Coastal Zone Management Plan (CZMP), Environmental Impact Assessments (EIAs) as well as requests for variances on permits. The CZMP, which was approved by the Cabinet of Ministers in 1990, provides the framework to manage resources in the coastal zone.

The jurisdiction of the CCD is restricted to the 'coastal zone', which is defined as the area two km out to sea, 300 metres inland and two km inland for rivers, lagoons and estuaries.

The CCD is responsible for:

- ◆ Formulating and implementing coastal protection and management activities,

- ◆ Regulating development within the prescribed 'coastal zone' through permits.
- ◆ Evaluating development project impacts through discretionary environmental impact assessments.
- ◆ Preparing and implementing the Coastal Zone Management Plan and conducting surveys in cooperation with other agencies.

Although the use and protection of natural resources are governed by a number of laws (as indicated below), these are not always adhered to, primarily due to a lack of awareness and/or the lack of resources for their monitoring and implementation. The 'top-down' bureaucratic approach to legally-based natural resource management hinders the effective management of natural resources. A 'bottom-up' approach could make the enforcement of such laws more effective. Thus, despite the existence of relevant laws and regulations, community-based natural resource management assumes a particular importance.

The laws that bear particular relevance to the natural resources of the Rekawa lagoon include the following:

- ◆ *The Seashore Protection Ordinance, Gazette No. 7710 (1929)* bans the removal of coral, sand, etc.
- ◆ *The Fauna and Flora Protection Ordinance, Gazette No. 8675 (1940)* protects threatened and endangered wildlife including sea turtles nesting on the Rekawa beaches.
- ◆ *The Fisheries Ordinance, Gazette No. 12304 (1961)* bans the use of destructive fishing gear and supports sustainable fishing activities.
- ◆ *The Tourist Development Act No. 14 (1968)* authorized the Tourist Board to regulate services and prevent indiscriminate and unplanned development in resort areas. Tourism development in the Rekawa area would also come under its purview.
- ◆ *The Natural Heritage and Wilderness Act (1980)* was amended in 1988 thereby requiring Environmental Impact Assessments and licences for industries potentially producing air, water and/or land pollution.
- ◆ *The National Aquatic Resources Research and Development Agency (NARA) Act No. 54 (1981)* established NARA to bring about the conservation of aquatic resources in aquatic habitats including coastal and offshore areas as well as to disseminate information and provide advisory and consultancy services.

- ◆ **The Coast Conservation (CCD) Act No. 57 (1981)** mandated CCD to develop a Coastal Zone Management Plan, regulate and control activities within the coastal zone, and formulate and execute coast conservation projects. It defined coastal zones to include portions of lagoons, estuaries and rivers. It also established uniform procedures for permit applications without distinction between development activities undertaken by private and state sectors. Among other provisos, this legislation encouraged collaboration among various government agencies involved in research and development activities within the coastal zone, specified penalties for violation of the law, and authorized the Director of CCD to demolish unauthorized structures. It also made possible the establishment of horizontal links between the relevant legislation.
- ◆ **The 1988 Amendment to the Coast Conservation Act No. 57 of 1981** empowered the Director of CCD to delegate powers, duties and functions to government agents or public officers of any administrative district which contained a portion of the coastal zone. It banned the mining, collecting, possessing, storing, burning and transporting of coral, and the possessing of limestone kilns. It authorized the demolition of kilns and the seizure of boats engaged in illegal activities within the coastal zone. Importantly, it granted the public the right to use any beach.
- ◆ **The Forest Ordinance No. 3 (1945) Amendment No. 13 (1966) and Act No. 13 (1988)** made the harvesting, possession, sale and transport of timber without a permit illegal and provided the necessary powers to prosecute offenders. This law is of relevance to mangroves and their harvesting in Rekawa.
- ◆ **The Marine Pollution Prevention Act No. 59 (1981)** authorized the Marine Pollution Prevention Authority to prevent, reduce and control pollution in Sri Lankan waters.
- ◆ **The Specified Tourist Services Code (1984)** made provision for the registration and licensing of all tourism-related establishments as well as enabling their classification.
- ◆ **The National Environmental Act No. 47 (1980) and Amendment No. 56 (1988)** established the Central Environment Authority (CEA). These laws provided for the protection of the environment against environmental degradation and for the prevention and control of pollution. The amendment was meant to bring about greater environmental quality control, the establishment of a fund at the CEA as well as of an Environmental Council consisting of senior officers from relevant ministries having environmental responsibilities.

3.5. Special features

The people of the Rekawa area and their social infrastructure reflect a rural community closely connected with the natural resources and processes. Their quality of life as assessed by urban standards is not high, but the natural resources and environment provide some income to most people as well as serve as a traditional resource base for domestic use. The low income profiles encourage villagers to use any available means to supplement their incomes, including unsustainable use of natural resources on which their very existence depends.

Increased generation of income was, therefore, a measure that could divert the villagers away from the exploitation of such natural resources, thereby leading to better natural resource management. These were some of the considerations that led to the Rekawa area being included as a site for the implementation of a Special Area Management (SAM) Plan drawn up and implemented by the Coastal Resources Management Program (CRMP) under USAID sponsorship. This project has been successful in drawing the attention of the villagers to the importance of the surrounding natural resources for their long-term wellbeing, as well as bringing the fisherfolk closer (resulting in the formation of a Lagoon Fishermen's Association).

4. ADMINISTRATIVE PROFILE OF CASE STUDY SITE

4.1. Overall administrative profile of the region

Prior to 1970, a Government Agent (GA) acted as the Chief Executive of each district. This was known as the Kachcheri System of public administration, established by the British and continued after they left. Under the GA, the Districts were divided into Divisions with an Assistant Government Agent (AGA) as the executive head of each Division. These Divisions were further subdivided into villages represented by a Village Headman (Gramaseva Niladhari), who was responsible to the AGA. A Village Committee system was also put in place, consisting of elected members and a Chairman.

This system has now changed with the introduction of Provincial Councils (PC) or Palath Sabha. The PC is made up of elected representatives under a Chief Minister of the Province. A senior administrative official serves as the Chief Secretary and Executive of the Province. The former AGA Division is administered by the Divisional Council (Pradeshiya Sabha) consisting of elected representatives. The Assistant Government Agent is now designated Divisional Secretary (DS) and functions as the Chief Executive of the Division.

The former Village Committee system was replaced by the Gramodaya Mandala system which has the Gramaseva Niladhari (GN) as the chief village-level executive. This system consisted of all the registered voluntary organizations in each GN division, but is no longer in operation in most divisions. A general government policy is to devolve responsibility to local authorities. In the present administrative framework, the Divisional Secretariat is the unit of government best suited for this role in the activities of the Rekawa SAM site. The DS implements the development projects of the Division and provides basic services to the inhabitants. Therefore, the government policy, outlined above, empowered the local Divisional Secretariat to undertake and approve activities that would have a direct bearing on issues at Rekawa. By such a policy, the residents of Rekawa were encouraged to look to the DS as a potential

agent for effecting much-needed changes at the local level.

The system of hierarchy that operates can best be illustrated using the following representative structure:

4.2. Administrative profile of case study site

The administrative profile of the case study area (ie, Rekawa) operates within the system of hierarchy illustrated above, on a national level. Within this system of administration, it is the Divisional Secretary that has the greatest administrative influence in the Rekawa area, particularly in matters related to day-to-day administration. The personality and high ideals of the incumbent DS went a long way in empowering the local community, directing them and improving their facilities. Positioned above the level of the DS, and therefore somewhat distanced from the immediate daily administrative functions of the Rekawa area, are the District Committees of the Hambantota District. These committees are important for the medium and long-term administration of Rekawa and they include the Agricultural Land Use and Hambantota Integrated Rural Development Project (HIRDEP) Coordinating Committees. For example, the District Agricultural Committee (DAC) is an important coordinating body that has the Secretary of the Provincial Council as its Chairman and includes members of Parliament, the Provincial Council and District heads of all government departments. The DAC has been very active and concerned about environmental issues in the Rekawa area. HIRDEP has a District Coordinating Committee, with the Provincial Secretary as Chairman. It undertakes a quarterly review of progress and discusses problems and issues in the implementation of HIRDEP projects. This committee includes all members of HIRDEP, District heads of departments and leading voluntary organizations. Another important district-level technical body, which is concerned with land use such as planning reforestation projects, is the District Land Use Committee (also known as the District Action Plan Committee for Land and Land Development). Members of this committee are the Secretary of Land and Land Development, District Land Officers, and District representatives of the Survey, Irrigation and Forest Departments.

Another body with responsibility for creating awareness on environmental issues such as soil management, pollution and discharge of toxic waste from factories is the District Environmental Agency (DEA). This body depends on other government agencies to implement its decisions. It comprises government officers from the Forest Department and the Central Environmental Authority, District Medical and Public Health officers and Education officers.

Although not strictly a government body, the Rekawa Lagoon Coordinating Committee (RLCC) was an *ad hoc* body representing relevant national agencies and community organizations involved in the management of the Rekawa site. Important government departments and organizations were represented in the RLCC which was chaired by the DS and met monthly.

Compared with the government administrative structure outlined above which has a 'top-down' approach, the RLCC tried to incorporate a 'bottom-up' approach to management, bringing together government-level administrative officers and community-level personnel to focus on local, community-based decision making and management action. The RLCC normally takes decisions based on the needs of the local communities (Lowry *et al.*, 1997) which are represented at the meetings.

Membership of the RLCC was fairly substantial and it remained somewhat open to the inclusion of new groups. The RLCC also co-opted/invited persons to attend meetings to discuss specific topics. The composition of the RLCC included:

1. Divisional Secretary, Tangalla.
2. Assistant Directors of Planning, Tangalla Divisional Secretariat
3. Officers from CCD, HIRDEP, CEA, NARA, Departments such as Forest, Irrigation, Fisheries, Police, Education.
4. Personnel from CRMP.
5. Representatives from Volunteer Organizations such as Lagoon Fishermen's Organization, Sea Fisherwomen's Organization, Farmer's Organization and Women's Development Society.

5. HISTORICAL PROFILE OF CASE STUDY SITE

5.1. Significant events that have a bearing on the community initiative

At the time that this restocking exercise began, the Rekawa area had the following framework in place which facilitated working with the fisherfolk community:

5.1.1. Receptivity to community-based initiatives

Rural areas have had a history of community workers influencing the lives and wellbeing of the villagers, possibly because of their relative inaccessibility to visits by officials of the administrative hierarchy. Rekawa seems to have had just such a tradition, judging by the number of voluntary and community-based organizations that were active here. These include:

Sarvodaya: This, the largest NGO in Sri Lanka, focuses on village-level activities. Its goal is "to develop, stimulate and encourage self sufficiency of the entire community by promoting sharing of labour, welfare and developing economic activities." (McCall, 1990).

Women's Development Society: This women's organization began in Hambantota in 1990 with local societies in the Medilla, Marakalliya, Medagama and Netolpitiya GN divisions of the Rekawa area. The organisation uses women as catalysts with the aim of helping alleviate poverty through improving nutrition, strengthening the infrastructure in rural areas, and promoting bank savings and credit.

Fisheries Cooperative Societies: These work at the level of the GN Divisions; their members are sea fisherfolk

Rekawa Lagoon Fishermen's Cooperative Society (RLFCS): The Rekawa lagoon fisherfolk form its members, its primary objective being the management of the lagoon fishery. The society is also registered under the Cooperative Ordinance. This case study was closely associated with the RLFCS whose activities and structure are given below.

5.1.2. Rekawa Lagoon Fishermen's Cooperative Society (RLFCS)

As the major occupation of the villagers is lagoon fishing, any activity related to the fishery resources of the lagoon is important to them. When the possibility of businessmen from outside the community moving into Rekawa to open up prawn farms became real, the local fisherfolk were induced to band together to create a united force capable of strongly resisting business pressures and interests.

The RLFCS was formed and registered in 1995, the first such lagoon fishery society to be registered. Its members elected a President and Secretary from among its membership, at an Annual General Meeting. Meetings are held regularly throughout the year and are chaired by the President of the RLFCS. In his absence, a pro-tem chairman is elected at that meeting. Outsiders are invited to attend meetings, especially when the matter under discussion pertains to areas where the members lack the relevant expertise. For example, the first author was invited to a discussion on shrimp restocking. The local schoolmaster often serves as an advisor to the society and since he is a learned and well-respected member of the village, the fisherfolk often seek his counsel. He is presently President of the Rekawa Development Foundation (RDF)

The structure of the RLFCS is simple, with the President and Secretary serving as its principal officers. They are empowered to represent the organisation at government or other outside meetings. The President of the RLFCS was an ex-officio member of the RLCC and was therefore empowered and able to effectively represent community concerns to government agencies at the RLCC. This representation is carried out in a responsible manner with issues being discussed, and decisions arrived at, prior to their presentation at other fora. Since all members are available at a local level, there is no difficulty in convening local meetings.

The RLFCS is a voluntary organization composed of fisherfolk acting on an equitable basis. Regular meetings are held at a community centre or in a local school where common issues and areas of conflict are discussed. Following such discussions, the members adopt a majority decision which becomes binding on all. Conflicts are therefore resolved by discussion and consensus, although there have been instances where some members have acted against a majority decision by briefly catching restocked prawns during banned periods, until the community discovered this and



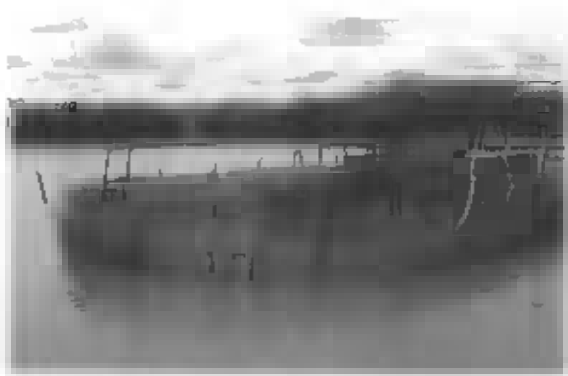
Some inter-connected macrohabitats: mangrove vegetation fringing Rekawa Lagoon with mud flats intermingled with grass

Photo : Suki Ekaratne



Fisherman with a fresh catch of fish.

Photo : Ashish Kothari



A Ja-Kotu or fish trap system at Rekawa lagoon, constructed in a manner that allows **free flow** of water while restricting the through movement of shrimps and fish. *Photo : Suki Ekaramne*



Rekawa Lagoon Fishermen's Cooperative Society shop, biodiversity-based enterprise. *Photo : Ashish Kothari*



A traditional gill-net fisherman next to the productivity-sustaining mangroves. *Photo : Suki Ekaramne*



Colombo University researchers and Kalpavriksh members at Rekawa Lagoon. *Photo : Ashish Kothari*



The Rekawa Lagoon, with grassy mudflats and a coastal strip. *Photo : Ashish Kothari.*



The calm Rekawa lagoon, with fringing mangroves framed against a hilly backdrop. *Photo : Suki Ukaratne*

adopted remedial measures.

The RLFCS participated in shrimp catch monitoring exercises conducted by the National Aquatic Resources Agency (NARA) and then by the authors. Thereafter, it actively participated in the shrimp restocking and harvesting exercise. These experiences led to the formulation of management guidelines for lagoon shrimp fishery by the RLFCS. The society also takes on the responsibility of managing the lagoon (RSAMCC, 1996).

Although the association is not legally empowered to impose punishments, social pressure and chastisement in such traditional, close-knit communities usually act as sufficiently strong punitive measures against the misuse of resources. Still, the lack of legal teeth for the adoption of punitive measures when required may be seen as a problem area. Even so, when individual fishermen adopt fishing practices that are viewed as being unsustainable or as adversely affecting the harvest of a larger group of fisherfolk, the association informs the local village-level official and the police and ensures that remedial action is taken.

The success of the villagers in discouraging outside businessmen from starting up prawn farms using resources from the lagoon may be considered a major achievement of the RLFCS that believes that environmental degradation resulting from the prawn farms would have adversely affected lagoon productivity and, consequently, their fishery income. The RLFCS also feels that it was able to prevent the social repercussions of changed lifestyles that high-income-generating prawn farms bring to rural villages through the influx of paid workers and high technological inputs. Another benefit that the fisherfolk perceive as having flowed from the RLFCS is that they have now become empowered by being able to send elected representatives to other meetings and fora. They feel that their presence and rights are being recognized by the state machinery and by officials outside the village. The prawn restocking programme is also viewed as a benefit stemming from the formation of the RLFCS, since the fisherfolk were able to express and discuss the concerns, benefits, modalities and timing of prawn releases/captures in meetings convened by the society.

The immediate day-to-day benefits of the RLFCS to its members arise from its attempts at ensuring equitable benefits to members through discussions on fishery harvests and marketing.

Admittedly, this process is not yet fully successful as is seen with the kraal fishery issue where a resolution of conflicting interests is still not achieved, although as noted in Section 6.7, this matter is presently being addressed by the RLFCS. When the fishing season commences, the members meet and discuss the number of gear types that will be allowed and exact areas where the gears may be deployed. With the prawn restocking programme, members were able to convince the fisherfolk that catching prawns only after they grew to a price-competitive size benefited the entire community rather than the few individuals who would gain from catching smaller prawns from this common-property resource. So, the RLFCS was able to impose a ban on fishing over a period of time until the prawns grew to a more marketable, and more lucrative, size. All the time, the RLFCS took the traditional practices of the fisherfolk into consideration. The RLFCS negotiated, and now owns, a freezer where the catch is stored and sold directly to consumers and hoteliers, fetching better prices for the fisherfolk.

5.1.3. Special Area Management (SAM) Project

'Coastal 2000' (CCD, 1992) proposed that a coastal zone management plan for specific geographical locations of the coastal zone be put in place, working with people and organizations that had direct links with the natural resources at these specific sites. This was referred to as Special Area Management (SAM) planning and was implemented in several international projects.

SAM planning in Sri Lanka was applied to two pilot sites, the Rekawa lagoon and the Hikkaduwa Marine Sanctuary (the latter being the initial site) considered by many to be an unsuccessful project, primarily because of its highly commercialised setting (for further details of this SAM site, please see Nakatani et al, 1994 and Ekaratne, 1997).

As part of the SAM plan, a Field Project Officer and several 'Facilitators' or 'Catalysts' were appointed; the latter were educated youth from around the project site who worked at the village level on a semi-voluntary basis and were paid a monthly honorarium.

They worked and communicated with small groups in the village and helped define their problems, offer advice and link people with resources. Community mobilization in Rekawa has been one strength of the SAM process here. The project of this case study received considerable assistance both from the Field Project Officer and the facilitators/catalysts.

The SAM project employed full-time field staff who were able to link up local communities, including the lagoon fishing community, making it possible for us to address them as a group. Therefore the lagoon fisherfolk were already present as a group when the project started.

6. PROFILE OF COMMUNITY BASED CONSERVATION (CBC)

6.1. Origins and process of CBC initiative

The destruction and alteration of coastal habitats, such as brackish-water mangroves, lagoons and estuaries in northwest Sri Lanka, through the development of export-oriented prawn farming (*Penaeus monodon*), were the chief motivational factors of this initiative.

These brackish-water habitats have been degraded through conversion into ponds for culture of the tiger shrimp, *Penaeus monodon*. A high return on investment in this export-oriented industry compelled many eager investors to enter this field of economic activity resulting in its unbridled expansion. Such unregulated expansion in brackish-water habitats, presently concentrated along the northwestern coast, has caused a disruption of the socio-economic structure of local coastal communities, the large-scale destruction of brackish-water natural resources such as mangroves, lagoons, estuaries and the alteration of water quality through unregulated discharge of prawn farm effluents into coastal habitats (Correa *et al.*, 1995, 1998). The recent and repeated outbreaks of disease among farm-cultured tiger shrimp resulted in the closure of most of the operational prawn farms. This was a direct result of the deterioration of water quality, and it is also the prime reason for depressed production presently being witnessed in the industry.

The depressed production of high-value tiger shrimp in the existing prawn farms, due primarily to poor management practices, has induced investors and planners to examine other possible locations for expansion, particularly in areas with land of low commercial value, irrespective of their ecological sensitivity. So, the coastal habitats of the south have come to be identified as potential areas for extending tiger shrimp farming, one such area being the lagoon in Rekawa.

The local community at Rekawa has put up strong resistance to the plans, anticipating a disruption of their traditional lifestyles and

fearing that pollution and habitat degradation would deplete lagoon resources, eventually depriving traditional fisherfolk of their livelihood.

On learning of this situation, the first author initiated a dialogue with the Rekawa fishing community and the local administration. It was decided to turn the lagoon into an economically valuable resource for the local community, and the national economy, so as to prevent any argument in favour of converting the lagoon and associated habitats into foreign-exchange-earning prawn farm ponds managed by outside vested interests. The first author also saw this initiative as a means of conserving and managing the biological diversity of Rekawa's coastal habitat. He saw it as a tested formula for similar projects involving local stake-holder communities, to improve their economic status, enhance the value of the natural resources and protect the associated biological diversity.

All agreements were reached with the community at their meetings so that the stakeholders were given the opportunity to discuss the issues at hand and arrive at a majority decision. This process helped them build up a consensus and realise and respect each other's point of view, based on the principles of Prior Informed Consent (PIC) on Mutually Agreed Terms (MAT), which, unfortunately, are not very often followed.

6.1.1. The Project

Project summary

The project may be summed up as being a restocking of the lagoon with post-larval stages of the prawn, *Penaeus monodon*, and allowing them to grow to a marketable size (a size that commands a high price in the market); this was then harvested by the local fisherfolk. Although smaller prawns can be caught and sold, they do not fetch a good price. Until the prawn grew to the required size, the community had to devise ways to prevent the fisherfolk from harvesting them. This proved quite a challenge to the stakeholders and tested their community-based skills.

Pre-project status

The shrimp fishery season extends from October to April/May. A shrimp catch is largely made up of *Penaeus indicus* which is not a high-value species. The high-value species is *Penaeus monodon*, which made up only 0.8% of the catch during the pre-project fishery season (compared with 2.0% in the previous season and 4.9% the

season before that) It was decided that the project would stock the young of *Penaeus monodon*.

Shrimp species in the catch (percentage composition)

<i>P. indicus</i>	93.9
<i>M. monoceros</i>	2.9
<i>M. dobsoni</i>	2.5
<i>P. monodon</i>	0.8

Economics of the project

Costs may be categorised under two headings:

- ◆ Equipment costs
- ◆ Production costs

Equipment costs are an initial investment and equipment can be reused, though it will undergo depreciation. Rearing cages constituted 93.5% of equipment costs; the costs were high as these custom-made hapas were imported from the USA. Small-scale fisherfolk in Sri Lanka receive fishing nets from the government on a subsidised basis and for any large-scale introduction of a programme, similar to this one, could initially be given to the fisherfolk on a subsidised or cost-repayment basis. Production costs can be regulated depending on:

- ◆ Requirements of a particular lagoon
- ◆ Needs of the fisherfolk.
- ◆ Numbers required for stocking operations
- ◆ Financial resources available to a fishing community.

Eighty-nine percent of production costs goes towards purchasing post-larvae (PL). These costs could come down with the opening of more cost-efficient hatcheries. Also, if the PL bought is big enough to stay within the hapa mesh. Therefore, the cost table shows the cost of purchasing 65,000 PLs from the hatchery, including 55,000 PLs that were estimated to have been stocked from the overall number of purchased PLs, and another 10,000 PLs that may have survived from escaped stock. Further loss of restocked shrimp may have occurred when the lagoon mouth was breached due to pressure from upstream farmers around the time the PL were released into the lagoon. This could be prevented (and costs for effectively released shrimp reduced) by carefully timing PL restocking.

Table 1. Equipment Costs

Items	Rs Cts
Rearing cages x 8	61,600.00
Feeding trays	300.00
Poles, netting, palmyrah kraal fence*	0.00
Food mincer and other tools	3,000.00
Ropes	1,000.00
Buckets, jugs, sieves	800.00
Total	66,700.00

*These items were provided by the fisherfolk without charge

Table 2. Production Cost(Excluding Labour*)

Items	Rs Cts
Post-larvae (65,000)	70,850.00
Vehicle hire (600 km x Rs 15)	9,000.00
PL feed (30 kg x Rs 80/kg)	2,400.00
Fresh fish feed (16kg x Rs 40/kg)	640.00
Fresh Clam feed**	0.00
Oxygen	3,000.00
Total	85,890.00

*Labour input: 2 biologists x 14 days and local fisherfolk for installing cages, helping out in feeding, transport of PL at release

**Clams were collected, not purchased

Recoveries (as shrimp and expenses from restocking exercise):

The cost recovery from the restocking took place with the sale of the recaptured shrimp after allowing them to grow in the lagoon until they reached a marketable size and harvesting them in the fishery. Larger sizes commanded better prices and since the shrimp grew much faster in the lagoon than in shrimp farms, it was beneficial to harvest larger shrimp. This required the community to evolve guidelines

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 for harvesting shrimp only after they had grown to an acceptable size. This tested the effectiveness of the RLFCs as a social force. The table below shows the recoveries in terms of shrimp numbers caught in the fishery and prices realised from their sale.

Table 3. Recoveries in Terms of Shrimp Numbers Caught in the Fishery and Prices Realised

Estimated restocked number	65,000
Estimated number of shrimp caught (average weight was 125g per shrimp)	1,920
Percentage caught	3
Production cost for restocking	Rs 85,890.00
Money recovered from sale of restocked recaptures caught in the fishery	Rs 120,000.00
Financial surplus (profit)	Rs 34,110.00

6.2. Elements for community involvement and success in the initiative

The shrimp that formed the focus of this case study was the most valued fisheries resource of the fishing community of the Rekawa lagoon. It was the high value aspect of this commodity that perhaps contributed most to the project's success.

Apart from the stocked shrimp harvest being cost-effective, the success of the community initiative can also be gauged from the community empowerment that resulted. For example, a causeway that was built by the Road Development Authority (RDA) in 1984 was suspected of reducing shrimp larval migration into the lagoon (Jayakody and Jayasinghe, 1992) and in restricting water exchange between the sea and the lagoon. It was the collective action of the villagers and district-level committees that initiated the removal of the causeway in 1998, after NARA-mediated workshops informed the community that the causeway did indeed hamper shrimp recruitment into the lagoon.

Project success required guaranteeing the *initial involvement* of the community and *retaining* their commitment in the long term. Various factors played their part in bringing about this involvement and commitment.

These are:

The community needed to become *empowered* to sustain their commitment. In this respect, a sense of long-term ownership by the community was vital. The decentralised grassroots-level decision-making capability with regard to practical day-to-day issues also helped bring about a sense of empowerment. Further empowerment of the community of fisherfolk took place through:

- Awareness programmes through educational workshops by the project team. The attendance of local administrators was crucial in order to stress the importance of the programme upon the local community.
 - The fisherfolk banding together to form an association, the RLFCs. This is discussed in Section 5.1.2.
 - This association having a leadership structure such as a Chairman and Secretary, as discussed in Section 5.1.2
 - The association having a strong voice within the community.
 - The association being able to meet regularly, even at short notice.
 - The association being granted recognition at different levels. For example, the RLFCs was represented officially at hierarchical bodies where important decisions were taken (such as the RLCC, the Rekawa Lagoon Coordinating Committee) and where most government institutions and community organizations were represented.
 - Fisherfolk having the power of veto at every stage of the process.
- The community needed to feel that the people involved in the project were *accountable* to them. This was achieved by building up a sense of trust, understanding and openness with community members for which frequent visits to the community and respect shown to their simple lifestyles and occupations were important elements.

The establishment of rapport and *links* were vital too. This was achieved in various ways and at different levels of the community, involving the establishment of personal working relationships between the project personnel and leaders of the local administration and community. Links between the researchers, administrative and law enforcement personnel/agencies ensured close cooperation and participation by all the concerned institutions. Facilitators (see below) played a key role in establishing and maintaining these links.

The demonstration and existence of *committed leadership* contributed considerably to the project's success. The leadership of a few strong and committed people at different levels was important. They were:

- At the local government administrative level, the leadership and commitment shown by the Divisional Secretary, D.A.L. Nimal.
- At the local community level, local schoolmaster M.M. Ranjith
- At the fisherfolk level, the President and Secretary of the RLFCFS and a few other fisherfolk.

The translation of an initiative into a feasible, successful time-bound project requires the commitment of considerable time and energy. It involves moving people away from established practices/habits and stimulating them into considering and accepting new ways of thinking/behaviour. For this, people who can facilitate such changes and reinforce them through repeated input are required. Paid facilitators worked full-time to bring about these changes at various levels, while others devoted themselves part-time. These *diverse facilitators* possessed various skills and were integrated through meetings. They were drawn from different stakeholder sectors (outside the community as well as within, and from peripheral sectors) in view of the different sectors they were called upon to influence. They needed to act in an integrated manner, with a common focus but with different approaches and strategies. This was made possible by an *overall facilitator* who had a range of knowledge skills. Technical and human relations skills were also called upon, as was the need of an overall plan and the role of each team player. (In this case the first author played the role of the overall facilitator.) All the facilitators had to be able to relate with one another and empathise with the community as a whole. They also needed to be skilled in conflict resolution.

The facilitators included persons drawn from within the community or its immediate periphery, but without technical skills (such as the nine young facilitators who were paid a monthly allowance). Or they were drawn from outside the community — persons with strong organizational abilities who lived in the area and had earned the respect of the community (for example, Project Officer, CRMP, Tissa Ariyaratne). These facilitators had to liaise effectively between the community and so-called 'outsiders' such as us who comprised the technically knowledgeable personnel. Then there were those drawn from within the community, or its surrounds,

who had earned the community's respect, such as schoolmaster M.M. Ranjith.

The establishment of *channels of communication* and retaining their effectiveness by keeping them open and flexible is not easy in any setting. Decisions also needed to be disseminated widely. These requirements were met through the following mechanisms and contributed much to the project's success:

- Formalised structures for meeting regularly at different levels; at the local administrative level via monthly meetings chaired by the Divisional Secretary at the Divisional Secretary's office; and at the fishing community level through regular RLFCFS meetings.
- Retention of a flexible structure at each level of the formalised meetings to allow experts to attend and advise. For example, by attending meetings at different levels the author was able to keep everyone, from fisherfolk to administrative personnel, informed of potential benefits and impacts.
- Regular meetings helped in conflict resolution among the stakeholders; for example, when the fisherfolk were in conflict over different methods of fishing. The RLFCFS served as a meeting point for such conflict resolution and we were also able to advise the concerned parties. Because of its formalised setting decisions arrived at were immediately made known, leaving little room for rumour. Therefore, when these decisions were not adhered to, wrong-doers were reported to the police who then acted on two such occasions.
- Keeping communication and discussion channels between us and the fisherfolk open through regular meetings.

The project needed to offer a significant *benefit generation* aspect/s for the many stakeholders in order to attract and keep people bound to its implementation and success. The fisherfolk saw a clear generation of benefits through income enhancement while others such as the facilitators had the benefits of employment as well as social standing in the community. The authors saw the project as a means to scientifically demonstrate the viability of a community-involvement project, to bring about ecologically and economically-sustainable penaeid shrimp stock enhancement, by which shrimp aquaculture/ranching and artisanal fishing could co-exist. The initiative also demonstrated an approach to sustainable practices in community-based coastal biodiversity management. The complex structures and mechanisms that were involved in bringing about its

success seemed to explain why such economically-viable stock enhancement of a natural system had not been demonstrated elsewhere earlier.

It was necessary that *every stage* of the project remained open and transparent and that there was active supportive *participation* by all or most of its stakeholders. At one stage, there were two persons who doubted the project's outcome, but since the majority was in favour they were able to persuade them to set aside their cynicism.

It was essential to have a well formulated *Plan of Action*, as well as project management by the Principal Investigator. This would help *integrate* the anticipated outcomes, outputs, aspirations and activities of the many groups and stakeholders involved in the project. The *Plan of Action* had to be time-bound yet sufficiently flexible to allow modification whenever necessary. It had to incorporate phases of program review with reference to time-related sub-component target achievement objectives, and the periodic re-evaluation of sub-component feasibility options considering successes/failures at sub-stages of the project. It called for excellent *project management* skills.

6.3. Monitoring and evaluation

The project's success was monitored every fortnight, when the prawn catch was sampled. The fisherfolk and the Fishermen's Society also kept daily records of catches; these were made available to us on our fortnightly visits. The sale prices of harvested shrimp were calculated based on information from the fisherfolk. The economic success of the restocking was evaluated based on costs incurred and the sale price of the shrimp caught.

Questionnaire-based surveys were carried out at the end of the restocking-harvesting exercise. Mid-term meetings were also held with the community. Prior to the fishery, the fisherfolk monitored the growth of the restocked shrimp and reported increases in size, using exploratory experimental fishing so that, with them, the first author could decide when commercial fishery could commence.

The fisherfolk were subsequently questioned about increased incomes and whether the restocking exercise had proved beneficial to them. This also provided inputs on the improvement of the socio-economic status of their families based on the enhanced incomes. Two cycles after the restocking (when no restocking was done), the fisherfolk were asked whether they could determine whether the restocking had been beneficial and whether they would like another restocking to be carried out.

6.4. Changes perceived/measured in state of habitat by the CBC initiative

An aspect to be studied, by other environmentally-conscious parties also, was the environmental benefits that would naturally accrue from an environmentally-friendly farming practice, as against the environmentally-destructive intensive prawn farming practised in the northwestern areas of the country. The SEMBV prawn disease, which forced most shrimp farms to close down and posed a threat to prawn farm sustainability, has been ascribed to environmental degradation. The FAO has recently been approached by international pressure groups asking it not to lend financial support to such environmentally unsound, non-sustainable farming practices (pers.com.; eg. Island, 1995). The success of the present programme would therefore present a tenable alternative.

A number of people both from within and outside the Rekawa area have told us that increasing the economic value of the lagoon through the restocking of export-quality shrimp has prevented environmentally-unsound prawn farming from making inroads into the lagoon. The community has now come to realise the value of the lagoon and has been motivated to examine how best to sustain the quality of the lagoon water so as to improve shrimp growth. Recently, at a meeting of the RLFCs where the first author was requested by the fisherfolk to conduct another restocking exercise, the community discussed how an overseas hotelier was polluting the lagoon with grey water from the hotel. They decided to bring this to the immediate attention of the relevant authorities. The fisherfolk had also decided that, in the better interests of water quality, indeed the quality of their lives, they would not allow mechanised craft to be used in the lagoon. We had earlier shown them the myriad small microscopic organisms in the water essential for good shrimp/fish growth. These would have been adversely affected by fuel such as diesel. No corn-based lime kilns now operate in the Rekawa area. Further, the local community members themselves have put up signboards in certain mangrove areas stating that mangroves are protected. Such initiatives reflect the changing attitudes of the people towards natural resource conservation.

The fisherfolk informed us that eels that used to attack shrimp in nets had decreased, possibly due to the better flushing of water from the lagoon and a greater influx of seawater, following the construction of the Kapuhēwala bridge near the lagoon mouth. Moves towards construction of the bridge were brought about by

the empowerment of the community following the CBC initiative.

The community told us that it would cease from mining coral if their incomes remained adequate, through the shrimp restocking programmes, for example, particularly if income-generation coincided with lean periods. They were aware that coral mining was destructive, but had little or no alternatives.

The community has also been working with the Forest Department that is engaged in mangrove protection through the setting up of signboards. The Turtle Conservation Programme, which was viewed with some skepticism when the author first visited the area several years ago, is now endorsed by the fishing community. In general, the community has been made to realise that its long-term wellbeing depends on the good health of the waters of the lagoon and associated habitats. This attitude, and the subsequent protection of habitat, helps maintain water quality as well as biological diversity in the region.

6.5. Changes in resource availability and livelihood opportunities due to CBC initiative

The *Penaeus monodon* restocking programme saw several major economic concerns on which its success would be evaluated economically and socially, particularly by the fishing community.

The most important economic concern of the local community was the extent of *direct economic benefit* that the fisherfolk could derive as a result of the restocking programme. Its *financial feasibility* depended on whether restocking expenditure could be recovered through the sale of recaptured tiger shrimp. It is clear that the fisherfolk derived greater economic benefit in the 'with project' situation, compared to the 'without project' situation (see Section 6.4.1 where increased income and shrimps are reported after restocking). It also became clear that income realised from the sale of restocked tiger shrimp exceeded the expenses that were required for the restocking exercise (see Section 6.1.1).

6.5.1. Increased shrimp stock, incomes and resource availability due to CBC

Shrimp fishery in Rekawa begins in October, peaks in February and is over by late April/early May. The fishery is extremely intensive, virtually all the shrimp is removed by early May. The two stock enhancement exercises that were carried out with *Penaeus monodon* PLs in July 1996 (55,000 PLs) and July 1997 (70,000 PLs) resulted in large commercial catches of *Penaeus monodon* from September through to January in both years. The total shrimp

resource in terms of numbers of *Penaeus monodon* grew by as much as 1,400% and the entire annual catch was worth 33% more than in the year when no restocking was done.

An increase in the catch rate of tiger shrimp in the fishery harvest from the Rekawa lagoon and the economic analysis (Section 6.1.1) show that the restocking programme was successful in terms of harvested tiger shrimp resource, increased income to the fisherfolk as well as the recovery of immediate costs in the restocking exercise. The restocking programme has been a financial success and has also assisted the community in a socio-economic sense. It is sustainable, since it is profitable, provided initial funds for restocking come out of a fund base that can be gradually built up from profits. When the environmental benefits of this type of shrimp farming are also taken into account, the programme may be considered a great success (Ekaratne *et al*, 1996; Davenport and Ekaratne, 1997; Davenport *et al*, 1999). A factor that could facilitate the sustainability of similar exercises is the transfer of know-how to community members with respect to effective finance management. Although community members are aware that they can sustain such initiatives only if they collectively set aside a sum from their enhanced incomes for repeated restocking, they lack the financial discipline and knowledge to effect the necessary changes in their spending-saving habits.

Although shrimp resources increased, thanks to the CBC initiative, during that time of the year when they are not normally available, a concern expressed by some fisherfolk was whether the introduction of prawn stocks from outside natural recruitment would depress productivity in the lagoon (in relation to the traditional *Penaeus indicus* naturally-recruited fishery). A comparison of prawn yields (over the pre-stocking and post-stocking periods) from the lagoon based on the naturally-recruited *Penaeus indicus* stocks, show that the restocking programme did not depress the normal *Penaeus indicus* resource available to the lagoon fishery (Davenport *et al*, 1999). Indeed, the post-project *Penaeus indicus* harvest exceeded pre-project harvest quantities, perhaps due to improved recruitment or/and aquatic productivity patterns.

6.5.2. Changes in livelihood opportunities due to the CBC initiative

The time of year at which the fishing community derived economic benefit from shrimp recapture was important in a social context because, during the non-fishing season, that extends from May/June to September/October, the income of lagoon fisherfolk is meagre and they face serious financial and social difficulties.

This is because Rekawa's lagoon fishery remains the major source of income to the lagoon fisherfolk, and this fishery was seasonal, depending on natural recruitment from the sea. Consequently, no income is generated in the off-season and only a low income at the start of the fishing season which starts around October/November and extends till about April/May. If restocked tiger shrimp were able to realise a harvest over this low or no-income period, such an income would exert a much greater beneficial impact socially than that which is judged solely by financial benefit.

When the 1,400% increase in tiger shrimp stock and improved incomes from the restocking are looked at closely, we see that 96 per cent of the increased income associated with restocked tiger shrimp was realised over a 2.5 month period, from October to the early part of the following year. This is the beginning of a normal fishing season (based on *Penaeus indicus*) when fishing incomes are still very low. A questionnaire-based survey indicated that the increased income during this period was indispensable to the welfare of the fisherfolk's families, increasing their livelihood opportunities during an otherwise low-income period. The importance of such timing was amply illustrated in a recent survey conducted as part of the present study, in which 69% of fisherfolk favoured the programme because it brought in income over a lean-income period.

Compared with the harvested *Penaeus indicus*, the tiger shrimp is larger and earns twice the market price. Therefore, the fisherfolk prefer a harvest of tiger shrimp.

From a survey conducted among fisherfolk who engaged in full-time lagoon fishing, results indicated that all of them recorded an increase in income from the shrimp fishery following the stock-enhancement programme. About 8% stated that there had been an increase in income from fish and shrimp, while 92% of those who responded to the question stated that increased income was derived from shrimp fishery alone. This increased income had been used mainly to buy new fishing gear, school uniforms and books for their children as well as for house repairs and the purchase of means of transportation, such as bicycles. All this confirmed that the enhanced incomes helped the community socio-economically. About 62% of fisherfolk regarded the restocking programme as "very good" while 31% stated it to be "good". Others did not respond to the question. Approval for the restocking programme was either because of the increased income (23%) or income earned during a low-income period of the year (70%). We see here the clear socio-economic implications of income-generation during lean periods.

The benefits to the fisherfolk and their grasp of the sustainability concept of a fishery were amply illustrated when 92% of the fisherfolk stated that they would agree to management measures such as gear limitations imposed by the Fishermen's Association for the long-term sustainability of the shrimp stocks that would be introduced into the lagoon as part of a future stock-enhancement programme.

6.6. Institutional changes in access/control due to CBC initiative

Following the CBC initiative, the RLFCs has much greater control over the resources. They have opened up a shop to sell their catches to the consumer directly, rather than through the traditional middleman. This brings the fishermen better prices. The RLFCs also has a deep freezer in which catches are stored for sale at higher prices.

With the empowerment of Rekawa communities, the Rekawa Development Foundation (RDF) was started, in 1996, which takes an overall interest in the Rekawa region. It is on the premises of the RDF that the RLFCs now meets as the two bodies are interlinked. The RDF conducts assistance programmes which also benefit the RLFCs. For example, the RDF coordinates programmes that offer assistance for housing, boat-building, latrine-construction, children's books, schooling needs, a foster parent scheme, a women's self-employment scheme, etc. The RLFCs participates and benefits from all these programmes. An Environmental Centre is also being planned, which speaks much for the environmental awareness created by CBC initiatives. Recently, the RLFCs and the RDA have been able to locate and channelise unutilised monies from the local government to the construction of a children's play/learn facility.

The ability and effectiveness of the RLFCs in conflict resolution will be tested to the fullest as it is now discussing ways to shift kraal fishery to a less impacting location. This is a contentious fishing method that obstructs the movement of fish and traps smaller fish and shrimp. The very fact that the RLFCs is considering resolving such contentious issues means that it's come a long way from the indecisive stands adopted in the society's infancy.

The Fisheries Act No. 2 of 1996 makes legal provision for the declaration of Fisheries Management Areas such as Rekawa, and the areas to be managed under the purview of a Committee whose members are registered fisherfolk resident in that Fisheries

Management Area. The Act empowers the Minister to declare selected suitable sites as Fisheries Management Areas. These enactments have come about thanks to adequate proof that CBC initiatives are among the few effective methods to bring about effective fisheries management in developing countries that lack personnel and sufficient finances to monitor and implement the many very effective laws that are put into our statute books by well-meaning legal luminaries.

6.7. Success/failure and opportunities/constraints for CBC: Lessons learnt

The CBC initiative reported in the case study demonstrates the success of community involvement in the management of natural resources, and the increase in livelihood of the community as a whole, especially as natural-resource management is often constrained by resources being considered 'common property'. The attitudinal and functional changes brought about within the community (such as the empowerment to have wide activities and powers as enjoyed by the Rekawa Development Foundation and the RLFCs), the local administrative framework as well as national laws (such as those reflected in the Fisheries Act No. 2 of 1996) to incorporate community-based management through the establishment of management committees consisting of local persons, can be considered a success that offers greater opportunities to the stakeholder community.

The successes associated with this particular CBC initiative should be balanced by looking at aspects that need to be upgraded for the project's replicability and sustainability. It is prudent to examine the failures and constraints commonly experienced in the translation of CBC initiatives into long-term programmes whereby they grow from being initiatives to becoming sustainable self-driving long-term programmes.

The CBC initiative reported here was envisaged as a programme where the community put away some profits to fund future restocking programmes, at least partly. Such communities, however, are economically backward and have poor management capabilities. Because of these practical difficulties very few of them are endowed with long-term vision. A couple of years after the successful completion of two profitable restocking exercises, the community is still unable to muster up sufficient capital to restart the restocking cycle, although they are fully aware of its profitability. Very recently, the community requested the first author to restart the programme and he has since been attempting to raise money for the exercise, keeping in mind the long-term goals.

The main drawback of the CBC initiative can therefore be said to be the inability to sustain this activity to bring about long-term benefits to the community and the environment.

The SAM project, referred to earlier, had a priming phase where staff was employed both at the site and elsewhere. Our project, on the other hand, did not employ anyone at the site but drew on assistance from the community on an unpaid basis. Foreign-funded projects, with foreigners at the helm, are sometimes known to make surreptitious monthly payments to local administrators in order to harness their support during the project period. This might seem necessary for the progress of short-term projects but it is lethal to project sustainability. A more productive strategy would be to train and empower local administrators over a period of time in order to earn their commitment, which would then be available in the long-term also.

In this case study when the well-meaning foreign-funded SAM project came to an end, as every assistance programme inevitably does, the foreigners left, leaving no one to revisit and monitor the site and/or the community. The dynamism of the Rekawa Lagoon Coordinating Committee (RLCC), that served as the cornerstone for the success of the CBC initiative, waned with the demise of the SAM project. Persons employed by the SAM project left the area, if they were outsiders, or became frustrated if they were from the area and could not find further employment. In this case study, although the project was funded from overseas, the first author has been revisiting the site to try to bring something more permanent to the lives of the people and to the natural resources of the country.

So, it is felt that foreign-funded projects without committed local personnel at the directing level cannot be expected to seriously consider the sustainability of CBC initiatives. Indeed, they can even be unwittingly harmful to CBC initiatives in that any withdrawal of support resulting in a collapse of required infrastructure would cause CBC initiatives to falter. This would make scapegoats of local communities and bring about an erosion of confidence in CBC initiatives. All future opportunities could well be lost in this manner. The other SAM project at Hikkaduwa is regarded as a failure, so much so that other developers shy away from such 'unmanageable' sites.

A CBC project must therefore be accepted only where definite and realistic plans are drawn up regarding its sustainability or/and transition to a subsequent activity phase. Local expertise should be harnessed at the highest level.

The success and sustainability of CBC initiatives is largely dependent on good project management and committed leadership. It is therefore necessary that leaders from within the community itself are carefully selected and trained, even though this may extend the duration of the project.

Effective community mobilisation to form cohesive groups was a factor that contributed to the project's success. This was initiated by the SAM project. Locally-recruited 'catalysts' (see Section 5.1.3) played a key role in the process, further strengthening the case for recruiting local personnel for CBC initiatives.

Mechanisms to develop legal backing to punish recalcitrant members of the community may be seen as a problem area that requires examination. This aspect surfaced when individual fisherfolk adopted fishing practices that were viewed as unsustainable or as adversely affecting the harvests of a larger group of fisherfolk. The only remedy available to the fisherfolk was to inform the local village-level official and the police and ensure that the officials take corrective action.

The 'common property' nature of the valuable shrimp resource meant that a few unscrupulous fishermen would try to exploit the situation by surreptitiously fishing, thereby breaking from the normally cooperative framework of the community. The evidence of such 'illegal' fishing meant that unreported tiger shrimp recapture had taken place, particularly during the period that the RLFCFS had banned shrimp fishing. If this were taken into consideration, the recovery figures in the stock-enhancement exercise would increase, resulting in greater financial surplus as well as better shrimp recapture rates. Although this did not unduly hinder project activities, as the incidences reported were too few, it clearly demonstrated the need to collect background information from various stakeholder groups.

6.8. Steps proposed for the future

The steps proposed for the future are those with specific relevance to the stalled project dealing with an aquatic coastal habitat. Since aquatic and coastal habitats in Sri Lanka are being increasingly impacted (Ekaratne and Jinendradasa, 1997) and their conservation and sustainable use are becoming imperative (Ekaratne, 1998), lessons learnt here do have wider implications.

The proposed steps include those of a biological/ecological nature as well as measures to ensure that the CBC initiative does not falter to such an extent that restoring it would be impossible.

Ensuring the quality of lagoon water is central to the sustainability of lagoon fisheries and the income of the lagoon fisherfolk. The stakeholders should ensure that the water remains unpolluted and that shrimp farming employing feeds and chemicals is avoided.

Literature indicates that the surface area of the Rekawa lagoon is decreasing. It would be in the interests of the local community as well as the scientific fraternity to investigate the extent of any such change in water area and the reason/s for such a change.

It is necessary to maintain the momentum of the 'bottom up' management approach by reactivating the Rekawa Lagoon Coordinating Committee (RLCC) to its former level of activity. Extending support to the Rekawa Lagoon Fishermen's Cooperative Society (RLFCFS) is important to sustain the lagoon conservation initiative through restocking, particularly in the light of increasing tourism-related activities that could change the environmental and social profile of the area. RLFCFS members need to be empowered to maintain their vigil on the lagoon waters.

Support to the Rekawa Development Foundation (RDF) is also necessary, especially by way of increasing available office facilities and upgrading its staff so that the organisation can represent community concerns effectively to government agencies and donor agencies in order to continue developing the Rekawa area. The financial support that the RDF has recently been able to obtain from multilateral funding agencies such as Plan International shows that the RDF has earned considerable credibility not only from the locals but outside agencies as well. It would appear that the strengthened RDF will play a pivotal role in facilitating local community involvement in initiatives that decide future developmental direction in the Rekawa area.

A programme to monitor lagoon catches and water quality, to be conducted jointly with the RLFCFS membership in the initial stages and later by RLFCFS members, would help track any undesirable changes in water quality.

7. MAJOR ISSUES AND RECOMMENDATIONS

Major issues were discussed in Section 6.7 under 'Success/failure and opportunities/constraints for community involvement in management: Lessons learnt'. One issue that loomed large was that of ensuring that the reported success is repeated. This sustainability aspect assumed greatest importance perhaps because the initiative reported in this case study was a success over the project period.

CBC initiatives need to have the following aspects in place:

1. A well-formulated integrated Plan of Action incorporating long-term sustainability plans, especially when funding is withdrawn at the end of the project.
2. A knowledgeable, locally-recruited facilitator with commitment and excellent leadership, project management, communication and inter-personal skills.
3. Establishment of empathy and a sense of accountability and commitment to the community from project personnel and local administrators.
4. A project facilitation period when stakeholders are primed for subsequent participation.
5. A framework to initially draw in the community and subsequently retain community interest.
6. Clear communication with the multiple stakeholders about the significant benefit-generation aspect/s.
7. Multiple mechanisms to empower the community.
8. Effective rapport and links amongst the diverse sectors involved, including government sector personnel.
9. A flexible communication structure ensuring transparency and conflict-resolution.
10. A diversity of inter-linked facilitators with various skills, drawn from various stakeholder sectors of the local community.
11. Every stage of the project open and transparent, thereby ensuring active supportive participation by all or a majority of stakeholders.

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ANNEXURES

Annexure 1

MANGROVE AND SCRUB VEGETATION SPECIES IN
REKAWA LAGOON AREA(adapted from Ganewatta *et al.*, 1995)

Scientific Name	Local Sinhala Name
<i>Acanthus ilicifolius</i>	Mulli, Katu ikkili
<i>Acrostichum aureum</i>	Karen Koku
<i>Aegiceras corniculatum</i>	Heenkadol
<i>Avicennia marina</i>	Manda, Madagas
<i>Avicennia officinalis</i>	
<i>Bruguiera gymnorhiza</i>	Malkadol, Sirikanda
<i>Bruguiera sexangula</i>	
<i>Ceriops tagal</i>	Punkanda, Rathungas
<i>Clerodendrum inerme</i>	
<i>Dalichandrone spathacea</i>	Diya danga
<i>Excoecaria aggalocha</i>	Thela
<i>Heritiera littoralis</i>	Etuna
<i>Lumnitzera racemosa</i>	Bariya
<i>Rhizophora mucronata</i>	Kadol
<i>Sonneratia acidia</i>	Kirala
<i>Sonneratia caseolaris</i>	Kirilla
<i>Typha angustifolia</i>	

Annexure 2

COMMONLY FOUND FISH AND SHELLFISH IN REKAWA
LAGOON AREA(adapted from Ganewatta *et al.*, 1995; personal observations)

Scientific Name	Common Name
<u>Fish</u>	
<i>Anguilla sp.</i>	Eel
<i>Aries sp.</i>	Catfish
<i>Carangoides malabaricus</i>	Malabar trevally

Chanos chanos
Elops sp.
Epinephelus taurinus
Etroplus maculatus
Eutheron sp.
Gazza sp.
Gerreomorpha sp.
Gerres sp.
Gerres setifer
Gubius sp.
Gobius tentaculoris
Hyporhamphus sp.
Ilisha elongata
Lelagnathus sp.
Leiognathus equus
Macromus vilatus
Monodactylus argentus
Megalops sp.
Mugil cephalus
Muraenesox cinereus
Nematalosa nazus
Ophisthopleus tardoore
Oreocluamis masambicus
Oreocluamis niloticus
Puntius vittatus
Sardinella sp.
Siganus javus
Sillago sihama
Tachysurus sp.
Tetraodon sp.
Therapon jarbua
Thryssa sp.
Trichanthus brevirostris

Milkfish
 Ten-pounder
 Greasy grouper
 Spotted etroplus
 Large-scale banded grunt
 Toothpony
 Bidy
 Silver bidy
 Black-tipped silver bidy
 Goby
 Tentacled goby
 Halfbeak
 Slender shad
 Ponyfish
 Greater ponyfish
 Striped-dwarf catfish
 Mono
 Tarpon
 Flathead mullet
 Daggertooth pike conger
 Bloch's gizzard shad
 Tardoore
 Mozambique tilapia
 Nile tilapia
 Striped barb
 Sardine
 Streaked spinefoot
 Silver silago
 Catfish

 Jarbua terapon
 Anchovy
 Tripod fish

Crustaceans

Brachirus orientalis
Macrobrachium rosenbergii
Metapenaeus dobsoni
Metapenaeus monoceros
Penaeus indicus
Penaeus latissulcatus
Penaeus monodon
Penaeus semisulcatus
Squilla serrata

Giant freshwater shrimp
 Penaeid shrimp
 Penaeid shrimp
 White shrimp
 Milk shrimp
 Tiger shrimp
 Green tiger shrimp
 Mangrove crab

Annexure 3

BIRD SPECIES IN REKAWA LAGOON AREA

(adapted from Ganewatta *et al.* 1995)

Scientific Name

Common Name

Non-migratory Birds

<i>Acridotheres tristis melanosternus</i>	Common mynah
<i>Aegithina tiphia multicolor</i>	Ceylon iora
<i>Alcedo atthis taprobana</i>	Common kingfisher
<i>Amiurornis phoenicurus</i>	White-breasted waterhen
<i>Anastomus oscitans</i>	Openbill
<i>Anhinga melanogaster</i>	Darter
<i>Artamus fuscus</i>	Ashy swallow shrike
<i>Ardea purpurea manilensis</i>	Eastern purple heron
<i>Ardea cinerea rostrifris</i>	Eastern grey heron
<i>Ardeola grayii</i>	Pond heron
<i>Bubulcus ibis coronandus</i>	Cattle egret
<i>Butorides striatus javanicus</i>	Little green heron
<i>Copsychus saularis ceylonensis</i>	Southern magpie robin
<i>Centropus sinensis parroti</i>	Common coucal
<i>Ceryle rudis leucomelanica</i>	Indian pied kingfisher
<i>Charadrius dubius curonicus</i>	Little ringed plover
<i>Chlidonias hybrida indica</i>	Indian whiskered tern
<i>Coracias benghalensis indica</i>	Indian roller
<i>Corvus macrorhynchos culminatus</i>	Black crow
<i>Dendrocygna javanica</i>	Lesser whistling teal
<i>Dicaeum erythrorhynchos ceylonensis</i>	Sri Lankan small flowerpecker
<i>Egretta alba modesta</i>	Larger egret
<i>Egretta garzetta garzetta</i>	Little egret
<i>Eremopterix grisea ceylonensis</i>	Ceylon finch lark
<i>Esacus recurvirostris</i>	Great stone plover
<i>Gallus lafayetii</i>	Jungle fowl (endemic)
<i>Halcyon smyrnensis fusca</i>	White-breasted kingfisher
<i>Haliaeetus leucogaster</i>	White-bellied sea eagle
<i>Haliastur indus indus</i>	Brahminy kite
<i>Hemiprocne longipennis coronata</i>	Indian-crested swift
<i>Himantopus himantopus ceylonensis</i>	Black-winged stilt
<i>Hydrophasianus chirurgus</i>	Pheasant-tailed jacana
<i>Urolancla punctilata lineoventer</i>	Spotted munia
<i>Thereiceryx zeylanicus zeylanicus</i>	Brown-headed barbet

<i>Merops orientalis ceylonicus</i>	Green bee-eater
<i>Egretta intermedia intermedia</i>	Median egret
<i>Mirafra affinis ceylonensis</i>	Bush lark
<i>Ibis leucocephalus</i>	Painted stork
<i>Cinnyris asiatica asiatica</i>	Purple sunbird
<i>Cinnyris lotenia lotenia</i>	Loten's sunbird
<i>Oriolus xanthornus ceylonensis</i>	Black-headed oriole
<i>Orthotomus sutorius fernandonis</i>	Tailor bird
<i>Pelargopsis capensis gural</i>	Short-billed kingfisher
<i>Pelicanus philippensis</i>	Brown pelican
<i>Phalacrocorax niger</i>	Little cormorant
<i>Phalacrocorax fuscicollis</i>	Indian shag
<i>Porphyria poliocephalus</i>	Purple coot
<i>Prinia ludyanii pectoralis</i>	Ashy prinia
<i>Prinia inornata insularis</i>	White-browed prinia
<i>Rostratula benghalensis</i>	Painted snipe
<i>Ptilinopus kromeri manillensis</i>	Rose ringed parakeet
<i>Molpastes enfer cafer</i>	Red-vented bulbul
<i>Pycnonotus luteolus insulae</i>	White-browed bulbul
<i>Saxicola des fulicata leucoptera</i>	Black robin
<i>Spirornis cheela spilogaster</i>	Serpent eagle
<i>Sterna albifrons</i>	Little tern
<i>Streptopelia chinensis ceylonensis</i>	Spotted dove
<i>Podiceps ruficollis capensis</i>	Little grebe
<i>Tchirea paradisi</i>	Sri Lankan paradise flycatcher
<i>Fluvskornis melanocephala</i>	White ibis
<i>Tringa totanus eurhinus</i>	Eastern red shank
<i>Turdoides striatus striatus</i>	Common babbler
<i>Ixabrychus sinensis sinensis</i>	Yellow biter
<i>Lobivanellus indicus indicus</i>	Red-wattled lapwing
<i>Lobipluvia natalarica</i>	Yellow-wattled lapwing

Migratory Birds

<i>Charadrius dubius curonicus</i>	Little-ringed plover
<i>Chlidonias hybrida indica</i>	Indian whiskered tern
<i>Hirundo rustica gutturalis</i>	East Asian swallow
<i>Merops superciliosus philippinus</i>	Blue-tailed bee-eater
<i>Motacilla cinerea melanope</i>	Grey wagtail
<i>Motacilla flava thumbergi</i>	Grey-headed yellow wagtail
<i>Nunnius arquata orientalis</i>	Eastern curlew
<i>Pitta brachyura</i>	Indian pitta
<i>Plegadis falcinellus falcinellus</i>	Blue-tailed bee-eater
<i>Pluvialis dominica fitva</i>	Asiatic golden plover
<i>Pluvialis squatarola squatarola</i>	Gray plover
<i>Sterna gelochelidon nilotica nilotica</i>	Gull-billed tern

Tringa actitis hypoleucos
Tringa stagnatilis
Tringa totanus eurhinus

Common sandpiper
 Marsh sandpiper
 Red shank

Annexure 4

CORAL SPECIES IN THE REKAWA REEF

(adapted from Ganewatta *et al.*, 1995)

Acropora formosa
Acropora aculeus
Acropora robusta
Montipora aequituberculata
Stylocoenia guentheri
Favia speciosa
Favites chinensis
Favites flexuosa
Favites abdita
Favites pentagona
Pavona varians
Platygyra lunellina
Platygyra sinensis
Platygyra pini
Hydnophora microcosm
Millepora platyphyllia
Galaxea fascicularis
Pocillopora danicarnis
Pocillopora verrucosa
Porites sp
Pavona varians
Psammacora contigua

Annexure 5

FISH SPECIES IN THE REKAWA REEF

(adapted from Ganewatta *et al.*, 1995)

Scientific Name

Common Name

<i>Acanthurus leucosternon</i>	Powder-blue surgeonfish
<i>Acanthurus lineatus</i>	Striped surgeonfish
<i>Acanthurus triostegus</i>	Convict surgeonfish
<i>Ctenochaetus striatus</i>	Striped bristletooth
<i>Naso lituratus</i>	Orange unicornfish
<i>Caranx melampygus</i>	Blue-fin trevally
<i>Chaetodon citrinellus</i>	Citron butterflyfish
<i>Chaetodon decussatus</i>	Black-finned butterflyfish
<i>Chaetodon lunula</i>	Raccoon butterflyfish
<i>Chaetodon vagabundus</i>	Vagabond butterflyfish
<i>Anampses lineatus</i>	Lined wrasse
<i>Gomphosus varius</i>	Bird wrasse
<i>Halichoeres cenricaudatus</i>	Checker-board wrasse
<i>Halichoeres marginatus</i>	Dusky wrasse
<i>Halichoeres nebulosus</i>	Nebulous wrasse
<i>Stethojulis trilineata</i>	Three-lined wrasse
<i>Thalassoma quinquivittata</i>	Five-striped wrasse
<i>Thalassoma lunare</i>	Moon wrasse
<i>Lutjanus fulvus</i>	Yellow-margined sea perch
<i>Lutjanus lunulatus</i>	Crescent snapper
<i>Acanax scopas</i>	Broom filefish
<i>Parupeneus barberinus</i>	Dash-dot goatfish
<i>Parupeneus indicus</i>	Indian goatfish
<i>Pempheris ovalensis</i>	Silver sweeper
<i>Abudefduf septemfasciatus</i>	Seven-bar sergeant major
<i>Abudefduf sordidus</i>	Black-spot sergeant major
<i>Abudefduf vaigiensis</i>	Indo-pacific sergeant major
<i>Chrysiptera leucopoma</i>	Surge damselfish
<i>Chrysiptera sp</i>	Damselfish
<i>Neopomacentrus acyrtus</i>	Yellowtail damselfish
<i>Neoglyphidodon honang</i>	Ocellated damselfish
<i>Plectroglyphidodon dickii</i>	Dick's damselfish
<i>Plectroglyphidodon lacrymatus</i>	Jewel damselfish
<i>Pomacentrus chrysurus</i>	White-tail damselfish
<i>Stegastes nigricans</i>	Dusky gregory

Stegastes sp.
Zanclus canescens
Canthigaster solandri

Damselfish
 Moorish idol
 Solander's toby

Annexure 6

MARINE TURTLES IN THE REKAWA AREA (adapted from Ganewatta *et al*, 1995)

Scientific Name

Common Name

Chelonia mydas
Caretta caretta
Dermochelys coriacea
Lretmochelys imbricata
Lepidochelys olivacea

Green turtle
 Loggerhead
 Leatherback turtle
 Hawksbill turtle
 Olive Ridley turtle

* Calculated in Sri Lankan Rupees, where US\$ 1= SL Rs 65.00 at project implementation time.

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