Sustainability of Small Grants

Mangroves for the Future Small Grants Experience in Sri Lanka (2009-2012)

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Mangroves for the Future Small Grants Experience in Sri Lanka (2009-2012)

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Contents

Foreword

A Small Grants Programme is a window for funding aimed at supporting local level initiatives leading to sustainability and resilience. Several such programmes funded by various donors have been implemented in Sri Lanka in the past. In most instances other than the final project reporting, the sustainability aspect or the lessons learnt through the project several years after the project end is not evaluated.

IUCN Sri Lanka is the National Secretariat of Mangroves for the Future (MFF) regional initiative that is being implemented in the country since 2008. MFF Sri Lanka implemented over 82 small grants to date and as an innovative step, decided to allocate resources to better understand the post-project sustainability of MFF projects. Fifty nine (59) projects have been implemented during 2009-2012 of which 54 were evaluated. The evaluation was carried out from mid June to end August 2014.

Sustainability of past projects was evaluated in terms of (a) implementing organization type (grantee) and (b) thematic areas. This enabled to understand what type of organizations generally produce sustainable project outputs and also the thematically focused projects that are sustainable.

MFF Sri Lanka is now on the 6th Cycle of MFF Small Grants Facility (SGF) and continuing. The process of sustainability assessment will be expanded to other cycles too in future.

The findings of this evaluation will no doubt help us to strengthen the short listing of future MFF SGF concepts. We hope this booklet will not only help MFF Small Grant administration but also other agencies managing small grants.

IUCN Sri Lanka wishes to acknowledge the grantees for the support and active participation during this evaluation and Dr Susil Liyanarachchi for leading the Evaluation Team.

We also wish to recognize the contributions of Dr Tilak Wettasinghe for editing the document and Mr Amila Tharanga for designing the publication.

The Team
December, 2015.

1. Introduction

Mangroves for the Future (MFF) is a unique partner-led regional initiative to promote investments in coastal ecosystem conservation for sustainable development. Co-chaired by IUCN and UNDP, MFF provides a platform for collaboration among the many different agencies, sectors and countries that are addressing challenges to coastal ecosystem and livelihood issues. The goal is to promote an integrated ocean-wide approach to coastal management and to build the resilience of ecosystem-dependent coastal communities.

MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami. It initially focused on the countries that were worst affected by the tsunami — India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand. More recently, its coverage has expanded to include Bangladesh, Cambodia, Myanmar, Pakistan and Viet Nam.

The programmes are implemented through or in partnership with national governments, UN agencies, NGOs, CBOs, etc. The Regional Steering Committee (RSC) and the National Coordinating Body (NCB) in the country concerned, oversee the work carried out. NCB ensures the accountability and transparency to MFF's operation at country level while providing guidance on the geographic and technical focus. The RSC provides overall direction and guidance to the programme. In Sri Lanka, the MFF National Steering Committee (NSC) functions as the NCB.

MFF Small Grant Facility (SGF) is one of the funding mechanisms for supporting / financing sustainable local level initiatives in the coastal areas. These grants support strategic and tailor-made local community action for the management of coastal ecosystems and their sustainable use.

In Sri Lanka, SGF is managed by IUCN Sri Lanka Country Office (IUCN SL) under the guidance of the MFF National Steering Committee (NSC), which oversees the selection process and project implementation.

Till mid 2015 SGF has implemented five grant cycles in Sri Lanka, beginning in 2009 and has awarded 82 small grants to CBOs, NGOs, universities, management boards and small scale businesses (Table 1.1).

Table 1.1 - Number of SGF projects awarded since 2009 covering in Phase 1 (one cycle) and Phase 2 (4 cycles)

Phase	Period	Grant value (LKR)	Number of grants awarded
Phase 1	1.01.2009 - 31.12.2009	500,000	41 *
Phase 2, Cycle 1	1.12.2010 - 30.04.2012	500,000	22 **
Phase 2, Cycle 2	1.01.2012 - 30.05.2013	750,000	10
Phase 2, Cycle 3	1.01.2013 - 31.12.2014	1,000,000	04
Phase 2, Cycle 4	1.01.2014 - 30.05.2015	2,000,000	05
		Total	**82**

* 3 projects were prematurely terminated due to financial mismanagement
** 1 project was prematurely terminated due to financial mismanagement

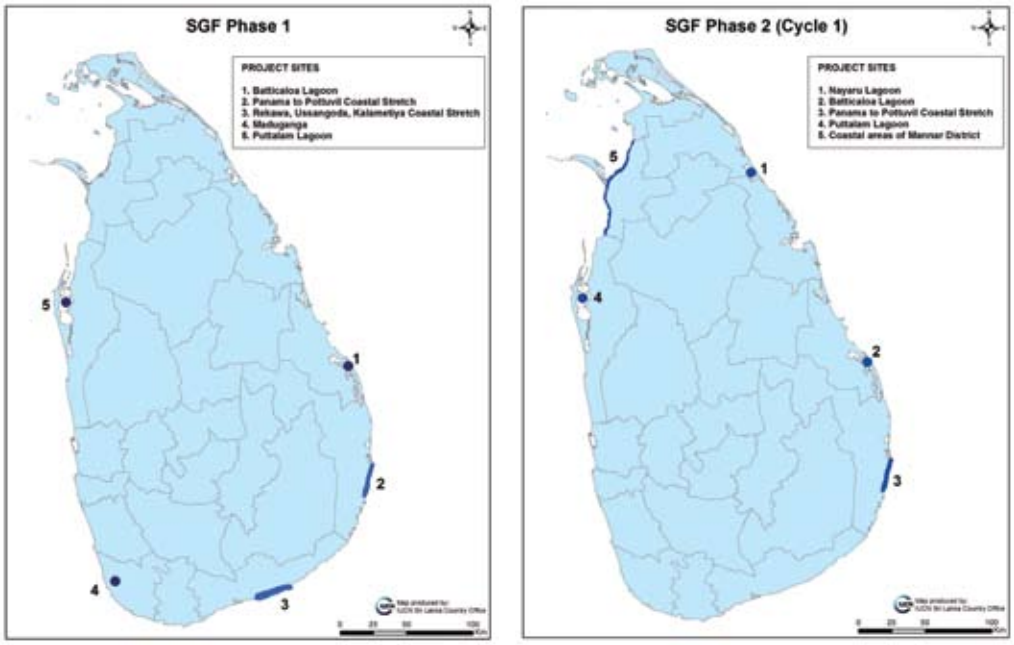


Fig.1.1 - Geographic areas of SGF interventions in Phase 1 and Phase 2, Cycle 1

In most instances other than the final project reporting, the sustainability aspect or lessons learnt several years after the project end is not evaluated.

As an innovative step, IUCN Sri Lanka, the National Secretariat of MFF, conducted a post-project evaluation of SGF projects implemented in Sri Lanka during Phase 1 and Phase 2, Cycle 1 covering the period January 2009 to April 2012 (Table 1.2). This exercise aimed to understand the sustainability of project outputs beyond project life, and the impact of projects/changes brought about by the interventions. The evaluation was carried out from mid June to end August 2014.

Table 1.2 - Geographic areas of SGF interventions in Phase 1 and Phase 2, Cycle 1

Phase 1	No: of projects	Phase 2, Cycle 1	No: of projects
Batticaloa Lagoon	4	Batticaloa Lagoon	3
Panama to Pottuvil coastal stretch	8	Panama to Pottuvil coastal stretch	6
Rekawa, Ussangoda, Kalametiya coastal stretch	9	Puttalam Lagoon	7
Maduganga	8	Coastal areas of Mannar District	5
Puttalam Lagoon	9		
Total	**38**		**21**

2. Method

2.1 Preliminaries

The outcome of 59 projects, 38 in Phase 1 and 21 in Phase 2, Cycle 1 were considered in this study; the four prematurely terminated projects were not included (Annex 1 lists the selected projects). The evaluation was carried out in two stages.

Stage1 – A brief questionnaire was sent, by post, in late June 2014 to all 59 grantees to seek their participation in this assessment. The questionnaire was in two parts; Part 1 sought information on the current position/status of the grantee and Part 2 on the current status of the MFF project activities.

The grantees were requested to indicate the most suitable time for the evaluators to visit them. Three letters were returned to IUCN as the grantees were not available at the given project addresses.

Stage 2 – Selected projects were visited by a team to conduct field evaluations by prior appointment to ensure the availability of the grantee as well as the beneficiaries.

2.2 Field evaluation

A consultant was hired to conduct field evaluations, along with IUCN staff. The consultant prepared the interview guide and the National Secretariat planned the visits.

Five projects were not evaluated, namely Mandru (MFF/17) and Vinivida Coalition (MFF/42) of Phase 1 as they have closed down by the time of the evaluation. The office of another Phase1 grantee, Sarvodaya in Ambalantota (MFF/13) was closed down and attempts to contact the project staff through the Head Office in Colombo also failed. Two home gardening projects in Phase 2, Cycle 1, namely MFF/27 (Wanasarana Thurulatha Swetchcha Sangamaya) and MFF/03 (Al-Aksha Sarvodaya Shramadana Society) could not be evaluated due to inability of the grantees to arrange the visit.

Hence, only 54 of the 59 projects were evaluated with field visits to 46 sites. Four (4) were research projects of Phase 2, Cycle 1(MFF/ 05, MFF/06, MFF/23, MFF/33) and their evaluation was based on the terminal reports. Another four (4) projects were evaluated through interviews in Colombo (MFF/09, MFF/22, MFF/59 of Phase 1, MFF/54 of Phase 2, Cycle 1).

Table 2.1 - Evaluation method and schedule

Geographic area in which projects were implemented	Method of evaluation				
	Desk study	Field visits/meetings in Colombo			
	Number of projects	Date	Number of projects visited	Evaluation through meetings in Colombo	Total Number of projects evaluated
Batticaloa		7–10 July 2014	5	1	6
Panama to Pottuvil	2	7–10 July 2014	9	1	12
Maduganga		23 July 2014	7		7
Puttalam	2	24-25 July 2014	13		15
Mannar		13-15 August 2014	5		5
Rekawa, Ussangoda & Kalametiya		21-22 August 2014	7	2	9
Total	4		46	4	54

The evaluation team comprised of the consultant, the Small Grants Officer of MFF Sri Lanka and the Country Representative of IUCN Sri Lanka. Findings are presented under four thematic areas, namely, Ecosystem restoration and other eco-friendly initiatives, Livelihoods enhancement, Research and Education and Awareness in the next four chapters in the next four chapters.

Field evaluation - Community bio-gas project (MFF/24) (Kumudini Ekaratne © IUCN)

Field evaluation - Coconut ekel-based handicraft production (Phase 2, MFF/50) (Kumudini Ekaratne © IUCN)

Meeting with the grantee - Educational programme for primary classes (MFF/11) (Ananda Mallawatantri © IUCN)

3. Ecosystem Restoration and other eco-friendly initiatives

MFF initial purpose was to support the tsunami recovery and build back better. As such, restoring the ecosystems affected by the 2004 Tsunami was appreciated by the communities. Increased awareness and engagement resulted the communities to value the goods and services provided by coastal ecosystems. MFF SGF included several project proposals for ecosystem restoration activities such as coastal planting, mangrove replanting, removing invasive species and other eco-friendly initiatives such as tank restoration, plant nursery management, fuel saving cooking options and replacing fishermen's traditional kerosene lamps with electric lights. Eighteen projects that addressed such restoration activities were implemented from 1 January–31 December 2009. However, only 15 of the 18 projects could be evaluated; 2 grantee organizations had ceased to exist by 2014, and the MFF/13 project office was closed down. Findings are presented under two subheadings; 'Ecosystem restoration' and 'Other eco-friendly activities'. The sustainability of project outputs was rated as High (H), Medium (M) or Low (L).

Sustainability – Project outputs are surviving/lasting and their benefits are being enjoyed by the communities, beyond the project cycle (end of funding)

Rating scale:

At the time of the study:
High: >75% of the output is still evident (eg: 80% of the planted mangroves are alive and growing).

Medium: 20 – 75% of the output is still evident.

Low: < 20% of the output of the intervention is evident.

3.1 Ecosystem restoration

Projects that dealt with coastal planting, mangrove replanting and removing invasive species were considered under ecosystem restoration. Thirteen Phase 1 projects belonged to this category and their titles, locations, grantees and sustainability ratings are presented in Table 3.1.

Table 3.1 - Sustainability rating of ecosystem restoration project outputs

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
Panama (one project)			
MFF/41	Rehabilitation of tsunami-affected coastal belt in Panama and improvement of livelihoods of communities	National Ethnic Unity Foundation	**L**
Pottuvil (one project)			
MFF/25	Rehabilitation and conservation of mangroves in Manthode in Kottukal area of Pottuvil Lagoon	True Vision Rural Rehabilitation Organization	**M**
Batticaloa (three projects)			
MFF/04	Reforestation of Coastal area: planting trees in Ethukkaal Beach, Kattankudy	Arifa Enterprises	**L**
MFF/05	Reforestation of Coastal area: planting trees in A.M. Hajiar Beach of Kattankudy	Arifa Enterprises	**L**
MFF/17	Restoration and protection of mangrove forests in Batticaloa Lagoon as an entry point for sustainable fishery practices	MANDRU (Institute for Alternative Development and Regional Cooperation)	**Not evaluated** (Grantee organization does not exist anymore)
Rekawa, Ussangoda and Kalametiya coastal stretch (two projects)			
MFF/18	Participatory mangrove management programme	Social Economic and Environmental Development Organization (SEEDO – Sri Lanka)	**L**
MFF/36	Improvement of the Lunama Lagoon and enhancement of livelihoods of communities living in the adjacent areas	Youth Enterprise Information Centre	**H**
Maduganga (two projects)			
MFF/39	Ecological restoration of a degraded mangrove habitat in Maduganga	Maduganga Development Foundation	**L**
MFF/13	Development of Madu Ganga wetland area and the mangrove habitat under MFF, in collaboration with Ambalangoda multipurpose community centre (MPCC) of Sarvodaya.	Lanka Jathika Sarvodaya Shramadana Sangamaya (Inc.)	**Not evaluated** (Project office closed down)
Puttalam (four projects)			
MFF/14	Restore the “Dutch Canal” and enhance ecosystem through mangrove replantation	National Aquaculture Development Authority of Sri Lanka	**M**
MFF/16	Mangrove Rehabilitation Programme	Semuthu Fisheries Co-operative Society Ltd.	**H**
MFF/20	Improving the Kalpitiya Lagoon ecosystem through mangrove restoration and introducing environmentally friendly household agricultural practices in the surrounding areas	Sevalanka Foundation	**L**

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
MFF/42	Conservation of the mangrove ecosystem in Puttalam Lagoon, currently degraded by anthropogenic activities	VINIVIDA – NGO Coalition for eradicating poverty through knowledge and communication	**Not evaluated** (Grantee organization does not exist anymore)

Detailed accounts of some selected projects, organized under three subheadings (coastal planting, mangrove replanting and removal of invasive species) are set out below. Project titles have been abbreviated in some cases.

3.1.1 Coastal planting

3.1.1.1 Establishment of coastal green belts - Beach planting (Phase 1: MFF/04 and MFF/05) (1.1.2009 - 31.12.2009)

Coastal vegetation of Ethukkaal and Hadjiar beaches in Kattankudy had been badly affected by natural hazards; first by the 1978 Cyclone and then by the 2004 Tsunami which left the beaches devoid of vegetation. Prior to the tsunami the communities spent the evenings leisurely on the beach that has much vegetation, but the bareness of the beaches has made the use of beach less attractive.

Also, the coastal vegetation acts as a windshield and provides protection. **Arifa Enterprises** undertook two pilot-scale coastal replanting programmes in the Ethukkaal and Hadjiar beaches to provide a protective cover as well as a shaded beach to promote socializing among the community families. Project details and results are as follows:

Intervention: Established two green belts of 0.5 km x 4 m each with *Casuarina* and *Barringtonia* (150 plants in each belt).

Status at the end of the project (31 December 2009): Survival rate of green belts at Hadjiar and Ethukkaal beaches was 90% and 87% respectively.

Current status: On 7 July 2014 was 12% and 0% respectively. The sustainability of this project's outputs was rated as Low.

Reasons for extremely low survival:

- Lack of protective cover owing to pilfering of protective cover poles for fire wood. Protection of plants from salt-laden winds is essential for an extended period.

- The tube well provided by the project was inadequate to supply water to about 135 plants. The District Secretariat erected a mesh cover towards end 2012 encircling the green belt and installed two water storage tanks with timely replenishment of water. The mesh cover decayed over the years
- The cyclone in December 2012 destroyed nearly all the survivors

Table 3.2 - Plant survival at various intervals between 2009 and 2014

Location	By April 2009	Project end (31 December 2009)	End of 2010	End of 2012	On 7 July 2014
Hadjiar beach	*Casuarina* 135 *Barringtonia* 15	*Casuarina* 135 *Barringtonia* 0	*Casuarina* 105 *Barringtonia* 0	*Casuarina* 65 *Barringtonia* 0	*Casuarina*18 *Barringtonia* 0
Ethukkaal beach	*Casuarina* 134 *Barringtonia* 16	*Casuarina* 130 *Barringtonia* 0	*Casuarina* 100 *Barringtonia* 0	*Casuarina* 20 *Barringtonia* 0	*Casuarina* 0 *Barringtonia* 0

Hadjiar beach - Plants with protective coverings, 24.6.2009 (Kumudini Ekaratne © IUCN)

Hajiar beach - 7.7.2014 (Kumudini Ekaratne © IUCN)

Ethukkaal beach - Plants with protective coverings, 24.6.2009 (Kumudini Ekaratne © IUCN)

Ethukkaal beach - 7.7.2014 (Kumudini Ekaratne © IUCN)

3.1.1.2 Rehabilitation of tsunami-affected coastal belt in Panama and improvement of livelihoods of communities (Phase 1: MFF/41) (1.1.2009 - 31.12.2009)

South Kumana is a remote coastal village nestled in the Southeastern coast of Sri Lanka. During the 2004 Tsunami, the well-established sand dunes and the coastal

vegetation absorbed the energy minimising the potential damage by the incoming waves; hence the damage was negligible. However, the sand dunes were breached at a weak point and the coastal vegetation in the immediate vicinity was destroyed. The community appreciated and valued the protection provided by the bio-shield and the need to restore the damaged green belt was a priority. **National Ethnic Unity Foundation** undertook the restoration through a small grant. Project details and results are as follows:

Interventions: A green belt of 600 m x 2 m in area was established with 2,880 seedlings of different species namely, Maila (*Bauhinia racemosa*), Wara (*Calotropis gigantea*), Neem (*Azadirachta indica*) and Palmyrah (*Borassus flabellifer*) in the Kumana village. Financial assistance (LKR 5,000 each) was provided to 12 women who looked after the green belt to improve their livelihoods [Brick making (2), fishery (2), tailoring (1), trading (2) and home gardening (5)].

Status at the end of the project: 51% of the plants had survived.

Current status: On 7 July 2014 survival was less than 20%. The sustainability of this project's outputs was rated as Low.

Table 3.3 - Plant survival status in 2009 and 2014

Date	% Survival	Species
End 2009	51%	Maila had the highest survival rate, followed by Wara; Palmyrah had the lowest survival rate.
Mid 2014	<20%	Neem had the highest survival rate, followed by Maila and Wara. Palmyrah did not survive.

Livelihoods of the 12 women who tended the green belt: One brick maker is now employed as a nurse in a government hospital. All the others, except the home gardeners, are still engaged in their chosen livelihoods. The home gardeners have given up their cultivations due to lack of water.

Table 3.4 - Summary of the coastal planting projects evaluated

Location	Survival	
	Dec 2009	July 2014
Ethukkaal beach	87%	0%
Hadjiar beach	90%	12%
Kumana village	51%	<20%

Photographs showing the development of the green belt:

Green belt with mixed species - just established, 10.3.2009 (Kumudini Ekaratne © IUCN)

Green belt - after 6 months, 26.11.2009 (Kumudini Ekaratne © IUCN)

Nearly after 4.5 years, 9.7.2014 (Kumudini Ekaratne © IUCN)

3.1.2 Mangrove replanting

3.1.2.1 Replanting mangroves in Pottuvil Lagoon near Manthode (Phase 1: MFF/25) (1.1.2009 - 31.12.2009)

Manthode is a village bordering the Pottuvil Lagoon on the east coast of Sri Lanka. Most of the mangroves fringing this lagoon were destroyed by the 2004 Tsunami. The main livelihood of the villagers is "lagoon fishing". A decline in catches after the Tsunami was observed by the fishermen and they attribute it to the reduction of the mangrove stands. **True Vision Rural Rehabilitation Organization**, a CBO in Pottuvil, undertook the task of assisting the fishermen to restore the damaged mangrove patches. Project details and results are as follows:

Interventions: Two community groups, selected from Karnagar and Al Hidaya Fisheries Cooperative Societies, were mobilized, and two community operated mangrove nurseries were established in Manthode.

10,000 mangrove seedlings were raised in the nurseries with propagules collected by the community. These were planted in Manthode (*Rhizophora mucronata* - 9,000 and *Avicennia marina* - 1,000 seedlings). Another 4,000 *Rhizophora* seedlings were raised to infill gaps.

Status at the end of the project: The survival rate at the end of 12 months was 80% *R. mucronata* and 30% *A. marina*.

Current status: Floods in the Panama-Pottuvil coastal areas, in 2010 and 2011, had damaged the plants, and according to the grantee, at present, survival rate is about 25%. The site could not be visited. The sustainability of this project's outputs was rated as Medium.

3.1.2.2 Replanting mangroves in a degraded sector of the "Dutch Canal" to enhance ecosystem productivity (Phase 1: MFF/14) (1.1.2009 - 31.12.2009)

The 100 km long Dutch Canal in the northwestern part of the country was constructed during the Dutch reign and was a popular navigation route for trade. This canal runs through the Negombo town and heads north towards the Puttalam Lagoon. Over the years, the mangrove stands along the canal banks have been cleared for the establishment of shrimp farms. This has resulted in the depletion of fin-fish and crustacean catches.

Restoration of a section of depleted mangroves was the aim of this project implemented by **National Aquaculture Development Authority of Sri Lanka** with the long- term objective of improving the water quality of the canal and fish breeding grounds, thereby, improving the income of the fisher community. Project details and results are as follows:

Interventions: Three sites, Viruthodai I, Viruthodai II and Kadayamottai (alternate canal), covering an area of 4.6 ha, were planted with 11,080 seedlings of *Rhizophora mucronata, Bruguiera gymnorrhiza*, *Avecennia marina, Xylocarpus gamatum, Ceriops tagal* and *Excoecaria agallocha* (Table 3.5).

Status at the end of the project and current status:

Table 3.5 - Species and number of seedlings planted and survival status in 2010 and 2014

Site	Species	Number planted	% Survival (April 2010)	% Survival (21 August 2014)
Viruthodai I (0.5 ha)	*R. mucronata*	1,080	60%	20%
Viruthodai II (2.05 ha)	*R. mucronata, B. gymnorrhiza, Xylocarpus gamatum, A. marina, Ceriops tagal*	5,000	60%	10%
Kadayamottai	*R. mucronata, A. marina*	5,000	80%	40%
Total		**11,080**		

The sustainability of this project's outputs was rated as Medium.

3.1.2.3 Community-based mangroves planting at Kurakkanhena (Phase 1: MFF/16) (01.02.2009 - 31.11.2009)

Kurakkanhena is a village located in the Kalpitiya DS Division bordering the northern part of the Puttalam Lagoon. The main livelihood of the communities living around the lagoon is lagoon fishery. The rich mangrove stands which bordered the lagoon had deteriorated over time due to the extraction of fuel wood by the communities.

Semuthu Fisheries Cooperative Society Ltd., a leading fishery society in the area, secured a small grant to restore the dwindling mangrove vegetation through a pilot scale replanting and educate the communities and school children on the value of mangroves.

Project details and results are as follows:

Interventions: Seven community-based nurseries raised over 12,000 seedlings of different species and were planted out as follows:

- *Rhizophora spp.* 7,000
- *Avicennia marina* 7,500
- *Excoecaria agallocha* 3,500
- *Lumnitzera racemosa* 3,500

To prevent cattle damage, an area of about 4,000 m^2 was fenced off before planting.

Status at the end of the project: 65% *Rhizophora spp,* 70% *A. marina*, 65% *E. agallocha* and 1%, *L. racemosa* plants, survived.

Current status: about 60% *Rhizophora spp* are surviving and growing vigorously. However, only a few *A. marina, E. agallocha* and *L. racemosa* plants were seen. The sustainability of this project's outputs was rated as High.

Replanted mangroves in Kurakkanhena - 11.11.2009 (Kumudini Ekaratne © IUCN)

Status after 4.5 years - 24.7.2014 (Kumudini Ekaratne © IUCN)

Table 3.6 – Summary of Mangrove planting projects evaluated

Location	Survival	
	Dec 2009	July 2014
Manthode	60%	25%
Dutch Canal	66%	30%
Kurakkanhena	65%	60%

3.1.3 Removing invasive species

3.1.3.1 Ecological restoration of a degraded mangrove habitat in Maduganga (Phase 1: MFF/39) (01.02.2009 - 30.11.2009)

Annona glabra, commonly known as Pond-apple, is an invader that grows in estuarine habitats. It forms dense thickets that can gradually replace other plants in the vicinity, and pose a threat to native mangrove communities.

The "Maduganga wetland", a RAMSAR site, is located in Balapitiya in the south. **Maduganga Development Foundation**, an NGO in Balapitiya, obtained a small grant to control the spread of this invasive species and restore the area by planting mangroves. Project details and results are as follows:

Interventions: An area 0.2 ha in extent was cleared of *Annona glabra* and planted with 1,500 seedlings of *Rhizophora mucronata.*

Status at the end of the project: The survival rate at the end of 12 months, was 70%.

Current status: *Rhizophora* survival is about 30% (information gathered at a meeting in the grantee's office; site was not visited). The sustainability of this project's outputs was rated as Low.

3.1.3.2 Removing Cattail *(Typha angustifolia*) from a village drainage water canal (Phase 1: MFF 36) (01.02.2009 - 31.10.2009)

Often growing in dense colonies, the aquatic reed *Typha angustifolia* is considered a weed when it invades managed wetlands.

Lunama is a coastal village in the deep south. The main livelihood of the community living close to the coast is fisheries. Those living away from the coast practice agriculture; the majority are paddy farmers and others cultivate vegetables. An irrigation canal supplies water to the paddy fields and the excess water is drained to the Lunama Lagoon through a 5 meter wide drainage canal known as "*Lunama meda basnawa*". In 2008, water flow in the lagoon end of this outlet canal was blocked by dense stands of *T. angustifolia.* This impeded the drainage of about 10 ha of paddy fields belonging to 25 farmers rendering the fields uncultivable.

Youth Enterprise Information Centre, a local NGO, undertook the removal of *T. angustifolia* with the participation of the 25 paddy farmers who were affected. Project details and results are as follows:

Interventions: *T. angustifolia* was removed from a selected length of the drainage canal, using an excavator and also with the assistance of the affected paddy farmers.

Status at the end of the project:

- A 750 m long stretch at the lagoon end of the 5 m wide canal had been cleared of *T. angustifolia* and restriction to the water flow in the drainage removed
- Ten hectares of abandoned paddy fields were cultivated without any hindrance from water logging. This enabled each of the 25 paddy farmers to earn an additional income of LKR 25,000 per season

Current status: Paddy farmers continuously remove, manually, any *Typha* that invades the canal. It is, however, not as effective as using an excavator. All 25 farmers continue to cultivate the 10 ha of paddy land that was lying fallow before the project. The sustainability of this project's outputs was rated as High.

Photographs showing the drainage canal before and after it was cleared of *T. angustifolia*:

Drainage canal – before removal of Typha spp., 16.3.2009 (Kumudini Ekaratne © IUCN)

Drainage canal – after removal of Typha spp., 24.7.2009 (Angela Fernando © IUCN)

Status after 5 years - 21.8.2014 (Kumudini Ekaratne © IUCN)

3.2 Other eco-friendly initiatives

Projects that addressed activities such as tank restoration, bamboo planting, plant nursery management, fuel saving cooking options, etc, were considered as "Other eco-friendly initiatives". Their titles, locations, grantees and sustainability ratings are presented in Table 3.7.

Table 3.7 - Sustainability rating of the Other eco-friendly initiatives

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
Rekawa, Ussangoda and Kalametiya coastal stretch (two projects)			
MFF/58	Improvement of the Lunama Lagoon and enhancement of livelihoods of communities living in the adjacent areas - Restoration of Palugaswewa tank	Youth Enterprise Information Centre	**M**

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
MFF/23	Promotion of bamboo plantation as an alternative wood source in Rekawa Lagoon area to prevent mangrove exploitation	Ruhunu Development Consortium	**L**
Pottuvil (one project)			
MFF/21	Rehabilitation and reconstruction of Pottuvil mangrove nursery	Community-based Eco-guide Association (CEGA)	**H**
Maduganga (two projects)			
MFF/24	Lagoon development and community empowerment in Maduganga	HELP-O (Human & Environment Links Progressive Organization)	**M**
MFF/33	Improvement of community management of the Maduganga Wetlands by introducing environmental education and sustainable development mechanisms	Nagenahiru Foundation	**L**

Detailed accounts of some selected projects are set out below.

3.2.1 Restoring a village tank (Phase 1: MFF/58)

Palugaswewa farm in Lunama was established in the early 1980s under the government's village reawakening scheme mainly to support 22 low income fisher families. Each family received a 0.4 ha plot of land for rain-fed cultivation. Palugaswewa Tank with a six hectare-meter capacity, situated adjoining the farm, was the source of water for off-season cultivation. However, the tank did not retain enough water during the off-season due to low rainfall in the area and the silted and dilapidated state of the tank has reduced the water holding capacity.

Youth Enterprise Information Centre secured a small grant to restore this village tank and thereby increase its water holding capacity. Project details and results are as follows:

Interventions:

i) The tank area was cleared of vegetation with the assistance of the 22 farm families.
ii) Under the technical guidance and supervision of the Technical Officer of the Ambalantota Divisional Secretariat:

- Palugaswewa Tank was mechanically dredged and its bund strengthened
- *Pathok ara*, a stream that drained excess rain water from the forest area to the sea, was diverted to the restored tank by building an anicut across it
- A supply canal was constructed to bring water from the tank to the farm

Status at the end of the project: The capacity of the Palugaswewa Tank has been increased from 6 to 14 hectare-meters more than doubling the capacity. The 22 farm

families were able to cultivate their plots during the dry season as well. The increase in income due to the additional season of cultivation ranges from LKR 3,000–20,000 per farm family.

Current status: The farmers were able to cultivate their plots during the dry season until the end of 2013. However, due to the unusual prolonged dry spell that prevails in the area (no rain for the past 8 months – January to August 2014), the tank has virtually dried up. Crops including three year old coconut trees have withered. The farmers have abandoned their farms temporarily and are doing odd jobs. However, they are confident that they could bounce back with the onset of inter-monsoonal rains. The sustainability of this project's outputs was rated as Medium.

Photographs showing the tank after restoration and the current status

Restored tank - 30.11.2009 (Kumudini Ekaratne © IUCN)

4.5 years later - compounded by unusual long drought, 21.8.2014 (Kumudini Ekaratne © IUCN)

Photographs showing the farm in 2009 and the current status

A section of the farm – coconut intercropping with annual crops, 30.11.2009 (Kumudini Ekaratne © IUCN)

Same farm after 4.5 years – with withered coconut plants, 21.8.2014 (Kumudini Ekaratne © IUCN)

3.2.2 Cultivating bamboo as a wood substitute to save Rekawa Lagoon mangroves and for erosion control (Phase 1: MFF/23) (01.02.2009 - 31.12.2009)

Rekawa Lagoon, 250 ha in extent, is located on the southern coast of Sri Lanka. Many communities depend on this lagoon for their main livelihood – fishery. These communities also extract timber, poles and fuel wood from the associated mangrove forests. Unsustainable felling of mangroves had a direct impact on the lagoon fishery and the need to develop an alternative source of wood was evident.

To fulfill this requirement, **Ruhunu Development Consortium (RDC)** introduced the cultivation of bamboo (*Dendrocalamus hookeri).* This bamboo will not only serve as a substitute for wood but with the soil binding qualities of its diffused root structure it will also reduce erosion on river, tank and stream banks. Project details and results are as follows:

Interventions: Communities and other potential beneficiaries in Boralluwa, Hettiyapokuna, Beliwalagoda, Netolpitiya and Kapuhenwela villages, surrounding the Rekawa Lagoon, were identified and mobilized, and programmes to create awareness were conducted. Selected community members (50) were trained on raising bamboo planting.

Three community members were trained in propagation techniques and bamboo nursery management, on 19.05.2009, at the Riverine Bamboo Planting Project in Kotmale run by the Mahaweli Authority of Sri Lanka. Three community-based plant nurseries to propagate bamboo planting material were established in Rekawa. Some 2,100 bamboo plants were purchased from the Riverine Bamboo Planting Project at Kothmale and 4,500 bamboo plantlets were propagated.

Status at the end of the project: Fifteen hectares of river and tank banks, including home gardens, and a few public places such as schools and temples had been planted with 4,500 bamboo plantlets in December 2009.

Current status: About 40% of the bamboo plants have survived and are 10-12 feet tall and healthy. Nearly all the bamboo planted in home gardens have survived and are being used as alternate wood sources – for scaffolding and in vegetable plots. The severe drought experienced immediately after planting was responsible for the high mortality, especially of plants on the banks. This was compounded by the cattle damage. All three nurseries that were set up to propagate bamboo plantlets have been closed down. The sustainability of this project's outputs was rated as Low.

3.2.3 Plant nursery establishment and maintenance (Phase 1: MFF/21) (01.01.2009 - 30.6.2009)

In order to meet the growing demand for mangrove saplings needed to restore the mangrove areas destroyed by the 2004 Tsunami, **Community-based Eco-guide Association (CEGA)** secured a small grant to establish a nursery in Pottuvil. Project details and results are as follows:

Interventions: Members of Hidayapuram Fisheries Cooperative Society were engaged to implement the project. A nursery was constructed and fenced off. *Rhizophora mucronata* and *Bruguiera spp*. propagules were supplied by members of the Pottuvil Lagoon Fisheries Co-op Society.

Status at the end of the project: During the project period, 800 plants were raised in the nursery and sold.

Current status: After project closure 1,000 plants have been raised and sold every 6 months at LKR 60 per plant. This income is sufficient to cover the cost of maintaining the nursery. The latest order was for mangrove plantlets to replant Vaharei Lagoon in the Trincomalee District. The nursery has now been shifted to a location near the Pottuvil Lagoon mouth and is looked after by a nursery keeper. At the time of the site visit it contained about 350 *R. mucronata* plants. The sustainability of this project's outputs was rated as High.

Activities of CEGA have now been diversified to include lagoon tourism (see boxed message).

Going beyond nursery establishment…

A beautiful lagoon with rock outcrops, fringing healthy mangrove stands and bustling fishing activities, the Pottuvil Lagoon has high potential for tourism – it is a treat for those who wish to savour the lagoon environment in a traditional canoe.

CEGA's work has thus expanded to responsible tourism with lagoon boat tours. The boat tour fee is LKR 4,000 for two passengers – the fee is shared equally between the trishaw driver, boatman, Fisheries Cooperative Society and CEGA. The tour has a stopover at this nursery.

Special trips are arranged for the adventurous folk who wish to visit the islands in the lagoon.

3.2.4 Community biogas plant in Mohottiwatte, Balapitiya (Phase 1: MFF/24) (01.01.2009 - 31.12.2009)

Located on the south coast, Mohottiwatte is a village by the Maduganga wetland. While the more affluent households in the village use liquid petroleum gas for cooking, the majority use fuel wood. As Mohottiwatte had no organized garbage collection

service the villagers dispose kitchen waste in the nearby estuary. To reduce fuel wood extraction from mangroves and pollution of the estuary, the **Human & Environment Links Progressive Organization (HELP-O)** constructed a biogas plant on a privately owned property in Mohottiwatte. They planned to supply cooking gas to three households in the immediate vicinity.

Interventions: A 12 cubic meter biogas plant was constructed in Mohottiwatte on a private property and fed with organic household waste.

Status at the end of the project: Though initially planned to supply for three households, a total of four houses were provided with gas for cooking. Other community members who delivered their kitchen waste to the biogas plant received two bottles of residual slurry, each week, as an incentive. Dumping of waste in the estuary, by Mohottiwatta communities, had been reduced considerably as both direct and indirect beneficiaries now take their kitchen waste to the biogas plant.

Current status: Due to problems that had arisen in sharing gas equitably only two households are now being supplied with gas. The biogas unit that had been inoperable for 8 months was repaired on 19. 7. 2014, just 4 days before our visit. The unserviceable gas cookers were also replaced by the grantee at no cost to the beneficiaries. The sustainability of this project's outputs was rated as Medium.

3.2.5 Replacing the fishermen's traditional kerosene oil lamps with electric lamps. (Phase 1: MFF/33) (01.01.2009 - 31.12.2009)

Fishermen generally use kerosene lamps during night fishing expeditions. Each fishing boat is estimated to use one litre of kerosene daily, costing LKR 60. Eighteen fishermen were given electric lamps by the **Nagenahiru Foundation** in a pilot initiative whose details and results are as follows:

Interventions: Eighteen fishermen were supplied with 18 LED/CFL lamps and two community-operated solar powered charging units to charge their lamps in the daytime.

Status at the end of the project:

- The fishermen no longer use kerosene lamps; this forestalls the emission of 3.15 kg of carbon dioxide and kerosene fumes to the atmosphere by each lamp, each night
- Each fisherman saves about LKR 25,000 annually on kerosene
- The 18 fishermen enjoy night fishing in an environment devoid of fumes, and with the least possible health hazards
- The new lamps have the potential to mitigate climate change by reducing emissions of carbon dioxide to the atmosphere

Fishing crafts fixed with LED lamps, 6.12.2009 (Kumudini Ekaratne © IUCN)

Current status: All 18 LED/CFL lamps are out of order and the fishermen have given up using them.

However, the concept has been readily accepted by the community who has now introduced solar powered lights for their ja-kotu (Prawn fishery method). This traditional method originally used kerosene lanterns to attract prawns to the traps. Instead, they now use solar powered lights. The sustainability of this project's outputs was rated as Low.

Solar powered lamps fixed to a Ja-kotuwa, 23.7.2014 (Kumudini Ekaratne © IUCN)

4. Livelihoods Enhancement

Enhancing the livelihoods of coastal communities was the aim of 26 of the 59 projects (over 40%) implemented in Phases 1 and 2, Cycle 1. The projects covered all prioritized geographical areas and introduced activities such as home gardening, handicraft production, ecotourism, aquaculture, animal husbandry and microfinance. Post-project evaluations were conducted on 24 of these livelihoods projects and the sustainability of their outputs was rated as High (H), Medium (M) or Low (L). The titles, locations, grantees and sustainability ratings of these projects are presented in Table 4.1.

Sustainability – Project activities/outputs continue to benefit the communities beyond the project cycle (end of funding)

Rating scale:

At the time of the study:
High: Project activities/outputs are continuing and targeted communities enjoy the project benefits. Livelihood practices promoted by the interventions have been adopted and demonstrable success, including replication, has been achieved.

Medium: Some project activities/outputs are continuing and targeted communities enjoy the project benefits. Livelihood practices promoted by the interventions have been adopted to a limited extent and are confined to the beneficiary group.

Low: Project activities have been discontinued after the project period.

Table 4.1 - Sustainability rating of livelihoods enhancement project outputs

Livelihoods enhancement projects			
Phase 1 (15 projects)			
Code Number	**Location and Project Title**	**Grantee Organization**	**Sustainability Rating**
Panama (one project)			
MFF/09	Pilot project for introducing sea weed farming *(Euchema denticulatum)* as an alternative livelihood activity among coastal communities at Panama and Pottuvil	Sevalanka Foundation	**L**
Pottuvil (four projects)			

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
MFF/28	Creating a source of income through animal (buffalo) breeding	Livestock Development Dairy Farmer Association	**M**
MFF/29	Alternative income generation through poultry farming for fisher families	Arugambay Tourism Association	**L**
MFF/30	Goat rearing as an alternative income generating activity for fisher families	AL-Ameen Sammorthy Association	**M**
MFF/57	Creating a source of income through animal (buffalo) breeding – Phase 2	Livestock Development Dairy Farmer Association	**M**
Batticaloa (one project)			
MFF/53	Alternative income for fisher families in Kattankudy	Organization for Protecting and Ensuring Democracy (OPED)	**H**
Rekawa, Ussangoda and Kalametiya coastal stretch (three projects)			
MFF/19	Improving additional income for tsunami affected coastal belt community in Rekawa-Medilla Lagoon area	Wanasarana Thurulatha Swechcha Society	**M**
MFF/34	Introduction of eco-tourism initiatives for communities engaged in harmful acts in the RUK ecosystem	RUK Diya Community Based Organization	**M**
MFF/38	Towards a prosperous tomorrow	Meth Sith Development Foundation	**H**
Maduganga (two projects)			
MFF/52	Pilot project for introducing of sea bass *(Lates calcarifer)* cage culture as an alternative livelihood development program among fishing communities around Maduganga estuary	Sevalanka Foundation	**H**
MFF/55 (New)	Pilot project for introducing of Red Tilapia *(Oreochromis spp.* hybrids) cage culture as a livelihood development program in Maduganga estuary	Sevalanka Foundation	**H**
Puttalam (four projects)			
MFF/15	Empowerment of fisher women by providing alternative income generation through cultivation of *Aloe vera* (Komarika)	Marine and Coastal Resources Conservation Foundation	**H**
MFF/49	To protect Amma thota fishing village, its environs and the resource	PEARLS - Peaceful Environment Assured Rights Lasting Solutions.	**H**
MFF/54	Sustainable livelihood development of 40 low income families living in the vicinity of Puttalam Lagoon in Palavi area	Wilpotha Women's Savings Effort	**M**
MFF/56	Empowerment of fisher women by means of providing alternative income generation through cultivation of *Aloe vera* (Komarica) - Phase II	Marine and Coastal Resources Conservation Foundation (MCRCF)	**H**

Code Number	Location and Project Title	Grantee Organization	Sustainability Rating
Phase 2 (Cycle 1) (11 projects; 9 evaluated)			
Panama-Pottuvil (three projects; one evaluated)			
MFF/03	Enhancing alternative incomes for fisher families living close to the Pottuvil Lagoon	Al-Aksha Sarvodaya Shramadana Society	**Not evaluated** (Grantee was not available)
MFF/27	Promotion of cultivating vegetables, fruits, yams and leaves in Home Gardens among household women community living in Pottuvil Coastal belt area of Ampara District of Sri Lanka	Wanasarana Thurulatha Swechcha Society	**Not evaluated** (Grantee was not available at the site)
MFF/45	Rush and reed species conservation and handicraft product development around Pottuvil	Committee for People's Rights (CPR)	**M**
Batticaloa (two projects)			
MFF/52	Improve livelihood income generation to vulnerable families through crop cultivation at the border of Batticaloa Lagoon for conservation and restoration of coastal ecosystem	Social Economic Development Organization (SEDO)	**H**
MFF/55	Promotion of cultivating vegetables, fruits, yams and leaves in Home Gardens among house hold women community living in Kalawanchikudi Coastal belt area of Batticaloe District of Sri Lanka	Wanasarana Thurulatha Swechcha Society.	**M**
Mannar (three projects)			
MFF/18	Providing of supplementary income to the coastal community in Northern Mannar through establishing of healthy mother plant stock of *Kappaphycus alvarezii (Eucheuma cottonii)* meet future demand of seedlings of seaweed farming industry in Sri Lanka	Sevalanka Foundation	**L**
MFF/57	Introducing Sea Cucumber/Sand Fish/Jaffna Attaya *(Holothuria scabra)* pen culture as a livelihood development program for conflict affected community in Mannar Island	Green Movement of Sri Lanka	**M**
MFF/51	Increasing eco-tourism through Conservation of baobab tree in the Island of Mannar	Al- Azhar Fisheries Cooperative Society, Uppukulam	**M**
Puttalam (three projects)			
MFF/17	Promoting Coastal Management by Establishing and strengthening Community based pressure group in Ammathottam Fishing Village	Peaceful Environment Assured Rights Lasting Solutions (PEARLS)	**H**
MFF/22	Promote community based, sustainable, environment friendly and commercially viable value added *Aloe vera* beverage (healthy food) as an alternative income generation for fisher women in Bar Reef Special Management Area in Kalpitiya	Marine and Coastal Resources Conservation Foundation	**L**
MFF/50	Conservation of mangroves by improving self-employment skills by women in fisher families living in Iranawila and Samindugama in the district of Puttalam	Mihikatha Environmental Society	**H**

In summary, 42% of the projects (10) were rated as High, 42% (10), Medium and 16% (4) as Low sustainability.

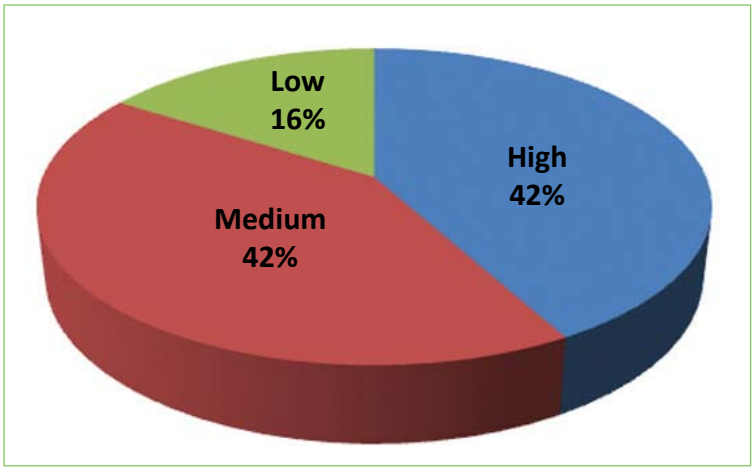


Figure 4.1 - Percent projects with High, Medium and Low sustainability of outputs

Sustainability rating of projects grouped under eight main livelihood types is presented in Table 4.2 and Figure 4.2.

Table 4.2 - Sustainability rating of projects on the main livelihood categories

Livelihood category	Sustainability rating			
	High	Medium	Low	Total
Home gardening	6	2	0	8
Handicrafts	1	2	0	3
Ecotourism	0	2	0	2
Aquaculture (seaweed)			2	2
Aquaculture (fish & sea cucumber)	2	1		3
Animal husbandry	0	3	1	4
Microfinance	1			1
Aloe vera beverage production	0	0	1	1
Total	**10**	**10**	**4**	**24**

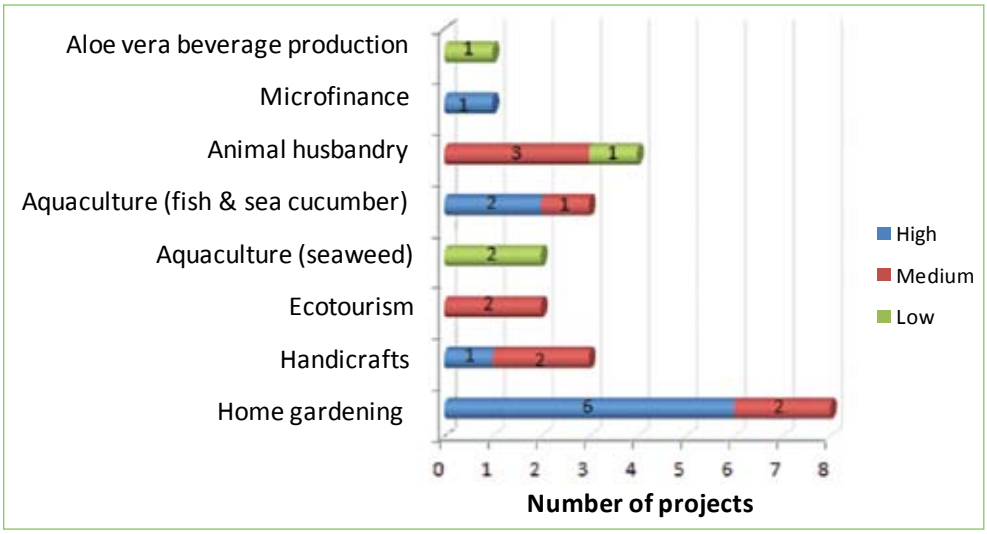


Figure 4.2 - Sustainability rating of projects on under main livelihood categories

A number of selected projects from each of the main livelihood category are described below. Abridged versions of the project titles have been used in the text.

4.1 Home gardening and marketing of processed products

Ten small grants projects were implemented to introduce agriculture to fisher families; post-project evaluations were conducted on eight projects. Agriculture with compared to the usual fishery related activities was a novel experience for them. Women in the fisher families were trained and assisted to cultivate vegetables and perennial crops, in their homesteads, to produce food for consumption and generate an additional income by selling the surplus. Sustainability of the outputs of six projects was rated as High.

4.1.1 Supporting the Ammathottam Fishing Village community to establish fifty home gardens (Phase 1: MFF/49) (01.02.2009 - 30.11.2009)

Ammathottam is a fishing village in Pallivasalthurai area in the Kalpitiya Peninsula. **PEARLS – Peaceful Environment Assured Rights Lasting Solutions**, a CBO from the area, introduced home gardening to selected fisher families to improve their nutrition, especially of the children. This project was implemented with the assistance of the *Ammathottam Janahanda Fishing Women's Guild*, a local society.

Interventions:

Out of the members of *Ammathottam Janahanda Fishing Women's Guild*, 41 women were selected as project beneficiaries. As home gardening was a new experience

potential beneficiaries were trained in basic agricultural practices by the Agricultural Extension Officer in Pallivasalthurai. Vegetable varieties, such as brinjal (egg plant), snake gourd, bitter gourd, tomato, spring onion and green chilli were planted in July 2009. Due to the inhospitable soil conditions the beneficiaries were encouraged to practice polybag-based cultivation ('bag culture'). A basket compost unit was set up in each garden to provide a regular supply of compost.

Two model home gardens were established, fenced and planted with several vegetable and fruit varieties, pulses, such as green gram and cowpea, and leafy greens as a guide for other home gardeners by 41 selected women beneficiaries. Two hundred and sixty coconut saplings were also distributed among the 41 women.

Project site at Pallivasalthurai (Kumudini Ekaratne© IUCN)

Status at the end of the project:

The two model gardens and 41 home gardens were well established and in production.

Current status:

About 15-20 women are engaged in home gardening and are participating in the *Divineguma* (Livelihoods enhancement) programme of the Government of Sri Lanka. Coconut palms planted are now bearing fruits. The families use fresh vegetables and also earn an additional income (about LKR 800 per month) from surplus produce. The sustainability of this project's outputs was rated as High.

Home garden in Ammathotam Fishing village (Kumudini Ekaratne© IUCN)

4.1.2 Training and supporting fisher families in Ussangoda to establish forty home gardens (Phase 1: MFF/38) (01.02.2009 - 30.11.2009)

Forty home gardens of fisher families were developed through a small grant awarded to **Meth Sith Development Organization**, a CBO in Ussangoda.

Interventions:

Forty women beneficiaries were selected and awareness programmes on agricultural practices were conducted by the Agricultural Extension Officer in the area. Beneficiaries were provided with a selection of vegetable seeds (bitter gourd, ridged gourd, tomato, green chilli) and fruit plants to commence cultivation. In addition, each beneficiary received three teak plants *(Tectona grandis)* that give yield in 20 years in the form of high value timer (investment on children's education etc). Each beneficiary also received a grant of LKR 5,000 to further develop the quality of the cultivation, for example, by crop diversification.

Status at the end of the project:

Forty home gardens were successfully planted with vegetables, finger millet, green gram, chilli, onion, cowpea and fruit crops. Beneficiary families enjoyed and nutritionally benefitted a regular supply of fresh, home grown vegetables, fruits and pulses. Sale of the surplus produce, at the weekly village fair, brought an additional family income.

Current status:

Though all beneficiaries continued to maintain their gardens, the severe drought experienced from November 2013 to August 2014 has destroyed the plants. Even some of the hardy teak plants have died.

The sustainability of this project's outputs was rated as High, considering the approach and outcome while discounting the natural disaster element.

4.1.3 Supporting fisher families in Kattankudy (Batticaloa) to establish twenty banana-based home gardens (Phase 1: MFF/53) (01.07.2009 - 1.12.2009)

Kattankudy the longest town area in eastern Sri Lanka, stretching over a distance of 1.5 km, is famous for traditional Muslim sweetmeats and is dubbed as a "sweet town". Kattankudy was badly affected by the 2004 Indian Ocean Tsunami. **Organization for Protecting and Ensuring Democracy (OPED)**, an NGO based in Kattankudy, secured a SGF grant to implement a home gardening programme with banana as the main crop. Banana is in high demand in the area and the objective was to enhance the income of fisher families.

Interventions:

Twenty fisher families living in the coastal area were selected and each family was provided with 50 banana suckers, agricultural implements, compost and fertilizer. Banana was intercropped with papaya, pumpkin and cucumber. Progress was regularly monitored with the assistance of the Agricultural Extension Officer.

Status at the end of the project:

The banana plants had begun to flower when the project ended in December 2009. Although there was no income from banana fruits hitherto, the beneficiaries made some money by selling banana suckers as planting material at LKR 75 each, and leaves at LKR 3 per leaf to restaurants for use as food wraps and plates (eating on banana leaves is a traditional practice). Dried banana leaves were used for home composting and the surplus sold to a nearby composting yard at LKR 5 per kilogram.

Homestead banana cultivation (Kumudini Ekaratne © IUCN)

Current status:

Only five (5) families out of 20 are presently cultivating banana in their home gardens; they make about LKR 25,000 every four months. The large dropout is mainly due to land fragmentation and using agricultural land to provide housing for their married children.

Post-project evaluation visit to a banana homestead cultivation (Kumudini Ekaratne © IUCN)

Six others are engaged in large scale banana cultivation in Pallimunai where cultivable land is readily available. Large scale cultivators make about LKR 280,000 every four months, from 0.4 ha of land.

Large scale banana cultivation after 4.5 years (Kumudini Ekaratne © IUCN)

Kattankudy area used to get bananas from Dambulla and Moneragala but not anymore – partially as a result of this project. Kattankudy is now self sufficient.

Intercropping with papaw, ginger, turmeric and green leaves brings an additional income and sustainability (for example, ginger fetches LKR 800 per kilogram).

The success of this project has been endorsed by the Divisional Secretariat which now promotes the *One crop, one village* concept. Exchange visits are also arranged by the government to the project area. The sustainability of this project's outputs was rated as High.

Expanding…

A project which started as pilot initiative with just 50 banana suckers per garden has now expanded to large scale cultivation of bananas with intercropping (0.4 ha with 576 banana plants and intercrops such as papaw, ginger, turmeric and green leaves). Moreover, appreciating this venture, the Kattankudy Divisional Secretariat is promoting the *One crop, one village* concept in the area.

4.1.4 Women undertake homestead cultivation in Kaluwanchikudi (Phase 2: MFF /55) (01.09.2009 - 31.05.2010)

Kaluwanchikudy is a coastal area in the Batticaloa District that receives only the northeast monsoon rains, from October to January. **Wanasarana Thurulatha Swechcha Society (WTSS)** initiated a project, funded by SGF, to develop 50 homesteads using 'bag culture', which requires much less water.

Interventions:

Fifty beneficiaries were selected from low income families earning LKR 2,500-4,500 per month. They were trained by the Agricultural Extension Officer on carrying out 'bag culture', a novel method of cultivation, pest control operations and compost preparation from kitchen waste. The beneficiaries were also provided with mammoties, watering cans, polythene sacks (30 each), soil, plants, packs of vegetable seeds (brinjal, okra, green chilli and lima bean) and planting material of local yams, papaw and lime, to get started.

Beneficiaries were provided with two mobile vegetable stalls. Their group leader accepted them and entered into an agreement with WTSS. It was the beneficiaries' responsibility to repair and maintain the stalls.

Status at the end of the project:

Home garden in Kaluwanchikudy (Kumudini Ekaratne © IUCN)

Fifty home gardens with improved water efficiency were established. The family consumed about 25% of the vegetables and fruits produced in the home garden. Before the project, a family had spent about LKR 3,200 a month on vegetables at the public market. According to a survey by WTSS it was reduced to LKR 2,240 (approximately 30% saving). Sale of surplus produce through the mobile stalls had increased household income by 30-40%. Taken together, the project resulted in a saving on vegetables (30% of extra cost) and improved income (30-40%). Consumption of homegrown, pesticide-free vegetables had reduced malnutrition and probably contributed towards longer-term health of the family.

Current status:

Ten of the 50 beneficiaries are engaged in gardening but none use the bag method; bags are not durable and hence costly. The gardeners now use water from tube wells. Cultivation has been diversified to include seasonal crops such as wheat, sweet melon and peanut. Monthly income is LKR 3,000-5,000. The two mobile sale stalls are idling.

Homestead cultivation (crop diversified) after 2.5 years (Kumudini Ekaratne © IUCN)

Mobile sale stall - 18.10.2012 (Kumudini Ekaratne © IUCN)

Mobile sale stall – idling after 2.5 years, 7.7.2014 (Kumudini Ekaratne © IUCN)

The sustainability of the project outputs was rated as Medium.

4.1.5 Crop cultivation to improve livelihoods of families in Kirankulam, a village bordering Batticaloa Lagoon (Phase 2: MFF/52) (01.7.2011 - 30.4.2012)

Kirankulam a coastal village located 20 km from Batticaloa town is subject to frequent flooding. Sixty percent of the villagers are poor farmers who cultivate paddy and

highland crops. Well known for cucumber cultivation during the summer, vegetables and coconuts also have a good market in the area. As the land owners do not have the means to properly fence and protect their plots, free ranging grazers frequently damage their crops. **Social Economic Development Organization (SEDO)**, an NGO from the area, stepped in to assist 20 widows to undertake crop cultivation and also protect their lands from stray cattle.

Interventions:

Twenty widows, owning lands ranging from 0.1-0.2 ha each, were selected as beneficiaries with the assistance of the Manmunai Pattu Divisional Secretary. They were trained in land preparation, integrated vegetable cultivation, compost preparation and nursery maintenance, , by the local Agricultural Extension Officer who also organized field demonstrations.

Each beneficiary was provided with a mammoty, garden rake, watering vessel, 18 fence posts and a roll of barbed wire. The fences were erected by the beneficiaries. Each woman also received 200 chilli, brinjal and tomato plants, and 10 plants each of coconut, banana and papaya (Red lady). The home gardens were monitored and evaluated periodically by the Agricultural Extension Officer.

Status at the end of the project:

The plots belonging to the 20 widows, totaling 2.6 ha, were under cultivation and about 3,400 kg of vegetables were harvested from October 2011 to March 2012. Sales over this period amounted to LKR 417,280 earning a profit of LKR 308,000. Profit per beneficiary ranged from LKR 10,500 to 24,000 during a five month period.

In April 2012, at the end of the project, 14 widows opted to cultivate cucumber. Over the 3-month season their income amounted to LKR 330,200; profit per beneficiary ranged from LKR 10,000-38,000.

Homestead vegetable cultivation in Kirankulam (Kumudini Ekaratne © IUCN)

Current status:

Twelve women continue to cultivate the same plots, as before. Others are cultivating larger areas (1 ha) and earn LKR 3,000–12,000 per month depending on the crop cultivated. The family members now enjoy chemical free vegetables and fruits. The beneficiaries have a strong network and help each other in land preparation etc including ploughing of their lands.

Homestead cultivation (crop diversified) after 2.5 years (Kumudini Ekaratne © IUCN)

With the additional income some have extended the planting area, bought electric water pumps or hire water pumps (LKR 100-200 per watering cycle), purchased jewelry or participate in a "Seettu", a traditional system of savings and credit.

SEDO still interact with the beneficiaries and assist them in getting the services of the Agricultural Extension Officer, as and when necessary. The sustainability of this project's outputs was rated as High.

4.1.6 Enhancing incomes of fisher families through *Aloe vera* cultivation (Phase 1: MFF/15 and MFF/56) (01.01.2009 - 31.05.2009)

The 32,750 ha Puttalam Lagoon, located on the northwestern coastline, is the second largest lagoon in Sri Lanka. Its resources are utilized by over 3,000 fishermen belonging to 28 registered fishery societies. Hence, the natural resources of this lagoon are under considerable pressure, mainly due to over-fishing. The introduction of supplementary income generation activities, especially for the women, was considered a feasible approach to reduce fishing pressure.

Aloe vera is a multipurpose succulent plant much valued as a medicinal herb. The succulence helps it to thrive under low moisture conditions. Two products are extracted from *Aloe vera* leaves: gel and latex. The gel is the base for many modern cosmetics. In recent times, the demand for *Aloe vera* products has increased, both locally and internationally.

Aloe vera thrives under dry, sandy conditions in the environs of Puttalam. Wild collection from the Puttalam area has been utilized by a number of cosmetic manufacturers in Sri Lanka. **Marine and Coastal Resources Conservation Foundation (MCRCF**), an NGO in Kalpitiya, launched a programme to cultivate *Aloe vera* in the home gardens of 15 selected fisher families. The objective of this project was to provide an additional other income generation to the fisher families.

Interventions:

Following the introduction of the project, 15 beneficiaries (12 from Anawasala and 3 from Kudawa) were selected and trained in *Aloe vera* cultivation techniques in mid-February, 2009. Willingness to participate in the project, availability of at least 125 m^2 of arable homestead land, and water for irrigation were the selection criteria. Beneficiaries were provided with healthy *Aloe vera* plantlets, purchased from two selected suppliers. Each beneficiary received about 575 plantlets and 750 kg of cow dung. Planting was completed in March, 2009. Beneficiaries were trained in post-harvest techniques with a practical session at a plantation site in late May, 2009. Individual guidance was also provided at the time of harvesting.

A buy-back system was put in place – MCRCF collected the harvested *Aloe vera* and sold it to a leading cosmetic company in Sri Lanka, Janet Group. Sales proceeds, less costs incurred by MCRCF, were remitted to the beneficiaries.

Status at the end of the project:

There were four harvests from June to October 2009 totalling 3,100 kg that fetched LKR 128,000. The monthly income of the beneficiary fisher families had increased by 26%. Participation in fishing as a livelihood had decreased by 5% thus reducing fishing pressure on the Puttalam Lagoon. The cosmetic company does not engage in wild collection of *Aloe vera* any more. Their

Aloe vera plantation (© Ranjith Mahindapala)

requirements are purchased from home garden cultivations, thereby providing livelihoods and also conserving the habitat.

Following the successful completion of the project, MCRDF received a second grant to expand the project to another 15 households (MFF/56).

Current status:

See section 4.1.7

The sustainability of the outputs of these projects (MFF 15 & 56) was rated as High.

4.1.7 *Aloe vera* value-added products (Phase 2: MFF/22) (01.05.2011 - 30.04.2012)

MCRCF formulated and successfully tested an *Aloe vera* based beverage during the SGF Phase 1 cultivation projects (4.1.6 above). In Phase 2 (Cycle 1) **MCRCF** secured a grant to introduce *Aloe vera* cultivation to another 20 women, with a view to supplying the increasing requirements of Janet Group, and using the excess leaves for beverage production.

Interventions:

Twenty new beneficiaries were selected to expand *Aloe vera* cultivation applying the same criteria as in Phase 1. They were from:

- Semuthu Fisheries Cooperative Society, Kudawa - 3 women
- St. Sebastian Fisheries Cooperative Society, Kudawa - 2 women
- St. Sebastian Fisheries Cooperative Society, Anawasala - 8 women
- Eachchankaduwa Rural Development Society, Kandakuliya - 7 women

In situ training on land preparation and cultivation was conducted for beneficiaries and basic inputs for cultivation (cow dung and 400 plantlets per family) were provided. The system utilized in Phase 1 to record day to day expenses and *Aloe vera* planting activities, was introduced to the new beneficiaries. As in Phase 1, MCRCF continued the buy-back system for the *Aloe vera* harvest and maintained the marketing link with Janet Group.

An *Aloe vera* beverage processing unit was established at the MCRCF office. This was manned by a trained processing assistant. Hygienic conditions were maintained in the processing unit, which was regularly monitored by the Public Health Inspector of Kalpitiya. Beverage sales were made from a specially turned out tricycle with a chilling facility, operated by a previously unemployed person from Kalpitiya. The beverage was promoted through leaflets and posters.

Stages of production - from *Aloe vera* sheath to drink
(© Hasantha Amerasekera, MCRCF)

Status at the end of the project:

- Fifty women were engaged in homestead cultivation of *Aloe vera*. Each woman sold about 20-35 kg every month to Janet Group for cosmetics production. Beneficiaries received LKR 35-40 per kg from MCRCF (after deducting a 10% coordination fee, transport and incidental expenses). Monthly income ranged from LKR 800-1,400
- The surplus was sold to MCRCF at LKR 33 per kg for beverage production
- The overall monthly incomes of the beneficiary fisher families had increased by 10-15% as a result of the project intervention
- Five percent of the beneficiaries who had been fishing in the lagoon gave up fishing, which may have reduced fishing pressure in the Puttalam Lagoon
- *Aloe vera* production details in Phase 1 and Phase 2, Cycle 1 are as follows:

Period	Number of growers	Number of harvests	Total sold to Janet Group (kg)	Total Income (LKR)
June – October 2009 **(Phase 1)**	14	4	3,117	128,270
August 2010 to May 2011 **(continuation of Phase 1)**	30	7	7,560	307,720
August 2011 to May 2012 **(Phase 2, Cycle 1)**	50	10	10,150	393,540
Total	**94**	**21**	**20,827**	**829,530**

- The additional 20 beneficiaries have increased the total income by 28%
- The salesperson (tricycle operator) from Kalpitiya, who was previously unemployed, was earning a monthly income of about LKR 10,000
- MCRCF continues to operate the successful buy-back arrangement after the project closure
- MCRCF won the most prestigious environmental conservation/women empowerment SEED International Award for 2011 for its *Aloe vera* based initiatives

Tricycle with chilling facility (© MCRCF)

In Phase 2, Cycle 2 MCRCF received another MFF SGF grant (1.10.2012 – 30.06.2013) to improve the existing processing unit at MCRCF office by the addition of a refrigerator and other processing equipment. The upgraded and refurbished beverage processing unit is suited for large-scale production.

The beverage marketing area was expanded beyond Kalpitiya town (more than 30 km) by using a motorized vehicle with a refrigerated facility. Tricycle sales were discontinued after the motorized vehicle was commissioned.

Table: 4.3 - Beverage production, sales and profits in the period February-June in year 2012 (Tricycle sales) and year 2013 (Van sales)

	Beverage produced (litres)	Sales Income (LKR)	Profit (LKR)
February-June 2012 (Tricycle sales)	1,320	157,180	20,510
February-June 2013 (Van sales)	1,830	325,020	86,680
Total	**3,150**	**482,200**	**107,190**

Current status:

About 30 of the 50 beneficiaries continue to cultivate *Aloe vera* and sell the leaves to MCRCF. The cosmetics company buys up to 1,500 kg of Aloe leaf per month from MCRCF. MCRCF buys growers' leaf for the cosmetics company, on a quota basis depending on the demand. Each grower sells 40-60 kg every month and earns around LKR 1,600.

Motorized selling unit (© MCRCF)

Beverage production has, however, been suspended. Although profits were good (Table: 4.3), lack of commitment of the string of sales persons employed and frequent repairs to the vehicle appears to have necessitated the stoppage. The sustainability of this project's outputs was rated as Low.

4.2 Handicraft production

Handicraft production in Sri Lanka is basically a cottage industry where the know-how is handed down from generation to generation. Generally, producers ensure that the raw materials are sustainably extracted from the wild. Three handicraft production projects are described below.

4.2.1 *Pandanus kaida* based handicrafts production (Phase 1: MFF/19) (01.01.2009 - 31.12.2009)

Netolpitiya, Danketiya and Palathuduwa are three villages on the southern coast that were hit by the 2004 Tsunami. This badly affected the incomes derived from fishing. To assist these coastal families that generally depend on fishing, ***Wanasarana Thurulatha* Swetchcha Society (WTSS)**, introduced handicraft production to the womenfolk using *Pandanus kaida* leaves that are abundant in the area.

Interventions:

After introducing the project, 50 women were selected from the three villages. Selection criteria used were that the potential beneficiary needs to be a member of a low income family and widowhood. They were trained by a qualified teacher on processing of Pandanus leaves, dyeing techniques, bag designing and making, and marketing techniques.

Each beneficiary received a monthly supply of Pandanus leaves, dye, cloth, thread, cardboard and gum, sufficient for the first nine months, to assist them to get established in the new business venture.

To ensure a sustainable supply of leaves, 6,000 plants of *Pandanus kaida* were planted in selected areas of Medilla beach (in Netolpitiya).

Handicrafts turned out by the beneficiaries - 2009 (Kumudini Ekaratne © IUCN)

Status at the end of the project:

The women were producing a range of items: mats, ladies' handbags, coin purses, carry-on bags for books, vegetables/fruits, etc. They have found a market for their products in the nearby schools, village fairs, etc. The monthly income from handicrafts ranged from LKR 2,000-6,000 per woman. Raw materials were purchased from the profits earned and not on credit, which ensured the sustainability of the venture. *Pandanus* was established on the coastal stretch of Medilla.

A vending cart was stationed at Netolpitiya on the Colombo-Kataragama highway (A2).

Current status:

The beneficiaries depended on WTSS to sell their products. When WTSS moved out at the end of the project their interest in mass production dwindled. About 20 beneficiaries are producing handicrafts but only to meet the purchase orders they receive. Each of them earn about LKR 1,500 a month.

The sustainability of this project's outputs was rated as Medium and it demonstrates the additional marketing support needed in such ventures.

Handicrafts turned out by a beneficiary -2014 (Kumudini Ekaratne © IUCN)

4.2.2 Coconut ekel-based handicraft production and dress making (Phase 2: MFF/50) (01.07.2011 - 30.04.2012)

Iranawila and Samindugama are two villages in the Mahawewa Divisional Secretariat Division of Puttalam District. Livelihood opportunities, especially for women of fisher families, are limited. The dense mangroves in the area are often cut and sold for firewood and making dwellings to earn an additional income. Although cutting mangroves is illegal, generally the law is not strictly enforced.

Mihikatha Environmental Organization (MEO) provided these families with alternative income generation activities to help conserve the mangroves.

Interventions:

Coconut ekel-based handicrafts produced by a beneficiary -2012 (Kumudini Ekaratne © IUCN)

blouses sewn by a beneficiary - 2012 (Kumudini Ekaratne © IUCN)

Twenty beneficiaries were trained in producing handicrafts with coconut ekels. Four training programmes were conducted on making waste paper baskets, marketing bags, office bags and flower vases. Coconut estates nearby provided the raw material, free of charge, to the beneficiaries. Trainees were provided with the required tools and other materials.

Another 20 beneficiaries were trained in dress making. Two training programmes on dress making were conducted, and basic equipment and material needed for dress making such as measuring tapes, tracing wheels, scissors, tracing paper, etc. were provided. Beneficiaries were trained to sew baby shirts, shirt blouses and A-line frocks using blocks.

Status at the end of the project:

A beneficiary's average income per month from selling coconut ekel products was LKR 2,500-4,000, which increased the family income by 30-50%. The buyers were both locals and foreign tourists to the area.

The women trained in tailoring and sewing also sew clothes needed by the family, which saves about LKR 2,000 per month. They also take sewing orders from neighbours.

Benefitting from self-employment skills and the awareness programmes, beneficiaries were motivated to avoid extraction of materials from mangrove sites, thereby helping to conserve the mangroves.

Current status:

About 85% of trainees are pursuing self-employment activities.

Handicrafts are sold at church festivals in the area and also at the Chilaw and Wennappuwa fairs – an coconut ekel vase at approximately LKR 300 and a basket at LKR 1,000, approximately.

All 20 trained in dress making sew their family requirements and also undertake orders. Sewing charges are: LKR 250 for a normal saree blouse and LKR 350 with lining included. Sewing charge for frocks varies with the design. Four trainees function as established dressmakers in the area and undertake large orders of uniforms and dresses for the festive season. They also get regular orders from a nearby children's orphanage. Materials such as cloth, thread, ribbon and buttons are purchased from wholesale shops in Colombo. They travel together to Colombo in a hired vehicle and share transport costs to cut down expenses.

The sustainability of this project's outputs was rated as High.

Coconut ekel-based handicrafts produced by a beneficiary - 2014 (Kumudini Ekaratne © IUCN)

Well established dress maker - 2014 (Kumudini Ekaratne © IUCN)

4.2.3 Rushes and reeds based handicraft production (Phase 2: MFF/45) (01.05.2011 - 30.04.2012)

The rushes and reeds (R & R) industry that once flourished in the Pottuvil area declined with the onset of civil unrest. **Committee for the People's Rights (CPR)**, an NGO with extensive experience in conserving traditional handicraft production, obtained funding

to revive and conserve the traditional knowledge on handicraft in Hijra Nagar a coastal village in Pottuvil. The project was appropriate as the villagers had some experience and an abundant supply of the raw material, *Cyperus corymbosus* (Peri-peri, Gal-eha), in the area.

Interventions:

Twenty women were selected as craft developers (rush and reed weavers). The selection criteria required the beneficiary to be permanent residents in the project area, own land, experience in R & R industry and interest in R & R cultivation. A CBO named *Rush and Reed Conservation and Producers Forum (R&RCPF), Hijra Nagar* was established and registered in May 2011.

The 20 craft developers were trained at the CPR's Training Centre in Horana. Main topics covered were harvesting methods, processing rushes and reeds, new designs appropriate for traditional weaving methods, and machine weaving techniques. At the end of the training programme, R&RCPF was provided with three handloom weaving machines and a flattening roller.

In September 2011, 25 cultivators (20 women and 5 men) were selected and trained in planting and they cultivated Gal-eha *(Cyperus corymbosus)*, wetakeyya *(Pandanus thwaitesii)* and Pathegi *(Caesalpinia sappan)*. The live fences comprised of Pathegi or Sappanwood *(Caesalpinia sappan)*. Pathegi stems yield a natural dye. 500 Pandanus plants (20 plants per plot x 25 plots) were also planted.

Status at the end of the project:

The craft developers were producing handbags, hats, mats and baskets of various designs and earned LKR 4,000-5,000 per month as additional income. The 25 cultivators had brought a total of 1.16 ha of land under cultivation.

Land cultivated with *Cyperus corymbosus* (Kumudini Ekaratne © IUCN)

By growing the raw materials the habitat was being conserved. With the use of weaving machines their production targets were achieved in double quick time. The craft products enjoyed a ready market in the village.

Beneficiary using a handloom weaving machine (Kumudini Ekaratne © IUCN)

Handicrafts turned out by the beneficiaries (Kumudini Ekaratne © IUCN)

Current status:

Of the 20 trained craft developers, 10 are in business. Five weave only sleeping mats while the others produce a range of items such as door mats, sleeping mats, hats and bags. The products are sold at "Divineguma" fairs. Some produce about 12 items in a month and earn LKR 6,000.

One weaving machine has been given to a person in Urani. The other two have not been used for the past few months as beneficiaries need external assistance to fill the bobbins. However, the beneficiaries continue with their work hoping the machines will be useable soon.

The sustainability of this project's outputs was rated as Medium.

4.3 Eco-tourism

4.3.1 Eco-tourism as an alternative to harmful livelihood practices in the Rekawa, Ussangoda and Kalametiya (RUK) ecosystem (Phase 1: MFF/34) (01.01.2009 - 31.12.2009)

Rekawa, Ussangoda and Kalametiya (RUK) are three coastal villages in the deep south of Sri Lanka. Rekawa is a turtle sanctuary, while Ussangoda plateau is a unique site of archaeological importance. Lunama-Kalametiya sanctuary is famous for birds.

Ruk Diya Eco Holidays is a community-based organization dealing with ecotourism activities in the RUK area. They run an accommodation facility called Ruk Diya Eco Stop and secured a grant to expand the ongoing activities - to establish a camping site in their land bordering the picturesque Lunama Lagoon.

Interventions:

Two camping units were constructed. Each unit was a two-storied wooden shelter complete with two canvas tents, a toilet, camp beds and basic camping furniture. The campsite was promoted through a leaflet, posters on notice boards, Sri Lanka Tourism website and Southern Area Tourism Authority.

Status at the end of the project:

Two sets of well-appointed camping units and the Eco Stop earned a monthly income of LKR 30,000 by renting out the campsite and providing home-cooked meals to visitors. Members of the CBO were employed to service the camping facility and other related tourist activities such as surface transport, boat rides etc.

Stages of camping unit under construction (Kumudini Ekaratne © IUCN)

On 16.03.2009	On 24.07.2009

Camping unit in full operation - 30.11.2009 (Kumudini Ekaratne © IUCN)

Camping unit in dilapidated condition - 22.08.2014 (Kumudini Ekaratne © IUCN)

Current status:

The camp site had been abandoned in 2012 due to security problems. The camp site was about 0.5 km away from Eco Stop, and protecting the tents and equipment was an issue as the site was easily accessed from the lagoon. The two units are now in a dilapidated condition and the access road is impassable. Tents and equipment are now stored at the Eco Stop.

However, Ruk Diya Eco Holidays still undertake bookings and tents are erected on the Kalametiya beach area and dismantled immediately after use. They ensure that the public area is not polluted in any way. A tent is rented out at about LKR 3,500 per day. The sustainability of this project's outputs was raged as Medium.

4.3.2 Increasing ecotourism through the conservation of Baobab trees in the Island of Mannar (Phase 2: MFF/51) (01.07.2011 - 30.11.2011)

Native to the African continent, Baobab (*Adansonia digitata*) is a deciduous tree generally found in arid areas. These trees reach heights of up to 30 m and have swollen trunks, in which they store up to 120,000 litres of water to endure harsh drought conditions (Wikepedia). Baobab trees are believed to have been brought to Sri Lanka by Arab traders around 700 AD. The oldest and the largest individual Baobab tree in Sri Lanka is found in Pallimunai and is reported to be over 700 years old.

In Sri Lanka, these trees are now found mainly in the Mannar Island. There are about 30 trees in Mannar which attract both local and foreign tourists. Although Baobab trees are protected by law in Sri Lanka, they are now being threatened by the rapid development taking place after the 30-year-long civil unrest ended. It is, therefore, essential that these Baobab trees in Mannar are protected for their historic value, which may also assist in increasing ecotourism.

Realizing the growing threat to these trees, **Al-Azhar Fisheries Co-operative Society** in Uppukkulam, felt the best way to overcome this is to provide protection to at least a few trees and sought funding from MFF SGF to start this endeavour.

Interventions:

Ten Baobab trees were identified and approval obtained from the District Secretariat, Mannar to construct protective walls. An awareness programme on the historical value of Baobab trees in Sri Lanka and the benefits of conserving these trees was conducted for 30 people who live in areas with Baobab trees. Brick walls (0.75 m high) were built round each of the 10 trees and 10 awareness boards providing basic information about the historical and cultural heritage values of Baobab trees were installed near each wall.

Status at the end of the project:

Construction of a short wall, painted white, around the base of each tree, and the installation of awareness boards have served many purposes. The walls not only protected the trees from destructive activities but also attracted tourists. The awareness boards helped the community as well as many visitors to Mannar district recognize the importance of these historic trees.

The Baobab tree has earned due recognition from both locals and visitors to Mannar.

Walled off trees (Kumudini Ekaratne © IUCN)

Awareness board (Kumudini Ekaratne © IUCN)

Current status:

Since the protective walls were built 2.5 years ago, one of the 10 protected trees has been felled by a developer who had claimed ownership of the land on which the tree stood. The other nine trees are in a healthy condition. While the brick walls of all nine trees are intact, awareness boards of three trees are missing.

The white protective walls and awareness boards attract the attention of visitors to Mannar. During the post-project evaluation visit, we were made to understand that an important reason for survival of the nine Baobab trees was the white protective wall that made them stand out from the others. The grantee also recommended that such protection be provided to at least one Baobab tree in each village in Mannar district. The sustainability of this project's outputs was rated as Medium.

After 2.5 years (Kumudini Ekaratne © IUCN)

4.4 Aquaculture

4.4.1 Seaweed culture

4.4.1.1 Farming seaweed *Eucheuma* spp as an alternative livelihood for coastal communities at Panama and Pottuvil (Phase 1: MFF/09) (01.01.2009 - 31.12.2009)

Eucheuma, a red alga, is a valuable source of carrageenan. *Eucheuma* spp is cultivated for extraction of carrageenans used specifically in the confectionery industry. South-east Asia is one of the largest producers of carrageenans through extensive cultivation of marine algae.

In Sri Lanka, many confectionery manufacturers obtain their requirements of carrageenan from abroad and opportunity is there to have a ready local supply.

Sevalanka Foundation (SLF) secured a small grant to start a pilot seaweed culture project. The objectives were to pilot test the culture technique and also to uplift the living standards of coastal communities through the establishment of a seaweed industry as an eco-friendly livelihood activity.

Interventions:

The Sevalanka Foundation worked in collaboration with two Fisheries Cooperative Societies (FCS), namely, the Abeysinghapura-Panama Fisheries Cooperative Society and the United Deep Sea Fisheries Cooperative Society in Pottuvil. Six society members, three each from the two societies, were selected by the respective fisheries societies.

Sixty cages (2 m x 1.25 m x 0.5 m) made out of 2.5 cm diameter PVC pipes and covered over with 2.5 cm reinforced plastic netting were constructed. Seaweed cuttings "bunches" each weighing about 75-100g were tied to ropes in the cages. The cages were anchored in the sea off Panama and Ullei (in Pottuvil) in the east coast of Sri Lanka. The plants were harvested when they had grown to about 1 kg. Harvested seaweed was sun dried and packed for sale in the local market.

Status at the end of the project:

About 50-70 kg (wet weight) of seaweed was harvested from a cage, stocked with 4 kg of vegetative cuttings. The dry weight of seaweed is about 10–12% of its wet weight. Seaweed was harvested in 6-8 weeks after stocking. Hence, 4 to 5 cycles were possible per year in Panama and Ullei, even after avoiding the monsoon season. Sale price of seaweed was LKR 50 per kg. Income of fisher families increased by about LKR 2,000 per month.

A cage being stocked with seaweed (Kumudini Ekaratne © IUCN)

Current status:

The cyclone experienced at the end of 2009 destroyed most of the cages. The fishermen were no longer interested in continuing with the venture. SLF salvaged most of the damaged cages from the sea and installed a few cages in Thirukkovil sea by their office. However, due to the rough condition of the sea, this culture also had to be abandoned. The sustainability of this project's outputs was rated as Low.

4.4.1.2 Providing a supplementary income to the coastal community in Northern Mannar by establishing a healthy mother plant stock of *Kappaphycus alvarezii (Eucheuma cottonii)* to meet future demand of seedlings for the seaweed farming industry in Sri Lanka (Phase 2: MFF/18) (01.05.2011 - 30.10.2012)

In 2009 **Sevalanka Foundation (SLF)** pilot tested culturing seaweed *Eucheuma* spp in Pottuvil and Panama (see 4.4.1.1). Having proven that culture is possible, SLF secured another grant to replicate culture in the northern coast. Realizing that the cage method was very costly, SLF opted for the less expensive raft method.

The objectives were to establish and maintain a healthy mother plant stock of *Kappaphycus alvarezii* to service Sri Lanka's future seaweed farming industry and to provide supplementary incomes to the poor fishers resettled very recently after three decades of war.

Interventions:

Having selected a site according to the standard criteria, the project was introduced to the members of St Anthony's Fisheries Cooperative Society. Five beneficiaries, all fishermen who collect sea cucumber for a supplementary income, were selected. Two of the five farms (each of 30 m x 15 m) were set up from July to August 2011. Each farm had thirty, 15 m long culture lines, and 40-46 seaweed bunches were tied to each culture line.

The seaweeds established well but were damaged and lost due to a cyclone that ravaged the area in December 2011. Damaged farms were repaired and the balance three were also set up and stocked.

Status at the end of the project:

Beneficiaries had lost interest in seaweed farming as the income from sea cucumber collection is significantly greater. Sea cucumbers are found in the area and main livelihood of the beneficiaries is sea cucumber fishing under a license from the Department of Fisheries.

The main concern about sea cucumber fishing in the area is the by catch - the small sea cucumbers rejected by the buyer that is discarded. As the collectors (skin divers) do not use diving equipment, the limited time they can spend under water is inadequate for grading. Thus, SLF decided to stock the discarded small sea cucumbers together with seaweed to make the project attractive financially. This enabled optimum use of the by-catch, and also the materials purchased for constructing the farms, and avoid terminating the project in midway.

Finally, the activity developed into a collaboration between St Anthony's Fisheries Cooperative Society and the five project beneficiaries who functioned as farm caretakers. Other members supplied the rejected small sea cucumbers to the farm. Sales of sea cucumbers and seaweeds from April to October 2012 were as follows:

- sea cucumber (about 32 kg) = LKR 208,000
- seaweed (20 kg) = LKR 4,000

Current status:

Seaweed farming had stopped as mother plants were not available. Sea cucumber farming was not on at the time of the evaluation as the season starts with the onset of rains in October. Nets had been taken ashore. The sustainability of this project's outputs was rated as Low.

Seaweed farm in operation - 24.01.2012 (Kumudini Ekaratne ©IUCN)

Only stakes where the original farm existed (as nets had been taken ashore) - 14.08.2014 (Kumudini Ekaratne © IUCN)

4.4.2 Fin fish culture

4.4.2.1 Cage culture of sea bass *(Lates calcarifer)* and Tilapia *(Oreochromis* spp*)* as an alternative livelihood for fishing communities around Maduganga estuary (Phase 1: MFF/52 & 55) (01.01.2009-30.09.2009 & 01.07.2009 - 31.11.2009)

The incomes of the fishing communities living around Maduganga RAMSAR site have been steadily falling due to declining fish catches. As a remedy, **Sevalanka Foundation (SLF)** with Ampe *Mithuru* Freshwater Fisheries Cooperative Society Ltd., a leading fisheries society in the area, introduced cage culture as a supplementary activity and a sustainable management practice. Based on the success of the ongoing pilot scale culture in Negombo, sea bass (*Lates calcarifer*) was chosen for piloting cage culture in Maduganga. The project was implemented through the members of the Ampe *Mithuru* Freshwater Fisheries Cooperative Society Ltd.

The floating cages did not impede water flow, and the materials used to construct cages were not harmful to the lagoon system. Fish culture was expected to reduce the capture fishery pressure on the estuary.

Interventions:

Four beneficiaries were selected after introducing the project to the Ampe *Mithuru* Freshwater Fisheries Cooperative Society Ltd. membership. The selection criteria were commitment and willingness to undertake project activities. An Aquaculturist trained the beneficiaries in cage construction and sea bass cage culture.

Site selection for the cages was based on water quality parameters such as salinity (5-15ppm), pH (7-8) and depth (minimum 3 m). Eight floating net cage units (each 3 m x 3 m x 2 m = 18 m^3); four with mesh size of 1 cm (for fingerlings) and four with mesh size of 2.5 cm (for grown fish) were constructed and installed at the selected site. A security hut was built at one end of the floating structure. The beneficiaries took turns in providing security.

First culture cycle: The four 1 cm mesh size cages were stocked with 1,600 sea bass fingerlings (60-75 days old) in April 2009 (stocking density = 25 fingerlings per m^3).

- Fingerlings were initially fed with commercial pellet feed. Trash fish was gradually introduced after two months. The salinity, surface dissolved oxygen, surface turbidity, temperature and pH of the water were monitored on a regular basis.
- Supervised by the Aquaculturist, the fish were graded in May and August 2009, and fish over 250 g were transferred to grow out cages (2.5 cm mesh size).
- The first cycle fish (sea bass) were harvested after 5.5 months on 10 October 2009.

Second culture cycle: The vacant small mesh size cages were stocked in mid August 2009. As sea bass fingerlings were not available the cages were stocked with tilapia (*Oreochromis* spp). Two thousand fingerlings were stocked (stocking density = 55 per m^3).

- Fingerlings were fed during the first month with commercial pellet feed and then introduced to farm prepared fish meal. Fish were fed twice a day.
- Harvesting was done in stages from 28 December 2009 to 8 January 2010 since the buyers were not prepared to take the entire stock of tilapia at once.

Status at the end of the project:

The pilot proved that sea bass and tilapia can be cultured in cages in the Maduganga estuary. First harvest of 428 kg of sea bass fetched LKR 107,000 and the first harvest of 682 kg tilapia fetched LKR 136,400. Hence, the income from sea bass cage culture per fisherman per cycle (5.5 months) was LKR 26,750 and from tilapia cage culture per fisherman per cycle (about 4 months) was LKR 34,100.

Cage unit (Kumudini Ekaratne © IUCN)

The success of the pilot intervention led to another small grant for Sevalanka Foundation to expand the project to four more beneficiaries.

Current status:

Tilapia cage culture is being carried out successfully by the beneficiaries, but as four separate ventures; not as partners. Fingerlings are bought with their income.

Post-project evaluation discussion with a beneficiary (Kumudini Ekaratne © IUCN)

Maduganga is famous for boat rides. Both local and overseas tourists enjoy a boat ride down Maduganga to watch birds, local fishing activities and visit islands. The boat tours have now introduced a stopover at the cage culture site where tourists get the opportunity to feed the fish. The fishers have added another dimension by setting up small cages to provide a therapeutic foot massage service, using fish.

Therefore, in addition to selling grown fish, the fishermen earn additional income from tourists. The intervention not only bring additional income from selling fish but also from other sources due to the fishers' creativity.

The pilot intervention has truly reduced fishing pressure on this RAMSAR site. The sustainability of the outputs of these projects was rated as High.

4.5 Animal husbandry

Pottuvil, on the east coast of Sri Lanka, was affected by three decades of civil unrest and the 2004 Tsunami. The main livelihoods of the community are fishing, small business enterprises and livestock rearing. Three grants were awarded for livestock rearing projects to empower widows and female-headed families.

4.5.1 Goat farming to enhance the income of widows and their families in Pottuvil (Phase 1: MFF/30) (01.01.2009 - 31.12.2009)

Goat farming is widely practiced by the community, mostly Muslims in the Pottuvil area. **Al-Ameen Samurdhi Society**, a CBO in Pottuvil, received a small grant to establish a goat farm in Pottuvil. The beneficiaries, eight women, performed the day-to-day activities on the farm on a roster basis.

Interventions:

The grantee, in concurrence with Pottuvil's Divisional Secretary, selected eight widows as the beneficiaries. A live fence was erected around the farm and a farm office, toilet, shelter for the goats and a drinking water well were constructed. Twenty-eight goats, certified by the Government Veterinary Surgeon, were purchased.

Status at the end of the project:

The herd had increased from 28 to 43 within a period of six months. The eight beneficiary women earn an average monthly income of LKR 2,000 each. A well-managed and profitable goat farm was in operation by the beneficiaries under the supervision of the grantee.

Current status:

On the instructions of the Sri Lanka Security Forces the farm was abandoned in late 2011. From the herd that was left at that time each beneficiary woman received two adults and a calf. The sustainability of this project's outputs was rated as Medium as the closure was externally enforced.

Goat husbandry (Kumudini Ekaratne © IUCN)

4.5.2 Poultry farming to enhance the income of widows and their families in Pottuvil (Phase 1: MFF/29) (01.01.2009 - 30.06.2009)

Arugam Bay, one of the best surfing points in the world, attracts both local and foreign tourists not only during the surfing season, but almost throughout the year. With the influx of tourists both local and foreign after the dawn of peace, demand for accommodation and food such as fresh meat, eggs and vegetables have increased.

The Arugam Bay Tourism Association (ABTA) established a poultry farm on their land in Pottuvil.

Interventions:

The project beneficiaries, 20 widows from the 2004 Tsunami and civil war affected families, were selected by the Divisional Secretary, Pottuvil. Poultry sheds which can

house about 1,000 birds were constructed and day-old chicks were purchased (500 per cycle). As in the goat farming project (4.5.1), the women shared the workload and took turns to perform the routine activities in the farm, under ABTA supervision. The services of the local veterinarian were sought on a regular basis. Marketing aspects of the poultry operation were handled by ABTA.

Status at the end of the project:

A well-managed and profitable broiler chicken farm was operational. Two production cycles have been completed with a net profit of LKR 40,000 from the first cycle (2 months) and LKR 30,320 from the second cycle (2 months). Profits were equally divided amongst the 20 families. Each widow earns an average income of LKR 2,000 every two months.

Poultry cages © IUCN

Current status:

Three more poultry cycles had been completed. Unusual cold weather that set in at the end of 2009 resulted in high mortality. As there was a drastic reduction in the income the beneficiaries were no longer interested in working at the poultry farm. After the last batch of broilers was sold ABTA discontinued this venture. ABTA had not obtained a Livestock Insurance to cover the untimely loss. The sustainability of this project's outputs was rated as Low.

4.5.3 Buffalo farming to enhance the income of widows and their families in Pottuvil (Phase 1: MFF/28 and MFF/57) (01.02.2009 - 31.07.2009)

Livestock Development Dairy Farmer Association (LDDFA) was established in 2003. One of its goals was to uplift the standard of widows and female-headed families in Pottuvil. In 2007, they received 30 buffaloes from GTZ, and in 2008 another 10 from the UNDP Small Grants Programme. The buffaloes are tended by widows. LDDFA secured a small grant from MFF to purchase 16 more buffaloes and assist another eight widows.

Interventions:

The beneficiaries (eight widows) were selected with the assistance of the Divisional Secretary, Pottuvil. An awareness programme on buffalo rearing and hands-on training was conducted by a LDDFA member. A farm shelter was erected and the land fenced off. Sixteen buffaloes were purchased from the National Livestock Development Board (NLDB) and the local veterinarian checked the animals periodically.

Status at the end of the project:


Buffalo farm (© Ranjith Mahindapala)

The eight widows were actively engaged in farming activities on a part-time basis. All 16 buffaloes were pregnant when they were purchased in late March and the herd had increased to 23 by July 2009. A satisfactory arrangement to market the milk was in place through LDDFA. The average monthly milk production of about 500 litres from the buffaloes fetched around LKR 17,000, at LKR 34 per litre. Each widow earned an additional monthly income of LKR 1,000.

LDDFA had leveraged funds from other sources to set up a milk processing facility.

Current status:

In late 2009, the Forest Department had filed four legal cases claiming the farm lands owned by four LDDFA members. Consequently, the farm went into low gear until they received strict instructions from the Sri Lanka Security Forces in late 2011 to terminate all activities.

At that time 20 widows were tending the buffaloes. On 3 November 2011, LDDFA compensated the widows by giving 1 buffalo each to 15 widows and the balance five received LKR 20,000 each and LDDFA closed down the farm.

Verdicts of two cases, in favour of the LDDFA, were received on 10 October 2012. The LDDFA President is confident that the other two legal cases also will end in their favour, and that farm activities can be resumed. The sustainability of this project's outputs was rated as Medium as the temporary closure was externally enforced.

4.6 Micro finance

4.6.1 Helping Ammathottam fishing villagers (Phase 2: MFF/17) (01.05.2011 - 30.04.2012)

Ammathottam is a fishing village located on the western coast of Puttalam Lagoon. Poverty is a common factor among the villagers and child malnutrition is rising. The lagoon is threatened by the felling of mangroves for firewood, use of unauthorized fishing gear that destroys fishery resources and unplanned development of prawn farms.

Improving the well-being of these fisher families while reducing the pressure on lagoon resources, is the challenge **PEARLS (Peaceful Environment Assured Rights Lasting Solutions)**, an NGO in the area, undertook with financial assistance from a small grant.

Interventions:

Two awareness programmes on coastal management were conducted in May and July 2011 and a village Pressure Group to protect coastal resources was established. The group consisted of two men and 11 women and they met once a month. The members were social activists, school principals and the *Grama Niladhari* (GN).

Training programmes on self-employment activities, such as home gardening, poultry and goat farming, dry fish making and bee keeping, were conducted in June for 100 women.

A microfinance loan scheme for women was established in July with an initial allocation of LKR 250,000 through the project. The scheme was managed by PEARLS and loans were made available to members of two well established women's organizations in the area, namely Al Haida and Jana Handa Women's Societies. Individual loans ranged from LKR 5,000 to 20,000, at 2% monthly interest, whereas the outside interest rates were as high as 3-6 % per month.

Status at the end of the project:

Forty two loans were given for self-employment activities. The additional incomes ranged from 40-80% of a fisherman's income; the grocery shop income exceeded it. Income generated is being saved or used for children's needs, structural improvements to houses (fixing ceilings) and purchasing furniture. All beneficiaries had started paying back their loans; some small loans had been fully repaid. PEARLS use the capital as a revolving fund; gives new loans as the repayments come in. The microfinance scheme is well established and PEARLS continues to operate it after project closure.

Vegetable stall of a beneficiary (Kumudini Ekaratne © IUCN)

Grocery shop of a beneficiary (Kumudini Ekaratne © IUCN)

The pressure group is vigilant and keeps a look out for those who damage mangroves; culprits are reported to the local police, through the GN.

Average loan size and profit per activity:

Activity	Average size of loan (LKR)	Average profit (LKR)
Dry fish production	5,000	4,000 per month
Poultry farming (meat)	10,000	6,000 per month
Poultry farming (eggs)	10,000	5,000 per month
Goat rearing	10,000 (for 2 goats)	2,500 per goat
Yam cultivation (manioc/cassava)	20,000	20,000 per 5-month cultivation season
Weaving palm fronds	5,000	3,000 per month
Grocery shop	10,000	9,000 per month
Vegetable shop	5,000	6,000 per month

Current status:

A well managed microfinance scheme is in operation. The initial microfinance fund has now grown to LKR 500,000. The number of loans given has doubled but the interest rate remains at 2%. Loan recipients' living standards have improved and the beneficiaries are empowered. The sustainability of this project's outputs was rated as High.

5. Research

Research projects conducted to acquire information and scientific knowledge on coastal ecosystems and habitats constitute a new thematic area in Phase 2 of SGF. Four such projects were reviewed using quarterly and final progress reports to determine how the research findings have been used and the benefits derived (research outputs/ outcomes). The success of a project was rated as High (H), Medium (M) or Low (L).

***Success*:** Extent to which the research findings were shared and benefitted the public and scientific community.

Rating scale:

At the time of the study:
High: Findings have been published in a peer reviewed scientific journal or presented at conferences or directly shared with concerned institutions/communities; and at least one recommendation implemented by a state or private sector agency.

Medium: Findings have been published in a peer reviewed scientific journal or presented at conferences or directly shared with concerned institutions/communities or at least one recommendation implemented by a state or private sector agency.

Low: None of the success parameters have been achieved.

Titles of the projects, locations, grantees and success ratings are presented in Table 5.1.

Table 5.1 - Success rating of research projects

Code Number	Location and Project Title	Grantee Organization	Success Rating
Phase 2 (Cycle 1)			
Panama (two projects)			
MFF/05	Groundwater vulnerability assessment in the Panama coastal aquifer system	Postgraduate Institute of Science	**H**
MFF/06	Ecological study of mangroves in Panama, Okanda and Helawa Lagoons in the east coast of Sri Lanka	Postgraduate Institute of Science	**H**
Puttalam (two projects)			

Code Number	Location and Project Title	Grantee Organization	Success Rating
MFF/23	Effect of substrate characteristics and environmental factors on species diversity and distribution of marine angiosperms in Puttalam Lagoon, Sri Lanka	Dept of Oceanography and Marine Geology, Faculty of Fisheries and Marine Sciences & Technology, University of Ruhuna	**H**
MFF/33	Evaluation of the impacts of restoring disturbed mangroves in Puttalam Lagoon: Potential for carbon sequestration	Dept of Aquaculture and Fisheries, Wayamba University of Sri Lanka	**M**

Detailed accounts of these projects are set out below. Abbreviated versions of the project titles have been used in the text.

5.1 Groundwater quality and vulnerability in the Panama coastal aquifer system (Phase 2: MFF/05) (01.04.2011 - 30.04.2012)

Collecting well water samples (Kumudini Ekaratne © IUCN)

Sri Lanka's coastal sandy aquifers, generally confined to a narrow strip of the island, are mostly overlain by beaches and low sand dunes. Being very important sources of fresh water for domestic and agricultural purposes, these aquifers are vulnerable to excessive extraction and anthropogenic pollution. Salt water intrusion that affects coastal sandy aquifers is caused by over extraction that allows seawater to enter the freshwater zone. Climate induced sea level changes also add to the problem.

Coastal aquifer system in Panama is undergoing drastic changes mainly due to rapid development and intensified agriculture implemented, since 2009, with the ending of the 30-year civil unrest. Groundwater wells in this region are often within 10-100 meters of the sea and brackish water lagoons. An increasing number of people in Panama area obtain domestic water from shallow boreholes that penetrate into the sandy aquifers. Increased water demand and intensive cultivation practices can have a significant impact on groundwater quality. If nitrates and phosphates are present in groundwater coastal aquifers as a result of extensive fertilizer usage and improper waste and sewage management, the situation will be aggravated.

On-site analysis of water samples (Kumudini Ekaratne © IUCN)

Over 80% of water used by the communities in the study area is sourced from aquifers. Hence, the **Postgraduate Institute of Science, University of Peradeniya**, secured a small grant to assess the groundwater quality and vulnerability in the Panama coastal aquifer system.

Interventions:

The following studies were conducted to evaluate water quality in the Panama area:

Seasonal changes in water quality

Water samples, from 33 selected ground water extracting wells, were drawn and analyzed four times during the project period - in June 2011, August 2011, January 2012 and April 2012.

The water samples were analyzed to determine the levels/concentrations of the following hydrogeochemical parameters: electrical conductivity (EC); pH; hardness; nutrients (nitrate, nitrite, ammonia, phosphate); cations [sodium (Na), magnesium (Mg), calcium (Ca), potassium (K), iron (Fe), manganese (Mn)]; anions (sulfate, fluoride, chloride) and toxic metals [arsenic (As) and mercury (Hg)].

Study of sea water intrusions into coastal sandy aquifers using stable isotopes

Oxygen and hydrogen isotope ratios in water samples were measured by wavelength-scanned cavity ring-down infrared spectroscopy with a Picarro L1102-i instrument that was coupled with a vaporization module. The analysis was carried out by The GeoZentrum-Erlangen, Germany.

Salinity variation in the Panama Lagoon

Salinity was measured at two locations in the lagoon during each sampling event.

Bacteriological quality of drinking water

Bacteriological analysis was carried out once at five selected locations.

Research findings:

- Dominant groundwater hydro chemical types were Na-Cl and mixed Ca-Mg-Cl
- Na, K, Ca and Mg concentrations in groundwater was high. The high ratio of Na/Cl in groundwater indicates a significant intrusion of saline water into the aquifer
- Exceptional values of electrical conductivity in ground water also indicate highly localized spots of preferential intrusion of salt water
- Nitrate-nitrogen in most samples was within the permissible limits for drinking water (10 mg/L) set by the World Health Organization; however, high levels were recorded in a few wells. High nitrate-nitrogen levels were mainly related to leakage from septic tanks that had been constructed in sandy soil. Relatively high nitrate-nitrogen concentrations (up to 4.0 mg/L) were also found in intensively cultivated areas
- Isotope ratios indicated that precipitation is the main source of groundwater recharge
- Hydrogeology, hydrogeochemistry and isotope data suggests that the Panama area is characterized by a two-aquifer system: sandy unconfined aquifer overlying a weathered and fractured semi-confined aquifer. In general, groundwater is fresh in unconfined aquifers and brackish in semi-confined aquifers

Research outputs/outcomes:

Based on the research findings, a database, including GIS-based water quality distribution maps that show highly vulnerable areas, was prepared to facilitate the planning and control of groundwater use in the area, and for spatial and statistical analyses of existing groundwater contamination.

Maps providing information needed to plan appropriate land use and associated human activities, as an integral part of an overall policy of groundwater protection and development, were also produced.

The study findings, including the water quality distribution maps showing highly vulnerable areas, have been shared with the Ampara and Colombo offices of the National Water Supply and Drainage Board.

Owners, whose drinking water wells were sampled, received a brief report on the water quality of their wells. Based on this information some owners were reluctantly compelled to stop using their well water for drinking and cooking purposes.

Going by the research findings, the following actions were recommended as being vitally important to safeguard ground water in the region and prevent its degradation:

- Improve the sanitary and drainage systems and adopt safe domestic waste disposal systems
- Develop a groundwater budget for the region. To ensure sustainability, groundwater use should be properly planned in keeping with the needs of development. Economic development plans should be geared to the water resources available
- Conduct continual follow up assessments of water quality, and control the extraction of groundwater to ensure its sustainability. Local authorities and government institutions should play a key role in this regard
- Implement and enforce existing policies and regulations. Introduce new legal instruments such as a Groundwater Protection Law
- Explore the possibility of installing an automated system to track ground water level and sea water level and device an early warning system to control water extraction intensity
- Enhance the technical capacity of various organizations dealing with groundwater

A research paper based on the study findings was published in *Environmental Earth Science* 21 Dec 2013 online; DOI 10.1007/s12665-013-3010-y. Thereby, the findings will reach a wider scientific community.

A leading private bank in Sri Lanka undertook a project to build drinking water wells for community use. They made use of the water quality distribution maps, prepared by this project, to avoid the highly vulnerable areas and selected safe locations to construct the new wells.

The success status of this project was rated as High.

5.2 Ecological study of mangroves in Panama, Okanda and Helawa Lagoons in the East Coast of Sri Lanka (Phase 2: MFF/06) (01.04.2011 - 30.04.2012)

Owing to three decades of civil unrest that prevailed in the northern and eastern parts of Sri Lanka, these areas were inaccessible for research activities. Hence, faunal and floral diversity in these areas is yet to be adequately assessed. After civil unrest ceased in 2009, these areas are being rapidly developed and up-to-date information is essential to formulate conservation strategies.

Recording mangroves and associate species in a transect (Kumudini Ekaratne © IUCN)

Recording girth measurements (Kumudini Ekaratne © IUCN)

The **Postgraduate Institute of Science, University of Peradeniya**, supported by a small grant, surveyed the mangrove vegetation in the Panama, Okanda and Helawa Lagoons to ascertain species composition, and the density of key mangrove species.

Interventions:

The following surveys were carried out from May 2011 to April 2012:

- Mangrove survey
  - Mangrove vegetation, in all 3 lagoons, was surveyed using the belt transect method. Each transect was 5 m in width and extended from the mangrove's landward margin to the water's edge. A total of 268 transects were done (207 in Panama, 22 in Helawa, and 39 in Okanda). Mangrove and associate species in each transect were recorded

- Girth and height of selected trees were recorded
- Relative density, relative frequency, relative dominance and Importance Value Index (IVI) were calculated

- Fishery survey
  - As the fishery in Okanda and Helawa Lagoons is not organized, only Panama Lagoon was surveyed
  - Species harvested were recorded by visiting landing sites, interviewing fishermen and surveying fish catches
  - Fishing methods, fishing crafts and gear employed were also surveyed

Research findings:

Mangrove survey

The survey found nine (9) true mangrove species and 15 mangrove associates (Tables 5.2 and 5.3). Species richness was highest in Panama Lagoon and lowest in Helawa Lagoon.

Table 5.2 - True mangrove species recorded from the three sites

Family	Species	Sites		
		Panama	Helawa	Okanda
Acanthaceae	*Acanthus illicifolius* (Ai)	+	-	-
Avicenniaceae	*Avicennia marina* (Am)	+	-	+
Combretaceae	*Lumnitzera racemosa* (Lr)	+	+	+
Euphorbiaceae	*Excoecaria agallocha* (Ea)	+	+	+
Rhizophoraceae	*Rhizophora mucronata* (Rm)	+	+	+
	Rhizophora apiculata (Ra)	+	-	-
	Bruguiera gymnorhiza (Bg)	+	-	+
	Bruguiera sexangula (Bs)	+	-	-
Pteridaceae	*Acrostichum aureum* (Aa)	-	-	+

+ Available

- Not available

Table 5.3 Mangrove associates recorded from the three sites

Family	Species	Sites		
		Panama	Helawa	Okanda
Apocynaceae	*Cerbera odollam*	+	-	-
Asclepiadaceae	*Calotropis gigantea*	+	+	+
Bignoniaceae	*Dolichandrone spathacea*	+	-	-
Clusiaceae	*Calophyllum inophyllum*	+	+	+
Combretaceae	*Terminalia arjuna*	+	-	-
	Thespesia populnea	+	+	+
Fabaceae	*Derris scandens*	+	+	-
Leguminosae	*Desmodium umbellatum*	+	-	-
	Cassia auriculata	-	+	-
Lythraceae	*Pemphis acidula*	+	-	-
Malvaceae	*Hibiscus tiliaceus*	+	+	+
Myrtaceae	*Syzygium cumini*	-	+	-
Palmae	*Phoenix zeylanica*	+	-	-
Verbenaceae	*Clerodendrum inerme*	+	-	-
	Premna foetida	+	-	+

+ Available

- Not available

- Four mangrove species namely *Avicennia marina, Lumnitzera racemosa, Excoecaria agallocha* and *Rhizophora mucronata* were the most common mangrove species in Panama and Okanda Lagoons (Figure 5.1). *E. agallocha* dominated the Helawa and Panama Lagoons mangrove community while *L. racemosa* dominated the Okanda Lagoon.
- Relative density of *L. racemosa* was highest in both Helawa and Okanda mangroves (Figure 5.2). In these two sites *L. racemosa* had colonized the open areas in disturbed sites forming dense thickets.
- Extent of mangroves in Panama, Helawa and Okanda Lagoons was 83 ha, 2.1 ha and 3.3 ha respectively. Helawa mangroves that were severely damaged by the 2004 Tsunami showed no signs of regeneration.

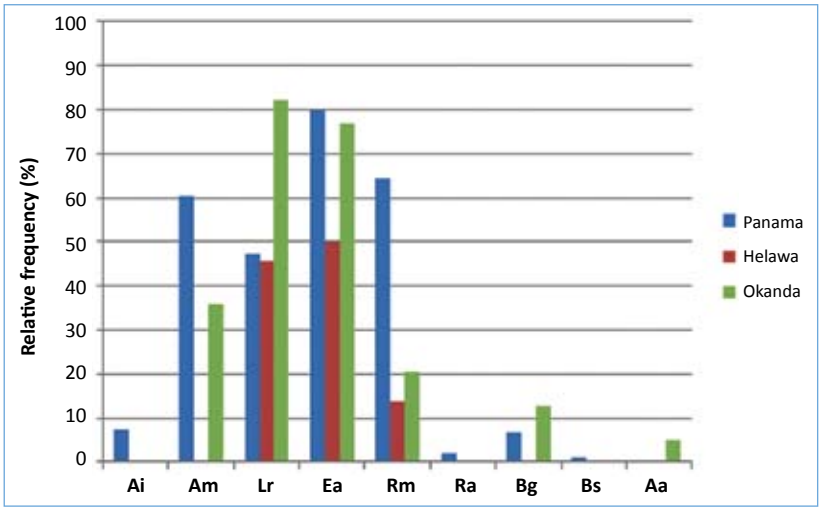


Figure 5.1 - Relative frequency of the true mangrove species in the three sites (Note: Please refer Table 5.2 for full names) Source: PGIS, UoP

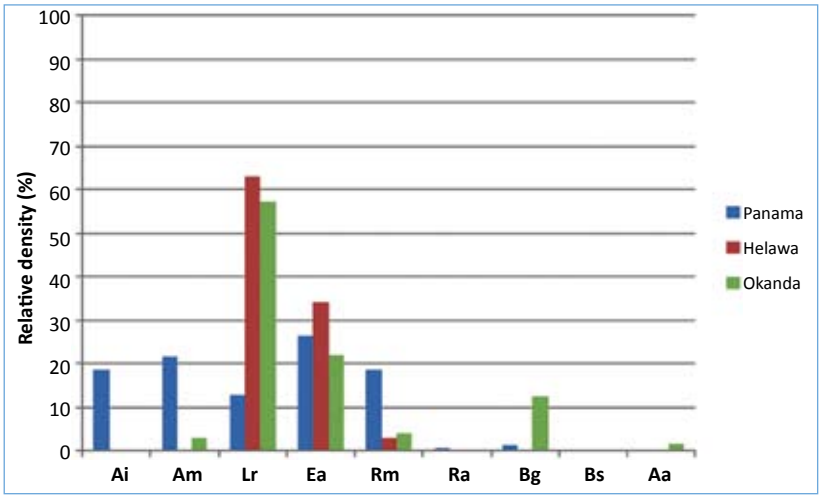


Figure 5.2 - Relative density of true mangrove species in the three sites. source: PGIS, UoP

Fishery survey of Panama Lagoon

Fishing crafts and methods:

- The fiber glass canoe with an outrigger (operated by one or two fishermen) is the main fishing craft used in the Panama Lagoon as using motor boats for fishing is prohibited.
- Gill nets and cast nets (stretched mesh size varying from 3.5-9.0 cm) were the main fishing gear

- Crab cages were used seasonally to capture mud crabs (*Scylla serrata*)
- Small hand nets were used to capture shrimps hiding among roots of mangroves during the shrimp season in April
- Panama Lagoon Management Society has 106 members, but only 27 members were involved in lagoon fishery on a regular basis

Fish catch:

- About 45 species of fish (belonging to 31 families) are harvested from the lagoon. However, just five species, namely S*iganas vermiculatus, Oreochromis niloticus, Mugil cephalus, Gerres argyreus* and *Mystus guilio* form the bulk of the catch, and occur regularly in the fish catch
- *Siganas vermiculatus* and *Mugil cephalus* are the most preferred food fish among the *Panama* village community and thus comparatively high priced. A complete list of food fish harvested from Panama Lagoon was compiled
- Mud crabs (*Scylla serrata*) are caught seasonally
- During the shrimp season four species of shrimps are harvested, namely *Fenneropenaeus indicus* (formerly *Penaeus indicus*), *F. monodon*, *F. merguiensis* and *Macrobrachium sp*.

Research outputs/outcomes:

Based on the research findings maps depicting the distribution of mangroves in each lagoon were prepared.

The mangrove distribution maps were shared with the Forest Department and Coast Conservation and Coastal Resource Management Department (CC&CRMD).

The need to protect these mangroves was evident in view of the rapid development taking place in these areas, especially for the tourism industry. Hence, the project strongly recommended that the mangrove boundaries should be clearly demarcated in order to protect these habitats.

Forest Department, funded by the CC&CRMD, has now demarcated the boundaries of mangroves in the Panama Lagoon.

The community, especially unemployed youth, participated in data collection along with the Field Officer, a biology graduate. Consequently, the community's knowledge on the ecology of mangroves associated with Panama, Okanda and Helawa Lagoons was enhanced, and also their appreciation of the value of the mangroves.

The success status of this project was rated as High.

5.3 Diversity and distribution of seagrass species in the Puttalam Lagoon (Phase 2: MFF/23) (01.04.2011 - 30.04.2012)

Seagrass survey in the Puttalam Lagoon (Kumudini Ekaratne © IUCN)

A specimen prepared for the National Herbarium (Kumudini Ekaratne © IUCN)

Seagrasses are flowering plants that thrive in shallow coastal seas, estuarine and lagoon habitats. They form meadows on the beds of their habitats and provide feeding, breeding and nursery grounds for many aquatic fauna.

Globally, there are about 60 seagrass species belonging to five families and 12 genera. In Sri Lanka, 15 species, in 9 genera, have been recorded.

Information on the existing seagrass communities in Sri Lanka is scarce, possibly due to security related limited access over the past 30 years in the northwest, where seagrasses are abundant, and the lack of scientists with specialized snorkeling and diving skills to explore these underwater habitats.

With MFF SGF funding, the **Department of Oceanography and Marine Geology of the University of Ruhuna** undertook to explore the species diversity, relative abundance, and distribution of seagrasses in the Puttalam Lagoon.

Interventions:

Fourteen sites in the Puttalam Lagoon were surveyed. At each site, a 50 m transect was laid perpendicular to the shoreline. Each transect was marked at 5 m intervals and samples drawn from each 5 m segment using 50 x 50 cm quadrats laid on either side of the transect. A map showing the distribution of seagrasses was prepared (as per instructions of the Seagrass Watch Manual).

Research findings:

Eight seagrass species, belonging to six genera, were recorded. *Enhalus acoroides* (11 sites), *Thalassia hemprichii* (6 sites) and *Cymodocea serrulata* (4 sites) were the three most common species. Other species recorded were *Halophila decipiens* (3 sites), *H. ovalis* (2 sites), *Cymodocea rotunda* (3 sites), *Halodule uninervis* (2 sites) and *Syringodium isoetifolium* (2 sites)

Research outputs/outcomes:

Based on the findings of this comprehensive study, maps of the distribution pattern of seagrass species in the Puttalam Lagoon were prepared.

The research findings and the supporting maps, are now available to coastal development planners, and will also provide a baseline for future research studies.

The above noted project outputs will benefit the following national level initiatives:

- Preparatory work related to declaring the Sri Lanka side of Gulf of Mannar as a MAB Reserve, led by the National Science Foundation (NSF) of Sri Lanka.
- Oil exploration project in the Cauvery Basin. The Petroleum Resources Development Secretariat (PRDS) of Sri Lanka will refer the seagrass distribution map when blocking areas for drilling.
- National Red listing process

Having realized the dearth of reliable information on the seagrass communities in Sri Lanka and recognizing the need to correct this situation the following measures were recommended:

a) Promote systematic research to fully document the current seagrass distribution patterns and habitat status
b) Conduct targeted programmes on the importance of seagrasses to sustain the livelihood of local communities and the need to conserve seagrasses
c) Demarcate undisturbed seagrass meadows and ensure some degree of legal protection
d) Set up a forum of marine scientists in Sri Lanka which was materialized in November 2015 by the formulation of “National Marine & Coastal Forum” at the 2nd National Symposium on Marine Environment held in Colombo on 18 November 2015.

The success status of this project was rated as High.

5.4 Restoration of disturbed mangroves in Puttalam Lagoon: Potential for carbon sequestration (Phase 2: MFF/33) (01.05.2011 - 30.04.2012)

Project site (Kumudini Ekaratne © IUCN)

Mangrove forests are highly productive carbon sinks that absorb and store more carbon than they release. However, in the Puttalam District, the ongoing expansion of shrimp farms and salt pans, and the harvesting of mangroves for fuel and construction purposes are threatening the mangrove habitats. Yet, there is little or no evidence of the disturbed mangroves being replanted or restored.

The potential biomass that can be produced (both below and above ground) and the likely amounts of carbon that can be sequestered with mangrove restoration in Puttalam have not yet been looked at. This information is vital to understand the overall benefit of mangrove habitats.

Discussion with IUCN staff
(Kumudini Ekaratne © IUCN)

Accordingly, this small grant project was carried out by the **Dept of Aquaculture and Fisheries, Wayamba University of Sri Lanka** mainly to determine Carbon content of the different organs of *Rhizophora mucronata* trees.

Interventions:

- Validation of current land use and extent of mangroves by using existing data and maps.
- Estimation of the total Carbon content of different organs namely, leaves, stem, branches, prop roots and roots of 1-2 years old *Rhizophora mucronata* trees.

- Estimation of the above and below ground biomass production by *Rhizophora mucronata* using appropriate models.

Research findings:

The carbon percentage content was highest in *stilt roots* and lowest in leaves and branches. Wet weight of *Rhizophora mucronata* plants and plant parts showed high variability, especially stilt roots (215.7g±199.2). Stilt roots also had the highest wet weight (not significant). Stems (52.38±23.60) and stilt roots (48.67±40.04) had the highest dry weights (not significant). The mean weights and their standard deviations are given below in Table 5.4.

Table 5.4 - Wet and dry biomass of *R. mucronata*

Type	Mean wet weight (g)	Standard Deviation	Mean dry weight (g)	Standard Deviation
Leaves	94.3	59.76	21.09	12.05
Branches	23.9	25.42	7.94	8.07
Stem	210.6	92.39	52.38	23.60
Stilt roots	215.7	199.2	48.67	40.04
Roots	129.9	97.57	31.01	21.88

The results indicate that *R. mucronata* is a suitable species, in terms of carbon sequestration, for mangrove restoration.

Stilt roots contain more carbon than any other plant part having both the heaviest biomass and the highest carbon percentage content. This finding shows that stilt roots of *R. mucronata* provide both a direct service (fish aggregations) and an indirect service (carbon sequestration). The results also indicated that a considerable amount of biomass is below ground which enhances the value of *R. mucronata* for carbon sequestration and justifies choosing this species for replanting programmes.

Research outputs/outcomes

The following documents incorporating the research findings have been prepared as scientific publications. These will be published shortly and serve to inform a wider scientific community.

1) Rathnayake, R.M.N.P., S. Jayakody and R. Chandrajith (2015). Carbon sequestration by *Rhizophora mucronata* (Lam.) plants in a mangrove plantation – Accepted for publication in a forthcoming volume of the *Journal of Aquatic Sciences*.

2) Rathnayake, R.M.N.P. and Jayakody, S. (2013). Carbon sequestration capacity of replanted 2.5-year-old *Rhizophora mucronata* plants. Abstract published in Proceedings of the 19th Annual Scientific Sessions of Sri Lanka Association for Fisheries and Aquatic Resources.

3) Rathnayake, R.M.N.P. Carbon sequestration of planted *Rhizophora mucronata* – a thesis for a M.Sc. degree, partially based on the study findings, has been submitted to the Postgraduate Institute of Science, University of Peradeniya

Based on insights gained during project implementation the following measures were recommended:

1. Study the carbon sequestration capacity of other mangrove species and select the most appropriate species for mangrove restoration.
2. Allow sustainable harvesting of replanted mangroves under community management, until appropriate alternatives for fuel wood are available.

The success status of this project was rated as Medium.

6. Education and Awareness

Raising awareness on environmental issues, with emphasis on the coastal environment, among school children, youth and fisher communities, was the theme of 11 out of 59 projects implemented in Phase 1 and Phase 2, Cycle 1 (18.6% of the grants awarded). A range of outputs included printing a monthly environmental magazine, producing a Primary School Teacher's Guide, printing a Mangrove Identification Guide in Tamil, awareness programmes for members of the fisheries cooperative societies and education programmes targeting school children and youth. Post-project evaluations were conducted on all 11 projects. Although meetings were held with either the Project Manager or the grantee it was not possible to meet any of the school children or fishermen (beneficiaries) who attended training programmes. As it was difficult to assess the sustainability of these projects, sustainability ranking was not attempted. The titles, locations and grantees are presented in Table 6.1.

Table 6.1 - Education and Awareness projects

Code Number	Location and Project Title	Grantee Organization
Pottuvil (one project)		
MFF/01	Community awareness and integrated coastal management programme in the Pottuvil area of Ampara District	True Vision Rural Rehabilitation Organization
Rekawa, Ussangoda and Kalametiya Coastal stretch (two projects)		
MFF/22	Sustainable mangrove ecosystem conservation initiatives by building capacity of school children	Visura Development Foundation
MFF/59	Sustainable mangrove ecosystem conservation initiatives by building capacity of school children - Phase 2 (A/Mawadala Baminiyanwila Jayanthi Junior School)	Visura Development Foundation
Maduganga (two projects)		
MFF/11	An educational programme based on activities to create positive attitudes towards mangrove ecosystem in early primary classes in the schools around Maduganga, Southern Province of Sri Lanka	Ecocare Centre for Environmental Education and Conservation
MFF/45	Monthly publication of Madupuwath	Maduganga Development Foundation
Puttalam (three projects)		
MFF/10	Safeguarding the existing mangroves along the Puttalam Lagoon belt by providing awareness programs to fishermen, school children and women sectors to enhance them to make better livelihood security	Friendly Environmental Cultural Economic Technological Supports Organization

Code Number	Location and Project Title	Grantee Organization
MFF/42	Community participatory biodiversity conservation of Bar Reef Marine Sanctuary	St. Sebastian Kandakuliya North Fisheries Cooperative Society
MFF/53	Mangrove conservation through filling the gap of knowledge and information of Tamil speaking communities in Puttalam and Mannar Districts	Marine and Coastal Resources Conservation Foundation (MCRCF)
Batticaloa (one project)		
MFF/54	Awareness building on coastal conservation through community participation	Visura Development Foundation
Mannar (two projects)		
MFF/25	Conservation and sustainable use of coastal and marine resources in Gulf of Mannar area	St Lucia's Fishermen Co-op Society, Pallimunai
MFF/56	Local knowledge building to address conservation issues in Mannar and Batticaloa Districts	Sevalanka Foundation

A few selected projects are discussed below. Abbreviated project titles have been used in the text.

6.1 Monthly publication of the environmental magazine, *Madupuwath* (Phase 1: MFF/45) (01.01.2009 - 31.12.2009)

Maduganga estuary and islands, a complex coastal wetland ecosystem in the Galle District, was declared a Ramsar site in 2003. The 915 ha estuary consists of 770 ha of open water and 15 islands with a total area of 145 ha.

The major threats to Maduganga wetland are the clearing of mangroves, dumping of waste, fuel discharge from boats, addition of agrochemicals from nearby cultivations, spread of invasive species and erosion of banks in the river and estuary.

The need to warn the community on the dangers faced by this unique ecosystem towards minimizing the threat was recognized by the **Maduganga Development Foundation (MDF)**, a pioneering NGO in the area. The MDF was spreading the message through an environmental magazine *Madupuwath* (News of Maduganga), a monthly environmental magazine devoted to Maduganga wetland in Sinhala language. The first four issues of *Madupuwath* were printed in 2007 in black and white, with funds from the Coastal Resources Management Project [administered by the then Coast Conservation Department (CCD)]. The MDF secured a small grant to produce 12 more issues (Volumes 5 to 16) of the magazine, which carries news items and articles on Maduganga area.

Outputs:

The design and layout of *Madupuwath* was improved to make it more attractive. Volume 5 to 11 (i.e. 7 issues) were printed in colour. One thousand copies of each issue were printed and sold at LKR 30 per copy at local book shops and schools, and at the MDF office.

The "new look" Madupuwath

While the printing costs of Volumes 5, 6 and 7 were funded by the project, revenue from sales was used to print subsequent issues.

Though the plan was to produce Volumes 5 to 16 during the 12-month project period, production was delayed due to an internal issue at MDF. As a result, only Volumes 5 to 10 were published during the project period; Volume 11 was published thereafter.

The "new look" *Madupuwath* gained in popularity among the school children during the project period. *Madupuwath* and its environmental messages reached communities in the area and also distributed among key government officials in the area.

Current status:

Post-project evaluation meeting on 23.7.2014 (© Ananda Mallawatantri)

Volume 11 was the last issue published; there were no publications thereafter. The publication is proven to be useful and value addition to development. Also the project was successful in passing the message. But the sustainability aspects failed for the second time too (first with the CCD funding). This indicates the need to assure a continued funding mechanism to ensure continuation of publication of area development and technical knowledge. This is a good project for an area private business or the Chamber of Commerce to adopt.

6.2 Building capacity of school children as a forerunner to sustainable mangrove ecosystem conservation initiatives (Phase 1: MFF/22 and MFF/59) (01.01.2009 - 31.12.2009)

The Rekawa, Ussangoda and Kalametiya (RUK) area is an important coastal zone in the Hambantota District providing employment to thousands of fisher families. Five of the six globally threatened turtle species nest on the beaches in the RUK area, and the Rekawa beach has been declared a Turtle Sanctuary. Threats to coastal systems in the area are many: cutting down mangroves, coral mining, poaching, harmful fishing practices such as dynamiting, inland sea shell mining and spread of invasive species.

The **Visura Development Foundation (VDF)**, an organization active in the area, felt the need for an intensive awareness programme as a pre-requisite for other activities to arrest the degradation of the coastal ecosystems. It also felt that awareness programmes that target school children would be very appropriate, as school children would carry the message to adults.

Ambalantota, a coastal town in the Hambantota District, has 23 schools. Although several government and non-governmental agencies have promoted conservation awareness in the RUK area over the past decade, a few interventions targeted school children. VDF sought funding from MFF to build capacity among 50 senior and 50 junior students of Ambalantota Maha Vidyalaya. Having successfully completed the programme within a period of six months, they secured a second grant to replicate the programme in another school; Baminiyanwila Jayanthi School also in Ambalantota, targeting 50 senior and 25 junior students.

Outputs:

- Awareness on mangrove ecosystems was enhanced through programmes conducted for 75 junior students (four programmes) and 100 senior students (two programmes) on mangrove ecosystems, uses of mangroves, and threats and conservation methods, followed by field visits to become familiar with mangrove plants
- Students' knowledge on ecologically important sites in the vicinity was enhanced through study tours to Kiralakele Mangrove Information Centre, Rekawa Mangroves and Ussangoda plateau (archaeological site)
- Students' ability to develop and implement simple research projects on mangrove ecosystems was enhanced
- Knowledge gathered from project activities was shared with other schools in the area by holding two exhibitions at Ambalantota Maha Vidyalaya and Baminiyanwila Jayanthi School, in June and December 2009 respectively

Capacity of VDF and its interactions with schools proved to be a good combination to promote knowledge in schools as well as in communities.

Exhibition (Courtesy Visura Development Foundation)

Current status:

A clear message on the importance of, and need for, conservation of mangroves has reached the elders/community through an effective medium: school children, who are the future custodians of this valuable coastal ecosystem. Communities are now likely to be more amenable to, and appreciative of, measures taken to protect the coastal ecosystems.

The mechanism was working during the project period but require external funding to continue.

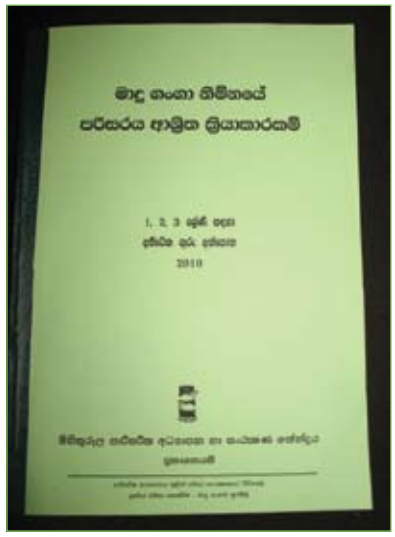
6.3 Enhancing the Maduganga area primary school children's knowledge of mangrove ecosystems by training their teachers (Phase 1: MFF/11) (01.01.2009 - 31.12.2009)

The current curriculum for primary school children (Grades 1 to 3) includes environment related topics. However, due to lack of proper training and guidance for teachers, their efforts fall far short of expectations. Recognizing this limitation, the **Ecocare Centre for Environmental Education and Conservation (ECO-CEN)** stepped in to assist primary school teachers, in selected schools in Balapitiya and Karandeniya Education Divisions in Galle District, by providing them with a refresher course and training tools.

Outputs:

- Based on information provided by the Zonal Education Offices in the Balapitiya and Karandeniya Education Divisions, 26 schools (12 in the Balapitiya and 14 in Karandeniya Education Divisions) were selected for a preliminary survey

- After a discussion with the Principal to identify the training and knowledge gaps, a questionnaire was administered at each of the 26 schools seeking information such as distance to Maduganga wetland, number of students in primary classes, availability of audio visual equipment such as a Television set, DVD player etc. and the educational background of primary school teachers
- After scrutinizing the completed questionnaires, 10 schools in the Balapitiya and 12 in Karandeniya Divisions were selected as beneficiary schools. A preliminary workshop for the nominated teachers was held on 11 and 12 March, 2009. The topics covered ranged from mangrove ecosystems, water quality, flora and fauna of Maduganga and environmental health issues. The Environmental Committee of the Sri Lanka Association for the Advancement of Science assisted in conducting the workshop, which concluded with a field visit to Maduganga
- A Teacher's Guide on Mangrove Habitats was developed in line with the guidelines of the National Institute of Education and made available to the 22 beneficiary schools
- A Teaching Aid Kit — a set of two CDs — was prepared and distributed to all 54 schools in the Balapitiya and Karandeniya Education Divisions
- A set of four CDs — on mangrove flora, mangrove fauna, uses and threats to mangrove habitats, and on folklore — was prepared to serve as an educational tool and made available to the 22 beneficiary schools
- The primary school teachers in the 22 beneficiary schools are now better equipped in terms of environmental knowledge, teaching skills, and teaching aids and tools
- Balapitiya and Karandeniya Education Divisions now have a pool of primary school teachers well-versed in teaching environment-related topics, and in producing teaching guides and educational tools. They can be deployed to assist the 32 schools that were not covered by the project.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Teacher's Guide

Current status:

Not monitored after project closure. The activity, although developed the capacity in the area, is a one-off intervention.

Post-project evaluation meeting with the grantee on 23.7.2014 (Kumudini Ekaratne © IUCN)

6.4 "Kandalam soolalum" – a Tamil language book on mangroves (Phase 2: MFF/53) (01.08.2011 - 31.3.2012)

Puttalam Lagoon, located on the northwestern coast of Sri Lanka, is the island's second largest lagoon with a mangrove coverage of about 338 ha. Of the 24 mangrove species recorded from Sri Lanka, 14 are found in Puttalam Lagoon, including the very rare *Scyphiphora hydrothyllacea* (Kalu Kadol). Also found in this region are two other rare species, *Xylocarpus rumphi* (Konthalan) and *Xylocarpus granatum* (Mutti Kadol). The mangroves are threatened by anthropogenic activities such as clearing to construct shrimp farms and felling for fuel wood. Famed for sandy beaches, kite surfing, whales and dolphin sighting, tourism is flourishing in the region and mangroves are being felled to construct hotels. The communities' lack of knowledge on the significance and value of mangroves aggravates the situation.

Regulations to protect mangroves are in force, but the best way to provide protection is through awareness raising on the importance of mangroves among the very communities that harm this valuable ecosystem. Several publications and identification guides on the mangroves of Sri Lanka are available in English and Sinhala, but hardly any in Tamil. Realizing this, the **Marine and Coastal Resources Conservation Foundation (MCRCF)** took steps to rectify the deficiency. A Tamil manuscript written by a nature loving member of MCRCF, a farmer by profession, was already available. MCRCF sought funding from MFF SGF to publish it.

Outputs:

- The manuscript was reviewed by a renowned Botanist to validate and endorse the contents and 500 copies of *Kandalam soolalum* were printed and distributed among schools, government institutions such as the Forest Department, and their personnel
- Five capable, enthusiastic volunteers/key agents from the area were selected, equipped with mangrove guide materials and trained to identify mangroves. They were the *Grama Niladhari* (GN) (Village Headman) of Puthukkuderuppu GN Division of Kalpitiya Divisional Secretariat Division; a senior teacher of Nirmala Matha Sinhala Maha Vidyalaya, Kalpitiya; Presidents of Semuthu and St. Mary's Fisheries Cooperative Societies (FCSs); and a student of Zahira National College, Puttalam, the *Kandalam soolalum* author's son
- Trainees were groomed as Field Guides familiar with mangrove and associated vegetation, enabling an alternative livelihood in the tourism industry

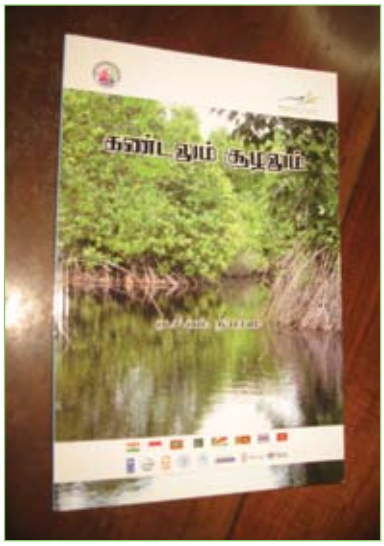
Author presenting a copy to the then Director General, Department of Fisheries and Aquatic Resources Development at the book launch (© IUCN)

Current status:

The trained volunteers continue to use their acquired knowledge in day-to-day activities:

- *Grama Niladhari* is able to identify mangroves and the skilled helped when dealing with land disputes/land development projects and in investigating complaints regarding illegal felling of mangroves
- The teacher shares the knowledge with students. Also, being a professional translator the training has enabled the correct use of terminology and species names in translations. As a skilled simultaneous translator, from English to Tamil and vice versa, the teacher performs with enhanced confidence at mangrove related workshops

- President, Semuthu FCS who lives in Kudawa, a popular tourist destination, is a mangrove tour boat operator during his spare time. This newly acquired ability to correctly identify mangrove plants provides a better service to clients (tourists)
- President, St Mary's FCS lives in Kurakkanhena surrounded by lush mangrove stands that are threatened by anthropogenic activities. His enhanced knowledge has now strengthened his resolve to protect them



Kandalam soolalum

6.5 Conservation and sustainable use of coastal and marine resources in the Gulf of Mannar area through raising awareness of the fisher community (Phase 2: MFF/25) (15.5.2011 - 15.4.2012)

The Gulf of Mannar lies between the southeastern tip of India and the northwestern coast of Sri Lanka. With a coastline of 222 km (including lagoons) the Mannar District is equally famous for marine fresh fish and dry fish. Fishing is a major contributor to the economy of Mannar District; 38% of the population is involved in the fishery industry, the second major source of livelihoods. The long-drawn-out civil unrest in the country had a major impact on the fishery in Mannar, but with the dawn of peace in May 2009 fishery is picking up at a remarkable speed.

However, fishermen are engaged in many destructive fishing practices, which impact on the long term sustainable utilization of resources in the Gulf of Mannar. Among them are the use of explosives (dynamite) although they are banned, monofilament nets, brush piles for catching cuttlefish, moxy nets, and SCUBA diving to collect sea cucumber and conch — use of SCUBA gear is not permitted in Mannar. Another serious issue is poaching by Indian trawlers in Sri Lankan waters.

Apart from harmful fishing practices, other environmental issues prevailing in the area are sea erosion compounded by sand harvesting for construction purposes, cutting of mangroves to make brush piles, and pollution in coastal areas (in and around landing sites) by discarding by-catch and fish refuse.

In order to address these issues **St Lucia's Fishermen Co-op Society, Pallimunai** initiated action to raise awareness of fishermen with funding from MFF SGF.

Outputs:

- Enhanced coastal ecosystems awareness among 332 fishermen, from eight FCSs, through eight awareness programmes specially designed for fishermen. They understood and appreciated how protecting coral reefs, sea grass beds and mangroves will result in enhanced fish catches
- Enhanced coastal ecosystems awareness among 343 school children from 8 different schools — Arippu R.C.T.M. School, Adampan School, Vidataltivu Central School (R.C.T.M.), Nanattan R.C.T.M. School, Talaimannar West School, Thottaweli R.C.T.M. School, Vaddakkandel T.M. School and Musali Muslim School
- 3,000 brochures on the marine resources in the Gulf of Mannar, and the threats they face, printed in the Tamil language, were distributed at the awareness programmes
- Five awareness boards with information on coastal ecosystems were erected at strategic locations

Current status:

The project has changed the mindset of fishermen to a certain extent. Cutting mangroves for brush piles is reported to have been reduced.

6.6 Raising awareness about conservation of the Bar Reef Marine Sanctuary (Phase 2: MFF 42) (1.5.2011 - 15.6.2012)

Awareness programme © St. Sebastian FCS

The Bar Reef, in the Gulf of Mannar, was declared a Marine Sanctuary under the jurisdiction of the Department of Wildlife Conservation in 1992. The Bar Reef Marine Sanctuary (306.7 km²) is the largest of the four Marine Protected Areas in Sri Lanka. Being home to 156 species of coral and 283 species of reef fish, Bar Reef is threatened by many anthropogenic activities such as overexploiting fish resources, utilizing illegal fishing methods (e.g. dynamiting, purse-seining), and pollution from activities such as shrimp farming and agriculture.

In order to reduce threats to this habitat, **St Sebastian Fisheries Coop Society, Kandakuliya** sought funding from MFF to educate communities living around the Bar Reef Marine Sanctuary (BRMS), highlighting its value and the threats to its habitats.

Outputs:

- Enhanced awareness among 235 members of four Fisheries Cooperative Societies (FCSs) (St Sebastian FCS, Kandakuliya, St Benedict FCS, Kandakuliya, St. Sebastian FCS, Annawasala and St Anthony's FCS, Kandakuliya) through six programmes on the importance of the BRMS and the benefits they stand to gain by protecting it
- Government officials such as the Divisional Secretary and officials of the Kalpitiya Pradeshiya Sabha, the Police, Navy officers, staff of the Department of Coast Conservation and Coastal Resource Management, Urban Development Authority, Sri Lanka Tourism Development Authority and school principals enhanced their awareness on the importance of, and the need to conserve, the BRMS
- Enhanced the knowledge of 38 hotel owners in the area on the importance of the BRMS and the benefits they stand to gain by protecting it
- Four thousand brochures (2,000 each in Sinhala and Tamil languages) were printed and distributed among school children and fishing communities
- Five awareness boards carrying messages about the value of dolphins, the importance of keeping the coast pollution free, the conservation of mangroves and the value of coral reefs have been installed in Kandakuliya, Kudawa and Eichchakaduwa

Current status:

Their knowledge of this unique ecosystem and its importance have motivated and enthused the members of FCSs to protect and conserve their heritage. Acknowledging the value of the BRMS, the fisher community now keep an eye on the area. They strictly adhere to best practices such as anchoring tour boats carrying tourists to the sanctuary only at the designated boat anchoring points (planned and executed by another donor funded project) and also being vigilant on unlawful fishing practices and reporting them to the relevant authorities.

General conclusion:

1. Publications (Newsletters etc) needs to be connected with a continuous fund mechanism as this aspect continued to fail after project ended. One idea may be to introduce to business community in the area and create a partnership.
2. Knowledge of plant species identification has short to long-term benefits. Therefore, can be mainstreamed in to any development grant/project mechanism. This can be done at the school level and Government office level.

7. Gender considerations

MFF promotes gender mainstreaming as a crosscutting theme across all MFF interventions. MFF continues the gender mainstreaming process assuring that programmatic interventions benefit both groups equally and inequalities as result of gender orientation is reduced wherever possible. Thus, gender concerns have been used as an explicit criterion in MFF project cycles. Hence, the number of project grants awarded and their post-project sustainability was examined in relation to the gender of the direct beneficiary.

7.1 Number of project grants awarded under each direct beneficiary gender category

The projects were divided into three categories: exclusively female, exclusively male and both sexes, based on the gender of the direct beneficiary. The 54 projects in the four thematic areas, namely, Ecosystem restoration and other eco-friendly initiatives, Livelihoods enhancement, Research, and Education and awareness were taken into consideration and the numbers are presented in Table 7.1.

Table 7.1 - Number of project grants awarded by direct beneficiary gender category

Phase	Number of grants awarded			Total
	Exclusively Female	Exclusively Male	Both sexes	
Phase 1	10	11	14	35
Phase 2, Cycle 1	4	5	10	19
Total	**14**	**16**	**24**	**54**

Higher number of projects targeted both sexes in line with MFF guidance of assuring that programmatic interventions benefit both groups equally — gender equality. Also the balance improved from Phase 1 to Phase 2, Cycle 1.

The breakdown under thematic areas is shown in Table 7.2. The highest number of projects targeting both sexes (equal participation), 9 out of 11, was in the Education and awareness thematic area. The other 2 projects which fell into the exclusively male category were awareness programmes for Fisheries Co-operative Societies whose members were mostly males.

Table 7.2 - Number of grants awarded to each to each direct beneficiary gender category by thematic area

Thematic area	Number of grants awarded			Total
	Exclusively Female	Exclusively Male	Both sexes	
Ecosystem restoration and other eco-friendly initiatives	1	6	8	15
Livelihoods enhancement	13	8	3	24
Research	-	-	4	4
Education and awareness	-	2	9	11
Total	**14**	**16**	**24**	**54**

Of the 15 Ecosystem restoration and other eco-friendly initiatives, eight (8) projects targeted both sexes while only one project fell into the exclusively female category.

The largest number of projects (24) addressed the Livelihoods enhancement thematic area with 13 projects (58%) in the exclusively female category. The highest number of projects in the exclusively female and exclusively male categories, 13 and 8 projects respectively were also in this thematic area. Only 3 projects targeted both sexes. Research projects funded by MFF SGF included both sexes.

7.2 Sustainability/Success of project outputs under each direct beneficiary gender category

Other than the Education and awareness projects (see Chapter 6), the sustainability/success of the projects was evaluated using gender categories.

Table 7.3 - Project Sustainability/Success* ratings by direct beneficiary gender category

Sustainability/success rating	Direct beneficiary gender category			Total
	Exclusively Female	Exclusively Male	Both sexes	
High	8	4	4	**16**
Medium	4	5	6	**12**
Low	2	4	6	**15**
Total	**14**	**13**	**16**	**43**

*Other than the *Education and awareness* category projects

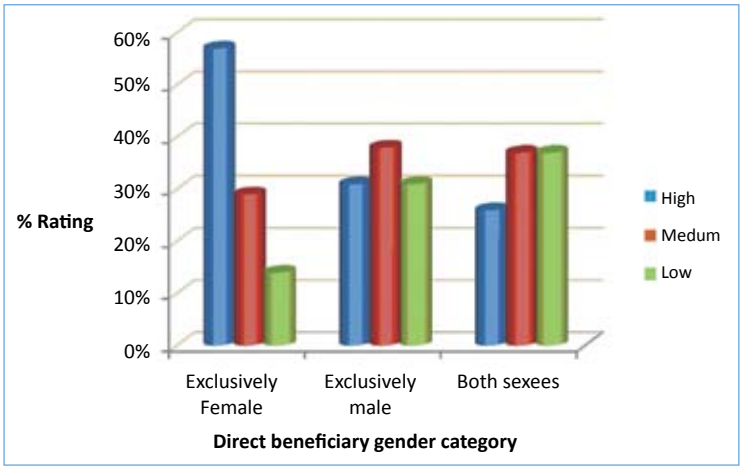


Figure 7.1 - Project sustainability/success ratings by direct beneficiary gender category

The sustainability of project outputs was highest in the projects in the exclusively female category (Table 7.3 and Figure 7.1). When right female champions got involved, sustainability of project outputs was proved positive (High). For example 58% of projects with female champions made it highly sustainable. When women took the lead and engaged in projects the sustainability was assured better.

Case of Coconut ekel-based handicraft project implemented by Mihikatha Environmental Organization (MEO)

Twenty women were trained in producing handicrafts with coconut ekels, while another 20 were trained in dress making. A beneficiary's average income per month from selling coconut ekel products was between LKR 2,500 to 4,000, which increased the family income by about 30-50%. The buyers are both locals and foreign tourists to the area.

The women trained in tailoring and sewing were sewing all the clothes needed by the family, which saves about LKR 2,000 per month. They were also taking sewing orders from their neighbours.

Status after 2 years 4 months:

About 85% of trainees are pursuing their self-employment activities. Handicrafts are sold at church festivals in the area and also at the Chilaw and Wennappuwa fairs - an ekel vase at LKR 300 and a basket at LKR 1,000.

All 20 trained in dress making sew all their family requirements and also undertake orders. Four trainees are now well established dressmakers in the area and undertake large orders for uniforms, dresses for the festive season etc. Sewing charges are: LKR 250 for a saree blouse and LKR 350 with lining. Sewing charge for frocks varies with the design. They also get regular orders from a nearby children's orphanage.

The high sustainability of the project was no doubt due to the grantee's commitment. Mrs Jayaseeli Gallage being a resident of the area was in constant contact with the beneficiaries even after the project closed. The committed beneficiaries were able to engage in these past time activities while engaging in their day-to-day household chores. The income generated was an added incentive which motivated them to continue.

Banana-based home gardening in Kattankudy (Batticaloa) implemented by Organization for Protecting and Ensuring Democracy (OPED)

To enhance the income, 20 women from fisher families were introduced to banana cultivation. Progress was regularly monitored with the assistance of the Agricultural Extension Officer. The banana plants had just begun to flower as the project came to an end, hence, no income could be recorded within the project period.

Status after 4.5 years:

Five beneficiaries continue with their banana home gardens; they make about LKR 25,000 every four months. Six others are engaged in large scale banana cultivation in Pallimunai where cultivable land is readily available. Large scale cultivators make about LKR 280,000 every four months, from 0.4 ha of land.

A project which started as pilot initiative with 50 banana suckers per garden has now expanded to large scale cultivation of bananas with intercropping (0.4 ha with 576 banana plants and intercrops such as papaw, ginger, turmeric and green leaves). Moreover, recognizing the value and relevance of this venture, the Kattankudy Divisional Secretariat is promoting the *One crop, one village* concept in the area.

High sustainability of project outputs/expansion in cultivating area is due to the commitment of women beneficiaries and the support extended to them by their husbands and family members with initial seed capital by way of project support.

8. Analysis of project performance and lessons learnt

Project information was analyzed at project outputs/outcomes level. A "Sustainability" rating was used for the projects on "*Ecosystem restoration and other eco-friendly initiatives"* and "*Livelihoods enhancement"* thematic categories. A "Success" rating was applied for the projects in the "*Research"* category. However, "*Education and awareness"* category projects were not included in this analysis as project evaluation interviews were conducted mostly with the grantees and did not cover beneficiaries themselves.

The level of sustainability/success of project outputs/outcomes was examined in relation to:

(a) Type of project implementing organization (grantee)
(b) Thematic category of the project

8.1 Sustainability/Success of project outputs/outcomes *vis-à-vis* type of project implementing organization

The 54 projects that were evaluated have been implemented by a total of 36 organizations. These diverse implementing organizations could be classified into the following types, based on their mandates:

- NGOs - Environmental
- NGOs - General
- NGOs - Business oriented
- Fisheries Co-operative Societies
- CBOs
- Quasi-government institutions
- Academic institutions

The names of grantees, grouped under these types, are recorded in the Annex 2. The number of projects, belonging to different thematic categories, implemented by these organizations is given in Table 8.1.

Table 8.1 - Number of projects carried out by each type of implementing organization under different thematic categories

Type of implementing organization	Number of implementing organizations	Thematic category and number of projects				Total number of projects
		Ecosystem restoration and other eco-friendly initiatives	*Livelihoods enhancement*	*Education & Awareness*	*Research*	
NGOs– Environmental	6	2	5	3	-	10
NGOs – General	16	8	13	6	-	27
NGOs – Business oriented	5	3	4	-	-	7
Fisheries Cooperative Societies	4	1	1	2	-	4
CBOs	1	-	1	-	-	1
Quasi-government institutions	1	1	-	-	-	1
Academic institutions	3	-	-	-	4	4
Total	**36**	**15**	**24**	**11**	**4**	**54**

The level of sustainability/success of the projects implemented by these organizations is presented in Table 8.2 and Figure 8.1.

Table 8.2 - Sustainability/Success ratings of the output/outcomes of the projects* implemented by different types of organizations

Type of implementing organization	Number of implementing organizations	Number of projects implemented	% Projects achieving different levels of sustainability/success		
			High	Medium	Low
NGOs – Environmental	6	7	42%	29%	29%
NGOs – General	16	21	38%	29%	33%
NGOs – Business oriented	5	7	14%	43%	43%
Fisheries Cooperative Societies	4	2	50%	50%	-
CBOs	1	1	-	100%	-
Quasigovernment Institutions	1	1	-	100%	-
Academic Institutions	3	4	75%	25%	-

* Other than the *Education and awareness* category projects

Key parameter used for rating:

Ecosystem restoration and other eco-friendly initiatives:

Sustainability – Project outputs are surviving/lasting and their benefits are being enjoyed by the communities, beyond the project cycle (end of funding)

Rating scale:

At the time of the study:
High: >75% of the output is still evident (eg: 80% of the planted mangroves are alive and growing).

Medium: 20 – 75% of the output is still evident.

Low: < 20% of the output of the intervention is evident.

Livelihoods enhancement projects:

Sustainability – Project activities/outputs continue to benefit the communities beyond the project cycle (end of funding)

Rating scale:

At the time of the study:
High: All project activities/outputs are continuing and targeted communities enjoy the project benefits. Livelihood practices promoted by the interventions have been adopted and demonstrable success, including replication, has been achieved.

Medium: Some project activities/outputs are continuing and targeted communities enjoy the project benefits. Livelihood practices promoted by the interventions have been adopted to a limited extent and are confined to the beneficiary group.

Low: Project activities have been discontinued after the project period.

Research projects:

Success**:** Extent to which the research findings were shared and benefitted the public and scientific community.

Rating scale:

At the time of the study:
High: Findings have been published in a peer reviewed scientific journal or presented at conferences or directly shared with concerned institutions/communities; and at least one recommendation implemented by a state or private sector agency.

Medium: Findings have been published in a peer reviewed scientific journal or presented at conferences or directly shared with concerned institutions/communities or at least one recommendation implemented by a state or private sector agency.

Low: None of the success parameters have been achieved.

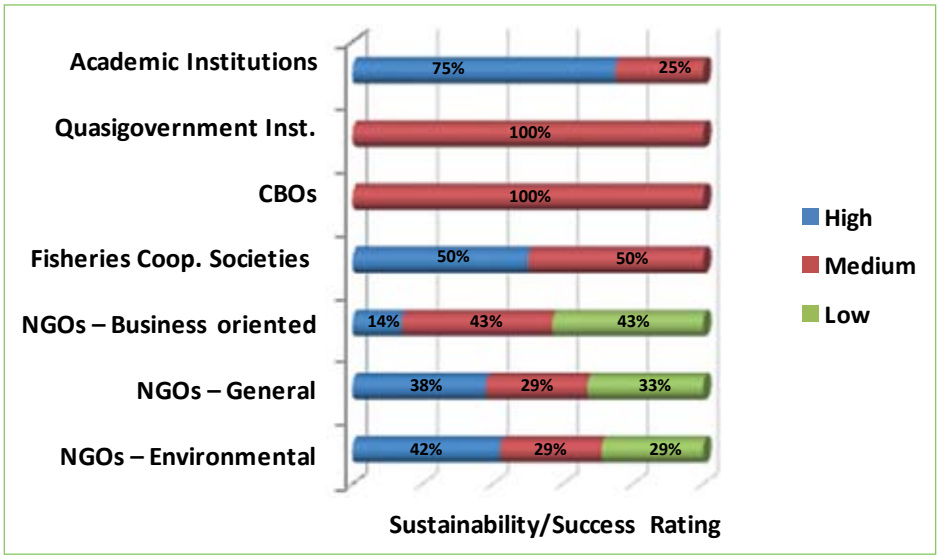


Figure 8.1 - Sustainability/Success rating of projects (except *Education and awareness* category projects) implemented by different types of organizations

It is evident from Table 8.2 and Figure 8.1 that the level of sustainability/success of project results was highest in the projects implemented by Academic institutions, followed by Fisheries Coop Societies, NGOs-Environmental and NGOs-General.

The projects awarded to Academic institutions were implemented by academics assisted by research students. Project activities were focused to achieve the objectives and completed on time. The research findings were shared with the scientific community and concerned institutions/communities. In two projects, at least one recommendation each was implemented by State institutions (MFF/06 and MFF/23). In another project the research findings were directly shared with, and benefitted the relevant public organization (MFF/05) (see section 8.2.3).

The performance of NGOs-Environment was ranked ahead of NGOs-General. The better performance of NGOs-Environment could be attributed to their superior knowledge of the subject matter of the projects they implemented. NGOs-General on the other hand have a tendency to undertake any project that comes their way, irrespective of their knowledge of the subject matter. In some cases a consultant was hired as an advisor to support in proposal development and reporting, but less technical support was available to the project at the implementation stage.

8.2 Sustainability/Success of project outputs/outcomes *vis-à-vis* project thematic category

Sustainability/Success ratings of the projects in the thematic categories *Ecosystem restoration and other eco-friendly initiatives, Livelihoods enhancement* and *Research* are presented in Table 8.3 and Figure 8.2).

Table 8.3 - Sustainability/Success ratings of the outputs/outcomes of the projects in three thematic categories

Thematic category	Number of projects	% Projects achieving different levels of sustainability		
		High	Medium	Low
Ecosystem restoration and other eco-friendly initiatives	15	20%	27%	53%
Livelihoods enhancement	24	42%	42%	16%
Research	4	75%	25%	-

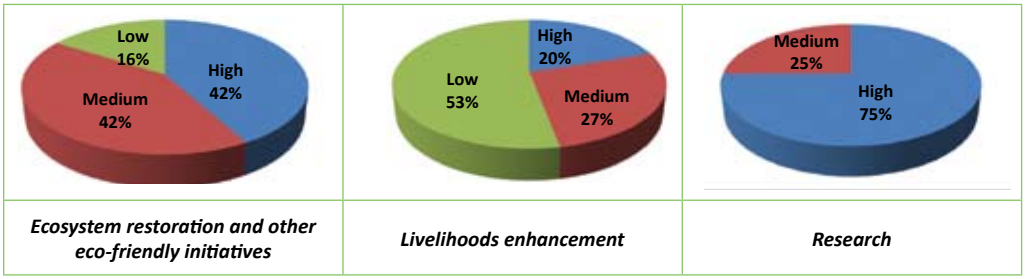


Figure 8.2 - Graphical presentation of the sustainability/success ratings of projects in three thematic categories

Table 8.3 and Figure 8.2 clearly show that the *Research* projects led the performance results with 75% of the projects rated as High. Next in line are the *Livelihoods enhancement* projects with 42% being rated as High and another 42% as Medium.

Sustainability/Success ratings of the project results are discussed below under each thematic category.

8.2.1 Ecosystem restoration and other eco-friendly initiatives

The sustainability of the results of 53% of the 15 projects in this thematic category was rated as Low (Figure 8.2). Out of which, 60% of these low sustainability projects belong to the Ecosystem Restoration subcategory (Figure 8.3).

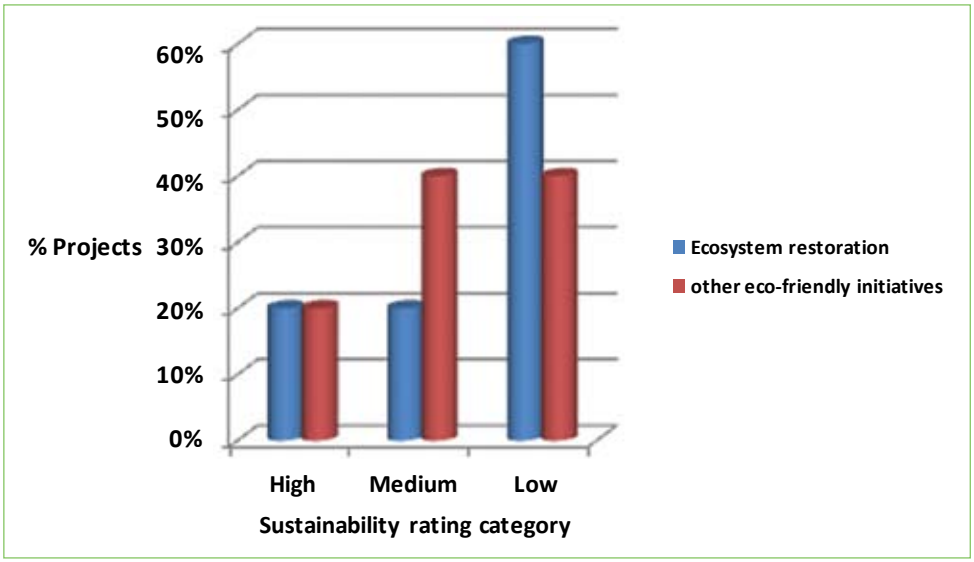


Figure 8.3 - Sustainability rating of the two subcategories - Ecosystem restoration and Other eco-friendly initiatives

Ecosystem restoration subcategory included three types of projects: Mangrove planting, removal of invasive species and coastal planting (Figure 8.4).

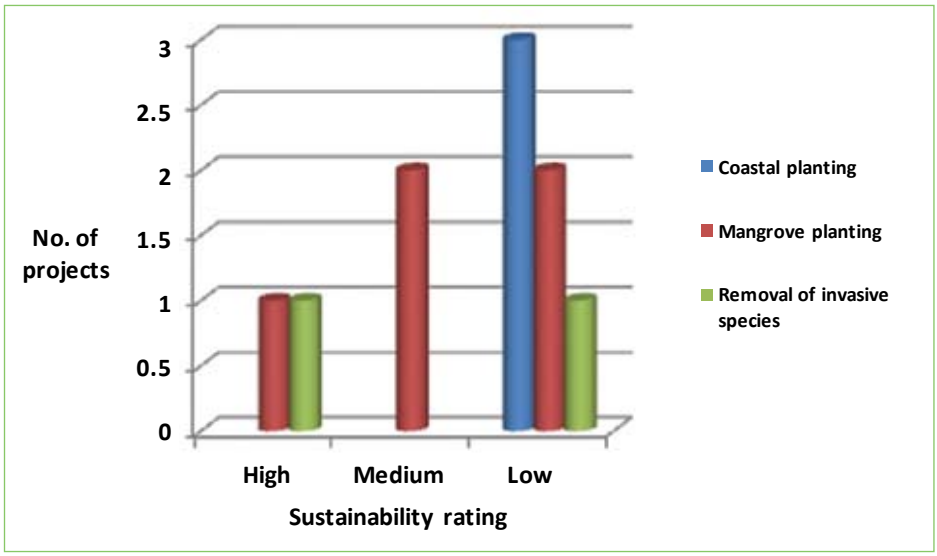


Figure 8.4 - Sustainability rating of the three components of ecosystem restoration subcategory

The five mangrove planting projects yielded mixed results. The sustainability of the project implemented by Semuthu FCS was rated as High. Semuthu FCS members being fishermen frequented the planted area and they nurtured the plants and filled the gaps. They also fenced off the area to protect the plants from cattle. The high level of sustainability achieved may be ascribed to the interest and commitment shown by the FCS members.

Sustainability of the two projects implemented by True Vision (NGO) and NAQDA, who had their field/project offices located in the area, was rated as Medium. Their field presence may have helped the grantees to maximize the support received from beneficiary fishermen and achieve satisfactory project results. Sustainability of the two projects operated by SEEDO and Sevalanka Foundation was rated as Low. Their project offices were located in Rekawa and Puttalam respectively but not in the immediate project area.

It appears that locating the grantee's field office in the project area is critical for achieving satisfactory results.

There were two projects on the removal of the invasive species. The sustainability of the project to remove Cattail (*Typha* spp.) from a village drainage water canal in Lunama was rated as High. This could be due to the commitment of farmers who continuously removed the new arrivals. The sustainability of the other project to control the spread of *Annona glabra* from a degraded mangrove habitat in Maduganga was rated as Low. The Maduganga community's commitment to keep their area clear of recurring *Annona glabra* was poor.

Sustainability of all three coastal planting projects was rated as Low. The coastal planting exercise proved a failure and brought no return on the money invested. Constant nurturing of plants for at least 1.5 years after project closure may have increased the survival rate.

8.2.2 Livelihoods enhancement

Eight different livelihood enhancement activities have been promoted through 24 projects. In contrast to the ecosystem restoration projects, the sustainability of 42% of these 24 projects was rated as High (Figure 8.2). Table 8.4 and Figures 8.5 and 8.6 provide a breakdown of the livelihood enhancement activities and the corresponding number of projects and ratings.

Table 8.4 - Number of projects promoting different livelihoods enhancement activities and their sustainability ratings

Livelihoods enhancement activity	Sustainability rating			Total
	High	Medium	Low	
Home gardening	6	2		**8**
Handicrafts	1	2		**3**
Ecotourism		2		**2**
Aquaculture (seaweed)			2	**2**
Aquaculture (fish & sea cucumber)	2	1		**3**
Animal husbandry		3	1	**4**
Microfinance	1			**1**
Aloe vera beverage production			1	**1**
Total	**10**	**10**	**4**	**24**

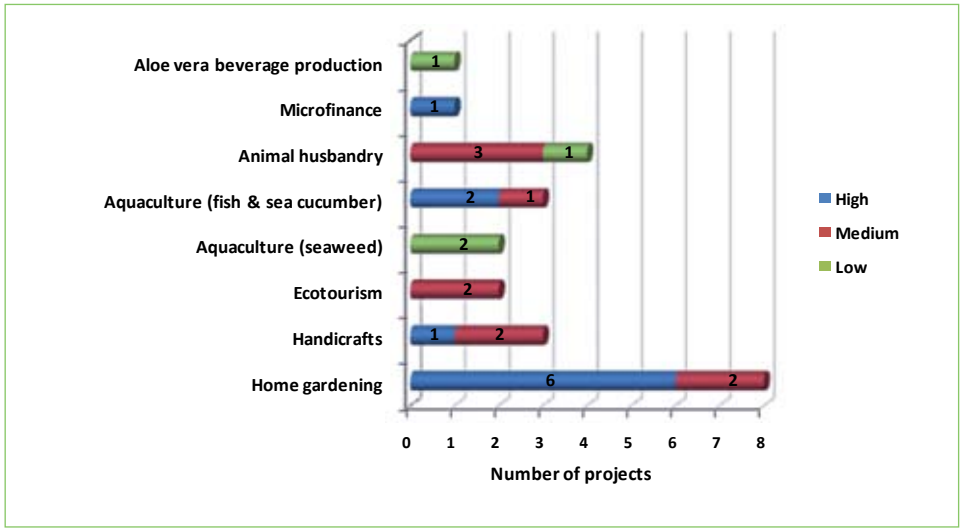


Figure 8.5 - Number of projects promoting different livelihoods enhancement activities and their sustainability ratings

Of the eight livelihoods enhancement activities promoted, micro finance related project ranked high followed by home gardening projects. The sustenance of the micro-finance project was due to the commitment of the Project Manager and his assistant, even after 4.5 years.

The sustenance of home gardens was due to beneficiaries nurturing their gardens with enthusiasm having appreciated the value of home grown, pesticide-free vegetables.

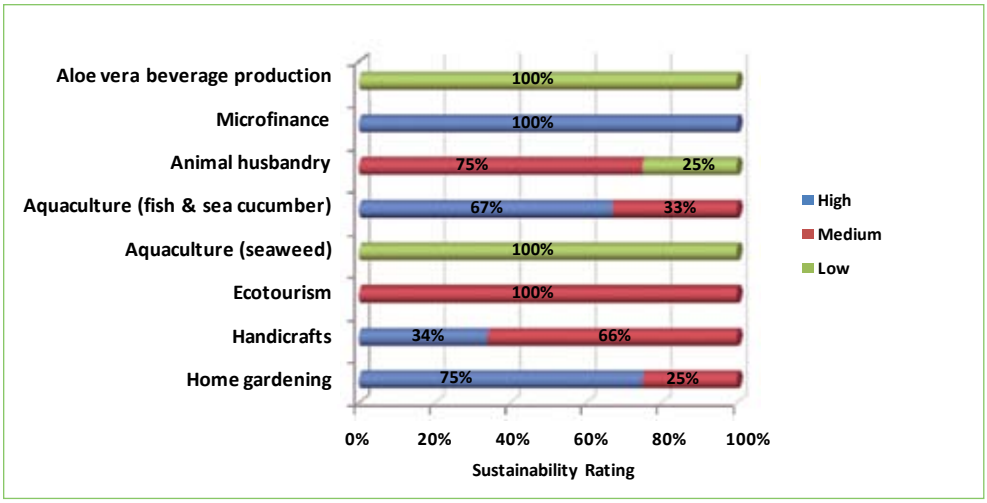


Figure 8.6 - % Projects achieving different levels of sustainability according to the livelihoods enhancement activity promoted

However, the *Aloe vera* beverage production project did not sustain (see Chapter 4, sections 4.1.7).

Though both seaweed farming projects were not sustained due to weather related issues, these SGF projects proved that seaweed can be farmed in the Panama, Pottuvil and Mannar areas.

Both fin-fish aquaculture projects were highly sustainable while the sea cucumber project was rated as Medium. These achievements can be attributed to the commitment of the beneficiaries.

Both ecotourism projects were rated as Medium while the handicraft projects produced mixed results. The project on ekel-based products was highly sustainable primarily due to the grantee's commitment. The lady being a resident of the area was in constant contact with the beneficiaries even after the project closed.

The Pandanus-based handicraft production project sustainability was rated as Medium. This project covered two large areas; Danketiya (in Matara) and Netolpitiya (in Tangalle), 40 km apart. The beneficiaries were continuously dependant on the grantee for market linkages even after project closure. The need to travel a long distance to meet the grantee, with no financial assistance to cover the substantial travel costs, discouraged some beneficiaries. This would have been the major reason for the Medium rating.

The reed-based handicraft project in Pottuvil (on the east coast) was implemented by a NGO based in southwestern Sri Lanka. Though the project showed good results

during the project implementing period, the beneficiaries did not receive the expected support from the grantee after the project ended. For example, to re-thread the bobbins beneficiaries needed support. Hence, the project was rated as Medium.

8.2.3 Research

The success level achieved by 75% of the projects in the *Research* category was High and the balance 25% was rated as Medium (Table 8.3 and Figure 8.1). Assessment of the success level of a Research project was based on the extent to which the research findings were shared and benefitted the public and scientific community; and the extent to which any recommendations were accepted and implemented.

Some important achievements of the projects in the Research thematic category were:

- Findings of the Panama groundwater vulnerability assessment, including the water quality distribution maps showing the highly vulnerable areas, have been shared with the Ampara and Colombo offices of the National Water Supply and Drainage Board. These maps were used by a leading bank to select safe locations to construct drinking water wells for community use
- A research paper based on the study findings on the Panama ground water assessment project was published in an international scientific journal — the only SGF in the MFF member countries to do so
- Mangrove distribution maps prepared during the ecological study in the Panama, Okanda and Helawa Lagoons were shared with the Forest Department and Coast Conservation and Coastal Resource Management Department (CC&CRMD). Also, the project recommendation to clearly demarcate the mangrove boundaries, in order to protect these habitats, has now been implemented by the Forest Department
- The *Coastal and Marine Scientists' Forum* was established in 2015, by the Marine Environment Protection Authority (MEPA) and other stakeholders in response to a recommendation made by the project that studied seagrass species in the Puttalam Lagoon, highlighting the successful positioning of the recommendation in addition to the technical merit

8.3 Lessons learnt

These evaluations provided insights gathered during the interviews and field visits on what went right and what went wrong during and after project implementation. A synthesis of these insights will provide useful lessons that can save much time and effort when designing and implementing future projects. Some lessons learnt are listed below.

General:

- Locating the grantee's field office in the project area or ability to give constant attention to the project are critical for achieving satisfactory results
- Sustainability of project outputs was evident when the beneficiaries had the opportunity to interact with the grantee even beyond project life. Therefore, having the grantee's continuous association with beneficiaries contributes to sustainability
- Sustainability is ensured where financial gain is evident
- The grantee's ability to play an advisory role beyond the project period was also a factor for sustainability
- Attracting traditional fishermen to a new agricultural/aquaculture business was challenging — probably due to financial incentives not being adequate to get the full attention

Coastal Planting:

- A 12-month project duration was inadequate to ensure the success of a coastal planting. Financial resources to maintain the plantation and fill gaps should be available for at least another 12 months
- Reliable water source in the immediate vicinity was helpful
- *Barringtonia* was a poor choice for Kattankudy area; none of the plants survived
- Palmyrah was not suitable as a beach plant in the Kumana village area

Mangrove planting:

- Mangrove planting, including the selection of appropriate species, should be carried out under technical guidance
- Planting in the "wrong place", for example, in the lagoon proper, will result in high mortality
- Also, incorrectly located plants will facilitate the accumulation of sediment and harm the lagoon system

Home gardening:

- The owners continue to cultivate home gardens as they value the nutritional and economic returns. Home gardening served dual benefits (a) food and nutrition to family (b) additional income
- Bag culture method was considered highly appropriate for the dry zone where water is scarce. However, it was not practical as the bags degrade fast and needed frequent replacement, and hence costly. Therefore, a container system that are not degrading (concrete/cement/clay) may prove beneficial
- Completing the training activities before commencing field operations was crucial for project success. The Agricultural Extension Officer's training and

guidance generated much self-confidence and motivation, which helped beneficiaries to realize their expectation of higher incomes
- Additional income especially by women has the potential to improve resilience (eg savings, participating in thrift and loan systems, buying gold etc plus investing in children's education)
- Potential to integrate with government provided training and benefit programmes ("Divineguma" Programme, *one-crop- one village*) is demonstrated as a good practice

Eco-tourism:

- Security aspects of eco-tourism operations is important
- The tents and camping is not yet in the mainstream tourism in Sri Lanka. Therefore, resulted a challenge in promotion

Aloe vera beverage production:

- Market evaluation/business planning should precede business expansion and follow up

Seaweed farming:

- Site selection for seaweed farming is important. Avoiding cyclone prone zones will ensure sustainability
- Pilot project showed that seaweed can be cultivated in cages in the east coast of Sri Lanka.
- Insurance for natural disasters is a must

Fin-fish cage culture:

- Sustainability is ensured where financial gain is evident
- Changing the livelihood style of fishermen is challenging and require significant incentives, training and marketing for new products

Animal husbandry:

- Poultry sheds must provide adequate protection against cold spells
- Livestock insurance needs to be in place for SGF projects to absorb losses

Microfinance:

- To succeed, microfinance schemes need committed and competent managers. The grantee being an NGO from the area and their willingness to provide continued assistance also plays an important part

Handicraft production:

- Sustainability of project outputs is dependent on the capacity acquired in all aspects including marketing
- Beneficiary unity and ability to work together is helpful to reduce costs, identify market niches, thereby contributing to sustainability

Gender considerations:

- 44% of projects targeted both sexes (fulfilling the MFF requirement – gender equality)
- The sustainability of project outputs was highest (58%) in the projects in the "exclusively female" direct beneficiary gender category. When women took the lead and engage in projects, the sustainability was assured better

8.4 Best practices

Best practices of MFF small grants projects and corresponding lessons learnt are given in Table 8.5.

Table 8.5 - Best practices and lessons learnt

Project stages	Best practices	Lessons learnt
Before award of grant	1. Training of project proponents in Project Cycle Management, proposal development, project budgeting, progress reporting	Well focused proposals with clear logical frameworks received
	2. Introduction of MFF reporting formats (result-based reporting)	Result oriented approach than merely reporting the progress on activities as per the work plan achieved
Inception Phase	1. Project introduction to Divisional Secretary (DS), *Grama Niladhari* (GN) (Village Headman) and relevant stakeholders	Cooperation from government officers ensured
	2. Project introduction (including work plan) to beneficiaries	Cooperation through understanding helped
	3. Beneficiary selection in consultation with DS, GN	Most deserving individuals will be selected and the process is transparent

Project implementing phase	1. initial training/education and awareness on project activities (new ventures)	Hands on training will enable the beneficiaries to carry on activities with confidence eg: success of *Aloe vera* cultivation, aquaculture practices
	2. Supply of basic equipments, material to last the first production cycle	Continuation of project activities without interruption (eg: *Aloe vera* cultivation, aquaculture practices)
	3. Training in trouble shooting/maintenance of equipment	The users do not have to depend on the grantee to carry out minor repairs. (eg: Abandoning of weaving machines in Pottuvil)
	4. Market information used for product development	Use of species on demand (eg: success of sea bass/tilapia farming; Failure of seaweed cultivation in Mannar due to non-availability of mother stock)
	5. Market linkages put-in place	Regular demand for the product in place thus motivating the producers (eg: *Aloe vera* with Janet Group)
	6. Business plan in place before expanding/ introducing a new venture	Expansion of existing ventures should be done gradually in stages to meet the demand (eg: failure of *Aloe vera* beverage production) Availability of steady supply of raw material needs to be checked before commencing a new venture (Failure of seaweed cultivation in Mannar due to non-availability of mother stock)
	7. Introducing an Aquaculture Insurance scheme	Having an insurance policy would help beneficiaries to bounce back and continue business as usual

Annex 1

MFF Small Grant Facility

Phase 1 Projects (1.1.2009 - 31.12.2009)

Code No	Title	Grantee	Budget (LKR)
Panama (3)			
MFF/09	Pilot project for introducing sea weed farming (*Euchema denticulatum)* as an alternative livelihood activity among coastal communities at Panama and Pottuvil.	Sevalanka Foundation	**588,320/-**
MFF/21	Rehabilitation and reconstruction of Pottuvil mangrove nursery.	Community-based Eco-guide Association (CEGA)	**400,000/-**
MFF/41	Rehabilitation of tsunami-affected coastal belt in Panama and improvement of livelihoods of communities.	National Ethnic Unity Foundation	**485,000/-**
Pottuvil (5)			
MFF/25	Rehabilitation and conservation of mangroves in Manthode of Kottukal area of Pottuvil Lagoon.	True Vision Rural Rehabilitation Organization	**458,000/-**
MFF/28	Create the source of income through animal (buffalo) breeding.	Livestock Development Dairy Farmer Association	**500,000/-**
MFF/29	Alternative income generation through poultry farming for fisher families.	Arugambay Tourism Association	**500,000/-**
MFF/30	Goat rearing as an alternate income generating activity for fisher families.	AL-Ameen Sammorthy association	**500,000/-**
MFF/57	Create the source of income through animal (buffalo) breeding – phase 2	Livestock Development Dairy Farmer Association	**495,000/-**
Batticaloa (4)			
MFF/04	Reforestation of Coastal area: planting trees in Ethukkaal Beach, Kattankudy.	Arifa Enterprises	**443,000/-**
MFF/05	Reforestation of Coastal area: planting trees in A.M. Hajiar Beach of Kattankudy 3.	Arifa Enterprises	**353,000/-**
MFF/17	Restoration and protection of mangrove forests in Batticaloa lagoon as an entry point for sustainable fishery practices.	MANDRU (Institute for Alternative Development and Regional Cooperation)	**497,000/-**
MFF/53	Alternative income for fisher families in Kattankudy	Organization for Protecting and Ensuring Democracy (OPED)	**450,500/-**
Rekawa Ussangoda and Kalametiya coastal stretch (9)			**3,937,700/-**
MFF/18	Participatory mangrove management programme.	Social Economic and Environmental Development Organization (SEEDO – Sri Lanka)	**501,000/-**

Code No	Title	Grantee	Budget (LKR)
MFF/19	Improving additional income to tsunami affected coastal belt community in Rekawa-Medilla lagoon area.	Wanasarana Thurulatha Swechcha Society	**495,000/-**
MFF/22	Sustainable mangrove ecosystem conservation initiatives by building capacity of school children.	Visura Development Foundation	**377,500/-**
MFF/23	Promotion of bamboo plantation as an alternative wood source in Rakawa lagoon area to prevent mangrove exploitation.	Ruhunu Development Consortium	**462,800/-**
MFF/34	Introduction of eco-tourism initiatives for communities engaged in harmful acts in the RUK ecosystem	RUK Diya Community Based Organization	**510,000/-**
MFF/36	Improvement of the Lunama lagoon and enhancement of livelihoods of communities living in the adjacent areas	Youth Enterprise Information Centre	**500,000/-**
MFF/38	Towards a prosperous tomorrow	Meth sith Development Foundation	**369,400/-**
MFF/58	Improvement of the Lunama lagoon and enhancement of livelihoods of communities living in the adjacent areas - Restoration of Palugaswewa	Youth Enterprise Information Centre	**416,050/-**
MFF/59	Sustainable Mangrove Eco-System Conservation Initiatives by Building Capacity of School Children-phase 2 (A/Mawadala Baminiyanwila Jayanthi Junior School)	Visura Development Foundation	**305,950/-**
Maduganga (8)			
MFF/11	An educational programme based on activities to create positive attitudes towards mangrove ecosystem in early primary classes in the schools around Maduganga, Southern Province of Sri Lanka.	Ecocare Centre for Environmental Education and Conservation.	**499,700/-**
MFF/13	Development of Madu Ganga wetland area and the mangrove habitat under MFF, in collaboration with Ambalangoda multipurpose community centre (MPCC) of Sarvodaya.	Lanka Jathika Sarvodaya Shramadana Sangamaya (Inc.)	**492,500/-**
MFF/24	Lagoon development & community empowerment in Madu Ganga	HELP-O (Human & Environment Links Progressive Organization)	**499,600/-**
MFF/33	Improvement of community management of the Maduganga Wetlands by introducing environmental education and sustainable development mechanisms	Nagenahiru Foundation	**500,000/-**
MFF/39	Ecological restoration of a degraded mangrove habitat in Maduganga.	Maduganga Development Foundation	**438,000/-**
MFF/45	Monthly publication of Madupuwath.	Maduganga Development Foundation	**500,000/-**
MFF/52	Pilot project for introducing of sea bass (*Lates calcarifer*) cage culture as an alternative livelihood development program among fishing communities around Maduganga estuary	Sevalanka Foundation	**599,250/-**

Code No	Title	Grantee	Budget (LKR)
MFF/55	Implementing pilot project for introducing of Red Tilapia (*Oreochromis* spp. Hybrids*)* cage culture as a livelihood development program in Maduganga estuary	Sevalanka Foundation	**492,550/-**
Puttalam (9)			
MFF/10	Safe guarding the existing mangroves along the Puttalam lagoon belt by providing awareness programs to fishermen, school children and women sectors to enhance them to make better livelihood security.	Friendly Environmental Cultural Economic Technological Supports Organization	**498,640/-**
MFF/14	Restore the "Dutch Canal" and enhance ecosystem through mangrove re-plantation.	National Aquaculture Development Authority of Sri Lanka	**484,500/-**
MFF/15	Empowerment of fisher women by means of providing alternative income generation through cultivation of *Aloe vera* (Komarika)	Marine and Coastal Resources Conservation Foundation	**500,000/-**
MFF/16	Mangrove Rehabilitation Programme	Semuthu Fisheries Co-operative Society Ltd.	**482,500/-**
MFF/20	Improving the Kalpitiya lagoon ecosystem through mangrove restoration and introducing environmentally friendly household agricultural practices in the surrounding.	Sevalanka Foundation	**445,070/-**
MFF/42	Conservation of the mangrove ecosystem in Puttalam lagoon, currently degraded by anthropogenic activities	VINIVIDA – NGO Coalition for eradicating poverty through knowledge and communication	**450,000/-**
MFF/49	To protect Amma thota fishing village, its environs and the resource.	PEARLS - Peaceful Environments Assured Rights Lasting Solutions.	**442,500/-**
MFF/54	Sustainable livelihood development of 40 low income families living in the vicinity of Puttalam lagoon in Palavi area.	Wilpotha Women's Savings Effort	**449,000/-**
MFF/56	Empowerment of fisher women by means of providing alternative income generation through cultivation of *Aloe vera* (Komarica) Phase II	Marine and Coastal Resources Conservation Foundation (MCRCF)	**500,000/-**

Phase 2, Cycle 1 (1.5.2011 - 30.4.2012)

Code No	Title	Grantee	Budget (LKR)
Panama - Pottuvil (6)			
MFF/01	Community awareness and Integrated coastal Management programme in the Pottuvil area of Ampara District.	True Vision Rural Rehabilitation Organization	**462,200/-**
MFF/03	Enhancing alternative incomes for fisher families living close to the Pottuvil lagoon	Al-Aksha Sarvodaya Shramadana Society	**488,800/-**
MFF/05	Groundwater vulnerability assessment in the Panama coastal aquifer system	Postgraduate Institute of Science	**481,976/-**
MFF/06	Ecological study of mangroves on Panama, Okanda and Helawa lagoons in the east cost of Sri Lanka	Postgraduate Institute of Science	**422,400/-**
MFF/27	Promotion of cultivating vegetables, fruits, yams and leaves in Home Garden level among house hold women community living in Pottuvil Coastal belt area of Ampara District of Sri Lanka	Wanasarana Thurulatha Swechcha Society	**531,000/-**
MFF/45	Rush and reed species conservation and handicraft product development around Pottuvil	Committee for People's Rights (CPR)	**673,090/-**
Batticaloa (3)			
MFF/52	Improve livelihood income generation to vulnerable families through crop cultivation at the border of Batticaloa lagoon for conservation and restoration of coastal ecosystem	Social Economic Development Organization (SEDO)	**464,000/-**
MFF/54	Awareness building on coastal conservation through community participation	Visura Development Foundation	**414,000/=**
MFF/55	Promotion of cultivating vegetables, fruits, yams and leaves in Home Garden level among house hold women community living in Kalawanchikudi Coastal belt area of Batticaloe district of Sri Lanka	Wanasarana Thurulatha Swechcha Society.	**525,000/-**
Mannar (5)			
MFF/18	Providing of supplementary income to the coastal community in Northern Mannar through establishing of healthy mother plant stock of *Kappaphycus alvarezii (Eucheuma cottonii)* meet future demand of seedlings of seaweed farming industry in Sri Lanka	Sevalanka Foundation	**652,000/-**
MFF/25	Conservation and sustainable use of coastal and Marine Resources in Gulf of Mannar area.	St Lucia's Fishermen Co-op Society, Pallimunai	**446,250/-**
MFF/51	Increasing eco- tourism through Conservation of baobab tree in the Island of Mannar (Phase I)	Al- Azhar Fisheries Cooperative Society, Uppukulam	**498,750/-**
MFF/56	Local knowledge Building to Address Conservation Issues in Mannar and Batticaloa districts	Sevalanka Foundation	**517,000/-**
MFF/57	Introducing Sea Cucumber/ Sand Fish/ Jaffna Attaya (*Holothuria scabra)* pen culture as a livelihood development program for conflict affected community in Mannar Island	Green Movement of Sri Lanka	**670,560/-**

Annex 1

Code No	Title	Grantee	Budget (LKR)
Puttalam (7)			
MFF/17	Promoting Coastal Management by Establishing and strengthening Community based pressure group in Ammathottam Fishing Village	Peaceful Environment Assured Rights Lasting Solutions (PEARLS)	**500,000/-**
MFF/22	Promote community based, sustainable, environmental friendly and commercially viable value added *Aloe vera* beverage (healthy food) as an alternative income generation for fisher women in Bar Reef Special Management Area in Kalpitiya	Marine and Coastal Resources Conservation Foundation	**538,000/-**
MFF/23	Study effect of Substrate characteristics and environment factors on species diversity and distribution of marine angiosperm in Puttalam lagoon, Sri Lanka	Dept of Oceanography and Marine Geology, Faculty of Fisheries a Marine Sciences & Technology, UoR	**587,000 /-**
MFF/33	Evaluation of the impacts of restoring disturbed mangroves in Puttalam Lagoon: Potential for carbon sequestration	Wayamba University of Sri Lanka	**425,000/-**
MFF/42	Community participatory Biodiversity conservation of Bar Reef Marine Sanctuary.	St. Sebastian Kandakuliya North Fisheries Cooperative society	**442,050/-**
MFF/50	Conservation of mangrove dense by improving self-employment skills by women in fisher families living in Iranawila and Samindugama in the district of Puttalam.	Mihikatha Environmental Society	**462,200/-**
MFF/53	Mangrove conservation through filling the gap of knowledge and information of Tamil speaking communities in Puttalam and Mannar Districts.	Marine and Coastal Resources Conservation Foundation (MCRCF)	**340,000/-**

Annex 2

Grantees by Type of Organization

NGOs - General	NGOs - Environmental	NGOs - Business oriented	Fisheries Co-operative Societies	Other CBOs	Academic Institutions
Sevalanka Foundation	Green Movement of Sri Lanka	Arifa Enterprises	St.Lucia Fishermen Co-operative Society	Al-Ameen Samurdhi Association	Postgraduate Institute of Science
Meth-Seth Development Foundation	Marine and Coastal Resources Conservation Foundation (MCRCF)	Ruk-Diya Community Based Organization	Al-Azhar Fisheries Co-operative Society		Dept of Oceanography and Marine Geology, University of Ruhuna
Youth Enterprise Information Center	Mihikatha Environmental Society	Community Based Eco-guide Association (CEGA)	St.Sebastian Kandakuliya North Fisheries Co-operative Society		Dept of Aquaculture and Fisheries, Wayamba University of Sri Lanka
Wanasarana Thurulatha Swechcha Society	ECOcare Center for Environmental Education and conservation	Arugambay Tourist Association	Semuthu Fisheries Co-operative Society		
Social Economic and Environmental Development Organization (SEEDO)	Human & Environmental Links Progressive Organization (HELPO)	Livestock Development Dairy Farmer Association			
Ruhuna Development Consortium	Maduganga Development Foundation				
Visura Development Foundation					
True Vision Rural Rehabilitation Organization					
Peaceful Environment Assured Rights lasting Solutions (PEARLS)					

NGOs - General	NGOs - Environmental	NGOs - Business oriented	Fisheries Co-operative Societies	Other CBOs	Academic Institutions
Committee for Peoples Rights (CPR)					
Wilpotha Womens' Savings Effort					
National Ethnic Unity Foundation					
Organization for Protecting and Ensuring Democracy (OPED)					
Friendly Environmental Cultural Economic Technological Supports Organization (FECET)					
Nagenahiru Foundation					
SEDO					