



# Small Help, Large Gain

## Community Action for Environmental Management

Kumudini Ekaratne and Ranjith Mahindapala





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Community Action for Environmental Management

IUCN, International Union for Conservation of Nature

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## Introduction

*Watching the water, from the restored Kabatakulama tank, gushing through the Lunu ela, gave me immense hope for the future – the new paddy lands that will come under the plough next season would bring the community much-needed income to better their lives. The newly-greened area by the tank is now a place for rest and recreation – the elderly opting for a bath after a hard day in the field while the young make it their playground; and the many birds that nest in the rich vegetation add colour to the place – a new environment for a better life...*

*...A community leader at the ceremonial opening of the sluice gate of Kabatakulama tank in Galkulama*

The restoration of the Kahatakulama Tank in Galkulama, Sri Lanka, is one of the small grants projects of the **Community Conservation Support Fund (CCSF)** which supported innovative, community-based, sustainable, natural resources management initiatives. CCSF supported Community Based Organizations (CBOs), Non-governmental Organizations (NGOs), provincial and local governments and the private sector to undertake replicable, small-scale pilot initiatives in Sri Lanka, to translate environmental policy into sustainable practices through local level environmental interventions. These projects, implemented from July 2006 to December 2008, ranged in value from about Rs 200,000 to Rs 4.4 million. The projects aimed at implementing environmental action plans at local level, promoting effective environmental tools and technologies to address local level problems, enhancing environmental knowledge and management skills, strengthening local level institutional capacity, and developing environmental partnerships.

The Community Conservation Support Fund is a component of the larger **Raising Environmental Consciousness in Society (RECS)** project, implemented by IUCN Sri Lanka with funding from the Royal Netherlands Embassy in Sri Lanka. The RECS vision is ensuring key stakeholders in resource management - the private sector, local communities and civil society members - demonstrate capacity to support national sustainable development objectives.

The Community Conservation Support Fund provided grants to 24 organisations in Sri Lanka. Five of these projects received additional grants for extended activities. About 65% of the recipients were community-based organisations and non-governmental organisations. Several areas were covered, including agro-forestry,

waste management, species conservation, ecosystem restoration and conservation, and supporting associated livelihoods. Replication of many initiatives was evident.

This booklet is an attempt to document achievements from several projects, with emphasis on lessons that may influence future project work and also policies. Of course, not all projects were successful to the extent we had hoped. Yet, these provided useful lessons on conducting small projects with communities and NGOs. It is hoped that this booklet will provide valuable insights on how small sums of money could produce significant local level results which are replicable.

IUCN Sri Lanka wishes to acknowledge the assistance of the Grantees in compiling this booklet; a near impossible task but for their ready cooperation with the required information. We have also liberally used published and unpublished information available with IUCN Sri Lanka. We also wish to record our appreciation to Tilak Wettasinghe for editing this publication.

March, 2009

The Community Conservation Support Fund is a component of the Project, *Raising Environmental Consciousness in Society (RECS)*, funded by the Royal Netherlands Embassy in Sri Lanka and the Government of the Netherlands. The Small Grants Programme is a component of RECS, and this publication documents some of these projects. IUCN Sri Lanka acknowledges the financial support of the Royal Netherlands Embassy in Sri Lanka and the Government of the Netherlands.

# 1.

## WILPOTHA WOMEN RESTORE A SMALL TANK AND BRING PROSPERITY TO KAMMANDALUWA

### 1.1 INTRODUCTION

Galkulama and Kadjuwatte are two villages in the Kammandaluwa Grama Niladhari Division<sup>1</sup> (GND). Kammandaluwa GND is the largest and the remotest of the 18 GNDs in the Pallama Divisional Secretariat in the Puttalam District in north-western Sri Lanka. A significant segment of the population lives in poverty, and finds it difficult to satisfy their immediate basic needs. Housing is far from satisfactory, sanitation poor, and water is scarce for both drinking and irrigating their paddy lands.

The situation is exacerbated by the high level of unemployment and lack of regular incomes. Consequently, this multi-ethnic society is beset with a number of social problems such as alcoholism amongst men, children having to drop out from secondary school, and men-headed households left behind by women seeking overseas employment. And illegal forest logging, in quest of a quick buck, is widespread.

There are several abandoned small village tanks in the Kammandaluwa area such as Kahatakulama tank and Kadjuwatte tank. These tanks have silted up over time and are now covered in vegetation, and no longer able to hold rain water for irrigation. The entire small tank system in the area, which is a cascading system, has become non-functional. About 16 ha of paddy land, once served by Kahatakulama tank, are now left uncultivated. The community felt that irrigation water to resume paddy cultivation is the answer to much of their economic problems.

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<sup>1</sup> A *Grama Niladhari* Division is the smallest administrative unit at the local level, and is comprised of a number of villages.

Kahatakulama tank overflows into Kadjuwatte tank through the Lune ela stream. The villagers suggested that damming this stream could bring an additional 6.5 ha of disused paddy lands back into cultivation. Thus renovating Kahatakulama tank and improving the irrigation system would bring back about 22.5 ha of paddy in each *yala* and *maha* season.

## 1.2 PROJECT FORMULATION

The Chief Priest of Sri Subadraramaya, the Buddhist temple in Galkulama, has lived in the area for several decades. He has an intimate knowledge of the small tank system here, and had a rough idea of the boundaries of Kahatakulama and Kadjuwatte tanks. As a unifying force, his guidance was invaluable in formulating the project. A participatory rural appraisal (PRA) with 60 farmers was conducted to identify the issues and problems, and to discuss possible solutions. Nearly 100 families were identified, and their views were also taken into consideration in formulating the project.

The *Wilpotha Kantha Ithurum Parisbramaya* (Women's Saving Effort, Wilpotha) secured a grant from the Community Conservation Support Fund (CCSF). A new community-based organization, *Dilena Tharu* (Shining stars) comprising 32 members was established to implement the project. The project commenced on 1 June 2007 and was completed on 31 July 2008.

## 1.3 OBJECTIVES

The key objective of the project was to bring relief to about 100 families in Galkulama and Kadjuwatte villages and to increase their income by at least 20%. This was to be achieved by restoring Kahatakulama tank, improving the surrounding ecosystem, building an anicut across Lunu ela and by developing sustainable home gardens for 40 farming families in Kadjuwatte village who have no paddy land, and constructing a bathing pond to serve the Kadjuwatte villagers.

## 1.4 PROJECT DESCRIPTION

### *The Project Site*

Kammandaluwa GND is a rural, multi-ethnic township with 310 Sinhala, Tamil and Muslim families with a total population of 1,518. Kammandaluwa, Galkulama, Kadjuwatte, Rajapakshawatte, Demela Surakkulama and Sindrathiya villages

comprise the Kammandaluwa GND. The Kahatakulama tank which was restored by the project is located in Galkulama village while the newly-constructed anicut and the pond are in Kadjuwatte village.

#### *Project Beneficiaries*

The direct beneficiaries of this project are 100 farming families in Galkulama and Kadjuwatte.

#### *Project Activities*

Key components of the project are described below:

- (a) *Mobilisation*:- The communities were mobilised prior to commencing the project and the proposed improvements and the expected benefits were explained and discussed with them, in detail. The support of the relevant government agencies (District Secretariat, Divisional Secretariat, Irrigation Department etc.) was also harnessed as the local authorities were expected to maintain the restored tank.
- (b) *Restoration of the Kahatakulama tank*:- This involved clearing the abandoned tank area of rank vegetation, excavating and deepening the tank bed, reinforcing the tank bund, and filling the compound and reinforcing the boundary wall of a house that had been built in the tank reservation.
- (c) *Constructions*:- An anicut across Lunu ela to irrigate 6.5 ha of paddy land, and a bathing pond in Kadjuwatte village.



Commencement of restoration (Courtesy Women's Saving Effort, Wilpotha)



Tank restoration by the community (Kumudini Ekaratne © IUCN)

- (d) *Training of community members*:- Several training programmes were conducted for the benefit of community members, as given in Table 1.

Table 1: Training programmes conducted by the Women’s Saving Effort, Wilpotha

Training Programme	No. of Beneficiaries
Leadership	33
Management and conservation of water resources	65
Cultivation of sustainable home gardens	42
Conservation of water in crop cultivation, and bee keeping in home gardens	14
Manufacturing reed products	25
Environmental protection	School children

- (e) *Greening the tank area and erosion control*: The areas bordering the tank were planted with reeds and other grasses to reduce erosion. The catchment area of the tank was enriched by planting 2,000 forest plants. These activities were carried out with community participation. A notice board, with project information, was also erected near the tank.
- (f) *Home gardens*: A model home garden, with on-site compost production,

was established and sustainable home gardening was promoted as an income-generating activity. Forty home gardens were established in Kadjuwatte, and eco-friendly agronomic practices such as composting, use of neem-based pesticides etc. were introduced.

- (g) *Self-employment:* Production of bags and other handicrafts from reeds growing in the tank area was introduced as an income generating activity for women. Training and demonstrations were conducted for a group of 25 women.
- (h) *Village shop:* A wattle and daub village shop was built in close proximity to Kahatakulama tank to serve as a sales outlet for home garden produce, local sweetmeats and handicrafts turned out by members of the CBO. Ten rupees from each day's collection is donated to the Dilena Tharu Society.
- (i) *Recreation Area:* A children's play-ground with basic equipment was established near the tank.

The civil works were carried out under the direct supervision of the Civil Engineer of the Puttalam Divisional Engineering Office.

#### *Key Technical Inputs*

Technical guidance on irrigation work was obtained from the Divisional Engineering Office in Puttalam, and technical data of the area was obtained from the 100 farmer beneficiaries by a participatory approach.

#### *Project Timeframe*

The project was implemented over a period of 14 months, starting June 2007.

#### *Project Cost*

The total cost of the project was Rs 2,846,694.

## **1.5 ACHIEVEMENTS**

- The restored Kahatakulama tank, now capable of holding 80,600 m<sup>3</sup> (8.06 hectare meters) of water, and the anicut constructed across Lunu ela together enabled farmers to resume cultivating 22.5 ha of abandoned paddy land, each season;
- Sixty paddy farmers in Galkulama have increased their incomes substantially.

Although no formal post-project assessment was made, it is estimated that the average income from additional paddy cultivation is Rs148,500.00 per ha of paddy land;

- The 40 home gardens established in Kadjuwatte are in full production; a variety of vegetables and yams including brinjals, green chillies, okra, pumpkin, capsicum, cucumber, bitter gourd, snake gourd, ridge gourd, tomatoes, manioc and spinach are being raised. The communities are reaping the benefits of their increased awareness on sustainable farming and soil conservation practices;
- The sustainable home gardens campaign has increased the availability of



Ceremonial opening of the rehabilitated Kahatakulama tank (Kumudini Ekaratne © IUCN)

fresh and nutritious garden produce, and reduced food bills. These families now enjoy a considerable degree of food security in terms of vegetables, and a supplementary income from the sale of excess produce;

- Reed handicrafts production as a self employment venture has taken off well and is another income generating opportunity for women;



Village shop by the Kahatakulama tank (Kumudini Ekaratne © IUCN)

- The village shop near Kahatakulama tank, built by the project, serves as a convenient outlet for handicrafts, sweetmeats and garden and other produce from the village;
- The Kahatakulama tank catchment area has been enriched by planting, with community participation, of over 2,000 plants of kumbuk (*Terminalia arjuna*), puwak (*Areca catechu*), del (*Artocarpus nobilis*), mi (*Madhuca longifolia*), mahogany (*Swietenia mahagoni*), pihimbiya (*Filicium decipiens*), weta-keyiya (*Pandanus kaida*), o-keyiya (*Pandanus ceylanicus*) and dunu-keyiya (*Pandanus thwaitesii*);
- The quality of life of people in Galkulama and Kadjuwatte has improved remarkably. They have a restored tank whose environs have been enriched by planting trees. They have a recreational area, a very pleasant meeting point in the evenings, a bathing and swimming facility, and a shop for refreshments. The communities' awareness of the environment has also been enhanced.

## 1.6 CHALLENGES

The lack of harmony and social unrest prevalent in the society presented a serious challenge. These issues were addressed by providing leadership training to a cross section of the community, and forming a committee of ten members from the newly established community-based organization, *Dilena Tharu*. The committee with representation from all communities worked under the guidance of the village priest and ensured timely implementation of project activities.

## 1.7 LESSONS

1. A disused, ancient, small village tank, and an irrigation canal system was restored comprehensively, overcoming politically motivated obstructions and with a minimum of state assistance. It was an ambitious project but the results have been highly rewarding.
2. The leadership provided by the Chief Priest of the village temple, and the aggressive approach of a strong women's community-based organization were key to the success of the project. This experience highlighted the guiding role that religious leaders and community leaders can provide, not only to mobilise communities but also in bringing together communities of different ethnicities for the common good.
3. Establishing harmony in the community, by forming a community-based organization with members from different ethnic groups, enabled the villagers to work together towards their common goal of improving the standard of living in the Kammandaluwa area. This was central to the success of the project. When a project serves a common cause there is every likelihood of commitment and success.
4. The project approach to reducing poverty through increasing paddy production, utilizing local raw material to develop self employment opportunities, and cutting down food bills by cultivating vegetables and fruits in home gardens, was exemplary.

## 1.8 CONCLUDING REMARKS

Galkulama and Kadjuwatte are two poverty stricken villages beset with attendant social problems. Their communities strongly felt that lack of water for their fields was the core problem. Women's Saving Effort, Wilpotha implemented this project

in collaboration with the beneficiaries and representatives of the communities to answer their plea for irrigation water, and much more. Restoring Kahatakulama tank and the irrigation system to bring abandoned paddy fields back into production, developing sustainable home gardening systems, providing sales outlets for surplus garden produce, and promoting self employment opportunities in the reed industry have all contributed to raise the income level of the farming families. Project initiatives also helped to minimize poverty-driven social and environmental problems, and enhanced recreational facilities. Quality of life in Galkulama and Kadjuwatte is on an upward trend.



Haphazard Garbage disposal - a major problem and a health hazard in many areas of Sri Lanka (Ranjith Mahindapala)

## 2. TURNING MUNICIPAL SOLID WASTE TO “GOLD” SAVES WELIGAMA BAY

### 2.1 INTRODUCTION

Weligama is a picturesque fishing village located midway between the cities of Galle and Matara in the Southern Province of Sri Lanka. Internationally famous for its stilt fishing, Weligama is a popular tourist destination with magnificent beaches and bays. Although popularly known as a fishing village, Weligama is a town with a population of 21,783 and classified as an Urban Council (UC). The UC administrative area consists of 13 *Grama Niladhari* divisions (GND) grouped under 10 Municipal Wards.

Disposal of waste is expensive. Massive amounts of garbage, of varying composition, must be dealt with daily. In Weligama, the daily solid waste collection, from households and shops, amounts to about eight tonnes. The Weligama municipal solid waste disposal site, 7.3 ha in extent, is a low-lying land by the main Colombo-Matara highway. The UC had used this site for several years and eventually purchased it outright in 2003. It is by no means ideal for solid waste disposal, but none any better could be found within the UC area. Like almost all local authorities in Sri Lanka, Weligama UC too was operating an open dump at this location. In view of the potential adverse environmental impact of operating an open dump on low-lying land, the UC initiated a course of action to remedy the situation. This dump posed a threat to the Weligama Bay.

As a first step, in late 2005, the UC with funds from the Southern Provincial Council, embarked on a small-scale pilot project to compost the biodegradable fraction of solid waste. A low cost, low technology pilot compost plant that consisted of a compost pad and an open building to house the recycling machinery, was constructed. However, this initiative failed, largely due to poor management and lack of interest by the UC.

The new administration of the Weligama UC that took over in April 2006, made a firm commitment to address the solid waste management (SWM) problem in a comprehensive manner. They installed a new huller and engaged 11 workers and two Supervisors, and commenced processing on a small scale on 1 June 2006. Due to the limited size of the composting pad only about 20% (1.6 tonnes) of the daily collection of solid waste was directed to the pilot compost plant to be sorted and processed. Although a waste composition analysis showed 75% was organic matter, only around 50% of the solid waste was easily degradable and could be composted; the remaining waste was spread in the open dump. The first packet of compost produced was sold to the public at a simple ceremony held on 28 August 2006. The compost was priced at Rs 7.00 per kg.

## 2.2 PROJECT FORMULATION

Encouraged by the results of the pilot project, the Weligama Urban Council secured a grant from the Community Conservation Support Fund (CCSF) to improve their SWM facility and scale up the composting operation. The project commenced on 1 February 2007.

Based on an evaluation of the technical and human resource capacities of the Weligama UC, a phased programme for waste management was considered appropriate. The programme was divided into four phases, as follows:

- (i) Separation of the solid waste into recyclables and biodegradable organic matter, at the waste disposal site, and composting the organic fraction;
- (ii) Improvements to the town waste collection system with good coordination between waste collection vehicles and residents, to ensure the streets will be free of haphazard disposal of waste;
- (iii) Improvements in the management of the residue disposal site to minimize adverse environmental and aesthetic impacts; and
- (iv) Finally, to introduce source separation of garbage to the residents of Weligama.

Weligama adopted an unconventional approach to implement its SWM programme. Conventional SWM programmes commence with source separation. This is the ideal, but source separation depends solely on public participation. Profiting from the bad experience of other local authorities, Weligama commenced its SWM programme

with an operation, over which it had complete control: site separation of waste and composting of the organic matter. That way, even without public participation, Weligama UC would have a successful SWM programme in place, which will surely win the ratepayers’ cooperation for the final phase of source separation.

### 2.3 OBJECTIVES

The main objectives of the project were to increase Weligama UC’s capacity to process solid waste, popularise the use of compost, and develop into a training centre for municipal solid waste (MSW) management. More specifically:

- Optimization of the existing pilot solid waste composting plant to achieve its capacity of 1.6 tonnes daily, and upgrading it to a full scale municipal waste composting plant capable of processing 6 tonnes of organic matter out of a daily solid waste collection of 8 tonnes.
- Study the feasibility of co-composting municipal waste with septage collected from septic tanks.
- If feasible, introduce co-composting of the organic fraction of solid waste and septage.
- Developing a hands-on training programme for small and medium local authorities in Sri Lanka on composting of MSW and/or co-composting MSW and septage.

### 2.4 PROJECT DESCRIPTION

#### *Site Geography and Coverage*

Weligama Urban Council has 6,159 residences, 968 commercial establishments and 154 institutional and government offices. The UC consists of 10 wards: Kapparatota, Maha Weediya, Paranakade, Pelena, Galbokka, Aluth Weediya, Pokunugamuwa, Hetti Weediya, Weliwala South and Weliwela West. The Weligama UC is located in the district of Matara in southern Sri Lanka. Being in the low country wet zone it receives an annual rainfall of 1,500 - 2,500 mm, and has an average temperature of 27°C.

#### *Project Beneficiaries*

The population of 21,783 in the 10 wards (13 GN divisions) of the Weligama UC area will benefit from the project.

*Implementing and Coordinating Agency*

The project was implemented by the Weligama UC.

*Project Activities*

The key components/activities of the project are as follows:

- (a) Upgrading the existing pilot compost plant to deal with the entire daily collection of MSW, including on-site separation into recyclables and biodegradable organic matter, and composting the organic fraction. Expanding the compost pad by 800 m<sup>2</sup> and the composting area by 650 m<sup>2</sup> to handle the increased volume.



Composting yard (Kumudini Ekaratne © IUCN)

- (b) Converting the open dump that was being used for waste disposal to a controlled landfill site. Constructing well designed bunds to divert run-on and run-off from the waste disposal site.
- (c) Developing an appropriate methodology in order to undertake co-composting the organic fraction of municipal solid waste with septage. Constructing a concrete stabilization pond, 13 m<sup>2</sup> in area, to store and treat septage, for this purpose.

- (d) Developing a short, hands-on training programme on composting, targeting workers and plant supervisors of other interested local authorities. The course to cover both theoretical and practical aspects of composting, and prepare participants to carry out their own programme of composting, with minimal additional technical inputs. This course is to be conducted by the Weligama UC, free of charge.
- (e) Mobilizing the community and conducting awareness programmes for source separation, home composting and synchronised waste collection in all 10 wards in the Weligama UC. Also, an awareness programme on waste separation for vendors and commercial establishments in the town.
- (f) Introducing source separation of garbage by setting up 25 compartmentalised waste collection bin units at strategic locations in the town. Each unit to have 4 compartments, one each for biodegradable matter; plastic and polythene; glass and metal; and paper and card board, to facilitate waste separation at source.
- (g) Acquiring two new tractors, a compartmentalized trailer (for non-degradable matter) and a compactor to facilitate waste collection; and introducing a regime for collecting waste. Waste to be collected daily, in all 10 wards, at the following times: degradable matter from 07.00 to 12.00 hrs and 12.30 to 15.00 hrs; and non-degradable matter from 06.30 to 10.00 hrs and 15.30 to 19.00 hrs. The tractors deployed to collect waste to be equipped with a warning bell to announce their arrival and alert the communities.
- (h) Establishing an exhibition centre to promote the waste recycling programme among the communities. Display a photographic record of the types and stages of composting, and of the compost manufacturing site. Print posters and leaflets for distribution to the communities.

While the SWM project with CCSF funds was in progress, Weligama UC also received assistance from other sources, listed below, for enhancing the ongoing activities:

- Central Environmental Authority – to provide home composting bins for 300 homes
- Caritas – to build a sorting area, a greenhouse to demonstrate protected agriculture, office building, watch hut, rest room for workers and for planting material for the organic farm.

- World Vision – to concrete the driveway to the composting site
- Southern Provincial Council – build a store room and sales outlet named “*Ranpoboniya*”, in the vicinity of the compost production unit to market compost and other products.

### **Box 1 – Composting and co-composting processes**

**Composting Process** - The sorted organic waste is placed in windrows and allowed to compost. Each windrow pile is about 0.9 m feet high, 1.8 m long and 1.2 m wide. The piles are turned manually every 7-8 days for aeration and moisture is added, if required, to accelerate the composting process. In nine weeks the waste is adequately stabilized and ready for screening. The compost is allowed to mature for about 10 days before it is packed for sale.

#### **Co-composting with septage**

Extensive studies of co-composting of MSW with sewage sludge and septage have been undertaken by the United States Environmental Protection Agency (US EPA) to determine the protocols for ensuring a pathogen-free product. The Weligama UC followed these protocols and has ensured that the compost piles have reached the right temperatures to ensure pathogen kill. Septage, rather than pipe-borne water, will be used for moisture adjustment during the first three weeks of composting, and water will be used thereafter. This procedure will save a considerable amount of water. Proper temperature control is key to pathogen control. Pile temperatures are monitored daily to ensure achievement of the time-temperature requirements prescribed for pathogen kill by the US EPA for co-composting septage and MSW. Workers are provided safety equipment and apparel to minimize contact with the waste. Samples are drawn at regular intervals and analyzed for the presence of pathogens to ensure a pathogen-free product.

Co-composting with septage reduced the time taken by about 7 to 10 days and increased the nutrient content in the finished product over conventional composting of MSW.

#### *Key Technical Inputs*

The UC receives technical advice from a solid waste management specialist with national and international experience. The Advisor, a resident of Weligama, provides this service to the project on a *gratis* basis.

#### *Project Timeframe*

The duration of the project was from 01 February 2007 to 30 September 2008.

#### *Total Project Cost*

The total funding obtained from the CCSF was Rs 4,368,548.

## 2.5 ACHIEVEMENTS

- The entirety of the biodegradable organic fraction of the daily collection of MSW, is being converted to high quality compost in the upgraded composting facility. Of the 8 tonnes of MSW collected per day, approximately 50-60% is easily biodegradable organic matter. This fraction of MSW is separated and converted into compost. The finished air-dried compost is about 15% of the fresh weight of MSW;
- All the marketable recyclable material is separated on-site and sold to vendors; these items amount to about 15% of the daily MSW collection;
- Currently, less than 35% of the MSW entering the site requires final disposal in the landfill. The UC has reduced its disposal footprint by over 65% during the last year. Information on MSW collected; amount of compost produced, used in the farm, and sold; and the income generated from the sale of compost and other items is given in Table 2;
- Use of septage to compost MSW was a major breakthrough. Septage was utilized to bring the organic matter to the moisture content of around 60%, required for composting. Co-composting the organic fraction and septage saved water, enriched the composting feedstock and simultaneously managed septage in an environmentally acceptable manner. It also reduced composting duration by 7-10 days (see Box 1 for a description of the composting processes);
- Training programmes on composting for personnel of other local authorities are in place. Negombo Municipal Council staff, trained in August 2007, has commenced operating a small-scale composting unit in Negombo. Ambalantota Pradeshiya Sabha (PS), Divulapitiya PS, Habaraduwa PS, Ratgama PS and Puttalam UC personnel were trained in 2008, and Weligama UC has plans to expand this programme.
- The open dump site on low lying land that abuts the main highway and posed a threat to Weligama Bay has been redeveloped: one part as a well managed landfill, and the other as a demonstration farm;
- With recyclable material being separated, and composting in operation (see first three bullet points above), it is only the remainder, largely non-degradable waste that goes to the landfill. Pollution potential of non-degradable waste

is low, about 10% of non-segregated MSW. Hence, with good management and control of run-off and run-on, which is in place, the present disposal site could be used at a greatly reduced risk of ground and surface water pollution;

- The farm, a UC venture, to promote organic agriculture and home composting among community members, produces a variety of organically grown fruits and vegetables such as papaw (*Carica papaya*), banana (*Musa paradisiaca*), mango (*Mangifera indica*), lady's fingers (*Abelmoschus esculentus*), snake gourd (*Trichosanthes anguina*), bitter gourd (*Momordica charantia*), tomato (*Lycopersicon esculentum*), and capsicum (*Capsicum annuum*). Though primarily a demonstration centre this flourishing farm brings in a sizeable income (Table 2);
- Establishment of a sales outlet named "Ranpohoniya" in the vicinity of the compost production unit to market compost and farm produce, which are now in high demand. Compost was sold in 2 kg, 5 kg and 25 kg packs at a wholesale price of Rs 8.00 and retail price of Rs 9.00 per kg;



"Ranpohoniya" sales outlet (Kumudini Ekaratne © IUCN)

- The Weligama UC is the first local authority in Sri Lanka to gainfully utilize its entire production of compost and is unable to meet the market demand. Only Grade A quality compost is sold to the public; all of Grade B quality compost is used in their organic farm;
- The introduction of a source separation system for garbage, with separate bins for degradable and non-degradable waste, is in progress. A daily collection specifically for non biodegradable matter such as polythene, plastic, metal, glass, paper and cardboard was initiated in the town;
- Phases 1, 2 and 3 of the SWM programme have been successfully implemented; phase 4 is in progress. Weligama UC takes pride in running a very efficient solid waste management enterprise. A systematic schedule for garbage collection and disposal, on a daily basis, is being implemented.

Weligama is a popular tourist destination. Maintaining a clean city will, no doubt, contribute to tourism in Weligama, as well as the health and wellbeing of its people.

*Table 2 - Solid waste management venture of the Weligama Urban Council – data on compost production and revenue realised*

Year	Month	MSW collected (Tonnes*)	Organic Waste for Composting (Tonnes*)	Compost Produced (Tonnes*)	Compost Sold (Tonnes)	Compost Used in Organic Farm (Tonnes*)	Revenue from compost sales (Rupees)	Revenue from all sales** (Rupees)
2007	February	224	112	33.60	8.50	25.10	46,830	67,893
	March	248	124	37.20	8.35	28.85	57,085	62,643
	April	240	120	36.00	8.62	27.38	54,803	83,955
	May	248	124	37.20	6.02	31.18	31,535	55,918
	June	240	120	36.00	4.00	32.00	54,460	204,757
	July	248	124	37.20	11.70	25.50	79,275	304,320
	August	248	124	37.20	12.72	24.48	91,665	404,695
	September	240	120	36.00	21.83	14.17	156,394	455,667
	October	248	124	37.20	12.18	25.02	73,955	498,827
	November	240	120	36.00	9.27	26.73	65,590	507,816
	December	248	124	37.20	14.28	22.92	111,510	502,017
<b>Sub Total</b>		<b>2672</b>	<b>1336</b>	<b>400.80</b>	<b>117.47</b>	<b>283.33</b>	<b>823,102</b>	<b>3,148,508</b>
2008	January	248	124	37.20	15.67	21.53	125,360	793,646
	February	232	116	34.80	16.50	18.30	132,040	869,365
	March	248	124	37.20	9.93	27.27	79,480	1,212,981
	April	240	120	36.00	8.44	27.56	63,040	648,025
	May	248	124	37.20	11.07	26.13	85,240	709,182
	June	240	120	36.00	12.16	23.84	100,920	629,095
	July	248	124	37.20	16.15	21.05	101,280	504,664
	August	248	124	37.20	15.21	21.99	118,000	475,220
	September	240	120	36.00	18.22	17.78	165,800	521,093
	October	248	124	37.20	12.76	24.44	105,520	562,927
<b>Sub Total</b>		<b>2440</b>	<b>1220</b>	<b>366.00</b>	<b>136.11</b>	<b>229.89</b>	<b>1,076,680</b>	<b>6,926,198</b>
<b>Total</b>		<b>5112</b>	<b>2556</b>	<b>766.80</b>	<b>253.58</b>	<b>513.22</b>	<b>1,899,782</b>	<b>10,074,706</b>

(Source: Weligama UC)

\* Estimate based on the capacity of the waste collection tractor.

\*\* Compost, plastic, polythene glass, metal, cardboard, paper and produce from the organic farm.

## 2.6 CHALLENGES

An awareness programme was implemented on the benefits of, and procedures for, source separation of household waste. However, not even half the households practice source separation. As a result, workers in the compost manufacturing plant have to spend more time in separating the waste. Further education and awareness programmes are necessary to educate the Weligama ratepayers. Meanwhile, posters and leaflets are being distributed to educate the public on the successful waste recycling operation and thereby motivate them to undertake source separation of degradable and non-degradable waste.

## 2.7 LESSONS

The success of this project is due largely to the commitment of the Chairman of the Urban Council (political will) and the excellent technical assistance and supervision provided by a public-spirited Weligama resident, on a *gratis* basis. The systematic approach combined with high leadership qualities and commitment of the project staff contributed to its success. Although a systematic cost-benefit analysis has not been carried out, the project appears to have become commercially viable and profitable, which augurs well for its sustainability. This project offers many important lessons:

1. A community-based, development-oriented programme has a high potential for success if there is political will and commitment, and true leadership.
2. Phased implementation of a development oriented project, commencing with a significant component having a high chance of success, is a useful approach.
3. Effective transformation of a development activity into a commercial venture enhances its sustainability.
4. The know-how on compost production and solid waste management, gained in the project, was extended by the grantee to other interested local bodies. To have such a training programme as an inbuilt component of the project is an initiative to be welcomed.

## 2.8 CONCLUDING REMARKS

Weligama Urban Council’s promising solid waste composting initiative which commenced operations in late 2005, was successfully upgraded with CCSF funds. With additional equipment and infrastructure, and efficient management supported with excellent technical assistance it is now a full-scale operation composting the entire biodegradable organic fraction of the Weligama municipal waste. Co-composting with septage killed two birds with one stone: cut down composting time and water usage substantially let alone ending up with a nitrogen-rich product; and also provided an acceptable, low cost solution to Weligama’s septage disposal problem.

Weligama’s approach to solid waste management is truly holistic. MSW is separated into recyclable material and organic material. The easily biodegradable matter is converted to compost and the balance goes to a controlled landfill. Some of the compost is utilized in their organic farm. There is a ready market for the compost and the UC is unable to meet the demand for the product. Virtually 100% of the operating costs, including labour wages, are recovered from the sale of compost, other recyclables and produce from the organic farm. The compost plant is nearly odour free, which is a clear indication that the process is well-managed - a fact endorsed by all visitors to the plant. No wonder it is sought after as a training centre by other local authorities.



Unsustainable agricultural practices – clearing the slopes for chena cultivation causing land degradation, loss of top soil and silting of reservoirs (Near Randenigala) (Ranjith Mahindapala)

## 3. COMMUNITY EMPOWERMENT FOR THE CONSERVATION OF MARYMOUNT MINI CATCHMENT OF THE VICTORIA RESERVOIR

### 3.1 Introduction

The Marymount mini catchment, in the Nuwara Eliya district, forms a part of the Victoria Reservoir catchment in central Sri Lanka. Land in the mini catchment is very steep with some slopes exceeding 60°. The villages of Marymount, Ambewela, Balagolla and Idmalanda are situated within the Marymount mini catchment.

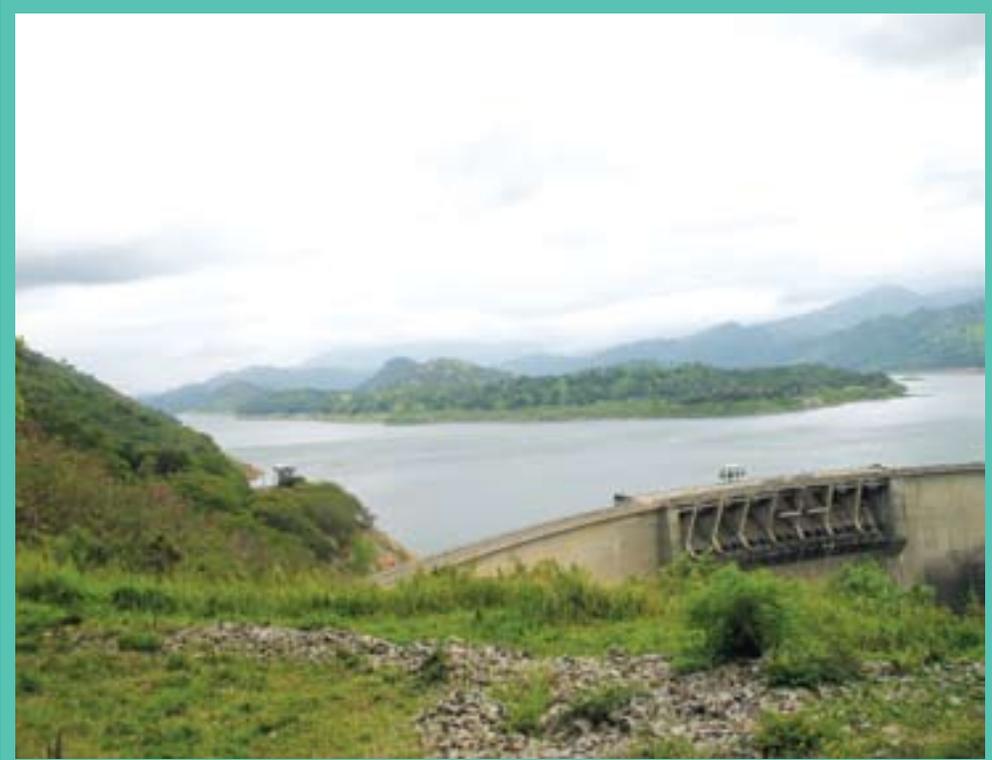
Marymount mini catchment is home to 565 farming families who cultivate seasonal vegetables on these steep lands. Improper agricultural practices have caused considerable soil erosion that has led to low fertility and land degradation. The farmers are now compelled to use increasing amounts of inputs in an effort to maintain their yields.

Continuous application of unsustainable agronomic practices on these steep lands carries the risk of irrevocable damage to the catchment area. Soil erosion will also harm the Victoria reservoir where silting has been reported in recent times. Encroachment of the catchment buffer zone for crop cultivation, and forest fires have aggravated the situation. The Mahaweli Authority of Sri Lanka (MASL), with funding from the Community Conservation Support Fund (CCSF), implemented an integrated approach to watershed management to reduce erosion and restore the mini catchment.

### 3.2 Project Formulation

The project was formulated with inputs from farmers, village leaders, village organizations and other collaborating institutions. Community-based organizations,

five in Marymount, seven in Ambewela and five in Balagolla, representing the population, were established to participate in project implementation. The project commenced operations on 1 March 2007.



Marymount minicatchment (Kumudini Ekaratne © IUCN)

### 3.3 Objectives

The main objective of the project was to improve the condition of the Marymount mini catchment area by reducing soil erosion and restoring soil fertility.

Securing the active involvement of the relevant agencies and the village level organisations in achieving project objectives was an important element.

### 3.4 Project Description

#### *Site Geography and Coverage*

The Marymount mini catchment, 1,045 ha in extent, is in the Hanguranketha Divisional Secretariat in the Nuwara Eliya district of Sri Lanka. This mini catchment, which is a subsection of the Victoria catchment, receives an annual rainfall of

1,500-2,000 mm, and the elevation ranges from 457-610 m. While the overall slope of land in the catchment is about 30°, a considerable extent is very steep with slopes >60°. The villages of Marymount, Ambewela, Balagolla and Idmalanda are areas with very steep slopes.

#### *Project Beneficiaries*

The beneficiaries were selected after calling for applications from the farming communities in the region. The selections were made by the MASL, Coconut Cultivation Board (CCB) and *Grama Niladharis* (GN) of Marymount, Ambewela and Balagolla. They selected 106 beneficiaries from Marymount, 102 from Ambewela and 52 from Balagolla.

#### *Implementing and Coordinating Agency*

The Headworks Administration, Operation and Maintenance Division (HAOM) of the MASL implemented the integrated approach to watershed management in the Marymount mini catchment area. HAOM also formed the community-based organizations in the villages, and coordinated with these organizations as well as other collaborating institutions.

#### *Project Activities*

- (a) Mobilizing stakeholders and beneficiaries and conducting educational programmes to raise their awareness on watershed management issues.



Introducing contour hedges of *Gliricidia* – Sloping Agricultural Land Technology (SALT) (Kumudini Ekaratne © IUCN)

- (b) Introducing sustainable agricultural practices, including contour hedges of Gliricidia (Sloping Agricultural Land Technology), establishment of boulder bunds etc., and providing financial incentives to implement soil conservation measures.
- (c) Training on organic crop production and soil conservation techniques.
- (d) Training on the rearing of dairy cattle, and constructing two cattle sheds; one each in Marymount and Ambewela.
- (e) Establishing two plant nurseries in Ambewela and Balagolla to raise 8,000 poly-bagged plants such as tamarind (*Tamarindus indica*), mahogany (*Swietenia mahagoni*), coffee (*Coffea arabica*), pepper (*Piper nigrum*) and pihimbiya (*Filicium decipiens*) for planting in home gardens and in the catchment area.
- (f) Supplying coconut seedlings and pepper cuttings for planting home gardens, in collaboration with the CCB.

#### *Key Technical Inputs*

Since Marymount mini catchment is a subsection of the Victoria catchment, the technical data required for the project was available with the MASL. CCB provided technical inputs for all the planting activities and the dairy farmers were trained by the National Livestock Development Board.

#### *Project Timeframe*

The duration of the project was 18 months from 1 March 2007 to 30 August 2008.

#### *Total Project Cost*

The project cost was Rs 2,496,000.

### **3.5 Achievements**

The mini catchment population was empowered by setting up community-based organizations and educating them on the role of integrated crop management in protecting the catchment.

Community awareness of the importance of proper soil conservation measures generally, and the need to move away from inappropriate seasonal vegetable cultivation on steep lands, was enhanced. Consequently,

- Boulder bunds were established in 71 farming units in the Marymount mini catchment;
- 342 coconut-based home gardens interplanted with pepper were established using 5,740 coconut plants and 3,000 pepper plants;
- Two cattle sheds in Marymount and Ambewela, and three rain water tanks in Marymount, Ambewela and Balagolla were constructed;
- Two large plant nurseries were established to raise plants such as tamarind (*Tamarindus indica*), mahogany (*Swietenia mahagoni*), coffee (*Coffea arabica*), pepper (*Piper nigrum*) and pihimbiya (*Filicium decipiens*) for home gardens and the forestry programme.

Improving the productivity of home gardens through sustainable agricultural practices is likely to increase incomes and reduce encroachments of the catchment.

### 3.6 Challenges

The 5,740 coconut plants required for the project, estimated at Rs. 25 per plant, had to be purchased for Rs. 50, due to an intervening price increase. Furthermore, plants were not available from the nearby Pallekelle nursery and had to be transported from the Kegalle and Dodangaslanda nurseries. This entailed a substantial increase in project costs that was partially met by collecting Rs. 10 per plant from the farmers.

Monsoon rains, anticipated in October were delayed and coconut planting and the forestry programme could not commence till end December. As a result, the training programmes and the cultivation period overlapped, and due to their busy schedule the farmers could not fully participate in project activities. Familiarity with the ground situation would have enabled a better scheduling of the training programmes.

Parents are reluctant to give ownership of their land to the second generation. This has created two problems: some lands are not cultivated due to lack of tenure, and the second generation is driven to encroach the reservoir buffer zone for cultivable land. Community empowerment to fully utilize available land in home gardens through integrated crop management would help in overcoming these challenges.

### **3.7 Lessons**

1. Better evaluation of the problems and a fuller appraisal of the proposal might have improved implementation and the achievement of outputs. A clear understanding of the ground situation and a well-defined preliminary pre-feasibility assessment of the socio-economic conditions, income generation activities, pastimes, recreational needs and land tenure issues are needed for sound project formulation.
2. Providing an allowance for unusual weather patterns and vagaries of the weather are difficult but important considerations in project implementation.

### **3.8 Concluding remarks**

Marymount mini catchment is a subsection of the Victoria Reservoir catchment. Inappropriate and indiscriminate farming on this very steep terrain has eroded the soils as well as farming incomes, and poses a threat to the Victoria reservoir. To develop and conserve the mini catchment, the project introduced an integrated approach to watershed management. Coordinated by the Headworks Administration, Operation and Maintenance Division of the MASL, the communities worked in collaboration with other organizations to promote sustainable agricultural practices for integrated management of perennial crops, raising dairy cattle and reforestation. Community empowerment was central to the project and would stand in good stead for MASL's continuing efforts to ensure the sustainability of the mini catchment.

## 4. URBAN SCHOOL BIODIVERSITY GARDEN PROGRAMME STARTS AT ROYAL COLLEGE COLOMBO

### 4.1 INTRODUCTION

Established in 1835, Royal College, one of Sri Lanka's leading boys' schools is located in Colombo and has a student population of 8,400. It prepares students from the primary level up to the GCE Advanced Level examination. The college is situated in the centre of an urban area which is a hive of activity. Urbanisation destroys the natural habitats of species. It behoves us therefore to construct niches to maintain biodiversity in urban areas. Hence, the Biodiversity Programme at Royal College implemented a project to establish a biodiversity garden in the school premises.

### 4.2 PROJECT FORMULATION

The Royal College Biodiversity Programme secured Rs 543,902 from a small grants scheme through the Community Conservation Support Fund (CCSF) and commenced operations on 1 April 2007. A project committee was established comprising, seven students under the leadership of the Teacher-in-charge of the Biodiversity Programme.

### 4.3 OBJECTIVES

The objective of this project is to conserve fauna and flora in urban areas and in the process enhance the knowledge of students. The project also aimed to extend the knowledge gained in biodiversity conservation to other schools and encourage them to implement such initiatives in urban school environments.

#### 4.4 PROJECT DESCRIPTION

##### *Site Geography and Coverage*

The biodiversity garden, 0.4 ha in extent, is located in the college premises at Rajakeeya Mawatha, Colombo 7.

##### *Project Beneficiaries*

The direct beneficiaries of the project were the students and staff of Royal College and 100 students drawn from 10 other schools in Colombo.

##### *Implementing and Coordinating Agency*

The project work was implemented by the Royal College Biodiversity Programme (RCBP), under the leadership of the Teacher-in-charge of the Biodiversity Programme. The project was managed by the Principal with the assistance of the school management team.

##### *Project Activities:*

- (a) Visiting two important biodiversity sites, the Horton Plains National Park and Hakgala Botanical Gardens, for RCBP committee members to study the faunal and floral diversity in these ecosystems, and to learn how to make a nature trail and maintain a biodiversity garden.
- (b) Constructing a 3.7 m long, 1.2 m broad and 1.2 m deep pond in the school garden to attract birds and amphibians. Aquarium fish and aquatic plants were introduced to the pond to enhance its biodiversity.



Pond in the urban biodiversity garden (Kumudini Ekaratne © IUCN)

- (c) Constructing a nature trail, 250 m long, with student participation. Erecting boards with the common and Latin names of plants found along the trail and preparing a small map with important features of the trail.
- (d) Planting butterfly larvae (caterpillars) host plants such as, kathurumurunga (*Sesbania grandiflora*), kiri anguna (*Wattakaka volubilis*) and kurundu (*Cinnamomum verum*) and nectar plants such as pinna (*Clerodendrum infortunatum*) in the vicinity of the pond.
- (e) Making a sand/mud puddle to attract male butterflies.
- (f) Erecting 12 butterfly identification boards, with information to help teachers, students and parents to identify butterflies, in the vicinity of the garden.
- (g) A pre-project survey to collect baseline biodiversity data, and updating it periodically.

#### *Key Technical Inputs*

Technical inputs were provided by the science teachers of the school.

#### *Project Timeframe*

The duration of the project was 18 months from 1 April 2007 to 30 September 2008.

#### *Total Project Cost*

The total funding obtained from the CCSF was Rs. 543,902.

### **4.5 ACHIEVEMENTS**

The study of biodiversity in the Horton Plains and Hakgala Botanical Gardens not only increased the students' awareness on biodiversity but also provided the knowledge, know-how and renewed motivation to establish a biodiversity garden in an urban school setting.

A model biodiversity garden, 0.4 ha in extent, complete with a large biodiversity pond and a 250 m long nature trail, was established in the premises of Royal College.

Creation of the biodiversity garden increased the biodiversity in the college premises. The varieties of butterflies and birds, and their numbers, in the vicinity of the pond has visibly increased. The baseline study prior to implementation of the project work recorded five common butterflies: the Common Jezebel (*Delias eucharis*), Common Indian Crow (*Euploea core*), Common Tiger (*Danaus genutia*) Common Sailor (*Neptis hylas*) and Psyche (*Leptosia nina*). After the biodiversity pond was established the number of butterfly varieties recorded increased to eleven; the new arrivals were the Red Pierrot (*Talicauda nyseus*), Common Palmfly (*Elymnias hypermnestra*), Indian Cupid (*Everes lacturnus*), Common Leopard (*Phalanta phalantba*), Common Evening Brown (*Melanistis leda*) and Common Mormon (*Papilio polytes*). Sightings of birds such as parakeets, sunbirds, kingfishers, egrets and coucals also increased. The common amphibians observed belonged to *Bufo*, *Rana* and *Philautus* genera while the reptiles were represented by rat snakes (*Ptyas mucosa maxima*), Common Garden Lizard (*Calotes versicolor*) and Green Garden Lizard (*Calotes calotes*).



Red Pierrot *Talicauda nyseus* (Naalin Perera © IUCN)

The biodiversity garden is being put to good use by the science stream students for their studies. It also serves as an attraction for many official visitors to the college.

A database on the biodiversity in the school garden has been developed. Updated through periodic monitoring by students, the database provides a time series of the build-up of biodiversity in the garden. Updating and maintaining the database stimulates student interest in environmental issues.

Awareness and knowledge on biodiversity conservation among the student population at Royal College have been enhanced.

An awareness workshop for 100 students, from 10 Colombo schools, was conducted at Royal College, to extend know-how on biodiversity conservation.

A biodiversity day was organized to showcase the Biodiversity Garden Project at Royal College; informative leaflets and posters on the project were made available to the visitors.

#### **4.6 CHALLENGES**

The biodiversity garden was set up and maintained by the senior students who are due to leave school before long. Therefore, ensuring long-term sustainability of the biodiversity garden was a challenge. This was addressed by teaching and training the younger students in biodiversity conservation and encouraging them to undertake the maintenance of the biodiversity garden. A systematic knowledge sharing process with the lower classes would ensure the long-term survival of the garden.

#### **4.7 LESSONS**

1. Biodiversity gardens in urban schools are a powerful instrument to generate interest on environmental issues in the young. Their realisation of the adverse consequences for future generations, due to loss of biodiversity in urban areas and environmental degradation in general, will have a good multiplier effect in society.
2. Students taking environmental initiatives, developing leadership qualities, creating school environmental networks and conducting group exercises are experiences that will stand them in good stead in adult life.
3. Organizing an awareness workshop and a Biodiversity Day to disseminate the knowledge gained through project activities, to students of other

Colombo schools, is a commendable initiative. These positive steps taken to promote biodiversity conservation in urban schools displayed a community-based approach to the conservation of biodiversity.

#### **4.8 CONCLUDING REMARKS**

Biodiversity Programme at Royal College realised the gravity of habitat destruction through urbanisation. They adopted a strategy of constructing an ecological niche in urban schools to conserve biodiversity. The project implemented by the Royal College Biodiversity Programme had two broad components, namely, a field work component and a knowledge sharing component. The field work included gaining the required skills, establishing the biodiversity garden and maintaining it. The knowledge sharing component provided assistance to schools embarking on biodiversity conservation initiatives.

## 5.

### ADDING VALUE TO GARBAGE – A PARTNERSHIP BETWEEN A LOCAL AUTHORITY AND A PRISON

#### 5.1 INTRODUCTION

Kuruwita was once sparsely populated elephant country. But, that was a long time ago! Today, Kuruwita *Pradeshiya Sabha*<sup>1</sup> (KPS) in the Sabaragamuwa Province of Sri Lanka, covering about 260 km<sup>2</sup>, has a population of 114,957 with fairly densely populated townships. The picturesque *Kuru ganga*, a branch of *Kalu ganga*, originating from Adam's Peak flows through Kuruwita. Almost 16% of the KPS area amounting to 2,841 ha, is under forest cover; 78% dense forests, 20% open forests and 2% scrub jungle. Agriculture and gem mining are the major sources of livelihood for the people in Kuruwita. Other livelihood activities are brick making, rattan products, quarrying, apparel industries and employment in the state and private sectors. Rubber and tea are cultivated extensively; coconut, paddy, cloves, pepper and cinnamon are grown on a smaller scale.

The disposal of garbage has been a recurring problem in Kuruwita. Around five tonnes of solid waste (SW), consisting of 58% biodegradable matter, 40% plastic and polythene, and 1% each of glass and steel, are collected daily from the households and shops in the area. It had been the practice, for many years, to dump all this SW into *Kuru ganga* polluting this valuable water source.

This certainly could not go on, and since 1987, garbage was disposed of in an open dump in a 0.6 ha land belonging to the KPS. The resulting environmental pollution was such that the Medical Officer of Health took the KPS to court in February, 2005. The court ordered the garbage dump to be covered with a layer of soil, every three days. However, strict compliance was not

<sup>1</sup> *Pradeshiya Sabha* is a Local Government Authority.

forthcoming as the KPS could not meet the high operational costs. With no end in sight to this vexed problem the KPS was at the receiving end of a continuous stream of complaints from the disgusted and infuriated community.

Sabaragamuwa Provincial Council (SPC) and the Central Environmental Authority (CEA) in response to the KPS' call for assistance pledged capital towards a pilot project to convert solid waste into compost. The KPS teamed up with the authorities of the Kuruwita Prisons (KP) to implement this compost project and entered into an open ended agreement on 25 October 2005. The Kuruwita Prisons allocated a 0.13 ha block of land to construct a building to house the composting pad. A store room to stock non-biodegradable matter was constructed on the KPS premises. These constructions were financed from the SPC allocation of Rs 1,688,200 for this project. The machinery required such as a shredder and a huller to the value of Rs 250,000 were purchased from funds provided by the CEA.

As the capacity was limited, market waste was collected only on Saturdays, but household waste was collected daily by the KPS and delivered to the composting facility in the Prisons. Sorting of the solid waste and the composting process was carried out by eight inmates of the Kuruwita Prison who were serving short term prison sentences. Composting was carried out under the technical guidance of CEA officials.

## **5.2 PROJECT FORMULATION**

The pilot phase operated by KPS and Kuruwita Prisons, which commenced on 25 October 2005, kept going amidst many difficulties. With the available infrastructure and machinery, KPS was able to process only a small amount of the daily collection of solid waste. As the pilot phase showed that SW composting was a feasible proposition, assistance was secured from the Community Conservation Support Fund (CCSF) to expand the operation to cover the entire KPS area. The project commenced on 1 January 2007 and was completed on 30 June 2008.

## **5.3 OBJECTIVES**

The main objective of the project was to prevent polluting the Kuruwita town and its environs by expanding the ongoing solid waste management process to cover the entire KPS area. Recycling and adding value to garbage, and mobilizing prison inmates for this worthy public service were the other important objectives.



Solid waste being separated by the prison inmates (Kumudini Ekaratne © IUCN)

#### 5.4 PROJECT DESCRIPTION

##### *Project site*

KPS area, in the Ratnapura district of Sabaragamuwa Province, is bordered by Nuwara Eliya District in the north-east, Ayagama Pradeshiya Sabha in the south-west, Ratnapura Pradesiya Sabha in the south-east and Eheliyagoda Pradeshiya Sabha in the north-west.

Low-lying lands extending westwards of KPS are at elevations below 150 m msl, and the highlands range from 300-1,500 m msl. The low-lying areas are subject to periodic flooding, and the hilly areas are prone to land slides. Situated in the wet zone, KPS receives an annual rainfall of 2,500- 3,500 mm.

##### *Project beneficiaries*

The target beneficiaries of the project include the inhabitants of the 56 *Grama Niladbari* divisions of KPS and the inmates of Kuruwita Prisons. There are 28,426 households and 470 shops and business establishments that will enjoy the transformation to environment friendly surroundings.

*Implementing and coordinating agency*

The implementing agencies are the Kuruwita Pradeshiya Sabha and the Kuruwita Prisons.



Compost piles (Kumudini Ekaratne © IUCN)

*Project Activities:*

1. Constructing, in the prison premises, a 8 x 11 m shed to sort solid waste and three cement tanks to wash and clean the recyclable plastic, polythene and glass waste.
2. Training the KPS Public Health Inspector and the Prisons Supervisor in composting, initially at the CEA and followed by hands-on training at the Balangoda Urban Council, which runs a successful solid waste management project. In turn they will train 35 prison inmates selected to participate in this project (see Box 2 for a description of the composting process).

## **Box 2 - Compost making process**

Approximately 5 tonnes of garbage is collected daily by KPS and delivered to the composting site in the Kuruwita Prisons. The garbage is then separated by the inmates into biodegradable and non biodegradable material such as plastic/polythene, glass, metal etc. The non-biodegradable material is washed and cleaned. Plastic is sold to S W Engineers, a recycling company in the Paradise Industrial Zone, Kuruwita. Glass, card board, empty cans, and metal/steel are sold to another collector.

The biodegradable matter is chopped and cubed and placed in windrows and allowed to compost. Each windrow pile is about 1.5 m high, 1.5 m long and 1.35 m wide. The piles are turned over every two weeks to ensure that the contents are aerated and attain the proper moisture level. It takes about 3 months to complete the composting process. The compost is then sieved and packed in 2 kg, 5 kg and 40 kg packets/bags and marketed under the trade name “Saradha”.

3. Conducting a workshop on source separation of SW and composting methodology for the business community in Kuruwita town.
4. Introducing source separation of garbage by setting up two-unit garbage bins (for plastics and biodegradable matter) in the town and at other places where people gather.
5. Training 100 farmer families from 25 farmer organizations in the KPS area in composting.

### *Key technical inputs*

Technical know-how on composting was provided by the Central Environmental Authority and Balangoda Urban Council.

### *Project cost*

Total project cost was Rs 2,023,700.

### *Project Timeframe*

The project was implemented over a period of 18 months starting 1 January 2007.

### **Box 3 - Project cost benefit analysis**

A preliminary financial analysis of the KPS compost project was carried out by IUCN in 2008, to assess its financial viability.

The fixed costs of the project (totalling Rs. 4,173,645) were borne by various agencies; the collection cost is borne by the KPS. As this analysis is 2 years after its establishment, all capital costs already incurred were taken as sunk costs.

A comparison of the operational costs with the financial benefits generated by selling compost and recyclable waste showed that the operational costs were not fully covered by the revenue earned. The annual operational cost is Rs. 1,267,936 and the annual revenue (financial benefits) from the sale of compost etc. is Rs. 1,012,560. Therefore, the financial loss of the compost project is Rs. 255,376 per annum. This represents the annual incremental financial cost incurred by the KPS in composting the organic waste of Kuruvita, instead of open dumping near Kuru Ganga.

However, the local communities derive considerable non-financial benefits from composting solid waste rather than open dumping. These benefits are not taken into account in a financial viability analysis. Composting of solid waste will prevent or minimize the following environmental and social costs of open dumping.

- haphazardly dumped solid waste serving as breeding grounds for vermin and is a health hazard;
- air pollution and generation of noxious odours;
- contamination of surface and ground water sources, and soil pollution;
- flooding due to drains being clogged with solid waste;
- low aesthetic appeal.

The incentive allowance paid to the prison inmates who worked in the composting yard is the biggest component of the cost, accounting for 57% of the operational costs. Generally, prisoners are not paid for work done within the prison. So, if the incentive allowance is not paid the operation would make an annual net profit of Rs. 464,624. Instead of the incentive payment, if a part of the profit is apportioned to the KP, for the welfare of all its inmates, composting will become a financially viable project, and the unique partnership for SWM between KPS and KP could be strengthened.

## **5.5 ACHIEVEMENTS**

- The Kuruwita PS area has been transformed to a garbage free zone. At long last, there is a practical solution to the garbage problem that plagued Kuruwita. Moreover, it has the makings of a profitable enterprise (see Box 3 - Project cost benefit analysis);

- About 100 tonnes of solid waste was collected during the project period (18months), from which 19,150 kg of compost was produced, and about 1,000 kg of recyclable materials were separated;
- Source separation helped to speed up sorting at the prison premises;
- Sales agreements are in place for the recyclable solid waste: plastics, glass, cardboard, empty cans, and metal/steel;
- The compost fertilizer produced by KPS conformed to acceptable quality standards. Its chemical composition as certified by the Horticulture Research and Development Institute, Gannoruwa, Peradeniya (21/2/2007) was;

Moisture	30%
pH	8.8
Electrical conductivity	6.66 ds/m
Nitrogen	1.35%
Organic Carbon	9%
Potassium oxide	2.5%
Phosphorous oxide	1.12%

- A demand for organic fertilizer was created through information dissemination and popularization of its benefits. The promotion to use compost fertilizers in home gardens in the KPS area was a success;
- The awareness raised through the project motivated some households to process their bio-degradable garbage to compost, *in situ*;
- Composting know-how imparted to farmers not only reduced the waste to be handled by the KPS, it also reduced the cost of crop production;
- The successful KPS and KP partnership not only found a solution to the garbage problem, it empowered the prison inmates by adding value to their contribution;
- The positive mindset of the prison inmates who enjoyed financial security by working on the project was a significant achievement. The prison inmates had the opportunity to build their nest eggs, which will assist them to begin a new life on their release.

Each inmate was paid an incentive allowance of Rs 100 per day. Of this, Rs 80.00 went to a savings account opened for each inmate and the balance Rs 20.00 to the Prisons Welfare Society. The 35 inmates saved a total of Rs. 731,089.38, during the project period.

## 5.6 CHALLENGES

Kuruwita is in a high rainfall zone. Composting was subject to frequent delays due to the prevailing wet conditions. The slow down in the composting process led to an accumulation of compost piles as well as unsorted garbage. This was overcome by building a shed for unsorted garbage.

## 5.7 LESSONS

1. First and foremost, political commitment is indispensable for the successful implementation of solid waste disposal schemes.
2. An entrepreneurial approach and commitment of the local authority staff is a key element in SWM projects.
3. Healthy living environments would be sustainable if the activities needed to create them could be turned into commercially viable ventures.
4. Sharing the benefits of a project amongst all those who contributed to its success, will ensure sustainability.
5. The model KP-KPS partnership that ensured success should inspire other innovative approaches to solid waste management.

## 5.8 CONCLUDING REMARKS

Disposal of solid waste was an intractable problem in Kuruwita. Open dumping and dumping into Kuru ganga was the order of the day, and environmental pollution had reached alarming proportions. But KPS did not have the wherewithal to even operate a rudimentary landfill, in spite of a court order to do so. With courage born of desperation, and supported by SPC and CEA, KPS teamed up with KP to pilot a small scale garbage recycling operation. The encouraging results led to an expanded CCSF supported SWM project to cover the entire KPS area. The solid waste was

separated into a variety of non-degradable recyclable materials, the biodegradable matter was composted, and all these products were marketed.

The partnership between KPS and KP was key to the success of this solid waste management project. This novel arrangement has the potential to make KPS, prison inmates and the local community, all winners. And most importantly, Kuruwita has been freed of putrefying garbage, the people are breathing freely, and freely flows the Kuru ganga.



A Bird's Eye View of a Kandyan Home Garden – a traditional sustainable system incorporating biodiversity conservation and income generation (Lankatillaka) (Ranjith Mahindapala)

## 6.

## ENVIRONMENTAL EDUCATION FOR BUFFER ZONE COMMUNITIES TO SAVE UDAWALAWA NATIONAL PARK

### 6.1 INTRODUCTION

Pokunutenna, a remote traditional village inside the Udawalawa National Park, in the Uva Province of Sri Lanka, was relocated to the buffer zone of the Park in 1972. This move was at the expense of traditional farming for the betterment of elephant conservation in Sri Lanka. Pokunutenna is the first village in Sri Lanka to have a tripwire elephant detection system installed to minimize human-elephant conflict. An environment friendly renewable energy electrification system is also in operation in Pokunutenna. Both the tripwire system and the renewable energy system have been successfully operated through a community-based organization named *Surya Thapa Surakum Eksath Samvidanaya* (United Society for Harnessing Solar Power), for the past seven years.

The area surrounding Pokunutenna has several water bodies including irrigation tanks nourished by rivers and streams. This irrigation system provides water not only for crop cultivation and other needs of the farming communities but also for the survival of wildlife. Dry deciduous woodlands predominate in the region, with small extents of grasslands and thorny scrublands, and provides a habitat for a variety of mammals such as elephant, sambur, spotted deer, barking deer, wild boar, water buffalo, giant squirrel, grey mongoose, brown mongoose, toque macaque (endemic), common langur, loris, jackal, sloth bear, toddy cat, small Indian civet, golden palm civet (endemic), leopard, black-naped hare, and endemic shrews.

In addition, there are more than 150 recorded bird species. In Pokunutenna the grassland birds, warblers and prinias, are abundant. In addition to grassland bird species, many species of low country forest birds have also been recorded. Wetland birds found in the reservoirs include rare winter visitors. Other endemic bird species

include the Sri Lanka jungle fowl, spur fowl, grey hornbill, and the brown-capped babbler. Many species of reptiles, butterflies, amphibians and freshwater fish have also been recorded in this area.

This region has a rich biodiversity of flora. A variety of dry deciduous trees such as ebony, satinwood and Ceylon oak predominate in Pokunutenna. Numerous varieties of medicinal plants are also abundant in the area.

Over the years, encroachment of the buffer zones has led to environmental degradation of the natural landscapes and habitats. The buffer zone population is generally poor and engage in activities such as cultivation of cannabis, sand mining, gem mining, poaching and cutting down of forest for timber, all leading to the loss of biodiversity. The high number of buffaloes, over-collection of medicinal plants, and spread of invasive plants have contributed to the loss in biodiversity of the ecosystem. In addition the increased use of inorganic fertilizers, insecticides, pesticides and forest fires have lead to pollution of the environment.

## **6.2 PROJECT FORMULATION**

United Society for Harnessing Solar Power recognized the value of environmental education for the community of the area to minimize adverse impacts on sensitive habitats and thereby conserve biodiversity in Pokunutenna. Hardly any environmental education programmes have been conducted, by government or non-governmental organizations, due to the remoteness of the area.

A grant was secured from the Community Conservation Support Fund (CCSF) for this purpose. The project aimed to increase the awareness of the community on the surrounding environment and its biological value. The community-based environmental educational programmes were focused on students, local farmer organizations, and the local governing authorities. Special attention was given to designing an educational programme to attract the younger generation towards conservation as they are the future guardians of the local natural resources. The project commenced operations on 22 December 2006.

## **6.3 OBJECTIVES**

- Raise awareness on the environment, with special emphasis on surrounding ecosystems and their biological value, among school children, farmers and local decision makers.

- Create awareness on the economic benefits to be derived from conservation and sustainable environmental management practices.

## 6.4 PROJECT DESCRIPTION

### *Site Geography and Coverage*

The project area is located in the buffer zones of the Udawalawa National Park, Dahaiyagala Sanctuary (traditional elephant corridor), proposed Bogaha pattiya Nature Reserve, Bellangala Nature Reserve and the catchment region of the Walawa River in the Monaragala and Ratnapura districts with Pokunutenna as the core centre. The mean annual rain fall in the project area is 1,524 mm and the mean temperature is 32°C.

The area surrounding Pokunutenna is generally flat with undulating hills rolling in the direction of the central massif of the country. The escarpment and the central mountains form a breathtaking backdrop to the area. Ancient irrigation reservoirs (tanks) in Pokunutenna area, a major part of the landscape, provide valuable resources for the survival of farmers as well as wildlife. Boulder streams, rivers and seasonal streams feed these tanks which help to irrigate the rice fields that spring up in the plains. A landscape mosaic of this nature inevitably leads to a wide variation in fauna and flora. The hills towards the mountains are clothed with savanna type vegetation containing various indigenous medicinal trees. The intervening valleys have thick patches of intermediate climatic zone forests that retain moisture in the ground and feed the streams. The forest in the plains takes the form of scrub jungle sprinkled liberally with valuable timber species.

### *Project Beneficiaries*

The direct beneficiaries of the project included 16 schools, 12 farmer organizations, and four local government agencies in close proximity to the remote buffer zone areas of Udawalawa National Park and the surrounding protected areas. The details are as follows:

#### **Schools:**

[Mo: Moneragala; R: Ratnapura]

- Mo/Kotaveheramankada Maha Vidyalaya
- Mo/Hambegamuva Janapada Vidyalaya
- R/Kaltota Dakunu Ivura Vidyalaya
- R/Diavinna Vidyalaya

- Mo/Hambegamuva Maha Vidyalaya
- Mo/Nalanda Kanista Vidyalaya
- Mo/Laginagala Kanista Vidyalaya
- Mo/Aluthweva Kanishta Vidyalaya
- Mo/Rathbalangama Vidyalaya
- R/Walipothayaya Maha Vidyalaya
- R/Kawantissa Vidyalaya
- Mo/Samagipura Kanishta Vidyalaya
- R/Kongahamankadu Vidyalaya
- R/Madabadda Maha Vidyalaya
- Mo/Kahakurullanpelessa Vidyalaya
- R/Rohana Maha Vidyalaya

### **Farmer organizations:**

- Pokunutenna Wewa Govi Sanvidanaya
- Mahapelassa Govi Sanvidanaya
- Siripura Govi Sanvidanaya
- Pothupitiya Govi Sanvidanaya
- Galapoththewewa Govi Sanvidanaya
- Ranvarapalassa Govi Sanvidanaya
- Neraluwa Govi Sanvidanaya
- Laginagala Govi Sanvidanaya
- Aluthwewa Prajasahabagithva Sanvidanaya
- Mahakarametiya Govi Sanvidanaya
- Pokunutenna Prajasahabagithva Sanvidanaya
- Rathabalagama Prajasahabagithva Sanvidanaya

### **Local government agencies:**

- Balangoda Pradeshiya Sabha
- Embilipitiya Pradeshiya Sabha
- Thanamalwila Pradeshiya Sabha
- Weligepola Pradeshiya Sabha

### *Implementing and Coordinating Agencies*

United Society for Harnessing of Solar Power (USHSP) implemented the project with community participation.

### *Project Activities*

Educational programmes to raise community awareness of their environment and its biological value, was the main thrust of the project. USHSP selected the schools, local farmer organizations and government institutions to participate in the awareness programmes. Close proximity to the crucial buffer zones of the Udawalawa National Park, the surrounding protected areas or the catchment of the Walawa River was the main qualification for selection; on this basis 10 schools, 12 farmer associations, and 4 local government bodies were selected. Six additional schools were selected subsequently.



Workshop for students (Kaltota Dakunu Ivura Vidyalaya) (Courtesy USHSP)

The workshops for students and local government bodies were held in their own premises, and for the farmer organizations in a community centre in Pokunutenna. Each workshop spanned over two days. The first day's programme included visual presentations (videos, films and slide shows) of the natural heritage of the region in its current state, and the second day was devoted to a series of lectures by relevant experts in the field.

The educational modules were prepared to suit the target audience. The programmes for school children included topics on biodiversity in general, with special emphasis on birds, reptiles, mammals and butterflies of Sri Lanka, elephant conservation and sustainable use of natural resources.

The programme for farmers covered the biodiversity of Sri Lanka, with special emphasis on agro-biodiversity, organic farming, gene conservation, understanding the human-elephant conflict and its mitigation, sustainable use of natural resources and wildlife regulations.

The programme for the local government officials sought to enhance their knowledge on biodiversity and highlighted the impact of development activities

on biodiversity. The use of natural resources to improve the rural economy, the human-elephant conflict and related issues, and wildlife regulations were the other areas dealt with.

A special programme was organized to teach school children on how to reduce harmful impacts in environmentally sensitive areas. One thousand pictures of important flora and fauna were distributed in schools to motivate school children in the conservation of natural species. Awareness programmes were also conducted for young adults on the sustainable use of natural resources.



Plant nursery managed by the community (Kumudini Ekaratne © IUCN)

To underline the economic benefits to be had from conservation (second objective of the project) 50,000 plants were raised in 13 nurseries. The nurseries were managed by villagers and the plants were used to plant up 5 ha in tank catchment areas, which would, in time, develop into dense forest. An awareness programme on agro-biodiversity, training in compost and biopesticide preparation was conducted for farmers. Farmers were also encouraged to cultivate native vegetable and rice varieties lest these traditional varieties will be lost forever from the region.

#### *Key Technical Inputs*

Resource persons from the University of Peradeniya, Open University of Sri Lanka, Department of Wildlife Conservation, Forest Department, Department of

Agriculture, Young Zoologists Association, Ceylon Bird Club, Field Ornithology Group of Sri Lanka and the Biodiversity Unit of IUCN Sri Lanka Office, provided technical support for the project.

#### *Project Timeframe*

The project duration was 20 months from 22 December 2006 to 31 August 2008.

#### *Total Project Cost*

The total funding received from the CCSF was Rs 3,601,694.

### **6.5 ACHIEVEMENTS**

- This knowledge based project successfully reinforced the importance of conservation of natural resources and the necessity to implement sustainable farming practices. More specifically, the communities' knowledge of natural resource management in Pokunutenna, and the surrounding areas, was enhanced;
- A total of 1480 students and 32 parents from 16 schools, 220 farmers from 12 farmer organizations, and 56 government officials from 4 *Pradeshija Sabbas* were provided with the opportunity to enhance their knowledge through educational programmes;
- The impact of the educational programme for students was evaluated. A simple multiple choice questionnaire, on the biodiversity of Sri Lanka, administered at the beginning and repeated at the end of the programme, showed that 90% of the students had enhanced their knowledge on their environment. This positive social impact will, no doubt, contribute significantly to the sustainability of the Pokunutenna ecosystem;
- Multimedia presentations on topics related to biodiversity were prepared for the awareness programmes. A poster on the biodiversity of Pokunutenna, and six brochures were also printed to disseminate some of the information covered in the workshops. The brochures were on Reptiles of Sri Lanka, Amphibians of Sri Lanka, Biodiversity of Sri Lanka, Protection of the tank ecosystem, Conservation of water resources, and Impact of the excessive use of pesticides. All these items will be available, even after the project ends, for awareness creation and dissemination of information;

- The communities' knowledge of indigenous plant species and their propagation was enhanced. Thirteen villagers were trained and they established 13 nurseries to raise 50,000 plants for reforesting the catchment area of tanks;



Planting the Pokunutenna tank catchment by the community (Courtesy USHSP)

- A wide variety of plants were raised, including: kumbuk (*Terminalia arjuna*), myrabalans/bulu (*Terminalia bellirica*), mi (*Madhuca indica*), ketakala (*Bridelia retusa*), thelembu (*Sterculia foetida*), wood apple/divul (*Feronia limonia*), wild cinnamon/dawul kurundu (*Neolitsea cassia*), satinwood/burutha (*Chloroxylon swietenia*), Indian laburnum/ehela (*Cassia fistula*), bo (*Ficus religiosa*), nuga (*Ficus fergusoni*), attikka (*Ficus racemosa*), halamba (*Mitragyna tubulosa*), kolon (*Adina cordifolia*), damba (*Syzygium assimilei*), gaub persimmon/thimbiri (*Diospyros malaberrica*), gona-pana (*Dysoxylum championii*), malabada (*Myristica dactyloides*), sandalwood/sudu-handun (*Santalum album*), mendoran (*Hopea cordifolia*), gammalu (*Pterocarpus indicus*), nelli (*Phyllanthus emblica*), kithul palm (*Caryota urens*), maila (*Bauhinia racemosa*), tamarind/siyambala (*Tamarindus indica*), margosa/kohomba (*Azadirachta indica*),

ankenda (*Acronychia pedunculata*), pihimbiya (*Filicium decipiens*), Indian beech/karanda (*Pongamia pinnata*), etamba (*Mangifera zeylanica*), kirikone (*Walsura trifoliolata*), Ceylon oak/kone (*Schleichiera oleosa*), neralu (*Cassine glauca*), keena (*Calophyllum walkeri*), and Alexandrian laurel/ domba (*Calophyllum inophyllum*);

These plants were used for re-vegetation of the catchments of Pokunutenna, Thiyabarawewa, Pothupitiya and Galpoththewewa tanks, and of Kumbuk ara, covering a total area of 5 ha, and increased the biodiversity of the locality.

- The establishment of nurseries has provided additional sources of income for the communities. A steady demand for nursery plants is envisaged as the farmers are now aware of the importance of re-vegetation and catchment protection;
- The 13 villagers who set up nurseries increased their income, from Rs 3,000 to 50,000, by supplying forest seedlings for the project;
- Eco-friendly crop cultivation increased income-earning avenues and employment opportunities. Some 220 farmers practice organic farming and cultivate native varieties of vegetables such as tumba-karavila (*Momordica dioica*). Their monthly income has, on average, increased by Rs 2,500;
- A small-scale, mobile, multimedia resources centre was established to implement educational programmes in areas outside Pokunutenna.

## 6.6 CHALLENGES

Initially, it was difficult to convince the communities on the value of natural resources conservation as they failed to see the economic benefits they would derive from these activities. However, with the establishment of nurseries to raise seedlings of economically valuable trees to replant the catchment areas they realized the financial benefits associated with the sustainable management of the park. This ‘awakening’ would also help the population to understand that sustainable agricultural practices would bring economic benefits in the long term. The lack of skills in nursery management and controlling fungal diseases was an impediment for the nursery programme. The establishment of several small nurseries, in different localities, rather than a few large-scale nurseries reduced the risks associated with improper management and the outbreak of fungal diseases.

## 6.7 LESSONS

1. The project objectives were linked to the conservation and protection of wildlife, and the participation of school children was a key element. Participation of school children in conservation appears to be a winning combination and many wildlife enthusiasts and well-wishers came forward with funding to support and extend project activities. These initiatives helped the participating schools to further develop their interest and sustain the nature conservation effort.
2. Enlisting the assistance of school children in protecting the ecosystem augurs well for the wide acceptance of sustainable agricultural practices in the future.
3. Adverse weather conditions delayed project activities. Although the nursery plants were ready, replanting the catchment areas could not be completed due to seasonal rains failing and curtailing the planting period. Unexpected changes in weather patterns are now experienced frequently, and this should be taken into account in organizing project timelines.

## 6.8 CONCLUDING REMARKS

The buffer zone communities posed a threat to the Udawalawa protected areas' rich biodiversity and sensitive ecosystems, by indulging in eco-damaging activities for short-term gain. United Society for Harnessing Solar Power (*Surya Thapa Surakum Eksath Samvidanaya*), a CBO with a good track record of working with the communities in Pokunutenna (tripwire elephant detection and electrification by renewable energy sources), was alive to the root causes: poverty and ignorance. Environmental education, focussed on the young, was their key strategy to bring about changes in the thinking and attitude towards the environment and its biological value, and the conservation of natural resources. The communities were encouraged to actively participate in raising tree seedlings and replanting tank catchment areas, and to undertake sustainable organic farming. Additional sources of income were introduced: eco-friendly cultivation of traditional vegetable and rice varieties, and trees of economic value. Eco-friendly crop cultivation increased agro-biodiversity in addition to providing economic benefits for the villagers. The replanted catchment areas will be managed by the communities and the sustainability of the measures introduced by the project will be secured

with community participation. The project's mobile multimedia resource centre will come in handy to maintain continued interest in environmental issues among Pokunutenna communities as well as to extend the conservation message to other areas.



Savannah Forest in Bibile – A repository of valuable perennial medicinal plants (Ranjith Mahindapala)

## 7. FOREST PARKS IN SCHOOLS TO INSTIL A LOVE FOR NATURE

### 7.1 INTRODUCTION

Polonnaruwa is one of the two districts of the North Central Province (NCP) of Sri Lanka. Its land area of 3,332 km<sup>2</sup> constitutes 31.5% of the NCP and 5% of the entire island. Polonnaruwa has a population density of 117.8 per km<sup>2</sup> and a high growth rate of 1.6%. The primary source of employment in the district is agriculture, which has expanded over the last two decades due to the Mahaweli Irrigation and Development Scheme. Other sources of income and employment include dairy farming, inland fisheries and tourism.

Forest cover in Polonnaruwa district is over 40%; higher than the national average of 30%. However, the rapid expansion in population, initiatives for regional development such as the creation of industrial parks, roads and large scale agriculture projects, and urbanization have led to deforestation. This has been further aggravated by illicit felling of trees for timber. The destruction of forest cover is alarming and calls for measures to conserve the existing forests and to increase the forest cover by reforestation, ideally through community participation, and preferably by the younger generation.

### 7.2 PROJECT FORMULATION

The District Planning Office (DPO) of the Polonnaruwa District Secretariat realised the need to actively promote the desire to conserve nature, as a forerunner to saving the forest cover in Polonnaruwa. DPO, funded by the Community Conservation Support Fund (CCSF), implemented a project to establish forest parks in selected schools in the district. The project commenced operations on 1 February 2007. The Project Management Unit of

the DPO, with the assistance of the Zonal Education Offices of Polonnaruwa, Hingurakgoda and Dimbulagala, selected 10 schools to participate in the project.

### 7.3 OBJECTIVE

The overall objective of the project was to inculcate among school children the value of conservation and management of natural resources. In the long run, the children will take the message to the elders and this awareness will protect and enhance the forest cover in Polonnaruwa district.

### 7.4 PROJECT DESCRIPTION

#### *Site Geography and Coverage*

The Polonnaruwa district, situated in the drier part of NCP, has an annual rainfall of 1,150-1,600 mm and temperatures in the range of 24°C to 36°C. Hingurakgoda and Polonnaruwa are the two townships located in the District of Polonnaruwa.

#### *Project Beneficiaries*

The beneficiaries of the project were 500 students, and the principals and teachers of 10 schools in the Polonnaruwa district, namely Kadawalawewa Junior School, Kadawalawewa; Nikawewa Gamini School, Jayanthipura; Seewalee Junior School, 4<sup>th</sup> Canal Polonnaruwa; Patunugama Junior School, Lankapura; Bisobandara Junior School, Medirigiriya; Nagapokuna Maha Vidyalaya, Hingurakgoda; Aththanakadawala Maha Vidyalaya, Elahera; Manampitiya Sinhala M.V, Manampitiya; Lakshauyana Junior School, Athumalpitiya; and Magulpokuna Junior School, Welikanda. Members of the beneficiaries' households were indirectly benefited due to the ripple effect.

#### *Implementing and Coordinating Agency*

The District Planning Office, Polonnaruwa, the planning arm of the District Secretariat, implemented the project.

#### *Project Activities*

- (a) Elaborating and discussing the concept, aims and objectives of establishing forest parks in schools with the principals and teachers of the selected schools.
- (b) Training the teachers as trainers, to ensure sustainability after the project ends.

- (c) Conducting awareness programmes in environment conservation for the students participating in the project. With the exception of Magulpokuna Junior School, the participants were middle school students. As these 10-12 year-olds in Grades 6 to 8 were not preparing for national examinations they could devote sufficient time for project activities.
- (d) Erecting a protective fence around the school premises and installing a dependable water supply, in each school, in preparation for planting. The District Planning Office entered into contracts with each School Development Society to carry out this work.



- (e) Supplying each school with a set of agricultural equipment such as mammoties, shovels, spades and watering cans, and 200 plants, including medicinal plants, to establish its forest park. The students undertook the planting and after-care of the plants. They erected display boards with the common and botanical names of the plants and drew a map of the school premises showing the location of the forest park.
- (f) Establishing a composting unit to serve each forest park. The students were trained in making compost by the Polonnaruwa Department of

Agriculture. Leafy material and other bio-degradable matter collected from the school gardens and cow dung from the surrounding areas were used for composting.

- (g) Establishing ten environment units, one in each school, to provide students with educational resources such as books and magazines.

#### *Key Technical Inputs*

The District Planning Office, Polonnaruwa provided the technical inputs required for the project.

#### *Project Timeframe*

The project funding was for a period of 18 months from 1 February 2007 to 31 July 2008.

#### *Total Project Cost*

The total funding obtained from the CCSF was Rs 3,936,673.

## **7.5 ACHIEVEMENTS**

Love of nature, and the inspiration to conserve and manage natural resources, have been inculcated in a 500-strong body of students. They are highly motivated to spread the message in their communities.



Trees taller than the custodians (Kumudini Ekaratne © IUCN)

Forest parks, 0.2 ha each, were established in the premises of eight schools in the Polonnaruwa district. The parks were planted with 2,000 forest plants of pihimbiya (*Filicium decipiens*), margosa (*Azadirachta indica*), teak (*Tectona grandis*), jak (*Artocarpus heterophyllus*), kumbuk (*Terminalia arjuna*), mi (*Madhuca longifolia*), hal-milla (*Berrya cordifolia*), Alexandrian laurel/domba (*Calophyllum inophyllum*), goda-kiralla (*Holoptelea integrifolia*) and nadun (*Pericopsis mooniana*).

Medicinal gardens comprising nelli (*Phyllanthus emblica*), ranawara (*Cassia auriculata*), pomegranate (*Punicum granatum*), rathmal (*Ixora coccinea*), orange (*Citrus sinensis*), adathoda (*Justicia adbathoda*) and nika (*Vitex negundo*) were also established within each forest park.

The students gained valuable hands-on experience through the forest park exercise. They actively participated in their establishment and carried out the planting and aftercare. They were trained in compost making and produced all the compost required for the plants. A healthy competition among the schools was generated by an award scheme. The best three school forest parks were awarded cash prizes of Rs 150,000, Rs 100,000 and 75,000; and field trips for the schools finishing in fourth, fifth and sixth positions.

The environment units set up in the schools, conducted quizzes on environment issues and produced and distributed “*Pulathisi parisara puwatli*”, a monthly magazine on environmental issues. These initiatives broadened the knowledge of the students in the beneficiary schools and helped to extend, as far as possible, these benefits to other schools in the district.

The students were empowered by participating in environment and natural resource management initiatives. It expanded their network for interacting with external administrative institutions and officials.

The School Development Societies, which collaborated in improving infrastructural facilities at the respective schools were able to secure voluntary work of parents, thereby making significant savings of expenditure.

The project enhanced the relationships between officials of the District Secretariat and the participating schools. This spin-off would benefit both parties beyond the project period.

## 7.6 CHALLENGES

A major challenge was the sustainability of forest parks when the project ends. This was overcome by assigning each student with the management of a designated set of trees. This generated a spirit of healthy competition and the students' endeavour to do better and outdo the others ensured that the trees were well looked after. Teachers, trained as trainers, were a handy source of advice. The environment units will monitor the progress beyond project life. Composting units will provide students with organic manure to nurture the plants.

## 7.7 LESSONS

1. Enabling the active and committed participation of school children and the School Development Societies in all the project activities was a good move. There is a sense of ownership amongst children, teachers and parents.
2. The preparation of a monthly magazine and its distribution generated considerable interest among the student population, and appears to have had a multiplier effect on environment protection issues.
3. The inability to establish two school forest parks due to problems stemming from internal administrative issues was a bitter lesson, and points to the need to anticipate and avert such negative developments.

## 7.8 CONCLUDING REMARKS

Polonnaruwa was fast losing its forest cover. To arrest and eventually reverse this trend the District Planning Office in Polonnaruwa targeted the younger generation. The establishment of forest parks in selected schools along with awareness programmes on reforestation and conservation, and the production and distribution of a magazine on environmental issues awakened their interest in the conservation of natural resources. The knowledge and understanding gained by these 10 - 12 year-old children would not only ensure the sustainability of the school forest parks, but would contribute, in no small measure, towards a prudent, holistic long-term solution for the preservation and management of natural resources in the Polonnaruwa district.

## 8. LEGAL FRATERNITY BUILDS CAPACITY TO ADDRESS ENVIRONMENTAL ISSUES

### 8.1 INTRODUCTION

The Constitution of the Democratic Socialist Republic of Sri Lanka decrees that a healthy environment is the right and the responsibility of all its citizens; it is the duty of the State to ensure this right. Sri Lanka has a comprehensive set of laws for the protection of the environment and to guarantee the rights of its citizens to a clean and healthy environment. The court system is the overarching mechanism that ensures all aspects of the law are applied transparently and fairly, and that correct procedures and processes are followed. Over the years the number of environmental cases brought before the judiciary have increased. However, many legal professionals are not fully equipped to undertake environmental cases. This may be largely attributed to less than desirable awareness of environmental issues within the legal profession.

The judiciary includes Supreme Court Judges, High Court Judges, District Court Judges and the Magistrates. The Attorneys at Law that work in the public and private sectors, and represent the general population, are an equally important arm of the judicial system. Building capacity of the judiciary and the legal professionals in environmental law was seen as an important step in ensuring and protecting the environmental rights of citizens.

### 8.2 PROJECT FORMULATION

The Environmental Foundation Ltd. (EFL), with funding obtained from the Community Conservation Support Fund (CCSF), aimed to increase the capacity of the judiciary to facilitate dealing with environmental cases brought before the court

system. The increased capacity envisaged was in the understanding of environmental issues vis-à-vis legislation, and in improving citizens' access to justice in relation to environmental issues.

The project commenced operations on 1 January 2007.

### **8.3 OBJECTIVES**

- Enhancement of skills and awareness of the judiciary and legal professionals relating to environmental issues and laws.
- Generation and dissemination of targeted guidance and reference material on the content and application of environmental laws and regulations in Sri Lanka.
- Strengthening of information sharing and networking amongst legal professionals.

### **8.4 PROJECT DESCRIPTION**

#### *Site Geography and Coverage*

The judiciary and legal professionals in the districts of Colombo, Kandy and Nuwara Eliya were covered in the project.

#### *Project Beneficiaries*

- 11 Supreme Court Judges, 12 Appeal Court Judges, and Judges and Magistrates of 9 High Courts, 9 District Courts, and 8 Magistrate Courts in Colombo;
- Judges and Magistrates of 2 High Courts, 3 District Courts and 3 Magistrate Courts in Kandy;
- Judges and Magistrates of 1 District Court and 1 Magistrate Court in Nuwara Eliya.

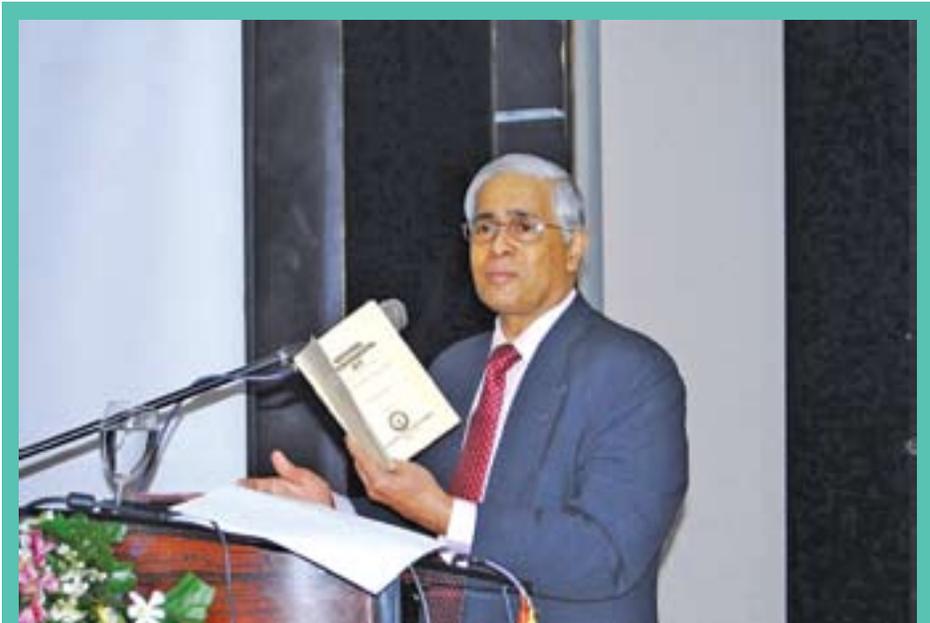
In total over 120 members of the judiciary and the legal professionals benefited from the project.

#### *Implementing and Coordinating Agency*

The Environmental Foundation Ltd. implemented the project.

*Project Activities*

- (a) Conducting two skills building workshops for legal professionals: Both were held in Colombo, in October and December 2007. The October workshop was attended by 39 legal professionals of the Environmental Lawyers Network established by EFL. The December workshop targeted members of the Bar Association, academics and Legal Officers attached to government sector institutions such as the Ministry of Environment and Natural Resources, Central Environmental Authority, Ministry of Fisheries, Land Reform Commission, Geological Survey and Mines Bureau and the Marine Pollution Prevention Authority, and was attended by a total of 43 legal professionals. Each workshop had an evaluation and feedback session.
- (b) Holding a National Forum for members of Sri Lanka's Judiciary: A total of 40 judges of the High Courts, District Courts and Magistrate Courts from the three districts attended the forum held in Colombo in January 2008, which was graced by the Chief Justice.



**Address by the Chief Guest**

Chief Justice Hon. Sarath N. Silva addressing members of the judiciary  
(Courtesy EFL)

- (c) Compiling useful reference material on current environmental laws and regulations in Sri Lanka, including environmental judgements.

- (d) Developing a database and establishing a network of environmental lawyers: The database of lawyers included information such as current contact details, including email addresses, and their areas of expertise.

#### *Key Technical Inputs*

Key technical inputs were made by the staff of EFL, a senior judge of the Supreme Court, a former head of the Environmental Law Programme at UNEP, a Senior Environmental Engineer at the World Bank, and eminent practising environmental lawyers.

#### *Project Timeframe*

The duration of the project was 15 months, from 1 January 2007 to 31 March 2008.

#### *Total Project Cost*

The total funding obtained from the CCSF was Rs 3,227,700.

## 8.5 ACHIEVEMENTS

- The project activities were welcomed and appreciated by the legal fraternity. The two workshops and the National Forum were attended by more than 120 members of the judiciary and legal profession;



#### **The Head Table**

(L to R) Dr. Sumith Pilapitiya (Senior Environmental Engineer - World Bank), Mr. Lal Kurukulasuriya (Former Head of Law - UNEP), Chief Justice Hon. Sarath N. Silva, Justice Shiranee Thilakawardane and Justice Nissanka Udalgama (Head - Sri Lanka Judges Institute) (Courtesy EFL)

- The participants' feedback and evaluation of the two workshops for legal professionals were generally appreciative and positive. For 61% and 72% of the participants in workshop 1 and 2 respectively, this training workshop had been a unique experience and opportunity. The feedback gave a strong indication of the value of this training. There were many requests for further initiatives;
- The current environmental laws and regulations in Sri Lanka were compiled and published in a book titled *Your Environmental Rights and Responsibilities: a handbook for Sri Lanka*. It contains the most recent updates on laws, regulations and scientific data relating to the environment, and will be a useful source of information for the legal and scientific communities. It paves the way for better understanding of the environment among the target group, which will ultimately result in correct directions from courts on environmental matters. This book was published in all three languages; 250 copies in all;
- Several notable environmental judgements in Sri Lanka were compiled and published in a book titled *Some Significant Environmental Judgments in Sri Lanka*. The judgements included cases on Noise Pollution, Privatisation of the Galle Face Green and the case on the Kandalama Hotel;
- EFL also compiled a quick reference guide on gazette notifications issued under the National Environmental Act in *Selected Gazette Notifications Related to the Environment*;
- A Network of Environmental Lawyers, comprising 170 members, was established;
- A network list server was completed and is in operation. The list server will ensure the dissemination of regular news bulletins on environmental issues and facilitate the exchange of information among members of the network;
- Networking environmental lawyers has strengthened the force of advocacy;
- The judiciary was empowered by establishing a network of legal professionals, and maintaining it after project closure, to enable exchange of resources and current legal developments in environmental law. This would strengthen the judiciary in their pursuit to enforce environmental protection more stringently and protect the rights of the citizens.

## 8.6 CHALLENGES

Experts in Environmental Law were scarce and not readily available for project work due to their busy schedules. At times scheduled programmes of the project had to be changed due to their inability to attend. Also, in deference to a request from the members of the judiciary all the workshops had to be confined to Colombo.

## 8.7 LESSONS

Some important lessons that emerged during the project are:

1. Specialized capacity building programmes on utilizing the present legal framework to better safeguard the environment are essential for members of the judiciary and legal practitioners.
2. There is a need for updating the legal fraternity on matters concerning the environment, on environmental law and providing access to such information periodically.
3. It is important to hold awareness workshops outside Colombo to reach judges country-wide.
4. There is a genuine interest among the legal fraternity to gain knowledge on matters concerning the environment, and to be briefed about the latest regulations and laws.

## 8.8 CONCLUDING REMARKS

Increasing awareness and developing capacity of the legal fraternity in Sri Lanka, on environmental issues vis-à-vis environmental legislation, was recognized as vital in ensuring and protecting the environmental rights of citizens. To achieve this Environmental Foundation Ltd. (EFL) set in motion a participatory process organizing workshops where the judiciary and legal professionals from different regions were brought together to exchange ideas. To keep this process alive and enable continuing exchange of ideas and discussions, a network of lawyers was established and linked through a list server. Some useful reference material was also compiled and EFL will continue to update the environmental knowledge and skills of the judiciary and the legal professionals with new references in environmental law and information regarding environmental cases. The sustainability of these achievements after the project terminates, and their impact, will be monitored by the Environmental Foundation Ltd.

## 9. TRADITIONAL ROOT AND YAM CROPS AS A RESOURCE TO STRENGTHEN RURAL ECONOMIES

### 9.1 INTRODUCTION

Roots and yams were an important component in the Sri Lankan diet. However, in recent times, the demand for traditional roots and yams has declined, largely due to market forces. As a result, their cultivation decreased considerably, and there is a real threat that some traditional species will be lost forever. To arrest this trend, a community-based organization initiated a programme to cultivate traditional root and yam crops in the Aranayake Divisional Secretariat Division of Kegalle District. This organization, the Community Development Centre (CDC) in Aranayake was founded in 1996 by a group of community leaders and social activists to improve the living standards of marginalised communities in the region. They commenced this programme, in 2001, in seven Grama Niladhari Divisions (GND) with a collection of 17 varieties of root and yam crops. Over the years, 55 varieties have been introduced to 500 participating farmers.

### 9.2 PROJECT FORMULATION

In an endeavour to build on this experience and expand the programme, the Aranayake CDC set out to empower rural communities in Uduwewela (another GND in Aranayake Divisional Secretariat) to conserve, cultivate and market roots and yams having nutritional and medicinal value. The project, funded by the Community Conservation Support Fund (CCSF), aimed to increase earnings of the rural communities and improve their living standards through the cultivation of traditional roots and yams, and in the process conserve these traditional crops.

The project commenced operations on 1 May 2008. A Participatory Rural Appraisal (PRA) was conducted to obtain information on the current status and needs of the farming communities.

### 9.3 OBJECTIVES

The main objectives of the project were to:

- conserve germplasm of traditional root and yam crop species.
- establish a model village for cultivating root and yam crops.
- establish a processing and sales centre for value added root and yam products.

### 9.4 PROJECT DESCRIPTION

#### *Site Geography and Coverage*

The project was located in the Uduwewela GND of the Aranayake Divisional Secretariat in the district of Kegalle in Sri Lanka. Five villages namely, Boralugama, Thuththiripitiya, Uduwewela, Kandahena and Uduwewela watte were selected to implement the project. The project area included a 12.5 ha block of land comprised of 100 arable plots ranging in area from 0.1 to 0.8 ha.

#### *Project Beneficiaries*

One hundred farming families in the Uduwewela GND benefited from the project and they also have access to a ready supply of germplasm.

#### *Implementing and Coordinating Agency*

The Community Development Centre in Aranayake implemented the project work with the assistance of the communities.

#### *Project Activities*

- (a) Germplasm collection of traditional roots and yams, including *Alocasia* and *Dioscorea* spp.



Newly cultivated yam varieties (Ranjith Mahindapala)

- (b) Establishment of a community-based organization in each of the five villages.
- (c) Establishment of a nursery to provide planting material for home gardens.
- (d) Documenting the knowledge available with the communities on traditional roots and yams.
- (e) Training 100 farming families on traditional methods of cultivation.
- (f) Providing farming calendars and training farmers to use them (traditional farming practices include adherence to auspicious times for farming related activities).
- (g) Introduction of sustainable organic farming methods including the use of mulches, liquid organic fertilizers, and vermiculture.
- (h) Application of soil conservation measures such as Sloping Agricultural Land Technology (SALT), contour stone terraces and trenches in home gardens subject to soil erosion.
- (i) Establishment of a processing unit for roots and yams.
- (j) Establishment of a sales centre for retailing value-added roots and yam products.

#### *Key Technical Inputs*

Technical information was gathered through a survey of the farming communities.

#### *Project Timeframe*

The duration of the project was from 1 May 2008 to 30 October 2008.

#### *Total Project Cost*

The funds obtained from CCSF amounted to Rs 1,990,000.

## **9.5 ACHIEVEMENTS**

The communities in the Boralugama, Thuththiripitiya, Uduwewela, Kandahena and Uduwewela watte villages were empowered by the establishment of five community-

based organizations namely, *Thisara*, *Parakum*, *Binara*, *Kumudu* and *Dimutbu* CBOs, respectively. Plans for the cultivation and use of traditional roots and yams were developed for each village with the active participation of the womenfolk.

Over 40 root and yam species, including habarala (*Alocasia macrorrhizos*), kidaran (*Amorphophallus paeoniifolius*), butsarana (*Canna indica*), turmeric (*Curcuma longa*), Raja ala (*Dioscorea alata*), udala (*Dioscorea bulbifera*), katu ala (*Dioscorea pentaphylla*), java ala/kukul ala (*Dioscorea esculenta*), ginger (*Zingiber officinale*), gahala (*Colocasia esculenta*), manioc (*Manihot esculenta*), sweet potato (*Ipomoea batatas*), kohila (*Lasia spinosa*), hulan kiriya (*Marata arundinacea*), and potato (*Solanum tuberosum*) were cultivated in 12.5 ha of land. Soil conservation and sustainable organic farming practices were employed.

Farmers were introduced to raised spiral bed gardening, which enabled them to cultivate several species in a small plot, and also the opportunity to cultivate a combination of crops in small home gardens.

One hundred farmers were gainfully employed in the cultivation of roots and yams, including threatened varieties, and earned an average monthly income of Rs 500 to 4,000.

The cultivation of traditional root and yam crops using traditional methods of cultivation was established as an economically viable, and therefore sustainable, enterprise. Sixty two farming families are using farming calendars based on auspicious times.



Snacks turned out from yams (Kumudini Ekaratne © IUCN)

The processing unit and sales centre established under the project provided farmers with the opportunity to retail not only the fresh produce but also value added items such as sweet meats and short eats prepared from roots and yams. A cookery book was also produced to popularize food preparations from roots and yams.

Promoting the cultivation of roots and yams not only uplifted the economic status of the beneficiaries; it also helped to conserve these species.

## **9.6 CHALLENGES**

A considerable number of species had to be cultivated in the designated areas but the land available was limited. Hence, home gardening models were employed and this enabled the cultivation of a larger number of species in the space available.

## **9.7 LESSONS**

Strengthening of the communities, especially the empowerment of women, by establishing a community-based organization in each village was a positive step that facilitated the successful implementation of the project. In fact, the women farmers turned out to be more knowledgeable and successful than their male counterparts.

## **9.8 CONCLUDING REMARKS**

Cultivation of traditional root and yam crops had declined to the extent that some species were on the verge of joining the ranks of threatened species. In a bid to save these species, the Aranayake Community Development Centre, funded by the CCSF, implemented a project in the Uduwewela GND to promote the cultivation of these traditional varieties. They succeeded in enabling 100 farmers to be gainfully engaged in this cultivation. Some 40 yam and root crop species were cultivated and in the process ensured their conservation. The farmers used sustainable organic farming practices and proper soil conservation measures. Facilities for processing value added products, and a sales centre for retailing of fresh produce and processed products, are in place. All this would ensure the sustainability of the project and thereby save the threatened species. In the longer term, the successful cultivation of traditional roots and yams would contribute to increasing the biodiversity of the varieties and the preservation of indigenous knowledge relating to these crops.



Conservation farming; Coconut intercropped with Gliricidia, which provides nutrients and mulch (Kohombe Estate, Kakkapalliya) (Ranjith Mahindapala)

# 10.

## MORATUWA UNDERGRADUATES ADD VALUE TO CAMPUS WASTE

### 10.1 INTRODUCTION

The University of Moratuwa, Sri Lanka, founded in 1960 as the Institute of Practical Technology, presently has three faculties viz. Engineering, Architecture and Information Technology, and a student population of about 7,000. The University has encountered difficulties in maintaining its environs to the standards required. Essentially, the problems are poor waste disposal methods, inadequate facilities and space for systematic solid waste management, and the lack of funds to address these issues.

Sometime ago, the Nature Team of the Moratuwa University, in collaboration with the university administration, initiated a solid waste management project as a component of their Nature Conservation Programme. However, this initiative was a failure due to lack of workers and poor awareness of proper waste disposal methods. Even more disturbing was the lack of commitment shown by the students.

### 10.2 PROJECT FORMULATION

The Moratuwa Nature Team decided to revive the solid waste management system, and together with a number of dedicated academics and non-academic staff embarked on an improved solid waste management project. They secured a small grant through the Community Conservation Support Fund (CCSF) and commenced project operations on 1 June 2007.

### 10.3 OBJECTIVES

The aim of the project was to introduce and establish a systematic approach to collect and dispose of garbage in an environmentally friendly manner. The project

focused on separating organic waste and non-biodegradable waste to facilitate recycling, and adding value by maintaining a bio-gas and composting unit to ensure sustainability.

## 10.4 PROJECT DESCRIPTION

### *Site Geography and Coverage*

Moratuwa, located on the south-western coast of Sri Lanka, is 18 km south of the commercial capital Colombo. Its mean temperature is around 28°C, annual rainfall around 2,500 mm and relative humidity around 90%. This University campus has an extent of approximately 25 ha of land and contains an ecologically important forest patch known as Kadjukele, which is rich in biodiversity and harbours various species including 85 birds, 61 butterflies, 12 reptiles and eight mammals. This forest patch is under threat due to dumping and burning of garbage from the university.

### *Project Beneficiaries*

The staff and students of the University of Moratuwa are the beneficiaries of the project.

### *Implementing and Coordinating Agency*

The Nature Team implemented the project with technical assistance for the biogas component from the National Engineering Research and Development Centre (NERDC).

### *Project Activities*

- (a) Conducting awareness programmes for students and university staff on the benefits of systematic waste disposal, and its impact on the environment;
- (b) Providing colour-coded waste bins to facilitate waste separation at source. Each unit had three bins of different colour – an orange bin for recyclable plastics, a green bin for waste food items for composting and a blue bin for all other waste for safe disposal. The bins were securely fastened to the ground to prevent sliding and overturning, and their lids were operated by a pedal mechanism. An information board was erected near each unit and leaflets on waste disposal were placed on canteen tables.



Colour-coded waste bin unit in one of the canteens (Courtesy Nature Team, University of Moratuwa)

- (c) Building an extension to the plastics sorting and cleaning unit to provide more space for washing, drying and storage of plastic waste material. The milk packets, plastic bottle caps, paper cups and yoghurt cups collected were washed, cleaned and stored prior to being sold to recycling centres. The cleaned waste fetched a higher price.
- (d) Renovating the biogas unit that had been constructed in 1992 near the university Walé canteen and getting it back into operation with the assistance of the National Engineering Research and Development Centre. Two workers were employed to maintain the biogas unit. As straw was not readily available the tanks were filled with grass mowed from the University grounds, and allowed to digest for six months. The grass which had been converted into organic fertilizer was cleared and the tanks were then filled with organic material (waste food) collected from the canteens. It took two to three weeks to fill the three tanks with organic material; and biogas production commenced three weeks thereafter.

#### *Key Technical Inputs*

Technical inputs were provided by the University of Moratuwa and the National Engineering Research and Development Centre.

#### *Project Timeframe*

The duration of the project was 18 months from 1 June 2007 to 30 November 2008

#### *Total Project Cost*

Total cost of the project, obtained as a grant from CCSF was Rs 528,950.

## 10.5 ACHIEVEMENTS

- An effective solid waste collection and disposal system in the Moratuwa university was successfully established through an awareness creation process.
- Installation of colour-coded garbage bins facilitated garbage separation at the point of collection. This enabled waste separation into three components at source, by the individuals themselves.
- The raised awareness level of the university population on recycling waste motivated them towards orderly waste disposal via the colour-coded waste bins. Surveys to monitor the waste collection and disposal system indicated that initially only about 7% of the individuals disposed their waste plastic containers and milk packets properly. However, continuing efforts to raise awareness achieved the desired results. To ensure sustainability this awareness creation process should be continued as new students come in.
- Waste separation at the point of collection into organic material, plastic material and other waste, in three different bins, reduced the time and effort required to complete the recycling and biogas production processes.
- The operation to sort, clean, store and sell recyclable plastics is now a going concern. The sale proceeds (Table 1) were apportioned as follows: 40% to the two workers and 60% to the Recycling Fund set up to support future work.



Renovated bio gas unit (Courtesy Nature Team, University of Moratuwa)

- The biogas unit was successfully rehabilitated. The biogas produced is used to cook food for the canteen.
- Workers in the biogas unit have started on a small vegetable garden using the compost produced. This is quite a successful operation but the produce has, by and large, been harvested by unknown persons!
- Moratuwa now has a cleaner and tidier (perhaps healthier) campus. And the threat to Kadjukele has been averted.

*Table 3 - Revenue from the sale of recyclable plastic and polythene*

Period	Revenue (Rs.)
June – August 2007	2,750
Sep – November 2007	5,670
December 2007 – February 2008	7,770
March – May 2008	- *
June – August 2008	- *
September – November 2008	2,299

\* There have be no sales during certain months.

## 10.6 CHALLENGES

Two casual workers on the university payroll, receiving Rs. 7,500 per month, were engaged to sort and clean the plastic recyclables. The very low output of this 2-member workforce was the main challenge. This was largely attributed to the low wages. To motivate them and increase their efficiency, 20% of the proceeds from the sale of recyclables was given to each worker as an incentive payment. Provision of financial incentives based on their output and better facilities for work helped to improve the situation for the time being. However, maintaining an acceptable level of efficiency in the long run remains to be seen. The workers were also taken on a tour to a factory recycling plastics so that they will appreciate the importance of their work.

The composting system can handle only 0.5 tonnes of organic waste per day. But with the rapid increase in student numbers the system capacity is now inadequate to cope up with the entire organic waste load. The Nature Team is looking out for a viable solution.

## 10.7 LESSONS

An important lesson from this project is that environment friendly waste disposal systems could be introduced for urban solid waste management in an identified area. Commitment from senior management is essential and more important than money in driving a process of this nature.

## 10.8 CONCLUDING REMARKS

Students, some 7,000 of them, were wont to scatter litter thoughtlessly in the common areas of the campus. And the authorities were hard-pressed to keep up with this constant flow of rubbish and maintain the university surroundings in a fit state. They even resorted to dumping and burning garbage in Kadjukele, an ecologically important reserve. To address this problem the university Nature Team, supported by key members of the staff, and funds from CCSF, introduced a streamlined garbage collection and disposal system. The system comprised of (a) strategically placed 3-bin garbage collection units to separate garbage at source; separate bins for plastics, organic materials and other waste, (b) a central facility for cleaning and storing the plastics to be sold to the recycling factory, and (c) a biogas unit to convert the organic waste to cooking gas for the canteen kitchen, and compost as a by-product. Profits from recycling go to a Recycling Fund. Most importantly, this was accompanied by programmes to create awareness and sustain interest in the benefits of environment-friendly waste disposal and recycling. It has by no means been easy to get this complex system up and running. It is working and it has potential, but there is more to be done. There is a need to expand and to increase efficiency. The campus is spick-and-span and Kadjukele is safe, at least for now.

# 11.

## COMMUNITY ORGANISATION - PRIVATE SECTOR PARTNERSHIP TO ERADICATE INVASIVE PLANTS IN BUNDALA NATIONAL PARK

### 11.1 INTRODUCTION

The Bundala National Park is a haven for both migrant and resident birds. It is situated about 250 km south-east of Colombo in the Hambantota District of Sri Lanka. Originally, in 1969, an area of 6,216 ha was declared a Sanctuary under the Fauna and Flora Protection Ordinance no: 2 of 1937, and then upgraded in 1992 to a National Park. The high species richness of birds associated with the Bundala lagoon merited it being declared as Sri Lanka's first Ramsar site – a wetland of international importance, in 1990. This national park which is home to 383 species of plants, 32 species of mammals, 197 species of birds (including winter visitors), 48 species of reptiles, 15 species of amphibians, 32 species of fish (fresh, marine and brackish) and 52 species of butterflies is now under threat from the invasive mesquite (*Prosopis juliflora*) and prickly pear cactus (*Opuntia dillenii*).

Mesquite is a fast growing perennial that forms a dense thorny scrub. Being drought and salt tolerant it withstands harsh environmental conditions, like a cactus.

Prickly pear cactus is a succulent plant adapted to arid environments and survival under harsh conditions. The above-ground parts are adapted to absorb water and store it in water-storage tissues in the stem, and the waxy cuticle of the stem prevents water loss. The plant develops an extensive root system, containing a relatively high salt concentration, spreading beneath the soil surface to forage for water. This extensive root system also enables the cactus to spread quickly.

Uncontrolled growth of these two species gives rise to thick patches of scrub which suppress the growth of other plants. Therefore, mesquite and prickly pear cactus are categorised as invasive alien species (IAS). MAS Linea Aqua (Pvt) Ltd., of Hanwella,

has been engaged in eradicating these two species from the Bundala National Park since August 2006. Prior to the present project they had cleared 45 ha with the assistance of several private sector organisations, namely Odel (Pvt) Limited, Zero3 Images, Commercial Leasing, Hatton National Bank and Metric Products. MAS Linea Aqua teamed up with the local community to ensure the success of the present project.

## 11.2 PROJECT FORMULATION

In order to expand their IAS eradication programme, MAS Linea Aqua sought funding from Community Conservation Support Fund (CCSF) to clear a further area of 18 ha. This project initiated in February 2007, was implemented with the assistance of a local community organisation, *Bundala Urumaya Surakeme Sangamaya* (BUSS) supervised by the Department of Wildlife Conservation (DWC). The Project originally planned for 11 months was extended by two months.

## 11.3 OBJECTIVES

The primary objective of this project was the eradication of mesquite and prickly pear cactus from an 18 ha block of land in the Bundala National Park. Enabling the regeneration of native plant species, expanding the habitat of local and migratory bird species and other animals, increasing job opportunities and incomes for the local villagers and enabling DWC to attract more visitors to the National Park and increase their revenue, were the other objectives.

## 11.4 PROJECT DESCRIPTION

### *Site Geography and Coverage*

The Bundala National Park is located 250 km south-east of Colombo in the district of Hambantota. The project area is an 18 ha block near the Embilikala lagoon in the Bundala National Park.

### *Project Beneficiaries*

The project is expected to yield economic and social benefits to the community in Bundala and the DWC. The areas cleared of invasive species need to be monitored on a regular basis to preclude new infestations. Such management activities will create new job opportunities for the local community. Furthermore, the likely increase in tourist traffic would bring about economic development of the region and increase DWC's collection from park visitors.

### *Implementing and Coordinating Agency*

The project was implemented by MAS Linea Aqua. They monitored project progress on a daily basis and supplied the required equipment; earth moving machines were hired from the locality. The workforce was provided by BUSS and MAS Linea Aqua coordinated with the DWC to obtain officers to supervise their work.

### *Project Activities*

The invasive species, mesquite and prickly pear cactus were cleared using manpower and machinery. The procedures employed for their removal differed.

**Mesquite:** The plants were uprooted using a earth moving machine, and then cut into small pieces using a chain saw. These pieces were piled up and allowed to dry. The dried piles were burnt and the ash ploughed back to enrich the soil.



Invasive plants being removed by BUSS members (Kumudini Ekaratne © IUCN)

**Prickly pear cactus:** The cactus was uprooted manually using rakes and mammoties, chopped up, crushed with a roller to press out the water, and left to dry. Dried pieces were piled up and burnt and the ash ploughed back into the soil to enrich it.

### *Key Technical Inputs*

Technical inputs for the eradication process were provided by the Warden and the technical staff of the Bundala National Park. Members of BUSS working on this project were also engaged in the previous MAS Linea Aqua operations in Bundala, and are experienced and well trained in handling this tedious activity.

### *Project Timeframe*

The project was implemented over a period of 13 months starting February 2007.

### *Total Project Cost*

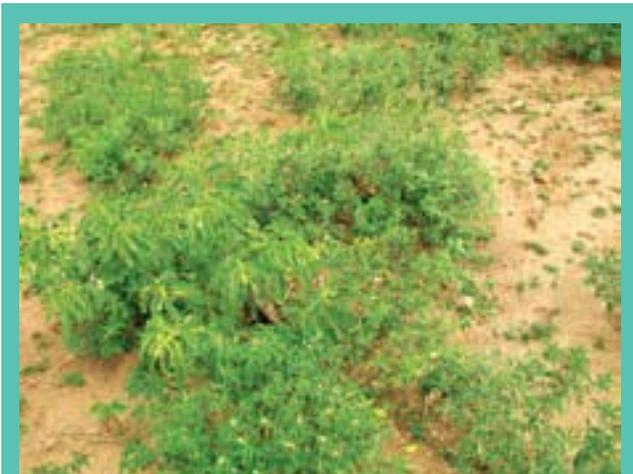
Total cost of the project was Rs 2,804,230.

## 11.5 ACHIEVEMENTS

Community support for the project was ensured by involving them in project activities. Apart from providing a source of income for the local community, it raised their awareness and effected an attitudinal change in regard to the invasive species ruining the park. Enlisting community support through the provision of such tangible benefits will no doubt facilitate sustaining the project outputs and save this Ramsar site.

Mesquite and prickly pear cactus were completely eradicated from 18 ha of the Bundala National Park. This achievement led to many benefits:

- Regeneration of native plant species in the cleared areas such as anoda (*Annona chirimola*), agil (*Erythroxylon monogynum*), bebila (*Hibiscus micranthus*), diya-habarala (*Monochoria hastata*), divul (*Limonia acidissima*), eraminiya (*Ziziphus lucida*), geta-tumba (*Leucas biflora*), katarodu (*Clitoria ternatea*), heen-katu-pila (*Flueggea leucopyrus*), kuppameniya (*Acalypha indica*), maliththan (*Salvadora persica*), mas-bedda (*Gymnema sylvestre*), nalal-batu (*Physalis micrantha*), nidi-kumba (*Mimosa pudica*), peti-tora (*Cassia tora*), pitawakka (*Phyllanthus amarus*), pol-pala (*Aerva lanata*), tala (*Corypha umbraculifera*), and vishnu-kranthi (*Evolvulus alsinoides*);



Regeneration of plant species (Kumudini Ekaratne  
© IUCN)

- Increased visibility of birds and butterflies in the cleared areas;
- Increased number of mammals such as deer, pigs, elephants and buffaloes visiting the cleared areas due to regeneration of food material;
- Nearly 40% of the palu trees were recovering from “die back” by the end of the project period;
- Employment opportunities for 70 members of the BUSS.

Employment opportunities for the local community, during and after the project, gave the local economy a much needed boost. In the long term, the improved potential for developing this park as a bird sanctuary is likely to bring in more tourists and provide an impetus to the development of the Bundala region. This would further enhance employment opportunities for the community living in the vicinity of the park.

## 11.6 CHALLENGES

The sustainability of the park beyond the project period and poverty reduction in the neighbouring areas were two major challenges. Enlisting the support and participation of the community to maintain all the areas cleared, by this and previous projects, was successful in meeting the immediate challenges.

## 11.7 LESSONS

1. The interest and commitment of a well established commercial firm to work in collaboration with a state agency in the national cause of restoring an internationally recognized ecosystem and animal sanctuary was a significant feature that could be replicated with advantage.
2. Absenteeism and a decline in efficiency over time, among some workers, tended to retard progress. This underlined the need to continuously pep-up the work force to achieve targets. Significantly, women were more productive and displayed a greater sense of involvement in the project.
3. The importance of adequate remuneration for casual workers to maintain their productivity and momentum throughout the project duration was clearly evident.

4. The use of effective awareness programmes to bring about attitudinal changes in the local communities regarding IAS was an important aspect of the project, especially in relation to its sustainability.

## 11.8 CONCLUDING REMARKS

The Bundala National Park, especially rich in migrant and resident birdlife and Sri Lanka's first Ramsar site, was threatened by the rapid spread of the invasive mesquite, *Prosopis juliflora* and prickly pear cactus, *Opuntia dillenii*. MAS Linea Aqua (Pvt) Ltd teamed up with the *Bundala Urumaya Surakeme Sangamaya* (BUSS) and the Department of Wildlife Conservation to eradicate these invasive species from an 18 hectare block in the Park and allow the native flora to re-emerge. Furthermore, they are seeing to it that it remains free of these invasive species. *Bundala Urumaya Surakeme Sangamaya* members, together with DWC officers, are on the look out, and will promptly remove any regeneration. The invasive enemies are definitely in retreat.

## 12.

# RESTORATION OF VILLAGE TANK ECOSYSTEMS TO ENHANCE AGRICULTURAL PRODUCTIVITY - KATUPATHWEWA TANK CASCADE SYSTEM IN ANURADHAPURA, SRI LANKA

### 12.1 INTRODUCTION

The ecosystem surrounding a small reservoir in a village settlement is complex in nature. It is made up of several constituents: forest scrubland, tank, hamlet, the paddy tract, upstream reservation (*Gasgommana*), downstream reservation (*Kattakaduwa*), and small hillocks (*Badawetiya*) and wetlands (*Ovita*) in the paddy tract, and finally stream bank vegetation (*Dola uyan*). This complex is collectively referred to as the village tank ecosystem. Each element in the ecosystem serves a specific purpose for the village community and plays a distinct role in maintaining the balance of the ecosystem.

The upstream reservation, *Gasgommana*, is a strip of land in the high flood region of the tank. Trees such as kumbuk (*Terminalia arjuna*), maila (*Bauhinia recemosa*), damba (*Syzygium assimilei*) etc. are found in this area. The *Gasgommana* with its trees and grass undergrowth protects the tank from sedimentation. It slows down the flow of runoff water passing through which allows for the deposition of suspended material. The downstream reservation, *Kattakaduwa*, located between the tank bund and paddy tract, acts as a buffer to protect the paddy lands. Traditionally, soil from the *Kattakaduwa* was reserved for repairing the tank bund. The *Kattakaduwa* consists of hygrophytic and upland habitats, and consequently contains a wide diversity of plants ranging from aquatic to terrestrial tree species found in the dry zone forest. Indian beech/karanda (*Pongamia pinnata*), mi (*Madhuca longifolia*), kumbuk (*Terminalia arjuna*), and weta-keyiya (*Pandanus kaida*) are predominant in the *Kattakaduwa*. It is reported that the *Kattakaduwa* prevents water contaminated with iron (Fe), potassium (K), calcium (Ca), sodium (Na) and magnesium (Mg) from entering paddy fields, and that the trees in the *Kattakaduwa* acting as a windbreak reduces evaporation losses from the tank.



Katupathwewa tank (Kumudini Ekaratne © IUCN)

The most common plant species found in the hillocks (*Badawetiya*), are mi, tamarind, margosa, indi (*Phoenix pusilla*), lolu (*Cordia* spp.) maila, and karamba (*Carissa* spp.), while in the wetlands (*Ovita*) the sedges dominate with gal-ehi (*Cyperus corymbosus*), pothu-kola (*Scleria poaeformis*), and cat-tail/hambu-pan (*Typha angustifolia*). Wild rice varieties are sometimes seen growing in association with sedges.

Diverse species are found on the banks of drainage canals (*Dola uyan*), the most common species being maila and diyasiyambala (*Aeschynomene indica*). Seventeen species are commonly grown along the border of the paddy tract, the dominant species being gliricidia, mi, margosa, kaduru (*Sapium insigne*), and Indian laburnum/ehela (*Cassia fistula*).

The ongoing process of indiscriminate utilization of land for agriculture has resulted in the destruction of landscapes, loss of soil fertility and disappearance of native fauna and flora. The changing attitudes of rural folk on traditional environment friendly agricultural practices, and the encroachment of legal reservations aggravate this unfortunate situation. The Katupathwewa cascade system of eight tanks, in Anuradhapura district, has not been spared from these ravages. As a result, high loss of tank water, low cropping intensity, sedimentation of the tank and increase in salinity due to leaching has lowered the productivity of the paddy tracts of the ecosystem. As the tank reservations had not been demarcated legal action was not possible and the offenders have got off scot-free.

## 12.2 PROJECT FORMULATION

The above-noted issues were discussed repeatedly at various fora over the past years, but these did not result in any meaningful action. In November 2006, Sewa Lanka Foundation invited some researchers from the University of Peradeniya and Field Crops Research Institute of the Department of Agriculture at Mahailuppalama, and selected farmers from the area to study this problem and propose corrective measures. Their consensus was that restoration of the ecosystem was the only sustainable means of improving its productivity. The farming community could expect the following benefits through the proposed measures:

- Increase in soil organisms and soil organic matter that will lead to enhanced plant productivity, through mixed plantings such as live fences, intercrops and border plants to fix nitrogen and produce green manure.
- Increase of pollinators and beneficial insects that will increase crop yields and control pests, through an Integrated Biodiversity Management (IBM) System.
- Replanting of river and stream banks with native plants to filter out leaching fertilizers, pesticides, herbicides and heavy metals and prevent the contamination of water that will be used for drinking by downstream populations.
- Minimize tank sedimentation which will also help maintain tank ecosystem hydrological cycles.
- Mitigate the risk of salinity development in the paddy fields.
- Reduce tank water losses by the establishment of wind breaks.

In view of the above benefits, Sewa Lanka Foundation undertook the restoration of tank ecosystems of five of the eight tanks in the Katupathwewa cascade. The eight tanks that belong to the Katupathwewa cascade are Katupathwewa, Divulwewa, Achirigama, Kabaragoyawewa, Kirimetiawewa, Ittawewa, Palugaswewa, and Galayawewa (fed by two streams outside the cascade). The tank ecosystems of Katupathwewa, Divulwewa, Achirigama, Kabaragoyawewa, and Kirimetiawewa were selected for restoration with CCSF funds. The sustainable development of tank ecosystems by community empowerment was the project aim. The project commenced operations on 1 January 2007.

The socio-economic level of the communities was ascertained through a survey covering 170 farming families that would benefit from the project. This baseline survey gathered adequate information of the ground situation prior to commencing

project work. A Participatory Rural Appraisal (PRA) exercise and a SWOT analysis were carried out to establish the strengths, limitations and opportunities available in the region and the potential threats that may arise during project implementation.

Commonly encountered problems identified by the PRA and SWOT analysis were water shortages for both drinking and farming, lack of a market and a remunerative price for their produce, lack of improved planting material, crop damage by wild animals, lack of an effective extension service, increased use of pesticides, and disappearance of food sources and fauna (insects, fish etc.).

### 12.3 OBJECTIVES

The main objectives of the project were to:

- Restore natural habitats/productivity of tank eco-systems by protecting landscapes, habitats and natural biodiversity.
- Strengthen and empower the communities, farmer organizations, school children and government stakeholders to undertake the restoration of landscapes and habitats of tank ecosystems.
- Train women in the sustainable use of local raw material for cottage industries as an additional source of income.
- Enforce legislation to ensure protection of tank ecosystems and biodiversity.

### 12.4 PROJECT DESCRIPTION

#### *Site Geography and Coverage*

The project site is located in Katupathwewa Thulana GND (Grama Niladhari Division) in the Nochchiyagama DS (Divisional Secretariat) of Anuradhapura District. This district covers 7,128 km<sup>2</sup> of the North Central Province in the dry zone of Sri Lanka. The Nochchiyagama DSD has 1,850 inhabitants in 368 families. The villages covering the Katupathwewa cascade system are Katupathwewa with 64 families, Panwewa with 106 families, Kabaragoyawewa with 61 families, Galyaya with 5 families and Weliea with 41 families.

#### *Project Beneficiaries*

About 170 farming families in the villages of Katukeliyawa, Katupathwewa, Panwewa, Kabaragoyawewa and Weliea, which is 63% of the farming communities in the Katupathwewa Thulana GN division, will benefit from this project.

### *Implementing and Coordinating Agency*

The project was implemented by two farmer organizations, namely *Samagi Govi Sanvidhanaya* and *Katurodagama Govi Sanvidhanaya* under the overall supervision of Sewa Lanka Foundation. The Sewa Lanka Foundation coordinated with government officials and other stakeholders to facilitate the field work carried out by the farmer organizations with community participation.

### *Project Activities*

- (a) Tank ecosystem restoration encompassed several aspects: awareness building in environment protection, ecosystem restoration, promoting livelihood opportunities and promoting sustainable agriculture. Project introductory meetings for the stakeholders were held at Katupathwewa and followed up with a survey of the socio-economic status of the village communities. Planning workshops and awareness meetings were then conducted for the beneficiaries who were selected after the survey.
- (b) Five nurseries were established; two each at Panwewa and Weliea and one at Kabaragoyawewa. More than 30,000 plants, of 40 different species, were raised in these nurseries for planting in the tank reservations where canopy cover was poor or absent. The planting was done with community participation.



Plant nursery managed by the community (Kumudini Ekaratne © IUCN)

- (c) Five awareness creation meetings were held for farmers and one for government officers including the District Secretary and Divisional Secretary. The awareness programmes in schools included field sessions on integrated farming and on emphasising the negative impacts of encroaching forest lands for crop cultivation.
- (d) Several training programmes on construction of bunds and terraces for soil conservation, mulching with green manure to maintain soil fertility, preparation of organic liquid fertilizers to replace inorganic fertilizers, nursery maintenance, compost production, and biological pesticide preparation were conducted with field demonstrations.
- (e) Vegetable seeds and fruit plants, for home garden cultivation, were distributed to 170 farmers. Model home gardens were also established.
- (f) Along with the above demonstrations, a programme was held to share traditional knowledge in farming among the participants. The practice of rituals such as *kem* and *pooja* which is fast disappearing, and astrology, were also discussed.
- (g) An anicut was built across the irrigation canal which originates from Rajangana tank and runs through Katurodagama. Impounded water in the resulting pond is expected to maintain the ground water table in the surrounding areas, and also supply irrigation water to an additional 13 ha of paddy land. This activity was carried out by members of the *Katurodagama Govi Samvidhanaya*, under the supervision of the Department of Irrigation.
- (h) A training programme for women on reed-based handicraft production was implemented. The source plants for the industry were prevalent in tank reservations. A retail outlet for handicrafts made by cottage industries was established at the office premises of the Nochchiyagama District Secretariat and provided a means for marketing the reed products.
- (i) The demarcation of reservations is essential to prevent their encroachment. The legal demarcation of the upstream reservation (*Kattakaduma*) and downstream reservation (*Gasgommana*) was carried out in October 2008 by the Survey Department.

- (j) Facilitating voluntary relocation of farm families to environmentally non-sensitive areas.

#### *Key Technical Inputs*

Technical support for tank ecosystem restoration was provided by a soil scientist who was also conversant in tank systems and traditional soil and water conservation methods.

#### *Project Timeframe*

The project duration was for a period of 21 months from 1 January 2007 to 30 September 2008.

#### *Total Project Cost*

The funds obtained from CCSF totalled Rs 4,411,300.

## **12.5 ACHIEVEMENTS**

- Awareness programmes on environment protection for government stakeholders, farmers organizations, schools and the farming communities strengthened and empowered the population to restore landscapes and natural habitats. The programme of activities for ecosystem restoration was planned and finalized with farmer participation;
- Canopy cover of the reservations was improved and the biodiversity of tank ecosystems was enriched by infilling vacancies with over 40 species of plants;

Over 30,000 plants of the following species, raised in nurseries with community participation, were planted in low canopy cover areas in the tank ecosystems: kumbuk (*Terminalia arjuna*), mi (*Madhuka longifolia*), karanda (*Pongamia pinnata*), maila (*Bauhinia racemosa*), kaila (*Phyllanthus reticulatus*), ingini (*Strychnos potatorum*), godakirala (*Holoptelea intergrifolia*), tamarind (*Tamarindus indica*), timbiri (*Diospyros malabarika*), arecanut (*Areca catechu*), mango (*Mangifera indica*), damba (*Syzygium assimile*), madatiya (*Adenanthera pavonina*), margosa (*Azadirachta indica*), kithul (*Caryota urens*), nithulla (*Ficus parasitica*), ehatu (*Ficus tsiela*), katukeliya (*Dioscorea pentaphylla*), halmilla (*Berrya cordifolia*), ebony (*Diospyros ebenum*), anguna wel (*Dregea volubdis*), wel-mee (*Hibiscus fliacens*), kumburu (*Caesalpinia bonduc*), domba (*Calophyllum inophyllum*), nika (*Vitex negundo*), kotta (*Ceiba pentandra*), keeriya (*Acacia chundra*), Aththana (*Datura metel*) palmyrah (*Borassus flabellifer*), nabada (*Euodia roxburghiana*), galsiyambala

(*Dialium ovoideum*), araththa (*Ophiorrhiza mungos*), wadakaha (*Acorus calamus*), erabadu (*Erythrina variegata*), wood apple (*Feronia simonia*), kundalu (*Citrus hystrix*), thelabu (*Sterculia foetida*), and weta-keyiya (*Pandanus kaida*);

- The campaign to promote home gardening succeeded in establishing 170 home gardens. King coconut, citrus, lemon, orange, teak, grafted mango, grafted jak, grafted cashew and grafted amberella (*Spondias pinnata*) were planted in their home gardens. Home gardening generated a substantial income, which enabled them to enjoy a higher standard of living. The use of organic fertilizer in place of inorganic fertilizers and the use of mulch to increase soil fertility reduced pollution;
- Self employment opportunities were increased by training womenfolk in producing handicrafts. Forty women were engaged in producing reed-based products. Using raw material abundant in the region to increase self employment opportunities for women was a very successful low cost initiative. A retail marketing outlet for local handicrafts such as reed products was established in the office of the Nochchiyagama District Secretary;
- The anicut and pond constructed in Katurodagama enabled 25 farmers to cultivate an additional 14 ha of paddy land during the *Maha* season and obtain a harvest of 80 bushels per 0.4 ha (1 bushel = 22 kg);
- The Survey Department demarcated the reservations of five village tanks: Kirimetiawewa, Achirigama, Kabaragoyawewa, Divulwewa and Katupathwewa. This will facilitate prompt action against encroachers;
- The project enhanced the relationships between government stakeholders, farmer organizations, farmers, schools and community members. This has strengthened the population and ensured the sustainability of the tank ecosystems.

## 12.6 CHALLENGES

Inordinate delays were experienced in obtaining official approval for the Survey Department to demarcate the reservation boundaries. In addition terrorist threats resulted in villagers vacating their homesteads.

The communities were empowered in regard to restoration of landscapes and habitats. However, convincing farmer communities that it would result in economic

benefits to the region was not easy. This was addressed by promoting livelihood opportunities simultaneously with the restoration of the tank ecosystems.

## 12.7 LESSONS

Confidence building has been a significant aspect in the voluntary relocation of farm families to environmentally non-sensitive areas. The decision to relocate voluntarily appears to have been facilitated by the active participation and contribution of representatives of state agencies, and the prospect of better livelihoods and assured income generating opportunities in the re-settled areas.

## 12.8 CONCLUDING REMARKS

The agricultural productivity of the paddy lands served by the Katupathwewa cascade had dipped to a new low. The rampant destruction of the natural habitats and landscapes of the tank ecosystem leading to decreased irrigation capacity, loss of soil fertility, farmers resorting to unsustainable agricultural practices, and disappearance of native fauna and flora, was the underlying cause. It was the considered view of the experts and enlightened farmers that nothing short of the restoration of the tank ecosystems could reverse this downward trend in productivity. The Sewa Lanka Foundation together with *Samagi Govi Sanvidhanaya* and *Katurodagama Govi Sanvidhanaya* were equal to the task. They strengthened and empowered the community by way of awareness programmes on environment protection and by building partnerships with government organizations, to undertake the restoration of the tank ecosystems. The empowered community prevented further encroachment of the reservation and participated in replanting programmes to successfully enrich a considerable extent of tank reservations that had a poor canopy cover. The sustainable home gardens and cottage industries that were established generate additional incomes and have raised the communities' standard of living.







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