Zwazo

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Zwazo is produced biannually by Nature Seychelles, a non-profit, non-governmental organization that has worked in conservation in Seychelles since 1998. Its primary objective is to improve the conservation of biodiversity through science, education, awareness and training programmes. To achieve this we are dependent on voluntary support and funding. If you would like to help this work, please contact us at the address below.

Chief Executive:
Dr. Nirmal Jivan Shah

Council:
A M Moustache,
R Perdiwalla, and
M King-Harman

Chief Editor:
Dr. Nirmal Jivan Shah

Editor:
Liz Mwambui

Design and Layout:
Liz Mwambui

Photos: Nature Seychelles/ Others

Cover Photo: Marc Sambi © FBOA

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P.O.Box 1310, Mahe Seychelles
The Centre for Environment and Education, Roche Caiman,
Tel:+ 248 4601100/4601126
Fax: + 248 4601102
email: nature@seychelles.net
web: www.natureseychelles.org
Blog: http://savingparadise.wildlifedirect.org/
facebook.com/natureseychelles
Twitter: @naturesey

A word from the

FRONT LINES

Don't be fooled – it may all go to hell in a hand basket

The natural environment provides us with water, air, protection against erosion, beautiful beaches, fish and so many other vital things for our existence. Our two most important economic pillars tourism and fisheries depend on the natural environment.

The Seychelles is famous for its environmental protection. Protection of 50% of our land, success in saving threatened birds, increased awareness in the population, the list goes on. But all is not well as development continues. We see environmental problems popping up everywhere. And many are symptoms of larger issues.

And this is the case not only in Seychelles. The UN Millennium Ecosystem Assessment shows that most places exhibit degradation of the air, water, and soil. Species are becoming extinct as natural habitats are being destroyed. The emissions of greenhouse gases are ongoing. All the environmental problems put together amount to a very serious threat to human welfare. Yet at the same time, conventional measures of well-being show that, on average, quality of life is improving around the world including Seychelles.

Research confirms that improvements in overall well-being are real, despite overwhelming evidence of environmental decline. People's complacency and disinterest in declining environmental quality are attributed to three main issues which are: increases in food production; technological innovations that decouple people from natural ecosystems; and time lags that occur before the problems show up and well-being is affected.

The continued rise in well-being that we expect may not actually happen. The negative impacts such as from climate change threaten new gains in agricultural production. Technological advances can provide only a limited protection in this regard. With all the evidence at our disposal, society may not be able to successfully adapt to further environmental degradation.

What we need is better understanding of the actual benefits of healthy ecosystems to human welfare. This issue of Zwazo showcases our ongoing work in making nature relevant to people as well as conserving and restoring key pieces of the ecosystem. In the features section authors from Seychelles and elsewhere have contributed eye-opening pieces on the services that ecosystems provide, and their costs and benefits.

We hope you will enjoy the read.

Nirmal Shah

US Ambassador Drops In

The US Ambassador to Seychelles Shari Villarosa visited Nature Seychelles and the Sanctuary at Roche Caiman on Saturday 17 November 2012. Ambassador Villarosa was on her first official visit to Seychelles, where she became her country's new ambassador. She was accompanied to Nature Seychelles by Mr. David Campbell, Political Officer and Second Secretary at the Embassy.

On hand to receive the ambassador was Dr. Nirmal Jivan Shah, Nature Seychelles' Chief Executive, Kerstin Henri, Director for Strategic Affairs, and Raju McKenzie, the Project Manager for the Reef Rescuer project.

During her visit, Ambassador Villarosa heard about the pressing environmental challenges facing the Seychelles, among them climate change.

One of the largest projects that Nature Seychelles is implementing is financially supported by the United States Agency for International Development - USAID. Through this support coral reefs affected by climate change are being restored. The project is part of USAID's strategic global commitments to partner with governments, civil society organisations and other relevant stakeholders to address the impacts of climate change.

"This substantive grant not only supported climate change action in the Seychelles but also brought back USAID to the Seychelles," Dr. Shah told the Ambassador.

The Ambassador heard that the early stages of the project, which involve growing corals in nurseries under the sea have been successful. The next stage involves transplanting them onto degraded reefs. The project is being piloted around Cousin Island Special Reserve, which Nature Seychelles manages so that it can be monitored and managed beyond the project lifetime.

Through this peer-reviewed work, which is supported by a steering committee of international experts, Nature Seychelles aims to make a positive and lasting impact to the way we manage, restore and rescue reefs in the Seychelles, in the region and elsewhere around the world, Shah said.

Ambassador Villarosa said she was looking forward to visiting the project base on Praslin Island as well as Cousin Island on her subsequent visits to Seychelles.

The Ambassador and Mr. Campbell were also taken around the Sanctuary at Roche Caiman and the Heritage Garden - the sites where Nature Seychelles' nature therapy programmes are taking place. She was most impressed by the garden and expressed her love for herbs such as Thai Basil, which is grown in the garden.

The nature therapy programmes at both sites are avenues to connect people with nature and are also being used to help the vulnerable and to rehabilitate members of society who are struggling with substance abuse.

The Sanctuary at Roche Caiman holds a wetland, a bird observation area, a centre where yoga and meditation are practiced, and a site where mangroves are being rehabilitated and a new garden is being developed.

The Sanctuary's development has benefited from the US Ambassador's Special Self Help Fund in the past, with monies going towards securing the area. It has also played host to personnel of the US Navy who over the years have volunteered their time and contributed to different conservation activities on the site.

Photos: Top - The Ambassador with Nature Seychelles staff.
Inset: Admiring plants at the Heritage Garden

US Navy Steps Up

US Navy personnel from the USS Klakring took part in conservation activities at the Sanctuary at Roche Caiman in September, as part of community relations activities the ship undertakes while in port. Robin Hanson, the wetlands manager, coordinated the activities for the day, which were aimed at further enhancing the sanctuary's assets and developing a new community garden.

The sailors helped to prepare poles that were used to build wildlife structures within the Sanctuary and to improve an activity area for vulnerable children groups.

They also helped to carry bricks, red soil, compost and branches to the site for the construction of a new garden for the Greening Livelihoods Programme.

The sailors worked under a heavy downpour that fell on most of Victoria and lasted the two hours they were on site. Robin Hanson expressed his gratitude to them for choosing to spend their afternoon in this way.

"I would like to thank you all for giving us your valuable free time. You've accomplished so much today, bringing many benefits to the wildlife and the community," he said.

To mark this visit and to leave a green footprint on the Sanctuary, the sailors planted a species of mangroves at a site that is under development through the Mangroves for the Future Initiative.

"It's really an honour to come out today and serve and contribute to the community in Seychelles. It's probably the best way we could spend our time," said Lt. Trey Souder.

"It feels good to give back. Hopefully when we come back years from now we'll see some of the mangroves that we planted have grown big," said EMC Steve Young.

This is not the first time that personnel from the US Navy have helped out with activities at the Sanctuary. They have previously helped in cutting and weeding the insidious Typha reed and in digging wader scrapes for birds, among other activities.

Earlier in August, four senior personnel from the USS New York also volunteered with the Reef Rescuers project on Praslin. The Reef Rescuers project, funded by the US Agency for International Development, is piloting the rehabilitation of damaged coral reefs using the coral gardening method.

Commander Michel Baker (US defense attache), Capt. Jon Kreitz USN (Commanding Officer, USS New York), Lt. Paul Dumas USN (Officer-in-Charge, Assault Craft Unit 4, Detachment B) and Capt. Patrick Madden USMC (Platoon Commander, Maritime Raid Force, 24 MEU) helped the rescuers to fragment corals and dived with the rescuers to attach them to a net nursery. Using toothbrushes, they also helped with the job of cleaning algae off the ropes of the underwater nurseries. They also had an opportunity to visit Cousin Island and go on a guided tour of the attractions there.

Photos: Top - Sailors help to plant mangroves Bottom - Capt. Jon Kreitz, USN (Commanding Officer, USS NEW YORK) fragmenting coral

We Made the Australian High Commissioner Happy

On a visit to Nature Seychelles in September, the Australian High Commissioner to Seychelles Ms. Sandra Vegting expressed her satisfaction with the progress being made by the Gardens for Growth project funded by her Government. The project benefited from a grant from the Australian High Commission Direct Aid Programme for Seychelles and Mauritius and begun in February 2012.

Developed in response to current social problems facing the Seychelles, in particular those associated with substance abuse, the project has helped participants acquire gardening skills with over 30 gardening sessions having been delivered and one garden completed. Others were set to receive conservation training.

The project works at the rehabilitation stage with clients from two centres in Seychelles - the Centre Mont Royal and Centre d'Accueil de La Rosière.

"The idea is simple. We are addressing social issues by merging the appreciation and protection of nature, with practical and transferrable skills that can be used by participants to build their livelihoods and re-enter the economic mainstream," said Dr. Nirmal Shah, Nature Seychelles Chief Executive.

It is also a part of a wider Nature Seychelles programme that is using nature for the benefit of people. Activities take place at the Sanctuary at Roche Caiman, which has been rebranded as a "Park for People."

The idea to help people see parks beyond their value for flora and fauna originated from Australia with Parks Victoria, the High Commissioner heard. Nature therapy on the other hand has been widely applied in the UK.

It is expected that after the project, those who have participated will be able to apply their skills in a commercial basis either in self-employment or elsewhere in the job market, particularly in the tourism industry.

"It is for this reason that we have sent the training modules to the Seychelles Qualifications Authority so that the skills they receive are recognised," Martin Varley, the Nature Seychelles' Projects Coordinator said.

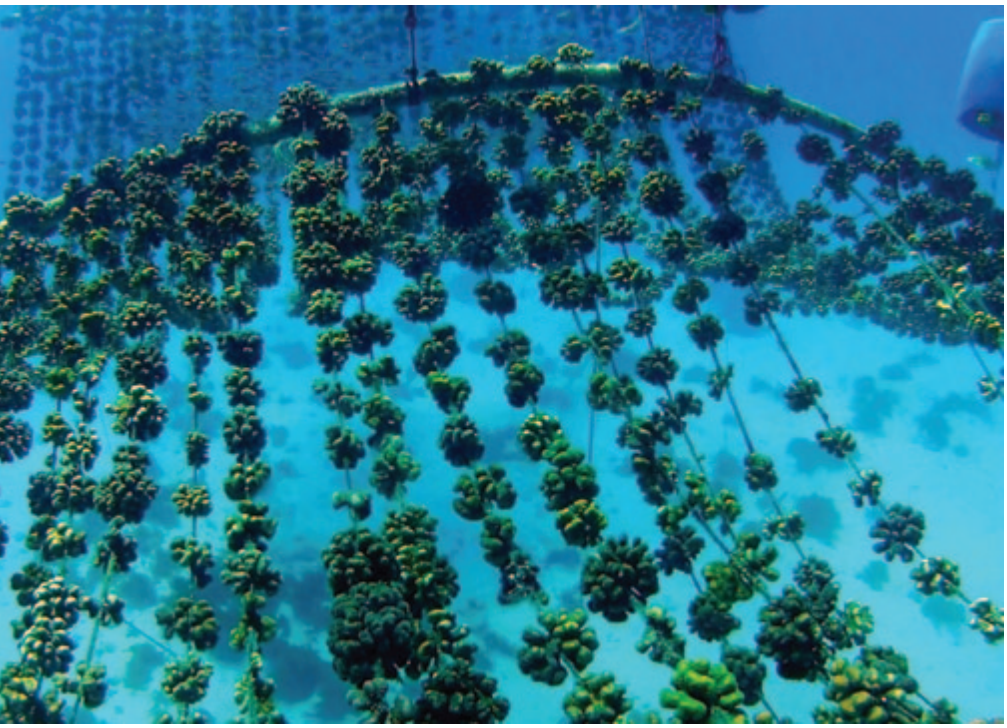
In addition to the work skills, participants are also building their self confidence and self esteem, often eroded by substance abuse. "The social interactions increase their well being and have the potential to reduce depression and lethargy, while enthusing them to truly envisage a better future for themselves," said Robin Hanson, the Green Health Coordinator who, alongside the horticulturalist Lucina Denis, works closely with the groups.

Participants have learned a variety of innovative and inexpensive techniques such as how to build raised beds out of roofing sheets, concrete blocks and casuarinas poles, and how to make compost bins out of old packaging palettes, made more efficient with the use of old inner tyre tubes otherwise destined for the landfill.

A variety of crops including rocket, coriander, aubergine, courgettes, beans, bananas, papayas, and coconuts grows in the new garden.

Ms. Vegting who is a keen gardener said she well understood the therapeutic power of gardening. And while on a tour of the new garden she had the chance to plant chillies. She was also shown around the garden and saw the various innovations being used such as space saving palette planters, rain water collection and the making of organic liquid fertilizer using guttering pipes.

Photos: Top - Recycled tyres used as beds Above: Ms. Vegting planting chilies at the garden



Excitement as Coral Project Hits Transplantation Milestone

Nature Seychelles' Reef Rescuer's project based on Praslin entered an exciting and critical phase towards the end of 2012 when coral transplantation began. This is the final stage of the coral gardening process that is being used to restore degraded coral reefs in selected sites off Cousin Island Special Reserve.

"It is fantastic to get to this point given where this project has come from and the steep learning curve we had as the first people to try this out in the region," says Dr. Nirmal Shah the Chief Executive Officer of Nature Seychelles.

Thousands of coral fragments, sourced from healthy reefs known as "donor sites", have been growing in underwater nurseries tended and monitored by staff and volunteer scientific divers working on the project. Over a period of two years, they built two types of underwater nurseries, with nearly 50,000 coral fragments of different species of corals growing on them.

The onsite work began in 2010 with the survey of donor sites to estimate abundance and diversity of corals as well as assess the number of coral fragments that could be harvested. Coral collection and fragmentation followed by attaching them to ropes then began in earnest as did the use of the rope nursery. By 2011 the first four rope nurseries had been established off Cousin and a model net nursery was being tested. Each rope nursery had about 5000 fragments.

"By end of 2012, we had 9 rope nurseries set up, with about 40,000 coral fragments of different branching and sub-massive species and 3 net units set up totalling about 1,440 coral fragments of different growth-form and origin, including massive

and encrusting species," says project leader David Derand. In the beginning, the rope nurseries had to be regularly cleaned of turf algae and other invertebrates that settled on the ropes, but this is no longer needed as white rope, which has a much lower 'attractive effect' is now being used instead of black rope. All the rope nurseries had to be relocated when trade winds shifted by towing them behind a boat. A single nursery can weigh up to 1100kg.

More than 12,000 of these nursery-grown colonies have now been transplanted onto a selected degraded reef slope on the south-west side of Cousin Island between 7 and 12m depth. The transplantation was preceded by baseline monitoring, which entails a careful site analysis, of both control and transplantation sites, to provide an idea of the benthic cover (notably for hard coral, macroalgae, as well as abiotic categories such as rubble and sand), the density of coral recruits, and the fish and invertebrate populations.

"This helps us to establish what is there before the corals from the nurseries are transplanted, so that we can monitor changes after transplantation over successive seasons and years, and measure transplantation success" says Derand.

Different attachment techniques were then tested on a pilot site to compare their efficiency. For this, 10 metre ropes of coral colonies (*Pocillopora eydouxi, Pocillopora verrucosa, Acropora hyacinthus and Acropora cytherea*) were cut from the main nurseries and swum to the transplantation site - on the south-west side of Cousin Island - by two divers.

On arrival at the site, the ropes were cut into sections for attachment. 5 metre and 1 metre pieces as well as individual corals were then nailed into the bare carbonate substrate using a variety of nails, to see which were the best for the job. The winner was a 2 inches concrete nail and 20cm ropes with 'prussik' knot were also used to stretch the 1m or 5m ropes of nursery-grown colonies and attach them as close as possible to the substrate.

The actual transplantation began in early December 2012 with the entire 20m long ropes from nursery-grown colonies being transferred from nurseries to the site.

"Because of the distance between the nurseries and the transplantation site, divers would swim a rope to the transplantation site aided by jerry cans filled with air and attached to the rope," says Derand, describing the tricky operation. By the end of the month, 59 ropes out of a total of 120 in four nurseries had been transplanted on the whole transplantation site.

"The pilot site is starting to look like a fully fledged reef now, and even has its own little community of butterfly and damsel fish. This is a great start and hopefully only a small taste of things to come," say Jim Scarborough one of the Scientific Divers who worked on the project.

Transplantation continues, as is maintenance of the remaining nurseries and monitoring of the different sites.

Photos: Top - A diver hammers in a rope nursery into place on the degraded reef Below - Coral fragments on a rope nursery

Octopus Diver Centre Learns Restoration Techniques

The divers who come to admire the underwater world of the Seychelles are amazed by the richness of its biodiversity, but are surprised to see the state of the corals.

We explain to our divers that the Seychelles were affected by the ocean warming event that occurred in 1998 that led to a severe bleaching of coral reefs and that recovery has been slow.

We also tell them about other factors that cause damage to corals including divers themselves when they land on coral, boat anchors dropped on dive and snorkeling sites, erosion and pollution. We explain that without corals there would be no marine life, no fishing, no snorkeling and no diving. The informed diver now understands that a misplaced fin kick can in seconds damage what took ages to build.

Coral recovery has been slow, especially around the fringing reef facing outwards from the coast, which has no protection from waves. When there are sea surges, all the dead coral on the sea bed become mobile and new generation of coral reefs have no hard substrate to grow on. On granitic substrate or in protected bays, the corals have been very resilient in the last few years.

So what can we do to help the new generation of corals grow? This is what we were contemplating when Nature Seychelles introduced us to the "Reef Rescuer" project being carried out around Cousin Island. For more than a year now we have been learning from Nature Seychelles how to grow thousands of corals on rope nurseries and how to transplant them to the substrate when they reach a reasonable size.

Additionally, on our side at Anse Volbert, which is on the other side from Cousin, we are trying some experimentation.

Previously, with the approval of the Marine Park, we put 4 concrete blocks, as substrate to grow coral on, near a dive site called Coral Garden. We are now experimenting with putting some kind of netting on the sea bed to try and stabilize the dead coral.

Meanwhile, our expert divers, sensitized to the problem, practice regular gardening under water. They replace, while diving, healthy broken coral fragments into crevices. Everyone can contribute to coral recovery!

Contributed by Octopus Diver Centre, Praslin

Tourism Fair Promotes Sustainable Energy

To mark World Tourism Day the Seychelles Tourism Board (STB) held a fair at the International Conference Centre Seychelles in September. The fair was used to promote sustainable energy in Seychelles. Local firms working in this area, the hotels and hospitality industry, local NGOs and others participated.

This year's theme for World Tourism Day *Tourism & Sustainable Energy: Powering Sustainable Development* aimed at highlighting tourism's role in sustainable energy. "One of the world's largest economic sectors, tourism is especially well-placed to promote environmental sustainability, green growth and our struggle against climate change through its relationship with energy," said UN Secretary General Ban Ki Moon.

Nature Seychelles used the fair to advertise the carbon neutral status of Cousin Island Special Reserve and to share tips on energy saving with fair attendees.

Since 2010, the organisation has embarked on a journey to make Cousin Island Reserve, which it manages carbon neutral. "Simply put we are investing in carbon credits to offset our carbon footprint, which is estimated at 1300 tonnes," Kerstin Henri, the Director of Operations explained.

Cousin's footprint was calculated by looking at the island's operations, including its use of efficient technology, its visitor footprint - calculated as a percentage of visitor travel to Seychelles (this includes international flights, hotel accommodation and internal transfers) and the carbon sequestered by Cousin's own forest, which was worked out and netted against the footprint.

"The final footprint was then offset through the purchase of credits in clean projects on the African continent in Darfur, Sudan and now in Uganda," said Ms. Henri. "We have also invested in projects in Brazil and Indonesia. Landing fees collected from visitors to island are used to purchase the credits. In our own small way we have become donors, supporting worthwhile projects in other countries.

"Making Cousin carbon neutral is an important tool helping us to market ourselves and Seychelles in a positive manner," she added.

The opening of the tourism fair was marked by a presentation on sustainable energy from Dimitry Turpin of the Energy Commission. Local firm Clean Plus made a presentation on "green" cleaning products for the hospitality industry.

The occasion was also used to award seven assessors with certification under the Seychelles Sustainable Tourism Label; a sustainable tourism management and certification programme designed specifically for use in Seychelles. It is voluntary, and designed to inspire more efficient and sustainable ways of doing business within the industry.

The label, said the Chief Executive of the STB, Elsia Grandcourt, if seriously adopted and carried through can become a powerful marketing tool with which to attract future business to Seychelles.

"Please ensure that you take a moment to understand what it means, what it can do for you and how it can strengthen the industry upon which we and our children will continue to depend," she told attendees.

Photo: Kerstin Henri, Director Nature Seychelles, stands by the organisation's stand at the fair

Nature Seychelles at Nature's Olympics

2012 has been the year of the Olympics with two major events taking place in London. Although not quite on the same scale, an event which has been dubbed 'Nature's Olympics' was held in September on the island of Jeju in South Korea. The World Conservation Congress, like the Olympics, is a quadrennial event and it brings together thousands of leading conservationists to discuss pressing issues facing the global environment.

The congress is organised by the International Union for the Conservation of Nature, IUCN. Founded more than 60 years ago it is the world's oldest and largest global environmental network - a democratic membership union with more than 1,000 government and NGO member organizations, and almost 11,000 volunteer scientists in more than 160 countries. IUCN's work is supported by more than 1,000 professional staff in 60 offices and hundreds of partners in public, NGO and private sectors around the world.

Nature Seychelles is one of several IUCN members in Seychelles and our Projects Coordinator Martin Varley went to South Korea for 10 days of intensive workshop, discussions and meetings.

'The main thrust of the Congress was the positive contribution that nature can make towards resolving global environmental threats,' he said. 'The big theme was carried under the slogan "Nature +" and the idea that if we strengthen nature, we'll see that ecosystems are more resilient and people, communities and economies are healthier.'

Each day's meetings were themed around a topic to highlight the role of nature in building resilience in that particular area. So there was Nature+ Climate, Nature+ Food, Nature+ Development, Nature+ People and Governance and Nature+ Life. Special attention was also given to islands with many representatives attending from Pacific and Caribbean countries as well as Seychelles. Experts in global environmental management then led workshops and discussions for audiences boasting a world of experience in each area.

'The breadth of expertise on show at the congress was breathtaking,' said Martin, 'The work that you hear about is inspiring and we will try to apply much of what we have learned to the things we do here in the Seychelles.'

The work of Nature Seychelles already resonates with the themes highlighted at the congress. Our work on Cousin Island has helped to bring back species from the brink of extinction and species conservation has long been a focus for the IUCN. Linking this to the economy through engagement in the tourism sector shows the key role nature has to play in the economy. Our more recent projects related to green health are helping to bring resilience to local communities and our heritage garden, with its regular harvest of organic food is a demonstration of the role of nature-based food production for food security.

Our work shows the potential Seychelles has to act as a beacon for nature-based sustainable development. So good is the fit that perhaps the IUCN should have had a sixth category on its list of themes: Nature+ Seychelles.

Photo: Dance performance at the Congress opening (IUCN)

Children from the President's Village Reap Green Exercise Benefits

Its 3.30 pm on Friday afternoon. As most people prepare to wind up the day and week, and head for home, Kathrin Baer, a volunteer at Nature Seychelles is at the Sanctuary at Roche Caiman getting ready for an evening of work. In an area of the Sanctuary she lays down logs, ropes, discs and other natural materials on the grass. Kathrin is preparing for a green exercise class with children from the President's Village at Port Launay.

"We use materials from nature like tree trunks and discs for balancing and jumping. We have also built a big track in the sand. We run, do high and long jumps, gymnastics, team exercises, and little competitions," she says.

A few minutes later the children arrive and the air is soon filled with laughter and screaming. This is the last day of a six week, once a week class for the children from the President's Village and they are making the most of it. By their own accounts they have enjoyed it. In fact most want to stay longer, but unfortunately they have to make room for other groups.

The green exercise is part of an EU-funded programme being carried out by Nature Seychelles called Greening Livelihoods. It uses the therapeutic power of nature to benefit the vulnerable people in Society by building their skills, confidence and self esteem. The programme is offering training in nature conservation, organic gardening and green exercise, which Kathrin, a trained sports therapist, is helping to deliver.

"I started off by planning sessions for a group of 18 kids aged 9-13. That included figuring out the length of each session, what kind of materials were available and what would be achieved with the different exercises," She says.

Then during the school holidays she started to work with groups from the scouts and the community in Les Mamelles. Soon after, the regular class with the children from the President's Village began.

The experience has been an eye opener for her. "I found the idea of using the power of nature in combination with work and exercise to help vulnerable groups improve their way of living amazing," she says. "It can be as helpful as therapy, improving amongst other things self esteem, team work and satisfaction. The project has just started, but I think it has big potential," she adds.

The benefits of green exercise have been backed by a number of research. A recent study showed that children who play on playgrounds that incorporate natural elements like logs and vegetation tend to be more active than those who play on traditional playgrounds with metal and brightly coloured equipment. They also appear to use their imagination more. The study conducted in the USA, and among the first of its kind, examined changes in physical activity levels and patterns in young children exposed to both traditional and natural playgrounds.

"The children more than doubled the time they spent playing, from jumping off the logs to watering the plants around the creek. They were engaging in more aerobic and bone and muscle-strengthening activities," said Dawn Coe, assistant professor in the Department of Kinesiology, Recreation, and Sport Studies at the University of Tennessee. "Natural playscapes appear to be a viable alternative to traditional playgrounds for school and community settings."

And so it is with great satisfaction that Kathrin handed out certificates to the children and prepared for the next group.

Photos: Children from the President's Village at Port Launay exercise at the Sanctuary at Roche Caiman

Scouts and Friends Get Some Nature Therapy

Their mothers may not like mud anywhere near their clean clothes, but for some youngsters wading knee deep in mud was irresistible. They happily squished in it and got stuck in it and just came short of throwing it at each other. The youngsters were part of a group of scouts and other children who visited the Sanctuary at Roche Caiman and Heritage Garden to take part in nature therapy activities which are part of Nature Seychelles' Greening Livelihoods programme. A group of nearly 50 children and their leaders participated.

Every school holiday, the Seychelles Scouts Association prepares a special programme for children that involves both scouts and children from the community. The programme is designed to get children off the streets during the holidays to come together for five days of learning, fellowship and adventure. During the August school holiday the programme was on *Acquiring Skills for Resilience* and was aimed at helping the youngsters face societal pressures such as premature sex and substance abuse, and acquire skills in communication and presentation.

As part of their five-day activities they participated in programmes that use nature therapy. Activities involved helping out in the wetland and garden and taking part in green exercise. They were led by Martin Varley, Robin Hanson and Lucina Denis of Nature Seychelles.

"We were very happy to welcome the children to our nature therapy programme," says Martin Varley who, with Robin and Lucina, is implementing the European Union funded Greening Livelihoods programme. "The scouts activities fit in well with our programmes aimed at using nature to benefit people in the midst of social challenges."

Robin Hanson organised the children into three groups for the activities. Each group had a scout leader assigned to it. To ensure that everyone participated in all the activities planned for the day, each group took half an hour on an activity before moving on to the next.

The first activity had the children stripping bark off Casuarina poles to be used in the reserve and the garden. Stripping off the bark ensures that insects particularly termites do not destroy the poles.

The second activity took place at the Heritage Garden. After giving a tour of the garden, and describing the plants and their uses, Lucina organised for the children to turn over organic compost and to pot seedlings.
The last activity was all about fun. For this part, the children exercised in the outdoors using readily available materials such as logs.

So what was the mud about? Towards the end of the activities, Robin discovered a pond full of frog tadpoles that were in the wrong place. He decided to move them to one of the pools in the wetland that had just been dug up. The children happily joined in. Lucky for them, there was rain water to clean up with afterwards. All in all, it was a fun afternoon of learning and valuable work was done.

Photos: The nature therapy activities use nature to benefit people

Water for Birds

The Friends of the Flycatcher after school club based on La Digue has installed eight bird baths on the island for the benefit of the Seychelles Paradise Flycatcher (Veuve). The baths were set up at the Veuve Reserve, the La Digue School, the Flycatcher Lodge, Villa Veuve, and the Community Centre at La Passe.

Bird baths are man-made shallow pools from which birds can drink, bathe, preen or cool off. They are normally made in the form of a basin.

A source of water is as important to birds as is food. Apart from drinking, water also removes dust, loose feathers, parasites and other debris from a bird's plumage.

The Seychelles Paradise Flycatcher favours native Badamier (*Terminalia catappa)* and Takamaka (*Calophyllum innophylum)* dominated broad-leaved plateau woodland in proximity to wetland areas for its habitat.The wetlands and marshes are also important as breeding grounds for insects, which the birds eat.

"But in the dry season the marshes dry up. We have observed flycatchers going into people's gardens looking for water and sometimes they come down low to the ground to buckets of water to drink and wash. This places them in danger of drinking detergent and being caught by cats while on the ground," says Josiana Rose of the Seychelles National Parks Authority (SNPA), and the education officer at the Veuve Reserve.

"Provision of water baths for the flycatcher will give them safe and easy access to water for drinking and bathing during the dry season that persists for many months," she says.

Nature Seychelles and the SNPA and have been promoting the conservation of the Critically Endangered flycatcher through an advocacy and education project whose aim is to help protect the species in its stronghold on La Digue. The project is part of BirdLife International (Nature Seychelles is BirdLife Partner) Preventing Extinctions Programme and is supported by Viking Optical of the United Kingdom. It's under this partnership that the Friends of the Flycatcher was started at the school.

Although still in its infancy, the club has been involved in a number of activities including cleaning up the island on World Clean-up Day and planting trees in the Veuve Reserve.

The baths are made of fibre glass and stand up to four feet above the ground on a wooden base.

"We are right next to the Reserve and the birds come here to the Badamier and the Bread-fruit trees, so the birds will have somewhere to drink and preen," said Mr. Michel Madeleine the head teacher of the La Digue School after a bath had been installed there. The school is the custodian of the flycatcher club and to its credit it now has one of the most active clubs in La Digue.

At the Paradise Flycatcher Lodge, which takes its name after the bird, an excited Mrs. Lucy Ericksson, a tourist from Sweden, was honoured to be part of the installation. Mrs. Ericksson who is originally from Tanzania was visiting Seychelles on the occasion of her 30th wedding anniversary and was staying at the lodge when the club arrived for the activity. A primary school teacher back in Sweden she happily video-taped the installation for her students. "I am very lucky to be part of this," she said.

Photos: Below - filling up a bath with water Inset - Male Seychelles Paradise flycatcher (Jeff Watson)

Open Day Promotes Maritime Careers in Seychelles

The Maritime Training Centre (MTC) in September held an 'Open Day' Exhibition, which ran for a full week. The exhibition coincided with the World Maritime Day observed every year on 27 of September. Several partners of the MTC including Nature Seychelles participated. The aim of the exhibition, open to students from secondary schools as well as their career guidance teachers, parents of MTC trainees and the general public, was to showcase the link between training at the institution and job opportunities in the maritime and related industries

Addressing guests, partners and the media at the opening of the event, the Acting Director of MTC Mr. Brian Hoareau said the institution has been organizing open days for the general public since 2010, spurred on by the 'Go to Sea' campaign of the International Maritime Organization. The campaign encourages young people to take up careers at sea. The response from the partners and the students visiting, he said, has been very positive.

Nature Seychelles has taken part in all the open days at MTC. The organization has used the opportunity to recruit youngsters to work on Cousin Island Special Reserve, the terrestrial and marine reserve the organisation manages, and a significant number of its wardens in recent years has come from the training institute.

Nature Seychelles stand was manned by Christopher, a former student of MTC who is now Cousin warden. Many of the current students of the MTC, particularly in their final years have shown interest in conservation and tour guiding careers he said. He also gave out materials including books, posters and magazines to sensitise the public on the environment and its conservation.

Demand for trained mariners has seen an increase in the traditional setting of shipping and fisheries, especially as Seychelles has established itself as a strategic partner in both fisheries and international shipping, Mr. Hoareau said.

The training institution is also

getting ready for training in other areas including maritime tourism (sport fishing, yachting and sailing), sustainable development, food security and nutrition especially as fish is a key source of protein, and mari-culture.

Photos: Top - A number of Cousin wardens have come from the MTC. Inset - A guest picks up copies of Zwazo magazine at the Nature Seychelles stand

Curieuse about Cousin:
GVI's day out on a special reserve

Towards the end of 2012 Cousin Island Special Reserve played host to a group of international volunteers and staff from Global Vision International (GVI) working on Curieuse. The visits provided an opportunity for GVI to improve upon their knowledge of the flora and fauna that can be found on the various islands in Seychelles. Although geographically close, Curieuse and Cousin are extremely different from each other.

"To see an inner granitic island in its natural state with its flourishing wildlife was fantastic and inspiring for our continued conservation efforts on Curieuse," said Patrick Woods, GVI Expedition Staff.

GVI is an international volunteer organisation, which runs over 100 projects in 25 countries. It has been working in the Seychelles since 2004 under the invitation of the Seychelles National Parks Authority, contributing towards a long term coral reef monitoring programme as part of a response to the 1998 global bleaching event.

In 2009 GVI extended the monitoring programme to include the Curieuse Island National Park adding Coco de Mer census and turtle nesting surveys to the programme. The GVI Curieuse expedition has since developed further to include mangrove surveys, giant tortoise census work and an ambitious project to become carbon neutral.

Cousin Island Special Reserve was established in the 1960s to save the critically endangered Seychelles warbler and is now home to several endangered species. It runs world class conservation programs and is an ecotourism site of worldwide renown.

The visits began with the legendary boat landing onto Cousin beaches.

"We moored our boat offshore and waited for the Cousin team to pick us up. We had heard about the beach landing technique used to get passengers onto shore and it certainly didn't disappoint," said the volunteers.

"As soon as we stepped onto the island we were greeted by tropic birds and fairy terns... we even spotted a small pod of dolphins just off the beach! Magical!"

The GVI staff said they were struck by the diversity and numbers of birds present on the island. They were also fortunate to be on the island during the height of the Hawksbill turtle nesting season.

"We have been monitoring turtle population on Curieuse for some years and have read about the success story of Cousin but it was still a shock to see 6 turtles on one small stretch of beach nesting at the same time. This really highlighted to me the importance of this relatively small island in global bird and turtle populations," said April Jasmine Burt, GVI Scientific Coordinator.

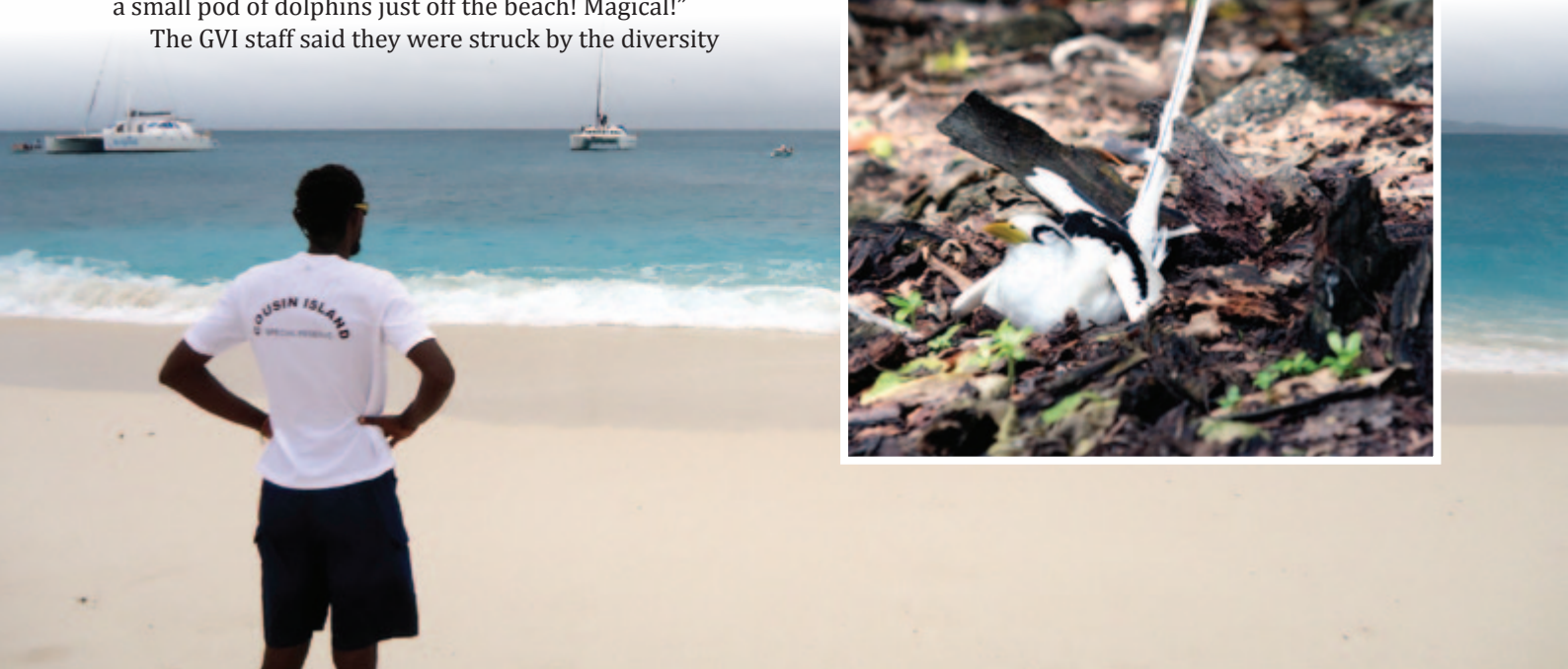
Tours around the island were led by the knowledgeable and fired up Cousin wardens whom the visitors said were engaging, passionate and shared an intimate knowledge of Cousin's wildlife through memorable stories and details.

"Our guide and island expert for the tour was Christopher and he certainly knew his stuff. He talked with enthusiasm on each topic and gave us a whole new understanding of the natural ecosystems and food webs found in the local area," they said.

GVI said it was fantastic to see Cousin achieving noticeable and defined results on the reserve.

"We hope through continued collaboration with the Cousin Island Reserve we can increase awareness of the research and conservation projects going on in the Seychelles."

Photos: Visits to Cousin are conducted by the wardens who have an intimate knowledge of the island's biodiversity (Carole Bennett) Inset - White-tailed Tropicbird (Alec Taylor)



Celebrating Nature's Protectors

Protected areas - parks, nature reserves, conservancies - are strongholds of biodiversity conservation. The protection of these special places often rests on the efforts of the men and women in the field: the rangers and wardens.

The term "ranger" first appeared in 12th century England to describe those employed to "range" through the royal forests, protecting the King's lands from poachers and maintaining law and order. Today, rangers continue this role in many areas around the world. In Seychelles, the equivalent of rangers are the wardens who work in nature reserves such as Cousin Island Special Reserve.

World Ranger Day was observed on July 31st. It honours and celebrates these hard-working, dedicated people. It is also a day to commemorate the rangers killed or injured in the line of duty. Being a ranger or park warden in some wilderness areas can be difficult, with exposure to harsh conditions and dangerous animals. In some places it can be deadly, with rangers coming face to face with trigger-happy commercial poachers and heavily armed rebels and drug smugglers.

The Thin Green Line Foundation, which provides support to rangers mostly in developing nations and conflict zones, says 1,000 rangers have lost their lives across the globe in the last 10 years. 70 lost their lives in 2012, says the World Conservation Union, IUCN.

"We salute all those rangers leading the battle to save biodiversity from extinction while risking their lives," says Eric Blais, Cousin Island Special Reserve Coordinator. "We realise how fortunate we are here in Seychelles because we are not faced with the same dangers and our work environment is safe."

The invaluable service provided by rangers whether in dangerous situations or not needs to be celebrated, says Blais, while commending the work done by Cousin Island Special Reserve wardens.

"They help to conserve biodiversity and to keep species out of danger for all of us. Supporting them ensures thriving protected areas and species," he says.

The warden's work has not gone unnoticed by visitors to the Island. This sampling of visitor comments bears witness to this.

"It is truly a beautiful island and congratulations on such wonderful work"

"It is very encouraging to see how seriously the Seychelles is about protecting their environment and the heritage of the world. Thanks to everyone who volunteers to work here"

"It is good to see the careful conservation of biodiversity that we have all read about before we came"

Photos: Cousin wardens help to conserve the island's biodiversity (Carole Bennett)

Seychelles Ocean One of the Healthiest

Seychelles and Germany have the fourth healthiest seas according to the Ocean Health Index, a comprehensive new measure that scores ocean health. The index announced in August 2012 scored Seychelles at 73 out of 100 (in a tie with Germany) against a world average of 60. The US-owned Jarvis Island in the Pacific, the USA Pacific Uninhabited Territories and Clipperton Island owned by France top the list of the 171 countries and territories measured.

An international team of scientists conducted this first comprehensive assessment of the ocean and its ecosystems, which was published in the August 15, 2012 issue of the prestigious journal *Nature*. A collaboration of 30 universities, non-profit organisations and government agencies pulled together data on the current status and likely future conditions of the oceans.

Developed countries generally did better than developing countries and only 5% of countries scored higher than 70, whereas 32% scored lower than 50.

The index measures ocean health in terms of the benefits from the ocean, organized as 10 goals that are enjoyed by people in a sustainable way. These are Food Provision, Artisanal Fishing Opportunities, Natural Products, Carbon Storage, Coastal Protection, Coastal Livelihoods and Economies, Tourism and Recreation, Sense of Place, Clean Waters and Biodiversity. Each country's overall score is the average of its 10 goal scores.

The tourism and recreation goal for example measures the number of tourists, their length of stay, and the sustainability of tourism in coastal areas while the Artisanal Fishing Opportunities goal measures whether people who need to fish on a small, local scale have the opportunity to do so. The biodiversity goal estimates how successfully the richness and variety of marine life is being maintained around the world.

The index provides a powerful tool to raise public awareness, direct resource management, improve policy and prioritize scientific research.

"The ocean plays a critical role in supporting human well-being, from providing food, livelihoods and recreational opportunities to regulating the global climate. Sustainable management aimed at maintaining the flow of a broad range of benefits from the ocean requires a comprehensive and quantitative method to measure and monitor the health of coupled human-ocean systems."

Below is the Global and Seychelles scores for each of the goals below.

	Global	**Seychelles**
Food Provision	24	12
Artisanal Fishing Opportunities	87	89
Natural Products	40	83
Carbon Storage	75	100
Coastal Protection	73	84
Livelihoods & Economies	72	92
Tourism & Recreation	10	55
Sense of Place	55	55
Clean Waters	78	72
Biodiversity	83	86
Total average score	**60**	**73**

Photo: The ocean around Seychelles is one of the healthiest (Alec Taylor)

Regional Partnership Launched to Stop Illegal Fishing

A major regional partnership has been announced to help combat illegal fishing in the western Indian Ocean, which is causing serious economic losses as well as social and environmental problems for coastal states.

The partnership, FISH-i Africa, launched by the Stop Illegal Fishing (SIF) working group of the New Partnership for Africa's Development (NEPAD), had its kick-off meetingin Seychelles on Thursday 13th of December 2012 at the Coral Strand Hotel at Beau Vallon, ending on Friday 14th of December 2012. With technical and financial support from the Pew Environment Group, the project will also involve cooperation with regional bodies such as the Indian Ocean Tuna Commission (IOTC) and the Indian Ocean Commission (IOC) through its SmartFish programme on illegal fishing.

FISH-i Africa intends to build cooperation, information-sharing and analytical systems between the key Southeast African coastal states of Comoros, Kenya, Mozambique, Seychelles and the United Republic of Tanzania.

The partner countries have committed to establish a platform for real-time sharing of sometimes sensitive data on vessels, their movements, catch and owners, aimed at enabling nations to take timely action against suspected illegal operators.

Seychelles Minister for Natural Resources and Industry Peter Sinon, who opened the project's inaugural meeting of fisheries officials and agencies, said: "Africa sits in the middle of very important and fragile oceans. We can no longer tolerate illegal fishing. We have to ensure this finite resource is passed on to future generations, and we have the jurisdiction to act now".

As a 'live' example of the new engagement, Minister Sinon said Seychelles was actively sharing information with Mozambique in the case of the Spanish-owned tuna vessel Txori Argi, which was fined Euros 1.2 million earlier this year by a Maputo court for allegedly fishing without a license in Mozambique's Exclusive Economic Zone (EEZ). Mozambican officials allege the bank bond put up for the penalty has not been honored.

Other possible areas of cooperation include sharing of legal and analytical expertise to pursue fishery and related crimes such as fraud, tax evasion and money-laundering. Delegates stressed the need for such expertise in tracing the real owners of some fishing vessels, often obscured by complex corporate structures registered in distant third-party countries. FISH-i will also bring ever-more accessible technology to assist in this work.

Stop Illegal Fishing (SIF) spokesman Mark Ssemakula stated that "In 2010, 33 African States at the Conference of African Ministers, Fisheries and Aquaculture (CAMFA) agreed on the need for urgent actions to deter and eradicate IUU fishing. FISH-i Africa brings a practical response to these recommendations. It provides a smart system for countries to work together to target their actions at those destroying our resources and not playing by the rules we set".

The project to set up the FISH-i system will work for approximately 12 months, but, if successful, it is hoped the model can be extended and even replicated in other coastal African regions.

Nirmal Shah

e-Atlas of the World's Marine IBAs Launched

An interactive atlas, which will help in the worldwide conservation of seabirds and other marine species has been launched. BirdLife International (Nature Seychelles is BirdLife Partner) launched the e-Atlas of Marine Important Bird Areas - the first global inventory of important sites for the conservation of migratory marine species - at the Eleventh Conference of the Parties (COP11) to the Convention on Biological Diversity (CBD), in Hyderabad, India, on 16 October 2012.

Seabirds are now the most threatened group of birds. They present unique conservation problems, since many species travel thousands of kilometres across international waters and multiple Exclusive Economic Zones, and only returning to land to breed.

"Given the vast distances they cover, the long periods they spend at sea and the multiple threats they face there, identifying a network of priority sites for their conservation is vital to ensure their future survival", said Ben Lascelles, BirdLife's Global Marine Important Bird Areas (IBA) Coordinator.

In Seychelles, it will help in the identification and creation of marine Important Bird Areas.

"Seychelles has globally significant colonies of seabirds, but like in many areas they face considerable challenges," says Nirmal Shah, Nature Seychelles' Chief Executive.

"In 2011, we signed a grant agreement to carry out activities that will lead to the identification of marine IBAs as part of a Global Environment Facility (GEF) financed project. The results are expected to feed into Seychelles' ongoing process to review and augment its protected area system, and are crucial to the conservation of marine species in general."

The e-Atlas covers 3,000 Important Bird Areas worldwide. It is the result of six years of effort that, to date, has involved around 40 BirdLife Partners, with the world's leading seabird scientists from inside and outside the BirdLife Partnership, in collaboration with government departments of conservation, environment and fisheries, and the secretariats of several international conventions.

Like a Google Map, the e-atlas will be dynamically updated as new sites are identified and new data about them become available. It will be linked to other BirdLife data resources, including BirdLife's species accounts, IBA fact sheets and State of the World's Birds case studies.

The atlas also provides a model for inventories of areas of conservation importance for other mobile marine species, such as whales, turtles and sharks.

Photo: Lesser noddies are some of the migratory seabirds that nest in Seychelles (Martijn Hammers)

Who Ate Nature's Cake?

By Martin Varley

I love cake. One of life's great pleasures is a visit to a baker's and to gaze longingly at the delicious freshly make breads, cakes and buns on display. Although it would be nice just to be able reach over the counter, grab a handful of croissants and shove them in my mouth, I know that to enjoy the pleasures of the pastries there is a trade: I have to part with my money, if I want to enjoy the sweet sensation of that strawberry cheesecake.

Well, nature is like a baker's. By saying that I don't mean that next time you go for a walk on the beach look out for loaves of bread hanging from takamaka trees. What I mean is that in the same way that bakers provide services we need to live, so does nature.

Plants counteract climate change by capturing CO2, wetlands purify water flowing into lakes and streams, forests soak up rain reducing the risk of flooding, worms turn waste into life-giving soil, mangroves protect coasts from storms, microbes in the sea produce half the oxygen we breath, nature is behind 9 of our top 10 medicines, over 100,000 different animal species, including bats, bees, flies, moths, beetles, birds, and butterflies, provide free pollination services and landscapes brings beauty to our lives and increases property values.

Nature's window display is vast. The problem is that we take nature's goods without paying, shoplifting her bounty. We think we can take nature's resources without any cost. If you walk into a baker's, scoop up all the bread into a bag and walk out of the door without paying, and keep on doing that, the baker will soon go out of business. Not only that but other people will go hungry. Unfortunately, this is what is happening with our environment. We are slowly bankrupting nature and denying others her goods at the same time.

Although most of us would never dream of stealing a loaf of bread, every day nature's shelves are getting emptier. Every year we lose about 35 million hectares of native forest, that's an area the size of Nepal, each hour three species of plants, animals and other living things vanish forever and 20% of the world's coral reefs have been lost, along with a third of the world's mangroves and half of the world wetlands.

The trouble with valuing nature is that unlike a chocolate cake or a bread roll, it is hard to put a price tag on a tree, a bird, or a walk on the beach. However, as we understand more about the crucial links between our environment and human survival, so efforts are now being made to make the value of nature more apparent. One such study is The Economics of Ecosystems and Biodiversity, an international initiative to draw attention to the global economic benefits of biodiversity. Its objective is to highlight the growing cost of biodiversity loss and to draw together expertise from the fields of science, economics and policy to enable practical actions. According to study the cost of biodiversity and ecosystem damage will reach 18% of global economic output by 2050 and currently stands at over US$2T/year.

Nowhere is the cost of stripping nature's shelves of its life giving good more apparent than in climate change. 2012 was a year of climate extremes with devastating droughts in the USA (where 2012 was the hottest year on record), Brazil and the Sahel and floods in Brazil, China, Australia, Bangladesh, Rwanda and the Philippines. For the first time scientists attributed the increasingly frequent occurrence of extreme events with manmade climate change. There is no such thing as a free lunch in nature. By emptying nature shelves of her goods without recognising that business rules apply to nature as much as they do to bakers, we have not only exacerbated climate change, but also stripped nature of the very resources that could have mitigated these extreme events.

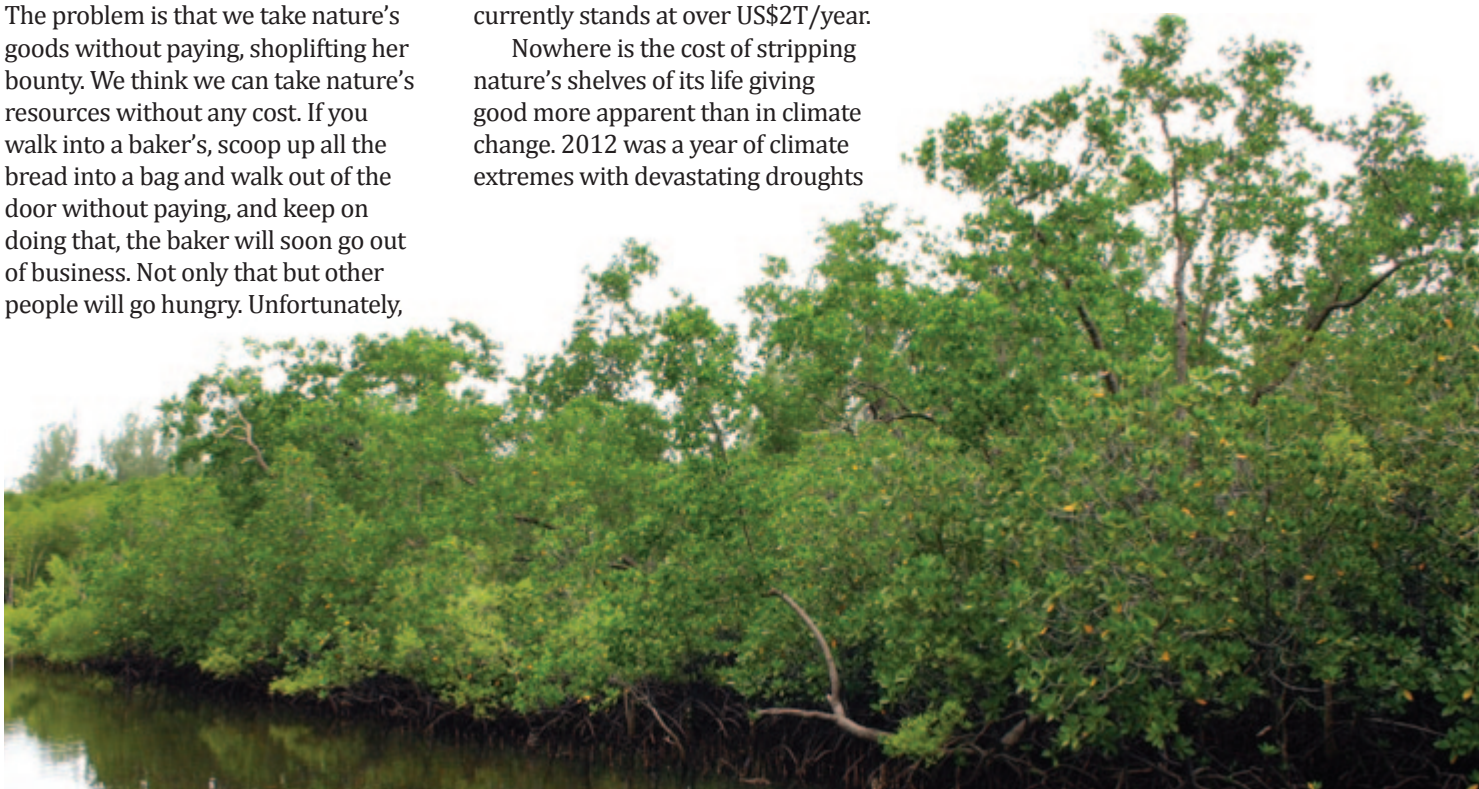
The need to account for natural capital in global economic systems is now more pressing than ever. We can have our cake and eat it as long as we pay a fair price for it.

More information on natural capital and ecosystem services can be found here:

The Economics of Ecosystems and Biodiversity - www.teebweb.org
The Natural Capital Project - www.naturalcapitalproject.org
The Intergovernmental Platform on Biodiversity and Ecosystems Services www.ipbes.net

Martin Varley is Nature Seychelles' Projects Coordinator

Photo: Mangroves protect coasts (Paul Leader Willams)



The Cost of a Special Reserve:

Sticker shock or value for money?

By Nirmal Shah

"The entry fee for Cousin Island is too high", grumbled a tourism operator on Praslin recently. This has been his pet grouse for many years, yet independent surveys have shown that 90 percent of the visitors are satisfied with the price. I suppose he wants a bigger cut from the tourists he brings to this outstanding and award winning Special Reserve.

First, I explained to him we don't charge entry fees but rather user fees. There is a difference – visitors to Cousin island Special Reserve use the various services we put at their disposal including boat landings and guiding, as well as the "product", one of the best examples of a wild and wonderful Seychelles. But more importantly, we have calculated some of the environmental values of this incredible and unique protected area as well as the costs of maintaining and improving them. And, we charge accordingly.

We want people to understand that Cousin is not an ordinary island. It's taken 40 years of hard work and millions of Rupees to transform Cousin from a coconut plantation to what BirdLife International calls "one of the world's great conservation success stories". Surely, only that is enough to place an enormous value on the Reserve. Cousin's overall importance is based on what environmental economists call ecological, scientific, option and existence values.

The ecological and scientific values of Cousin are so high that the renowned science magazine New Scientist described Cousin as "priceless" recently. The Reserve is also one of the clearest examples of what an option value is. Forty years ago the value perception of the island was extremely different to what it is today. At the time when the coconut was king and copra dominated the economy, no one in Seychelles could have predicted that 40 years later conservation would be more sustainable, more equitable and more valuable than coconut plantations.

Eco Tourism on Cousin began in 1972. However it is only recently that it has been developed as a tool for sustainable financing of conservation. The financial flows from Cousin to conservation in general in Seychelles have been important. For example, Cousin revenues have been used for over a decade to support a national youth and grass roots organisation, the WildLife Clubs of Seychelles.

The benefits to surrounding communities and private sector are also impressive. Tourism to Cousin is serviced by Seychellois-owned travel agencies, and several other local small to medium sized operators and charter boat businesses based on Praslin. The employees of these businesses are in the majority all Seychellois. Apart from the landing fees collected by Cousin management, foreign and local currencies are generated by the local

Photos: Top: Visitors arrive on Cousin. Below left - Tourists admire a giant tortoise (James Luxton) Right - Seychelles Magpie Robin (Herve Chelle)

private sector every year from Cousin-based tourism activities through direct and indirect revenues.

And we know that communities and businesses understand the importance of Cousin. We know this because poaching of the much-desired resources is very low compared to other protected areas nearby. In addition, poachers may not feel comfortable about entering an area containing tourism activity.

So, if I come back to the example of the grumpy old tourism operator on Praslin, the justification and raison d'être for making tourists pay to enjoy Cousin is not only domestic but also global. Although Cousin provides multiple domestic economic benefits, other benefits accrue globally, especially ecological, scientific, option and existence values. This presents a strong justification for some of the costs of conserving Cousin and the Seychelles environment in general being borne by the global community. The maintenance of a world class reserve and the resulting high value visitor experience is a perfect fit with the Government's policy to maintain an up-market image of the tourism product. In the words of Alain St. Ange, Seychelles Minister for Tourism, "Cousin is a jewel in our crown."

Save a Bird and Get Development: Calculating Environmental Values

Environmental economists distinguish between the value people derive from directly (or indirectly) using an environmental good or service, and the value derived from ensuring we have the option to use it later. A third distinction is the value gained from simply knowing that a resource - for example, an endangered species - exists.

Two approaches have been used to calculate these values in terms of money. The first is based on the notion that the type of purchases people make are based on their personal preferences, so purchasing habits can reveal what is most valued. Ecosystem services may not have a market as such, but proxy markets can be examined instead. For example, in valuing biodiversity, ecotourism can demonstrate what people will pay to see species in their natural habitats. A 1998 World Trade Organization report revealed that the ecotourism market was worth about US$90 billion a year, and rising. If no proxy markets exist, surveys and questionnaires can be used to estimate people's 'willingness-to-pay' for ecosystem services.

Dr. Nirmal Shah is Nature Seychelles Chief Executive
Twitter: @cousinisland

Adding Value: Replacing Coconuts with Conservation

Cousin's conservation history began in 1959 when Dr. J. H. Crook visited Cousin in 1959. His discovery that the Seychelles Warbler population which was confined to Cousin had been reduced to less than 30 birds prompted him to recommend turning the island into a nature reserve.

Cousin at the time had been cleared of its native vegetation and planted wall to wall with coconuts. Pigs, chickens and cattle had been introduced. An annual crop of up to 6,000 Wedge-tailed Shearwater (*Puffinus pacificus*, Fouke in Creole) chicks were taken for food. By the early 1960's the island yielded only 13 tons of copra annually. About 4,000 fouke, tobacco, salted fish, turtles, pigs and poultry were still taken off the island every year.

In 1968 after 7 years of discussions the International Council for Bird Preservation (ICBP), now BirdLife International, purchased the island for what seems like petty cash today - 16,452 GBP. Soon after, the Seychelles Government designated the island as a Nature Reserve under the Wild Animals and Birds Protection Act and in 1975, Cousin was designated a Special Reserve. This included the marine area up to 400m beyond the High Water Mark.

Cousin has been transformed into a thriving native woodland. The numbers of nesting hawksbill turtles have increased 8 times since 1972 making it the most important nesting site for this species in the Western Indian Ocean. There has been successful translocation of Seychelles Warblers from Cousin to several other islands, and of Seychelles Fodies from Cousin to Denis. To save the Magpie robin which was at the time on the brink of extinction, BirdLife translocated the bird from Fregate to Cousin, the first time a translocation of this species had been tried. Today Cousin has almost 50 Magpie robins - the second most important population. The Reserve hosts seven species of nesting seabirds, 5 species of endemic birds and 7 species of endemic reptiles. It is one of the few places free of introduced predators like cats and rats. Research has showed that the Reserve's reefs are very well protected resulting in a diverse and abundant fish fauna, especially of fish targeted by local fishers.

Promoting Payments of Ecosystem Services in the WIO

By Caroline Wanjiru

Market based Payments for Ecosystem Services (PES) is gaining momentum as a conservation tool in which land owner also called 'service provider' is compensated for the services his land provide. This is a voluntary transaction, whereby, PES provides financial incentives for conservation and in return, the providers of ecosystems services are contractually obliged to undertake land use practices that will ensure continued supply of ecosystem services.

PES should be distinguished from Climate Compatible Development or CCD in short. CCD seeks to minimise the harm caused by climate impacts, while maximising the many human development opportunities presented by transitions to a low-emissions, more resilient future. PES schemes are commonly seen as the 'silver-bullet' for achieving climate compatible development – that is benefits in climate change adaptation, mitigation and sustainable development.

Achieving CCD through PES in Kenya

In Kenya, carbon markets, biodiversity premiums and other PES schemes have created new opportunities for achieving climate compatible development. As the total number and diversity of PES projects continue to increase, there remains scant evidence on the fiscal and regulatory mechanisms required to deliver the incentives and governance conditions needed to support the establishment and operation of these emerging markets for PES, or indeed the expected benefits for both climate change (adaptation and mitigation) and development.

Already, Kenya has a number of policies and programmes to ensure the health and wellbeing of its citizens and the environment. The policies that specifically touch on coastal zones are contained in a number of policy documents, including National Climate Change Response Strategy, Vision 2030, and other environmental policy documents. In most of these policy documents, the limitations of knowledge, capacity, and financing mechanisms are noted.

The Meeting

It is in view of this that the Kenya Marine and Fisheries Research Institute (KMFRI) organized a regional workshop on PES and Climate Compatible development aimed at identifying the conflicts and deficiencies of, and possible solutions to the existing environmental policy associated with PES and climate compatible development in November 2012. The meeting was supported by the East African Forum for Payment for Ecosystem Services (EAFPES) and iCoast project both of which are posted at KMFRI

EAFPES is a regional forum that strives to enhance the transfer of knowledge and expertise on PES in the Western Indian Ocean region. It is funded by Ecosystems Services for Poverty Alleviation (ESPA) through Natural Environment Research Council, of the UK government. iCoast is a new research project funded by Climate and Development Knowledge Network (CDKN). It seeks to better understand how management of coastal ecosystems may be able to support climate compatible development (CCD) through applying the right policy and regulatory framework.

The objectives of the meeting were to review the major environmental policies in Kenya, with respect to the opportunities or conflicts they provide for enabling PES and climate compatible development; prepare a road map on how to incorporate PES into environmental policies; introduce EAFPES as an important vehicle to promote PES in the region and to officially launch the iCoast project.

The workshop was attended by a range of experts in natural resource management, policy planning, community group representatives, NGOs, research groups, government agencies and the private sector. A common theme from all these groups was the need to understand the potential market mechanisms such as PES has to support sustainable development in the coastal region.

During day 1 of the workshop, participants were drawn to spirited discussions on theoretical concepts of PES and climate compatible development in Kenya and abroad. Day 2 focused on identifying challenges and opportunities for implementing PES and climate compatible development in tropical coastal areas. Groups provided good insight into the enabling institutional and policy environment in Kenya's coasts and steps forward were suggested to support more wide scale adoption of climate compatible development and PES schemes in the region.

Caroline Wanjiru is the Executive Secretary of the East African Forum for Payments of Ecosystem Service (EAFPES)

Photo: Dhows in Shela, Lamu (Conservation Concepts via Flickr.com. Creative Commons Attribution 2.0 Generic)

The Cost of Conservation:

US$80 billion a year needed to save nature

By Martin Fowlie

An international team of authors led by scientists from BirdLife International and the RSPB (BirdLife in the UK) have produced the first authoritative information on the financial costs of saving threatened species and protecting key sites for conservation. The team used data for birds – the best known class of organisms – to estimate the costs of meeting conservation targets for all nature.

The information is contained in the paper, *Financial Costs of Meeting Two Global Biodiversity Conservation Targets: Current Spending and Unmet Needs*, published in the journal Science.

It provides hard figures estimating the investments needed to reduce the extinction risk for all known threatened species at US$4 billion annually, with a further US$76 billion needed each year to protect and effectively manage terrestrial sites of global conservation significance.

This shows that a substantial increase in investment in conservation is urgently required.

The cost of reducing the extinction risk of all globally threatened bird species (enough to show improvement by one category on the IUCN Red List) is estimated at US$0.88-1.23 billion annually over the next decade. Just 12% of this funding is currently provided.

Using data on the relative costs for other types of animals and plants, the team estimated that preventing human-driven extinction and improving the status of all animal and plant species known to be globally threatened would cost US$3.41-$4.76 billion annually.

To assess the costs of safeguarding sites, the authors examined terrestrial sites of global conservation significance for birds (the 11,731 Important Bird Areas [IBAs] identified by BirdLife). IBAs represent the largest systematically identified global network of important sites for biodiversity (not just birds), but only 28% are completely covered by existing protected areas. Effectively managing these already-protected sites would cost US$7.2 billion each year.

Expanding protection and effective management to the remaining IBAs increases the total to $57.8 billion per year. These additional protected areas would increase the proportion of the world's land surface covered by protected areas to just over 17%, the threshold governments have committed to in the Aichi Targets.

Globally important sites have also been systematically identified for mammals, amphibians and some reptile, fish, plant and invertebrate groups in a number of countries. Of these sites, 71% already qualify as IBAs. Assuming this relationship holds worldwide, the costs of protecting and effectively managing a global network of sites for nature more broadly is estimated to be US$76.1 billion annually.

"The shortfalls we have identified highlight a clear and urgent need to scale up investment in biodiversity conservation substantially", said the paper's lead author, Donal McCarthy, Environmental Economist at BirdLife International and the RSPB. "But the total costs are very small relative to the likely costs of inaction. The total is just 1-4% of the net value of ecosystem services being lost annually, for which estimates range from $2 to $6.6 trillion. More prosaically, the total required is less than 20% of annual global consumer spending on soft drinks."

"The total sums may sound large, but these are investments, not bills – saving nature makes economic sense because of the payback in terms of services and benefits that people receive in return, from mitigating climate change to pollinating crops", said Dr Stuart Butchart, BirdLife International's Global Research Coordinator.

The analysis, funded by the Cambridge Conservation Initiative Collaborative Fund for Conservation and Arcadia, provides a sound basis for resolving the discussions among governments on the finance needed to implement the CBD Strategic Plan for Biodiversity up to 2020. A particular challenge will be how to address the current mismatch between the higher resources available in richer countries and the higher conservation needs in biodiversity-rich but financially poor countries.

"Resolving the on-going conservation funding crisis is urgent: the longer that investments in conservation are delayed, the more the costs will grow and the greater will be the difficulty of successfully meeting the targets", added Butchart.

Martin Fowlie is Communications Officer at BirdLife International.

Photo: The total required is less than 20% of annual global consumer spending on soft drinks

Priceless or Worthless?

By Nirmal Shah

Most people who come across earwigs think they are creepy and want to kill them immediately. But there is one earwig that no one in Seychelles has seen alive. The Seychelles Earwig is known from a specimen collected at Morne Blanc on Mahe Island.

The Seychelles Earwig, the Seychelles Sheath tailed bat (sousouri banan), and the Seychelles Moominia snail have been included among the 100 most endangered species in the world, in a report that was released by the Zoological Society of London (ZSL) at the IUCN World Conservation Congress.

The 100 species, from 48 different countries are first in line to disappear for ever if nothing is done. Part of the problem is that none of these species provide humans with obvious benefits. "The donor community and conservation movement are leaning increasingly towards a 'what can nature do for us' approach, where species and wild habitats are valued according to the services they provide for people," says Professor Jonathan Baillie, ZSL's director of conservation.

This has made it increasingly difficult for conservationists to protect the most threatened species on the planet. We have an important moral and ethical decision to make: Do these species have a right to survive or do we have a right to drive them to extinction?

The Seychelles Earwig, scientific name *Antisolabis seychellensis*, is a small, blackish insect measuring about 5 millimetres. It is found on the forest floor in leaf litter in the damp forest of Morne Blanc. The main threat is thought to be the degradation of the habitat by invasive trees, mostly cinnamon and zambrosa.

The Moominia snail, with the scientific name *Moominia willii* and named after the collector Joanna Willi, is a land snail endemic to Seychelles. It has been found only on Silhouette Island at 350 metres altitude, where it is apparently restricted to two locations at Gratte Fesse spanning an area of about .02 km^2. It lives in the leaf axils of the endemic Pandanus tree, *Pandanus hornei*. It seems that habitat destruction is a big problem because of its extremely restricted habitat.

The Seychelles Sheath-tailed bat, scientific name *Coleura seychellensis* and known locally as sousouri banan is the rarest bat in the world with only 30 to100 individuals left. Once common, it went into a massive decline during the 20th century. Studies and monitoring by Nature Seychelles, British Universities and the Ministry of Environment show that populations on Praslin and La Digue Islands have disappeared. But two previously unknown roosts were discovered on Mahe Island, which along with Silhouette Island are the only sites harbouring the bat.

The bat prefers feeding in coastal areas where there are mature trees. But habitat destruction, disturbance of the roosting sites and pesticides are the main dangers. Rapid development, especially tourism, threaten the coastal areas of Mahe. Roost sites and feeding areas must be urgently protected otherwise this species will become extinct.

Nature Seychelles has been monitoring the roosting areas of the sheath tailed bat on Mahe for several years. But we had to stop about two years ago because we ran out of resources to continue. All efforts to raise funds to continue the monitoring have failed. Its a sorry state of affairs.

I believe there are many other Seychelles animals that are so endangered they belong on this list. One of my personal favorites is Philibert's Leopard Butterfly - *Phalanta philiberti* - a beautiful butterfly species endemic to Seychelles which experts think could have became extinct in the 1960's. I am convinced I saw one on North Island before the island was developed. This butterfly has no Creole name but large swarms had been recorded during the early 20th century. Populations apparently declined sometime in the mid 1960's. A solitary specimen was collected in 1953 but the species was not observed afterwards.

Seychelles has many species that are very little known and are probably on the brink of extinction. Nothing is being done because they have no monetary value. But they are part of our natural capital. As the song by Joe Samy, Seychellois singer/songwriter, goes "They must not die"

Dr. Nirmal Shah is Nature Seychelles Chief Executive
Twitter: @cousinisland

This article originally appeared in the authors blog:
www.theenvironmentinseychelles.blogspot.com

Photo: Seychelles Sheath tailed bat (Sinclair Lang)

Living off Nature

By Shaun Hurrell

On flat dusty clearings bordered by spindly trees in rural West Africa, women can be seen rolling out balls of what look (and smell) like large mammal droppings. They are processing seeds from the African locust bean tree to make a condiment called soumbala.

Making and selling soumbala, a stock seasoning for soups and sauces made from *Parkia biglobosa* seeds, is one of the few ways local people can make a living in rural Burkina Faso. Though not the most alluring of forest resource (it is fermented over a few days - hence the putrid odour), it shows that whatever nature provides has value to people.

But due to deforestation, the vital Parkia beans are in short supply. So through Naturama, BirdLife's Partner in Burkina Faso, local conservation groups have been encouraging sustainable use of such non-timber forest products in Parc National Kabore Tambi, which provides high densities of the trees that people need. These efforts are coupled with support for the local women, whose communities and livelihoods depend on this highly biodiverse Important Bird Area.

The soumbala sustainability project epitomises BirdLife's Local Empowerment Programme, an initiative that benefits local people whilst conserving nature. Since the 1990s, the BirdLife International Partnership has been working on the ground with local people at over 2,000 Important Bird Areas worldwide. From experiences with local communities whose lives are built around seasonal pools in forests in Cambodia, to sustainable harvesting of papyrus in Rwandan wetlands, to valuing ecosystem services in Nepal; a common theme has emerged: human wellbeing is intimately linked to the health of the world's ecosystems. This principle is recognised by the United Nations Millennium Development Goals (MDGs) which aim to eradicate extreme poverty by 2015.

But the goods and services that nature provides are important to everyone on this planet. Pollination of crops, soil formation, water purification, carbon storage, waste recycling, food, disease control, recreation… These are just a few of the services that healthy ecosystems provide to us for free, and that are being lost at an estimated cost of US$2 to $6.6 trillion a year. BirdLife campaigns passionately at international conferences (such as the UN Conference on Sustainable Development earlier this year) to have the value of nature written into international policy.

However, far away from supermarket aisles and online credit card payments, nowhere is human reliance on nature clearer than in the rural areas of less developed countries where people are most directly connected to their land. Projects from BirdLife's Local Empowerment Programme further illustrate this link.

Take for example northeast Cambodia. Scattered under the broad leaves of the Western Siem

Photos: Top: Weaving with papyrus in Rwanda Bottom: Nepal's rich biodiversity and its varied ecosystmes provide vital services and livelihoods for most poor people (David Thomas)

Pang forest, seasonal pools called trapaengs are central to the lives of people and are critical habitats for remaining wildlife in the area, including the critically endangered White-shouldered Ibis *Pseudibis davisoni*. Trapaengs are sources of water and fish for humans and birds alike, and provide a wealth of non-timber forest products. Since 2006 BirdLife has worked with local people to improve natural-resource management. Comprising local stakeholders with a common interest in protecting trapaengs (including former hunters in some cases), BirdLife in Indochina established a network of Local Conservation Groups (LCGs) who agreed a Trapaeng Management Protocol to protect the essential pools whilst meeting the needs of local people.

In one of the most densely populated areas of West Africa, a pocket of forest called Kilum-Ijim remains in northwest Cameroon. Last stronghold of Banded Wattle-eye *Platysteira laticincta*, the forest provides drinking water, firewood, food and medicine for the bordering neighbourhoods. In 1987, BirdLife initiated a project with the surrounding 35 communities to establish agreed forest boundaries, plan for suitable use of resources, improve agricultural practices and identify alternative sources of income. Both conservationists and communities wanted the forests maintained and the communities often suggested rules that were stronger than their project partners expected. Recent satellite imaging research has shown that since 1995 Kilim-Ijim forest has actually significantly regenerated.

BirdLife supported its Partner in Rwanda (ACNR) to develop a local cooperative to prevent the unsustainable exploitation of the highly biodiverse Nyabarongo wetlands. Now trained to rotate their harvest plots, members are able to reap regenerated papyrus which they weave into handicrafts such as baskets and ceiling panels for income.

When it comes to quantifying the value of nature, Nepal is leading the way. Bird Conservation Nepal (BCN, BirdLife Partner) has undertaken a nationwide assessment of ecosystem services at Important Bird Areas. One such place is Rara National Park, where BCN interviewed local people about the harvested wild goods, crops and water services provided by the park. They found that people in Rara have a high dependence on natural resources: for example pine needles are collected from the forest floor and used to improve the fertility and condition of the soil on people's farms.

Nature tourism is a highly valuable ecosystem service for countries all over the world and is increasingly being included in models of sustainable development in areas of high biodiversity importance. In Europe, a new BirdLife-led project is promoting sustainable birdwatching tourism throughout the Mediterranean basin, where many biodiverse areas recognised by the European Union are found. "Our belief is that birdwatching tourism is an ideal way of bringing sustainable development to Natura 2000 areas and Biosphere Reserves, maximising the benefits to local people and biodiversity, while minimising the negative impacts that tourism sometimes provides," said Cristina Sanchez, the Ornithological Tourism Project Leader and Director of SEO/BirdLife Catalunya.

Cousin Island in Seychelles is a superb model for sustainable tourism, whereby in 2010 Nature Seychelles (BirdLife Partner) celebrated the island becoming the world's first carbon neutral Nature Reserve: meaning each year 10,000 visitors bring revenue to the local area and have a clean environmental conscience.

Returning to Burkina Faso, people strongly opposed Parc National Kabore Tambi in the past, culminating in the shooting of a park ranger whose name the park now bears. Through BirdLife's soumbala project, Naturama has provided soumbala production kits and initial working capital for resident producers, allowing the doubling of weekly production and empowerment of women in the community. "I earn more money every month, which I use to take proper care of my children and to improve the quality of the food I buy," said one soumbala producer.

Today, the tangible socio-economic benefits seen in this Local Empowerment Programme project have generated strong support for conservation, and the neighbouring communities are already undertaking reforestation projects which will support not only the endangered flora and fauna found in the park, but all the natural resources that these people depend upon.

Shaun Hurrell is a Communications Assistant at BirdLife International

Photo - White-shouldered Ibis- just 250 thought to exist globally (Jonathan C Eames)

Nature's Prescription: A Regular Dose of Green

By Robin Hanson

A growing body of evidence is proving what many of us instinctively know. Being around nature, even looking at nature is good for us. What's really interesting and maybe slightly surprising is all the different ways nature and a healthy environment can be good for us.

At Nature Seychelles we are applying this evidence to create a number of innovative projects that between them improve people's health and happiness, act as part of a positive solution to social problems, and empower people to achieve the lives they want to live.

First some of that interesting evidence

A study examining recovery rates of patients who underwent gall bladder surgery found that those with a natural view recovered faster, spent less time in hospital, had better evaluation from nurses, required fewer painkillers and had less post-operative complications compared with those that viewed an urban scene (Ulrich,1984).

It is a very well established fact that exercise is good for us, not only for its obvious physical health benefits but also in terms of physiological wellbeing by relieving symptoms of anxiety, depression and by improving mood. However in many projects where there has been a trainer and the project finishes, participants often lose interest in the activities. Therefore a barrier to long term success can be one of motivation. Green spaces, being attractive places that can greatly enhance people's enjoyment of outdoor activity can prove motivational, increasing the chance of people carrying on practices (Tabbush and Obrien 2003).

Another study done by MIND showed that physical exercise has benefits but the environment we exercise in can has a significant effect on our well being too. Two groups did the same amount and intensity of exercise in the form of walking. One group was in a woodland the other in a shopping centre.

Those in the shopping centre expressed increased depression, compared to a reduction in depression from the green walk. 90% of participants expressed increased self-esteem compared to only 44% from the urban walk. The trend continues strongly favoring the green walk over the urban for reduction in feelings of anger, tension (the urban walkers tension increased).

Other participants of projects who have been doing activities in green spaces have described increased confidence and self esteem as well as a reduction in anxiety and depression.

The Projects

At Nature Seychelles we are delivering a number of projects all based on this body of evidence. Under the "Green Health Programme we are creating a number of very different opportunities for a broad range of people.

For Joe public, our Natural Yoga sessions take place in our beautiful purpose built centre overlooking a reclaimed area which is both a wetland and nature reserve. The sun shimmering on the surface of the water, the mountains hugged by low cloud or the stunning sunset skies are just some of the views that enhance the de-stressing, peace bringing aspect of the yoga sessions. Additionally, not only do people go away with the good feeling yoga can bring, they also go away knowing that the funds raised go towards other projects.

Our outside exercise session for orphans, runs once a week, utilizing our purpose built exercise equipment and natural materials, such as balance logs, tree ring stepping stones or even the natural space on the nature reserve where all this takes place. The sessions focus on health and fitness through play. But the evidence also shows that activities such as this taking place in natural settings increase a sense of well being, confidence and self-esteem, vital to our young people's healthy development and happiness.

We also run yoga and gardening sessions for out-patients from the local psychiatric ward. The sessions as already noted bring confidence, well being and self-esteem but also look to improve other issues. For instance some patients face very real challenges in day to day life that we take for granted, such as tying our own shoes, or being able to sit without becoming tired and fatigued due to over tight or under developed muscles. The sessions offer interesting and stimulating opportunities to address these and other issues, clients respond with enthusiasm, making good progress, increasing independence and gaining a better quality of life.

The other sessions we run are for clients from the Seychelles two drugs and alcohol treatment centres. Participants volunteer to come along to us at Nature Seychelles and choose between exercise, yoga, horticultural or conservation therapy sessions. Some choose to split their time between the different activities, reinforcing evidence that multi-activity based projects are better, offering more choice to meet a wider variety of interests.

The conservation therapy sessions are based on a model created by a leading UK rehab organisation. They find clients are often going through depression, anxiety, low self-esteem and low confidence, including reduced confidence in social interaction.

The projects not only offer vocational skills in the form of the horticulture and land management but also address these other issues, improving them significantly. The Seychelles clients seem to be enjoying the sessions, as previously said attendance is voluntary and it keeps on increasing and people keep coming back. The projects are going from strength to strength as more and more people reap the benefits.

We want to know how and why the project is so successful, to this end we have contracted an external consultant to investigate this question.

Robin Hanson is Nature Seychelles' Green Health Coordinator

Photos: Participants in the Green Health Programme choose between exercise, yoga, horticultural or conservation therapy sessions

Fishers Championing Conservation

Face off with Darrel Green

By Liz Mwambui

Fish plays an important role in the lives of Seychellois. A meal rarely goes without it and there are tens of ways to prepare fish. The per capita consumption of fish is said to be unparalleled in the world and provides the bulk of the country's protein. With its extensive seas - and about 1,000 species of fish in its waters - it's no wonder fishing in Seychelles is a valued economic activity.

Fish is also a main ingredient in the tourism mix, says Darrell Green, Chairperson of the Praslin Fishers Association. "No visitor comes here for the steak and chips," he says. What's more, visitors can eat fresh fish every day at the smaller restaurants and hotels, with the larger hotels able to replenish their stock fairly quickly.

As if on cue, during an interview with Green, a group of German tourists staying at a local guest house arrive to buy fish. On sale on that day are some impressive red snapper (*Lutjanus sebae*) locally known as Bourzwa and other species demonstrating just how good the fishing is.

But is the fish still abundant?

Green doesn't think that fish abundance has changed per se. "I would say that the fishing community has tended to fish on the same banks all the time. The fish on those banks has diminished," he says.

Green is also the Chair of the Praslin Fisheries Co-management Coordinating Committee (PFCCC). The committee has been set up to look into shared responsibilities for fisheries management off the islands of Praslin and La Digue. It brings together the government, fishers and other stakeholders including NGOs such as Nature Seychelles.

One of the key things the PFCCC has done is look into the fish stock. "If we don't, we won't know what we have and how sustainable the stock is," says Green.

Fishers are helping with data collection with regards to their catch and they've been equipped to do this. The exercise involves a cross-section of the local fishermen. Getting the fishers to collect this information builds their confidence in the data and exploits local knowledge. The committee has also experimented with fish sizing in Praslin. This is the practice of limiting the size of the species caught, where fishers were discouraged from catching small Bourzwa and Job fish. Most agreed to it.

The committee has been operational for just over a year and has had three major activities carried out, all funded by the UNDP-Global Environment Facility: the production of an education and awareness plan, defining the institutional set up of the PFA, and production of a species identification guide for the commonly fished species. The last of the activities will help to identify species by all the traditionally used names.

Changing times and diversifying

Fishing beyond the traditional banks was limited by the type of vessels and the equipment used. But this could slowly be changing. The disposable fleet is increasing, Green says, and more fishers are moving from the commonly used mini-mahes (small fibre glass boats) to schooners. These go beyond the traditional fishing areas and are fitted with modern equipment such as GPS, fish finders and depth sounders that improve the catch effort. Modernization of equipment for the artisanal fisher is still a challenge however, particularly with regards to access to capital and facilities for boat repair.

Artisanal fishing in Seychelles has traditionally been carried out for local consumption and targets certain species that are loved here. Green says there is a need to diversify to other species, for example to those that are prized by a different market - the local expatriate community.

"We could relieve the pressure on the locally preferred species by targeting the species that are abundant to the extreme to supply this market," he says, giving the example of the grey mullet, prized in many parts of the world but not commonly consumed in Seychelles, apart from when it's really bad weather and very hard fishing.

Access to fishing gear that would target other species like crabs, lobsters, and octopus to increase the variety of species targeted would also reduce impact on the traditionally fished species, he says.

Liz Mwambui is Nature Seychelles' Communication Manager.
Twitter: @naturesey

Photos: Fish is an important part of the Seychellois way of life

Pollinators: Linking Food Security and Conservation

By Dino J. Martins

One in three bites of food can be attributed to a pollinator. An overlooked 'ecosystem service', pollination, is essential to humanity. In Africa and surrounding islands, pollinators are primarily wild insects that travel between farms and natural habitat, and are extremely vulnerable to habitat loss and destruction. Pollinators intimately link wild species with basic human livelihoods.

The relationships between insects and flowers are ancient, beautifully intricate and correspondingly fragile. These relationships have co-evolved over millions of years and are important for the continued survival of about two-thirds of all flowering plant species.

Saving pollinators justifies conservation of small species-rich habitats, such as forest patches and contributes to food security and rural livelihoods of the communities living close to nature/alongside critically endangered species.

Pollinators can provide a very real and tangible connection between natural habitats, such as national parks and forest reserves, and daily human life, especially for rural subsistence farmers. It is in these rural communities that the daily battle against extinction is fought. It is here that a crucial constituency and awareness about pollinators and sustainable human livelihoods needs to be built.

Islands like the Seychelles are especially interesting for pollinator conservation as they contain many endemic or locally-adapted species and these adaptations include specialised pollination. Pollination systems on islands often include strange examples of different partners coming together as the effect of isolation, dispersal and juxtaposition of different opportunistic species is more pronounced on islands.

One of the most famous plants of the Seychelles is the Coco-de-Mer (*Lodoicea maldivica*). This strange and wonderful plant produces gigantic seeds that were once traded all across the Indian Ocean and highly prized items. The Coco-de-Mer is a kind of palm, and is an important species for

local birds, including the Seychelles Black Parrot, and endemic geckoes, chameleons and other species.

The Coco-de-Mer has separate male and female plants, and this means that a pollinator is required to transfer pollen from male flowers to female flowers so as produce fertilisation and produce new Coco-de-Mer fruits. Studies of the Coco-de-Mer on Praslin have revealed that many different insects and other animals are contributing to its pollination.

Stingless bees (native to the Seychelles) and introduced honeybees, long-legged flies, slugs and geckoes have been recorded visiting the male flowers and only geckoes, slugs and ants visiting the female flowers in a recent study (Blackmore et al., 2011). This study documented many different species interacting with and exploiting both the male and female flowers, but was not conclusive as to what species would be the most effective pollinator. This highlights how important it is to continue to study the basic biology of plants and pollinators in nature: we simply still don't know what the important pollinators are of many wild plants.

Among the pollinators, the insects stand out as one major group. Most wild plants are insect-pollinated, and they are especially important for crop pollination. In Africa wild insects pollinate crops like passion fruit, mango, coffee, papaya, eggplant, okra, cowpeas, pigeon peas, watermelons and pumpkins, and many others.

Natural habitats are disappearing fast all over the world. It is critical to prevent ecosystem services, such as pollination, from crashing. Preserving even small patches of habitat provides areas for wild pollinators to live in and then travel into farmland/cultivated areas to pollinate crops.

Saving small patches of habitat is a direct way of improving food security and alleviating poverty through increased yields. It is in the hands of rural farmers that the future of so many habitats sits. Farmers need to be engaged as partners in conservation. The beauty of pollination is that it really is where a strong and clear link can be drawn between human livelihoods, sustainability and protection of natural areas, and the myriad species they contain.

Dr. Dino J. Martins, an entomologist and evolutionary ecologist, is currently a postdoctoral fellow with the Stonybrook – Turkana Basin Institute and Chair of the Insect Committee, Nature Kenya.

Photo: A bee pollinating pigeon pea (Dino Martins)

Farming with Nature

By Jose Loustou Lalanne

Agriculture is sometimes seen only as an economic activity. The farm is a business and farmers have been labelled 'business men' and 'food producers'. Some practice agriculture in modified environments and rely on synthetic pesticides and chemical fertilisers in order to sustain production throughout the year. Whilst it is important to embrace technology in this sector, it is equally important to be in tune with nature.

Agriculture as a way of life, as cultural identity and as heritage is slowly losing ground. In days by gone when agriculture was our economic mainstay, farmers had formed some sort of ancient pact with nature. It was a way of life. The farm yard morning chorus was the alarm clock and the coconut palm was the tree of life. Food Sovereignty was not just a buzz word but part of our cultural identity where we ate what we produced.

The farmer who worked in partnership with the earth and saw his task as a noble vocation and not a mere business venture never despaired even when Mother Nature threw a few calamities his way.

This way of farming is about interacting with nature and observing its cycles, having better stewardship of the land, conserving biodiversity, enhancing sustainable agricultural production and improving livelihoods.

Sustainable farms are usually small and family run. They practice mixed farming where crops, livestock and trees are mixed in an integrated pattern that mimics natural biodiversity and thus reap the benefits of collaborating with nature.

It then becomes second nature for the farmer. No agricultural manual or farmer's almanac can replace indigenous knowledge. Interacting with nature reveals its strengths and efficiencies. These qualities are amplified to the farmer's advantage.

There are a few simple rules to farming with nature. Start small and keep costly external inputs to a minimum. There is no need for costly green houses at the onset.

Plant crops adapted to the soil type and micro climate. Remember that a litchi on the coast will never bear fruit.

Enrich the soil with farm yard manures, composts and organic mulches and let the soil build up its natural fertility. Practice good farm sanitation to keep pests and diseases at bay and use pesticides, preferably bio pesticides as a last resort.

Companion planting and intercropping short cycle crops with long term crops will maximise use of scarce agricultural land. Mixed cropping and crop rotation will also reduce the risk of disease and pest build up and also extend the farm's harvest.

A legume as a cover crop will help with nitrogen fixation and if incorporated in the soil will act as a green manure. Plant a wind break on the farm perimeter. Elephant grass, Agati and Cassie will not only provide a refuge for wild life but also fodder for farm livestock.

Save seeds and share with fellow farmers. Not only is it neighbourly but heirloom seeds help in preserving plant genetic resources. Terrace slopes on the contour line in order to limit soil erosion. Terracing is a way of increasing cultivable area on a slope and increasing soil moisture retention.

Make use of indigenous biomass like seaweed, coconut coir, leaf litter and other organic resources. Composted seaweed will provide many trace elements vital for healthy plant growth.

Practice minimal tillage where possible. After an initial tilling, direct seeding will allow the soil flora and fauna to aerate the soil naturally.

Use and conserve water resources wisely. Water is a finite resource and water reserves must not be polluted or wasted.

In these times of climate change with unpredictable weather patterns it is even more pressing and urgent to change the present agricultural model as we know it. There is no magic formula but if we keep nature in mind we have made a step in the right direction.

It has been said that sometimes the logic of nature collides with the logic of economics. In my mind the logic that always prevails is never in doubt.

Jose Loustau Lalanne started his career with the Ministry of Agriculture in 1983 but is presently retired

Photo: Rain water collection point at the Heritage Garden

Beneficial Insects of Seychelles: The Honey Bee

By Antoine Marie Moustache

The western or European honey bee (*Apis mellifera*) is a species of honey bee native to the continents of Europe, Asia, and Africa. Geographic isolation led to numerous adaptations as the honey bees spread. The Seychelles honey bee may be of an indigenous origin, however with the introduction throughout the 20th century of queens from Australia in particular, its indigenous traits would have been highly diluted.

Honey bees are prized for their dual role as pollinators and as producers of honey. Worldwide, *Apis mellifera* has been widely used for commercial pollination; the value of pollination goes into billions of dollars.

But honey bees can also teach us a thing or two about social organisation. A bee hive is made of three groups of bees - the queen, the workers (females) and drones (males).

The queen is the only fertile female and her job is to lay all the eggs from which the other bees are produced. She mates with drones, who are fewer than workers. The queen lays each egg in a cell prepared by the worker bees. The egg hatches into a small larva which is fed by nurse bees (worker bees that maintain the interior of the colony). After about a week, the larva is sealed up in its cell by the nurse bees and begins the pupal stage. After another week, it will emerge an adult bee.

Both workers and queens are fed royal jelly during the first three days of the larval stage. Then workers are switched to a diet of pollen and nectar or diluted honey, while those intended for queens will continue to receive royal jelly. Female worker bees clean the hive and feed the larvae and build combs. They also forage, collecting pollen and nectar from flowers. So typically the bees you see are the workers.

It is the nectar that makes honey, which is a clear liquid consisting of nearly 80% water, with complex sugars. Raw honey is stored in honeycombs to dry. Once dried, the cells of the honeycomb are sealed with beeswax (used in drugs, cosmetics, furniture polish and candles) to preserve the honey.

Although honey is highly prized, beekeepers in Seychelles are now few and scattered. The real buffs of this traditional activity have fizzled away mostly because old age has caught up with them and they have not been able subsequently to pass on their knowledge. It is thus not known for sure how many Seychellois still practice beekeeping.

Nonetheless, local honey fetches a good price on the local market probably because so little of it is produced in the face of such a huge demand. Government provided assistance to beekeepers in the early 1990s through an internationally assisted project targeting employment generation. Some 30 locals, mostly women, were trained and were provided with start up equipment and relevant funds. However the gains of this project were never sustained over time.

The honey bee's primary commercial value is as a pollinator of crops. They account for 80% of all insect pollination.

But as orchards and fields have grown larger; wild pollinators have dwindled. This is a global trend.

A decline of bees has been reported throughout the northern hemisphere due to disease with serious implications for agricluture, which translate into millions of dollars. Bees have also been affected by loss of habitat for foraging, and use of pesticides. If bees world-wide were to be struck by an incurable disease, it would mean that the existence of man and many other living species would be seriously threatened because it would mean both a major decrease in world food output and a decrease in food and non-food biodiversity.

In several areas of the world the pollination shortage is compensated by migratory beekeeping, with beekeepers supplying the hives during the crop bloom and moving them after bloom is complete.

Antoine Marie Moustache is the Special Advisor, Ministry for Natural Resources and Industry, Seychelles.

Photos: Top - Seychelles honey bee (Liz Mwambui) Below - Mr. Hoareau a Beekeeper checks on a hive installed at the Heriatge Garden.

Life Down Under

By Jose Loustou Lalanne

Most of us like a leisured stroll in the garden and take time out to admire the plants and wildlife and to contemplate nature in general. Anything above ground catches the eye. It is relaxing and peaceful.

A few centimetres underground, however, is a thriving community most are unaware of. In this world of microbes, nematodes, fungi, insects and earthworms a whole new world order is at work. Everything is geared to breaking down organic matter into humus which gives a good soil its rich dark colour. Humus makes the soil easier to cultivate, it increases its permeability and retention capacity for water and nutrients.

A chemical analysis of a soil will reveal its mineral content and capacity to provide nutrients for plant growth. This we sometimes refer to as soil fertility. This is only half the picture. For a farmer to have a productive soil and to ensure sustainable cropping he needs to sustain the organic matter levels of his soil. Some resort to using chemical fertilisers to top up any nutrient deficiencies, this however gradually kills off biological activity of the soil; few organic nutrients remain, leaving crops dependant on chemical fertilisers. In fact they become addicted. The soil then just becomes a medium for basically keeping plants upright.

The top soil or the 'O' horizon in scientific parlance is to be protected at all costs. Once it is depleted through over cultivation or lost directly from erosion it is difficult to recover. This is why slash and burn farmers move on to the next bit of forest for clearing. The dust bowl in the American prairies is a classic example of how a few centimetres of soil, or the loss of it, changed American history forever.

Here in Seychelles farmers cultivate two main soil types, the coralline sandy soil and the red soil. Both are inherently infertile and require generous amounts of manures, organic soil ameliorants and organic matter to keep continuous cropping viable.

The organic matter content of virgin soil is quite high but this is soon depleted once the ground is cleared for cultivation. The so called half life of organic matter in our soils has been calculated at three months, hence the need for periodic replenishment.

The soil is a dynamic medium where the microbe plays a pivotal role in breaking down organic matter so that plants can tap into the nutrients made available through a process called mineralisation. Earthworms are natural tillers and help to aerate a compact soil. The dreaded termites break down dead wood and other organic debris and the microbe breaks it down even further to make the nutrients available for plant uptake.

In fact soil microbes represent the whole of soil organisms to include Bacteria, fungi, algae, nematodes, earthworms and some with funny names like Actinomycetes, Protozoa and Arthropods.

Bacteria are by far the most numerous. In a handful of soil millions of these tiny one celled creatures thrive. They release plant growth hormones and some even detox the soil and act as a buffer against toxic residues.

Fungi produce plant hormones and antibiotics that enhance root growth and aid in disease suppression.

Actinomycetes are responsible for the sweet earthy smell one notices whenever we dig into fresh fertile soil.

Protozoa feed on and digest bacteria in the soil thus speeding up the cycling of nitrogen making it more available to the plant.

Nematodes are abundant in most soils and only a few like the root knot nematode are harmful to plants.

Arthropods are the millipedes and other bugs. Together with earthworms they are known as the primary decomposers.

In the cycles of transformation of elements in nature, soil microbes play an important, if not leading role. They keep in constant circulation the elements that are most essential for plant and animal life. The Carbon and Nitrogen cycles aptly demonstrate how everything is returned to the soil to be processed by microbes, including us.

Were it not for them, life as we know it would cease to exist.

Photos: Soils in Seychelles require organic debris and microbes to make them fertile.

Jose Loustau Lalanne started his career with the Ministry of Agriculture in 1983 but is presently retired

Wildlife Photography: Re-connect with your Inner Being

By Peter Chadwick

We have lost the connection with our soul and the peace of our inner being! In my mind, this is because we have made our lives way too complicated: up early in the morning to speed to work, dodging people that ignore road rules, only to get to the office where we are bombarded by hundreds of "urgent" emails, attending countless meetings where everything is a "priority" and must be dealt with immediately, thereby leaving little time to actually get done what is truly important!

Finally, when the day's graft does end, we journey home via frustrating bumper-to-bumper rush hour traffic to collapse in a pile of total exhaustion. By following this maddening routine day in day out, we end up becoming our own worst enemies by not making the time to "stop and smell the roses" and give ourselves a chance to relieve the stresses built up by our lifestyles.

For me, this is why wildlife and outdoor photography is such an enticing activity and is definitely the key to my own sanity. Through picking up a camera, we have an opportunity to express ourselves by capturing a moment in time that is being offered by Mother Nature's palette.

No two seconds are ever the same and each of us has such a different view of this world that we can constantly come up with something that is different and unique. The more time we spend photographing, the more that we are able to connect with our inner-being and are able to free our soul and truly find out who we are. The results of our efforts, having been captured on camera then make us realise the importance of nature and understand that we need to conserve it - if for nothing else than our own well being.

Outdoor photography also forces us into the outdoors where fresh air again fills our lungs, helping us to slow down. Once this initial slowing down has started, our brain clears and begins to focus on finding the beauty of this fragile world that we live in and we start enjoying the peace and tranquility that also comes with the outdoors.

We start picking up the subtleties in the way that light falls on a subject or we focus on the unusual behavior of an animal or bird. Ultimately, we learn more about the world that we live in. Soon we are addicted and schedule time in our busy lives to take a break.

With the advances in technology, photography has become easily accessible to more and more people and it has been amazing to watch the boom in the number of wildlife and outdoor photographers. Sadly, many believe that you must have the biggest and most expensive camera on the market to become an outdoor and wildlife photographer.

Sure, equipment does help but these days you can take amazing photographs with your smart phones and a great image comes from the vision of the person who is pressing the shutter, not the price tag of the equipment.

There have even been books written on how to make the most of your iPhone to take brilliant photographs, so I therefore challenge you to go out and learn more about photography and try using your smart phones as the first step to becoming addicted to photography.

Social media such as Facebook, Instagram and Flickr allows us then to instantly share our memories and get comments from others.

Photography forums have popped up all over the Internet and although these are great points for learning and expanding your photographic knowledge, it is important to keep ones own individuality and not become a copycat photographer.

Sadly, I see too many people trying to capture the same type of shot that some well-known photographer has captured. When they fail, they become frustrated and annoyed, defeating the initial object of finding relaxation. Photography is about YOU and being able to express your own way of seeing the world, if others do not like your photograph then so what, it is their loss! Yes, it is also important to go out and learn the basic principals of photography, learning the technical capabilities of your equipment and what draws ones eye to a specific image, but it is then equally important to go out and experiment, play and have fun!

So next time you are stuck in the traffic or a boring meeting, think of scheduling time to pick up your camera and head to the outdoors and find relaxation for your soul to reconnect to the important things in life!

Peter Chadwick is a Conservationist and Wildlife Photographer. www.peterchadwick.co.za

Photo: White-tailed tropicbird on nest, Cousin Island Special Reserve (Peter Chadwick)

Biomimicry: Nature Knows Best

By Liz Mwambui

In the 1940s Swiss engineer, Georges de Mestral invented the hook-and-loop fasteners we now know as velcro. He was inspired by seeds of the burdock plants that stuck to his clothes and his dog's fur on a trip to the alps. The first fasteners were sold in the 1950s giving the world the now widely used product, and the generic term "velcro" today associated with this kind of fastener popular in clothes and shoes.

The invention of velcro is an example of man copying or being inspired by nature to solve human problems. The science of examining nature and its systems in order to emulate it or take inspiration from it is called biomimicry.

Biomimcry was popularised in the 1980s by award-winning scientist and author Janine Benyus. She defines it as a "new science that studies nature's models and then imitates or takes inspiration from these designs and processes to solve human problems".

Mimicking nature is not new however; man has long looked to nature to solve his problems. For instance, Leornardo da Vinci studied birds to design his flying machines. He made copious drawings of birds in flight recorded in his *Codex on the Flight of Birds* now held at the Bibliotheca Reale in Italy. Although his attempts to fly failed, his design for the "ornithopter" (the flying machine) is said to be the basis for the modern day helicopter. Aviation pioneers the Wright Brothers succeeded where Da Vinci failed. They created the world's first airplane in 1903. They too were inspired by observations of birds in flight.

The field of biomimicry has grown in the last decade. In the face of "peak everything" - oil, water and other natural resources - scientists, designers, architects and engineers are discovering new ways to re-build a sustainable world by copying nature.

"It's the conscious emulation of life's genius," says Benyus who co-founded the Biomimicry 3.8 Institute. The institute trains, equips, and connects engineers, educators, architects, designers, business leaders, and other innovators to sustainably mimic nature's 3.8 billion years of brilliant designs and strategies.

The Eastgate Centre in Harare, Zimbabwe, is an example of this. Inspired by the ubiquitous Termite mounds found on the African continent, Architect Mick Pearce collaborated with engineers at Arup Associates to build this mid-rise building with ventilation that eliminates air-conditioning. The building is modelled on the self-cooling termite mounds that maintain the temperature inside their nest to within one degree of 31°C, day and night, while external temperature vary between 3°C and 42°C. Similarly, the Swiss Re Building in London, known as the gherkin, is modelled after the structure of a sea sponge - gaps in each floor naturally ventilate the entire building. Designed by Lord Norman Foster and Arup, the building uses half the energy of a typical building.

Other examples come from improvements in solar power technology. By mimicking leaves, researchers have created cheaper and tougher solar cells. In wind power technology, WhalePower developed a new fan and wind turbine blade design that imitated the way Humpback whales manoeuvred their huge bulk through water using their flippers.

AskNature.org a project of the institute is an online community for biomimicry enthusiasts. The online library provides a wealth of ideas based on nature's design strategies and solutions. Here, innovations such as surface finishes inspired by the self-cleaning mechanism of lotus plants and other winged insects, which reduce the need for chemical detergents and costly labour, are presented.

In a 2005 TED (Technology, Entertainment and Design) talk given in Canada, Benyus outlines three questions that we need to ask to learn about how to make things better and to re-design a sustainable world.

1. How does life make things without being wasteful?
2. How does life make the most of things?
3. How does life make things disappear into systems? (Life doesn't deal with things divorced from their natural systems.)

But the most important thing, Benyus says, is that organisms do amazing things without destroying their environments. That's our biggest design challenge. Luckily for us, she says, there are billions and billions of design geniuses in the natural world that are willing to gift us with ideas.

Liz Mwambui is Nature Seychelles' Communication Manager. Twitter @naturesey

Photo: The ubiquitous termite mound has inspired sustainable architectural design (Niall Crotty)

Selling the Sun

Face time with Radley Weber

By Liz Mwambui

The sun shines down on Seychelles throughout the year, so harnessing its power seems like a very bright idea. But solar energy and the use of Photovoltaics (PV) systems to convert sunlight into electricity is only now beginning to catch fire. One of its protagonists is Radley Weber, who owns Vetivertech, a company dedicated to renewable energy in Seychelles.

Radley has just installed a 3 Kilowatt PV unit at the Grand Anse Secondary School on Praslin Island for free, to run the school's computer room with its 14 computers and air conditioning. It's one of three projects his company has undertaken for free to promote PV systems in the Seychelles. Two other PV units were donated to families living at Perseverance, a new housing estate on Mahe.

At the Grand Anse School, the unit, partially supported by funding from the Global Environment Facility and for which Vetivertech footed all of the installation costs, has drastically cut down the school's electricity bill. "The unit supplies them with most of their electricity so they have made substantial savings," he says. "And the cost was quite cheap - it came to about 6000 US dollars."

The improving cost and efficiency of the technology is what attracted Radley to PV systems. But he is no stranger to the technology. Back in the 1980s as a returning graduate, his first job was in renewable energy.

"Seychelles had a small research centre looking at different sources of renewable energy in order to provide a cheaper energy source for the development of the outer islands," he explains. "Because of the fuel crisis in 1982 the price of fuel had rocketed and we wanted to see whether we can generate cheaper electricity from wind and solar."

As a result, there was a series of projects initiated one of which was with Photovoltaics. "Since then I have been passionate about PV even though I changed jobs," he says.

But it was only two years ago, when he began to build a new house, that he returned to it. "I decided to see what the new technologies were and how they had developed and evolved over the few decades," he says.

He was pleasantly surprised to see that PV efficiency had gone up, and the cost had come down tremendously. The conversion percentage from sunlight to electricity was a long way from the 2-3 percent he had known to the 16-20 percent it is now, while the cost of what was called the peak watt, which was 20-30 dollars at the time was now down to 1-2 dollars or even cheaper depending on what country you are in.

This, he says, made economic sense given the cost of electricity in Seychelles now. "In those days the cost of electricity was 33cts per unit now it's up to 4 Rupees 53 cents per unit if you are a high end user."

With this in mind, he put in quite a big system for his house that he says works very well for him. The only disadvantage is that because the feed-in-tariff hasn't been finalised he is unable to sell his surplus. A feed-in-tariff will allow producers to sell their electricity to the Public Utilities Company. Currently, if you are connected to the grid and are feeding in you are essentially supplying electricity for free.

"In my case, for example I have a system which generates surplus energy during the day that goes into the grid, and at night I draw from the grid. But because the surplus doesn't have a tariff attached, I don't get paid," Radley says.

But plans are underway to introduce a tariff under a new energy law in the next couple of months. A viable tariff will encourage more people who at the moment don't know exactly what benefits they will get from investing in PV.

Vetivertech is working with SolarWorld, a German company with a worldwide presence and which is considered to be the leader in PV to assess the electricity needs of some local companies to excite local interest in PV. SolarWorld initiated some of the industry standards in terms of guarantees for solar products. Solar panels for example have a guarantee of 25 years.

But although interest is growing, capital to invest is still a handicap. Part of the donor community has shown interest in supporting Photovoltaics, but there's still a financial gap to bridge.

Meanwhile, Radley would like to take his passion for PV to the local media, particularly to TV, to educate people on solar energy and its long term benefits. "I believe the future of PV is very good and I believe that in my own lifetime most countries in the world will be using solar as a form of energy. Oil is a finite resource," he says.

Liz Mwambui is Nature Seychelles' Communication Manager.

Photo: PV systems make use of an abundant supply of sunshine to generate cleaner and sustainable energy

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