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people and the environment

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Making a Difference: Restoration of Habitats and Species - Experiences from WIO Region

contents

Last word

editorial

Making a difference: Restoration of habitats and species in the region - Experiences from the WIO region

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Jellyfish Tree *(Medusagyne oppositifolia)*
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Readers are invited to send in their articles for inclusion in the magazine to: secretary@wiomsa.org. Photographs for the WIO Gallery are also welcome. The photos must be shot within the Western Indian Ocean Region.

The Western Indian Ocean, in common with the rest of the world's oceans, is facing increasing pressure on the marine and coastal resources, and increasing degradation of critical habitats. In particular, the nearshore and coastal ecosystems are under tremendous stress. There are many causes for this decline, including overfishing, use of inappropriate fishing technologies, insensitive tourism operations, extraction of corals and coral sand for construction, and clearance of mangroves for mariculture and just for better views!

This situation is likely to become even worse as climate change, which is predicted to have a particularly severe impact on marine and coastal systems, begins to bite. While much effort is, and will continue to be focussed on preventing further damage whenever possible, so much has already been lost that a more proactive approach is needed. The establishment of community-managed conservation areas and the ecosystem restoration initiatives described by the articles in this 7th issue of the WIOMSA magazine represent the cutting edge of such an approach.

The articles all celebrate positive actions being taken by scientists, conservationists, fishers and communities to redress the degradation of some of the most critical habitats in the region. While most of these actions are on a relatively small scale they show the ways in which proactive interventions can really make a difference. All the articles indicate that the people concerned are already looking at upscaling their work to have even more impact, and show that the lessons learned through their experiences can be applied in many other situations.

What also emerges clearly from the articles is that this ground-breaking work is being undertaken by some of the poorest people in the world, in Africa, considered by outsiders as one of the world's most troubled regions. We can only be proud that such innovation is taking place here, and celebrate the achievements of the diverse teams of people involved in all these activities.

The articles in this issue deal specifically with: the restoration of mangrove forests in Gazi Bay on Kenya's south coast, and in the Limpopo River estuary in Mozambique; coral restoration at Mombasa and Kuruwitu in Kenya; community conservation on Wasini Island at the southern tip of the Kenya coastline; and restoration of natural vegetation in the Mahé National Park, Seychelles. The Last Word looks at the possibilities for a community-managed future for conservation in the WIO region, and beyond.

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A Fisher and Conservationist: Kenyan fisher restores corals in fished site for 36 years

By Dr. Jennifer O'Leary (WIO Strategic Adaptive Management Programme Co-Director)

Pascal Yaa has been fishing the reefs in the reserve of the Mombasa National Marine Park and Reserve (MNPR) since 1968 (before the MNPR was even established). As an octopus fisher, Pascal swims using a mask and snorkel and sees the coral reef on a daily basis. And what he has seen recently has disturbed him. He has witnessed fishers killing corals, and nets and recreational vessels (including commercial dive boats) crashing into 100+ year old corals.

Fig. 1: Pascal talking about fishing and coral reefs, and on the reef with an octopus
Photo: Jennifer O'Leary (both)

What makes Pascal stand out from others who may have witnessed these things, is that he did not just stand by and watch: he took action.

For 36 years, Pascal has been visiting over 100 coral heads in the fished reserve of the MNPR and working to restore damaged corals. If a large coral head (typically the slow growing, massive Porites) has toppled, Pascal finds its base and rights it, sometimes fortifying its position with rubble. If a branching coral (like Acropora) has been damaged Pascal takes the broken branches and inserts them back into the branching framework. Pascal removes nets and other marine debris (plastics, nappies, and other trash) from the reef every day to keep corals from being further damaged by lack of light (which they need to survive).

According to Pascal, large coral heads typically take over 1 year to become moderately attached and over 2 years to be firmly attached to the ocean floor. Pascal has kept records on coral growth rates and knows how long it takes for a large coral to develop – and this can be decades. Swimming the reefs, it is very clear that the places where you see aggregations of fish are where there are large, healthy corals.

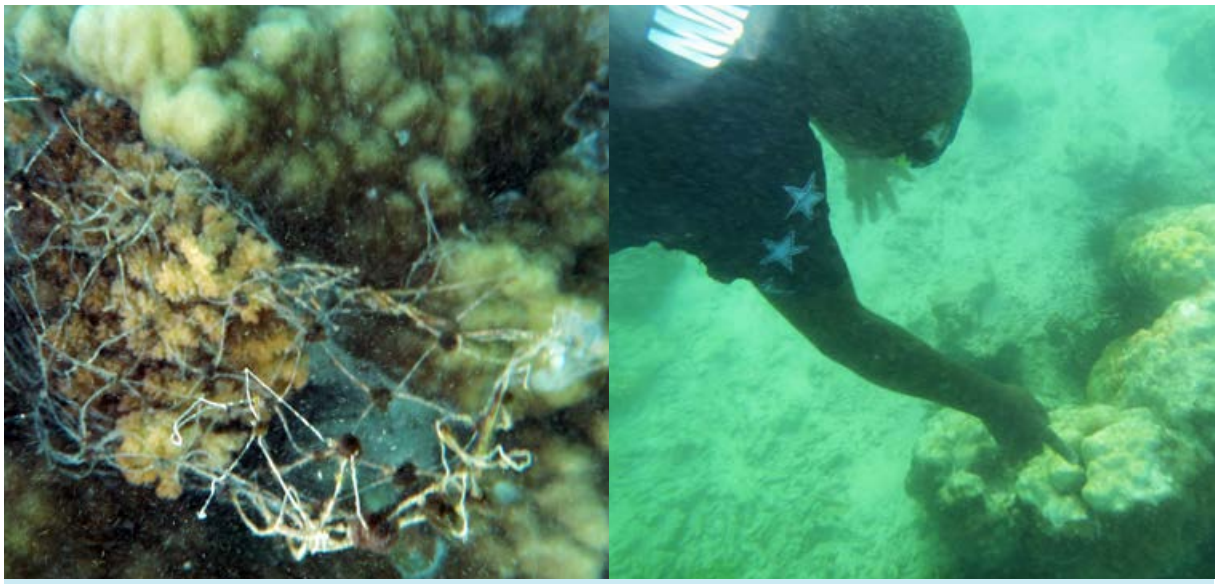


Fig. 2: Coral covered and being killed by a fishing net, and Pascal examining the dying tissue on a coral that has been newly toppled by either fishing or boats. Photo: Jennifer O'Leary (Both)

From Pascal's perspective, protection and restoration is critical as he has seen first-hand what happens when corals are removed from the reef. In his own words, Pascal says, "Corals are the homes of fish and other animals like the octopus. Sometimes fishers with nets will kill an entire coral head to get a single fish. This means the fish will not come back because their home is gone. I have seen a lot of change in the reefs in Mombasa in my lifetime, mainly loss of corals through damage by people, and also too many sea urchins because the sea urchin predators are gone. And a dead coral is not the same as a live one. When a coral dies, the fish and octopus do not stay there, even though the structure may remain for some time. Only live corals provide the habitat needed for the animals we fishers rely on for income."

Pascal's fins are so old and patched that even the other fishers comment upon their poor status. But, I can tell you that even with such poor equipment, Pacal can outswim me – and I consider myself to be a very strong swimmer. I went out with Pascal to better understand a typical day of an octopus fisher. And I did learn about that, but Pascal also gave me a coral-by-coral tour of the reserve. As a scientist who has been conducting research in the reefs of MNRP and other fished and protected reefs in Kenya for over 10 years, I thought I knew the reefs relatively well. Pascal showed me sections of the MNRP reserve that I had never visited with coral heads as large and healthy as those within the protected park. He also showed me quite a lot of damage and we worked together to right several newly toppled coral heads (over 1 m wide) that day. It was an exhilarating

Fig. 3: Pacal righting a toppled coral, and pointing to a coral with damage (white) but recovering from where he removed plastic trash that was covering it. Photo: Jennifer O'Leary (Both)

Fig. 4: Dead coral being eroded by sea urchins which have proliferated because of overfishing of their predators (typically the redlined triggerfish), and some of the fish catch from the MNRP reserve Photo: Jennifer O'Leary (Both)

experience to witness the passion that Pascal has for this site, these corals, and for Kenyan coral reefs. According to Pascal, the long-term solution is training. "We need to train the young fishers about corals and why they are important. Many of them don't know. I tell them, but they don't believe me – maybe because they have not seen what I have seen." What Pascal says is likely to be true. Many Kenyan fishers don't swim and have not seen what the coral reefs look like or what happens when corals are damaged or removed.

The Kenyan Wildlife Service and the Tanzanian Marine Parks Authority have started a new program in Strategic Adaptive Management (SAM) of Marine Protected Areas (MPAs) to train MPA managers to use a proactive, science-based approach to management. A large part of this programme is to involve stakeholders like fishers and beach venders more effectively in the MPA management and conservation process. Through the SAM programme, we will be able to fund the training Pascal has been asking for. Pascal helped lead the training, and we are hoping he will work with other fishers to establish fisher-based monitoring and coral restoration efforts in fished reefs adjacent to MPAs. The Mombasa MPA is also now taking stakeholders to the coral reef twice a year so they can understand what the MPA is all about. We helped fishers understand the concept of spillover (fish moving out from MPAs to neighboring fished reefs) by doing a joint study using fish tagging in the Mombasa MPA. Through this study, fishers can see for themselves whether and how many of their fish originate in the MPA. Pascal is hopeful that these actions will make a difference.

One single fisher has made a tremendous contribution to conservation of the fished reefs in Mombasa. It is our responsibility to support Pascal in these efforts and capitalize on his knowledge by engaging others in restoration and knowledge sharing. In the scientific literature, there is much discussion of using traditional knowledge and incorporating it into conservation planning. However, often, the discussion ends there – on paper. Pascal may not have read a single scientific paper, but he has taken action that has made a difference – and that is People Power.

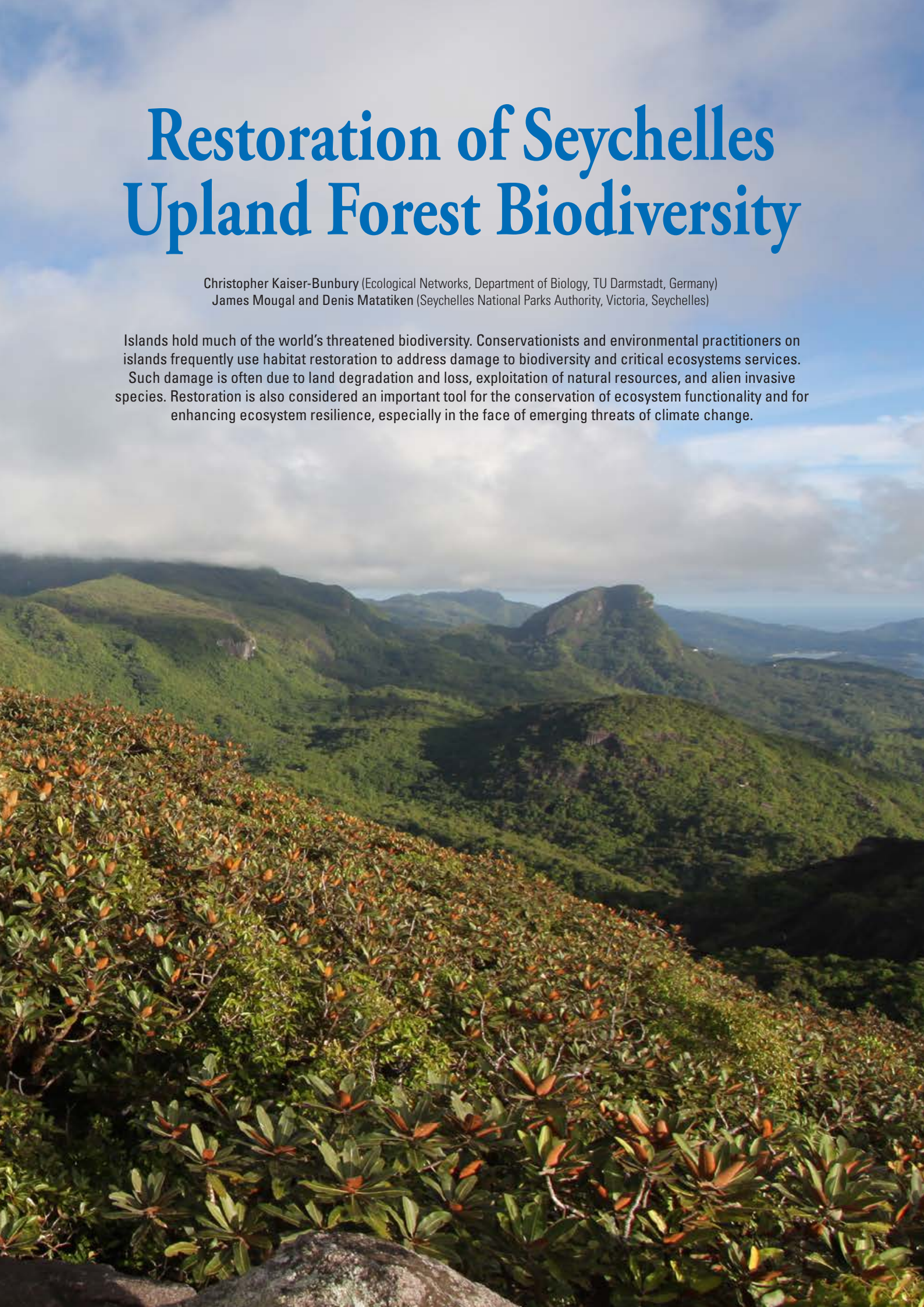
Fig. 5: Group of stakeholders and managers going to the coral reefs during a SAM training, and Pascal heading home after a long day of reef restoration and fishing. Photo: Jennifer O'Leary (Both)

Mahé National Park, Seychelles, showing Inselbergs. Photo: Christopher Kaiser-Bunbury

Restoration of Seychelles Upland Forest Biodiversity

Christopher Kaiser-Bunbury (Ecological Networks, Department of Biology, TU Darmstadt, Germany)
James Mougal and Denis Matatiken (Seychelles National Parks Authority, Victoria, Seychelles)

Islands hold much of the world's threatened biodiversity. Conservationists and environmental practitioners on islands frequently use habitat restoration to address damage to biodiversity and critical ecosystems services. Such damage is often due to land degradation and loss, exploitation of natural resources, and alien invasive species. Restoration is also considered an important tool for the conservation of ecosystem functionality and for enhancing ecosystem resilience, especially in the face of emerging threats of climate change.



In Seychelles habitat restoration is a conservation tool with a long and successful history, be it the restoration of small islands (e.g. Cousine, Cousin and Aride), parts of islands (e.g. North Island, Denis), or small patches in the upland forest on Mahé. The unique inselberg plant communities in the Seychelles belong to another habitat type that has recently been added to the restoration list. Inselbergs (the local name is 'glacis') are rocky, steep-sided outcrops that harbour the last endemic plant communities in Seychelles, with endemism levels as high as 96% of the species (Fleischmann et al. 1996). These rock-adapted plant communities occur from sea level to high altitudes on the granitic islands. Inselbergs have strikingly different microclimatic and soil conditions and are essentially disconnected pockets of endemic plant communities surrounded by habitats dominated by introduced species. Many endemic inselberg plants are classified as endangered or critically endangered, including the jellyfish tree Medusagyne oppositifolia, and inselbergs hold many iconic and formerly widespread species such as the pitcher plant Nepenthes pervillei and the endemic evergreen tree Mimusops sechellarum (IUCN 2013).

Fig. 2: Jellyfish Tree, *Medusagyne oppositifolia* **(left) Fig. 3: Pitcher Plant,** *Nepenthes pervillei* **(right)**
Photo: Christopher Kaiser-Bunbury (both)

In 2010, to protect these plant communities and the associated fauna from further degradation, we launched a collaborative project with international scientists and local counterparts to free four inselberg communities from introduced plant species (mostly Cinnamomum verum, Alstonia macrophylla, Psidium cattleianum and Chrysobalanus icaco) and investigate the impact of habitat restoration on the integrity of the ecosystem.

The main aim of the activity and the associated research was to determine whether habitat restoration is able to mitigate the effects of plant invasion on native plant and animal communities. The project was funded by the Seychelles Environmental Trust Fund, the Swiss National Science Foundation, and the German Research Foundation and implemented by the Seychelles National Parks Authority (SNPA).

One component of the restoration trials was to examine the impact on the native plants of the use of herbicides to prevent regrowth of removed invasive plants. While the neighbouring native plants are positively affected by the removal of invasive plants, this effect did not differ between areas with and areas without herbicide application on cut stumps (Kaiser-Bunbury, C.N., Mougal, J., Valentin, T., Gabriel, R. & Blüthgen, N. Herbicide application as habitat restoration tool: impact on native island plant communities. Applied Vegetation Science. In revision). The research also showed that a lower than recommended concentration of herbicide can be used to kill the target plants if restoration is carried out during the dry season, and the stem is cut very close to the ground and immediately sprayed with a relatively small amount of herbicide. By using these techniques, the restoration team invested some 900 person-hours and 10 litres of systemic herbicide to remove approximately 40,000 introduced plants from a total area of approximately 4 hectares. This was followed by the planting of 2,000 native seedlings. Unfortunately, as a consequence of the long drought between March and August 2012 many of the planted seedlings did not survive, although most did. Monitoring carried out shortly after the intervention showed that adult endemic plants in restored communities produced particularly large fruit crops compared to unrestored sites, probably due to the reduced competition for water and resources at sites where all introduced plants had been removed (Kaiser-Bunbury & Mougal 2014).

Preliminary findings from studies of pollinator and seed disperser communities on the restored inselbergs suggest that the intervention has rapid, direct and positive effects on the native mutualist communities. Over the next few years we will continue

NINTH WIOMSA SCIENTIFIC SYMPOSIUM

SECOND ANNOUNCEMENT

The Western Indian Ocean Marine Science Association (WIOMSA), University of KwaZulu-Natal and Council for Scientific and Industrial Research (CSIR) are pleased to announce the Ninth WIOMSA Scientific Symposium which will be held in the Wild Coast Sun Hotel in the Eastern Cape, South Africa in October 2015.

Dates: Monday, 26th October – Saturday, 31st October 2015

SYMPOSIUM THEME:

Knowledge - improving lives in ocean and coastal systems

SESSION THEMES:

The main themes include but are not limited to:

- Vulnerability, Resilience & Adaptation
- Biodiversity and ecological processes
- Utilization of resources
- Human dimension and governance systems
- Understanding Ecosystem Services
- Innovations in Support of an Ocean-based Economy

SYMPOSIUM STRUCTURE

The symposium will comprise a combination of plenary and parallel sessions. Prominent experts from within and outside of the region will be invited to attend the symposium and deliver keynote presentations. Posters will be displayed throughout the symposium and a dedicated poster session will be arranged to facilitate discussions with the presenting authors. Keynote presentations, oral and poster presentations are scheduled from 26th to 29th October 2015.

Day 4, 30th October 2015 will provide an opportunity for special sessions focusing on particular issues to be held and 31st October 2015 is dedicated to excursions and tours to different places of interest in the area.

Notification of abstracts acceptance	15 May 2015
Deadline for application of travel grants	30 June 2015
Deadline for confirmation by institutions wishing to participate in the exhibition opportunities	31 August 2015

WIOMSA Western Indian Ocean Marine Science Association

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Fig. 3: Area before (left) and after (right) Restoration
Photo: Christopher Kaiser-Bunbury

to investigate the longer-term indirect impact of restoration on the endemic plant communities and the habitat's resilience to re-invasion. Eventually, we aim to provide clear recommendations for the restoration of ecosystem integrity in degraded habitat on islands, reflecting natural ecological and evolutionary processes.

Critical for the long-term success of any terrestrial habitat restoration programme is regular weeding of emerging invasive plants and maintenance of the restored plant communities over several years, even decades (Kaiser-Bunbury et al ibid.). In Seychelles, this can prove particularly difficult because of the lack of financial resources and staff limitations. Governmental and non-governmental environment organisations usually lack the staff to contain regeneration of and reinvasion by introduced plants after clearance, which results in a rapid regression towards a plant community once again dominated by introduced species. To mitigate this threat to the long-term success of any restoration work in Seychelles, a local non-governmental organisation, the Plant Conservation Action group, together with SNPA and representatives of the local community, funded by United Nations Development Programme, Global Environment Facility (UNDP/GEF) Small Grant Project, is currently developing a community-based restoration programme driven by a local guardianship scheme. The aim of this initiative is to develop and maintain the long-term commitment of local 'guardians' in preserving the alien-free status of these plant communities. Such an integrated approach could prove sustainable across other habitat types, such as coastal ecosystems, in Seychelles and, if successful, could be adopted by other islands in the region.

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Fleischmann, K., S. Porembski, N. Biedinger, and W. Barthlott. 1996. Inselbergs in the sea: vegetation of granite outcrops on the islands of Mahé, Praslin and Silhouette (Seychelles). Bulletin of the Geobotanical Institute ETH 62:61-74.

Kaiser-Bunbury CN & Mougal J. 2014 How do pollinators and seed dispersers respond to restoration of inselberg (glacis) vegetation? Kapisen 16: 6-7

IUCN 2013. The IUCN Red List of Threatened Species. Version 2013.2. http://www.iucnredlist.org>. Downloaded on 24 May 2014.

Fig. 4: Restoration Team Member applying Herbicide (left) and Restoration Team (right)
Photo: Christopher Kaiser-Bunbury

Community-Based Marine Conservation Initiative in Coastal East Africa

Important lessons from Kuruwitu in Kenya

By Lydia Mwakanema & Edward Kimakwa (WWF), Dickson Nyanje (KCWA)

WWF's active involvement of local communities in the conservation of marine resources is paying off. It is generally agreed that the paradigm shift of involving communities in conservation, especially around protected areas, has delivered significant conservation and human development benefits.

The Kuruwitu Conservation Area in Vipingo (Kilifi,) Kenya is one such example. In 2005, WWF provided seed funding, through the East African Wildlife Society, towards supporting the Kuruwitu Conservation Initiative. The existing Kuruwitu conservation initiative was greatly helped following a tour in which WWF had taken some fishing communities (including some members from Kuruwitu) from the Kenyan coast to learn about sustainable fisheries management and community-based initiatives in the Tanga region, United Republic of Tanzania.

The Kuruwitu marine conservation area lies along the Kenyan coastline in Kilifi County. Kuruwitu extends approximately 8 km along the coast. The area is characterized by a mosaic of white sandy beaches with clear water, coral reefs, coral platforms, caves, lagoons, ancient indigenous coastal forests, and unique inland mangrove swamps some 1.5 km from the sea. The marine and coastal component provides important habitat and breeding grounds for a diversity of fish and corals. Apart from a diversity of pelagic and demersal fish species, Kuruwitu is among the famous sites in Kenya where many ornamental fish species can be found. The interconnected sea-mangrove swamp/coastal forest habitat is home to many plants, and wildlife including birds, monkeys, baboons, lizards, diverse corals and ornamental fish as well as marine turtles.

Fig.1 The Kuruwitu Conservation Area. Photo: Des Bowden

The management of the Kuruwitu conservation area is the responsibility of the Kuruwitu Conservation and Welfare Association (KCWA). The KCWA is a community based marine conservation and management initiative bringing together artisanal fishers and private beach residents from the 6 landing sites of Mwanamia, Kijangwani, Kuruwitu, Kinuni, Vipingo and Bureni. The association was formed by fishers and community members on 10 January 2003, and formally registered in the same year. It has the goal of promoting the sustainability of coastal and marine resources in the area for the environmental, economic, social and cultural benefits of the community and other stakeholders. It has currently more than 250 paying members.

The idea for the KCWA started when the fishers of Kuruwitu realized that their fish catches were dropping immensely and the fish they were catching were getting smaller. They knew that this was due to overfishing and destructive and uncontrolled fishing activities. The reduced numbers and size of fish could not sustain their livelihoods and posed a direct threat to both present and future generations. The situation was made worse for the poor Kuruwitu community by aquarium fishing in Vipingo, as this industry was seriously depleting fish stocks and threatening the all-important fish nurseries of the reef. Fishers and other community members in Kuruwitu discussed these issues and decided to take action against the matter by forming the KCWA.

One of the key original goals of KCWA was to set up a no-take zone to allow recovery of the marine ecosystem and species dependent on this. A no-take zone helps to restrict unsustainable inshore fishing and destruction of the habitat around the reef. Thirty (30) hectares was closed off from fishing and declared a marine sanctuary (a marine protected area). The area remains closed today. Fishing in Kuruwitu is mainly artisanal with 300 fishers approximately, and fishing activities in other, open areas are managed by the Kuruwitu Beach Management Unit.

Today the community appreciates the benefits of the closure as the fish catches and sizes in the vicinity of the no-take zone and outside the reef have improved significantly. Although it takes time for a marine ecosystem to recover from destruction before fishers realize the benefits, the fishers here have already started to see the positive impacts of the sanctuary. The community is now fully supportive of the marine protected area. The regenerating coral reef ecosystem attracts visitors to Kuruwitu who come for snorkeling and whale and dolphin watching. The visitors pay for these activities and accommodation in the area, and hence contribute to the income of the community.

KCWA has become a role model for other communities along Kenya coast. The association owns two large dhows, one which fishers use to fish offshore, away from the sensitive reef areas with the other being used for tourism. They also have a glass-bottom boat. A further sixty (60) hectares have been identified for potential expansion of the no-take zone and another no-take zone was launched in January 2015 in Bureni. This expansion will triple the size of the sanctuary. The KCWA recently signed an MOU with the Kurwitu Beach Management Unit (KBMU) to jointly manage a proposed Core Conservation area, which will cover an 8km square area under the KBMU's jurisdiction. Various sustainable alternative income generating projects and other conservation initiatives will be implemented over

Fig. 2 The Rich Marine Diversity of the Kuruwitu Conservation Area (left), Kuruwitu is an Important Learning and Recreational Area (right) Photo: Des Bowden

a 5-year period. The KCWA has developed and follows a management plan.

The recovery of coral and fish species is noticeable. Species that could not be seen before the onset of the project are increasingly spotted within the area. The no-take zone has remained protected and un-fished for over ten years now. For years Kuruwitu has been an important site for marine-science research in Kenya that is providing vital data showing recovery trends since the closure of the area.Scientific data indicates that over this period populations of marine flora and fauna in the sanctuary have experienced a more than five-fold increase.

Marine conservation stimulates the local community to participate in protecting resources around them. The association's projects create jobs and contribute to households' income. Tourism activities generate income for the community. Money spent by tourists to the area trickles down to support community livelihoods.

KCWA provides a learning point for other communities in Kenya and visitors from other countries to conserve the natural resources around them for the betterment of their life. Recently WWF organized and facilitated a learning tour to Kuruwitu for some fishing communities from Tanzania. A very nice reversal of the original tour of Kenyan fishing communities to Tanga!

> At the end of the day, it is all about balance and ensuring that the original objectives for which an MPA are not compromised.

Kuruwitu is the first community owned and run Marine Park in Kenya, and indeed the entire South Western Indian Ocean region. Kuruwitu is a model community-based natural resource management project owned fully by the community. The Kuruwitu model provides a perfect example of how well managed marine ecosystems provide sustainable practical benefits to the people and to the environment with at least 15 other similar projects having started up following their lead. This is very much in line with the WWF Marine Ecosystem Services Action Plan (ES MAP) within the context of the WWF's 2013-2020 Global Marine Programme (GMP) Strategy, 'One Ocean, One Voice'. The success and achievement of conservation work in Kuruwitu need to be scaled up to enable decision makers to fully recognize the value to society of ecosystem services and reflect these values in decisions. Securing and enhancing marine/coastal natural capital is worth undertaking for the good of current and future generations.

For more information contact:
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Fig. 1: Limpopo Basin map. Source: limpoporak.com

Restoration of Mangrove Forests at Limpopo River Estuary, Southern Mozambique

By Henriques Balidy[1] and Salomão Bandeira[2]

Limpopo River transformation and impact on mangroves

The Limpopo River, which is 1750 kilometres long with a drainage basin of 400 000 hectares (Figure 1), is among the most flood-prone rivers in southern and eastern Africa. The main channel of this river starts in the southern African country of Botswana, runs along most of South Africa's border with Botswana, then along its border with Zimbabwe before flowing through southern Mozambique to the Indian Ocean at Zongoene, near Xai-Xai town some 200 km north of Maputo, the capital of Mozambique. Its mean annual discharge is 170 cubic metres per second at the river's mouth. However an extensive flood in 2000 caused the river to increase from its usual 100 to 200 meters width up to 10 kilometers width near the river mouth, leading to massive mangrove forest degradation; uprooting trees and causing dieback over vast areas. Sedimentation was also evident resulting in some areas becoming unviable for mangrove forests. People's property and livelihoods were affected as well as the road infrastructure, and a highway bridge was destroyed near the Limpopo estuary.

The Limpopo basin is one of the largest river basins in southern and eastern Africa and its flooding impacts extensive areas in particular in the area of its estuary. Data compiled by the Mozambique National Institute for Disaster Management (INGC) indicate that in the

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past 50 years, there have been severe floods recorded in the Lower Limpopo basin. The most extreme were in 1955, 1967, 1972, 1975, 1977, 1981 and again in 2000, which was considered the worst flood since 1848 (INGC et al., 2003). The recent flooding of 2013 continued the trend. The susceptibility of the Lower Limpopo area to flooding is due to a number of factors including the topography of the region and the extreme localized rainfall events.

The Mangrove forest associated with the Limpopo estuary, was estimated at only 387 hectares in one of the first mangrove change detection analyses for Mozambique (Sakete and Matusse 1994, Barbosa et al 2001). This is surprisingly small for the second largest river in Mozambique (the Limpopo is the second largest river in Africa after the Zambezi River draining into the Indian Ocean). However recent mapping conducted by the Centre for Sustainable Development of the Coastal Zones (CDS-ZC) using detailed aerial photographs, cartography data from a national geography and cartography directorate as well as community interviews has revealed surprising results. The newly calculated total mangrove area of the Limpopo estuary is 928 Ha of which only 382 Ha (41.16%) are mangrove forests in good condition, with 546 Ha (58.84%) heavily degraded (Figure 2). This degradation is attributed mainly to recurrent flooding, in particular the 2000 event that uprooted many trees, and brought enormous sedimentation leading to transformation of the Limpopo estuary.

The Development of the Mangrove Restoration Initiative

The Centre for Sustainable Development of the Coastal Zones (CDS-ZC), is an autonomous institution under the Ministry for the Coordination of the Environmental Affairs in Mozambique (MICOA), which was launched in the 1990's with the overall mandate of providing technical assistance to local communities and promoting marine and coastal resources conservation. The CDS-ZC launched the initiative to restore the Limpopo estuary mangroves for the following main reasons:

- The extensive damage caused to the mangrove forest at Limpopo following the 2000 extensive flooding that impacted not just the estuary but also swept away several villages in the basin. This flooding also affected the neighbouring countries served by this river (Botswana, Mozambique, South Africa and Zimbabwe).

- Community leaders in the affected estuary expressed interest in regaining their lost livelihoods after the sweeping away of their resources by the 2000 floods. Fishers and subsistence collectors of resources

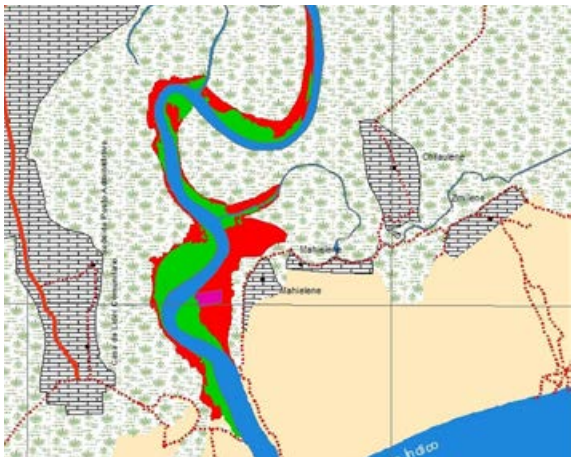
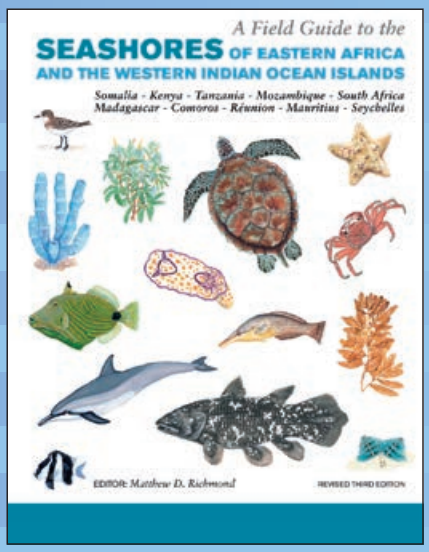


Fig. 2: Limpopo River estuary depicting well-kept (green) and degraded mangrove (red) areas and other land use areas. (Top)
Source: CDS Zonas Costeiras, 2011

Fig. 3: People stranded on roof tops in the flooded Xai-Xai town in the 2000 flooding of Limpopo River (Middle)
Photo: Arsenio Manhice/EGPAF

Fig. 4: The Limpopo River flooded near the town of Xai Xai, normally the water is about as wide as your index finger. (Bottom)
Photo: World Food Programme/Save the Children

WIOMSA PUBLICATIONS



WIO Region

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Wholesale Price:	US$ 20

Rest of World

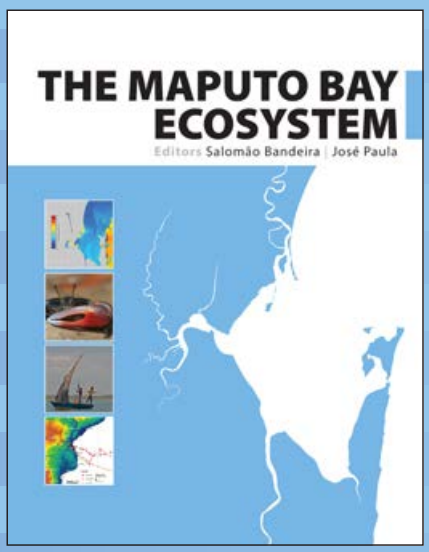
Retail Price:	US$ 50
Wholesale Price:	US$ 30

A Field Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands

This Third Edition is completely revised. Packed with 1,650 species of plants and animals from all coastal habitats, 155 pages of stunning watercolour illustrations and hundreds of detailed line drawings, this riveting guide is an invaluable source of information for enthusiasts to identify the marine life common to this region.

Thoroughly researched by 53 regional and international experts, this in-depth and comprehensive guide gives precise descriptions of species and their habitats, together with an authoritative summary of the knowledge of each taxonomic group. Other new features include a revised description of the WIO coastal zone, 70 species with new names, an up to date expanded Bibliography with over 1,600 references including 250 new ones, new sections on oil and gas exploration in the coastal zone, marine alien invasive species and piracy that replace the previous section on remote sensing using satellite imagery.

The coastal dangers and treatment section has been completely updated and expanded, highlighting changes in treatment to malaria and descriptions of Chikungunya and Dengue.



PRICE: USD 75

The Maputo Bay Ecosystem

This book presents the current knowledge about Maputo Bay in Mozambique, the largest coastal embayment in the country and a major feature along the eastern African coastline. Located on the fringe of the tropical Western Indian Ocean, Maputo Bay is a rich natural complex estuarine system forming a vast and heterogeneous environment with a diverse social and economic context. The book comprises four main parts plus sections within that include special contributions as case studies, for a total of nineteen chapters and thirty case studies.

Part 1 deals with the environmental and human setting (geographical setting, geomorphology and evolution, hydrology and circulation, human settings, and history of research);

Part 2 presents the main habitats and ecological functioning (mangroves, seagrasses, coral reefs, charismatic fauna, and adjacent terrestrial environments);

Part 3 is on fisheries (semi-industrial shallow-water shrimp, magumba fish and artisanal fisheries);

Part 4 addresses cross-cutting issues (pollution, climate change, and management options). The book further analyses research gaps providing recommendations that intend to contribute for scientific progress and management. It is the result of the contribution of 68 regional and international experts, and is thoroughly illustrated with maps, graphical figures and colour photographic plates.

Copies of the book can be ordered from:
The Executive Secretary, WIOMSA P.O. Box 3298, Zanzibar, Tanzania
Email: secretary@wiomsa.org

Fig. 5 The Rich Marine Diversity of the Kuruwitu Conservation Area (left), Kuruwitu is an Important Learning and Recreational Area (right) Photo: Des Bowden

within mangrove habitats were badly impacted, losing fish, shrimps, crabs and wood products.

- The location of the CDS-ZC headquarters in Xai-Xai Town, some 20 Km to the estuary, was also a decisive factor. The experience of witnessing the flooding, the submerging of villages and downtown Xai-Xai town, the extensive loss of livelihoods, the displacement of coastal communities and the resulting despair and loss of hope amongst locals catapulted the initiative of revitalizing the lost mangrove forest in Limpopo River.

The process of conservation and restoration of the mangrove forests of the Limpopo estuary started in 2007 when a local community leader, Mr. Vasco Mule expressed interest on behalf of the entire Zongoene community in being involved in the restoration. In 2008, CDS-ZC conducted a baseline study and mangrove mapping aiming at understanding the state of conservation of the mangroves. The CDS-ZC also actively engaged local communities in mangrove restoration and conservation. In 2009, with funding of USD10,000, from IUCN Moçambique, CDS-ZC began the restoration programme with the local communities taking ownership of the initiative. CDS-ZC promoted environmental awareness and conducted community campaigns to sensitize locals on the need for mangrove conservation and replanting. This process culminated in the establishment of a nursery in 2010 where replanting was led by the local community, with the service costs being subsidized by the CDS-ZC project. This initiative was later integrated into a five-year government program where additional funding from PASA, a support program of the environmental sector, was allocated annually to ensure continued restoration of the mangroves in the Limpopo estuary. Concomitantly, additional sources were later mobilized from UNEP (Climate Change Resilience project), RESILIM (USAID, Southern Africa), UDEBA LAB (Project Hanyani Mzee Zongoene).

Mangrove restoration

In the initial year of replanting (2010), 12,500 seedlings were planted. The number of seedlings rose to 168,367 in 2013. Due to the scarcity of propagules in the vicinity of the replanting area CDS-ZC had to seek propagules from the Incomati estuary on the outskirts of Maputo some 200 Km south of the Limpopo. The replanted mangrove species were Avicennia marina, Bruguiera gymnorhiza, Ceriops tagal, Rhizophora mucronata and Xylocarpus granatum. Thespesia populnea, a mangrove associate, was also replanted. The Incomati estuary was the donor for the propagules of B. gymnorhiza, C. tagal and R. mucronata as well as the associated T. populnea. By 2013, 26.3 hectares had been replanted in the 2000 Limpopo flood ravaged areas, with 94,453 seedlings out of 168,367 being produced in the nursery. The replanting process included rehabilitation of channels and creeks to allow water flows to the previous mangroves areas. The overall seedling survival rate was 80% (Table 1.)

Table 1. Total mangrove seedlings produced, replanted and survival rates over the years.

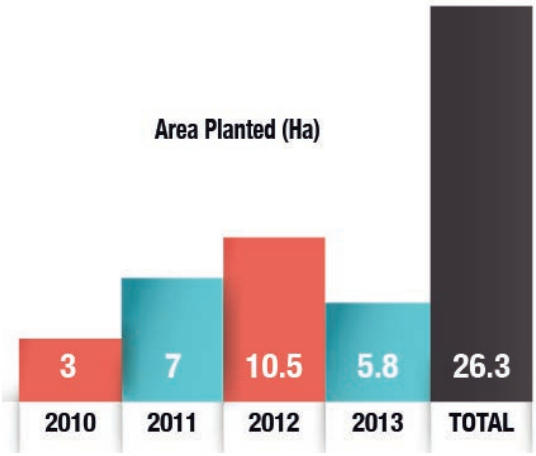
	2010	2011	2012	2013	Total
Seedlings produced in the nursery	12.500	29.200	51.667	75.000	168.367
Seedlings replanted to the field	10.800	25.200	37.453	21.000	94.453
Survival rate and percentage of planted	8.640 (80%)	11.340 (45%)	35.500 (94.8%)	21.000 (100%)	76.480 (80%)

Most of the seedlings produced were of Avicennia marina, followed by Ceriops tagal and Rhizophora mucronata (Table 2)

Table 2. Raised seedlings at Limpopo estuary nursery.

Species	2010	2011	2012	2013	Total Species
Avicennia marina	9.621	18.752	14.404	39.526	82.303
Ceriops tagal	1.420	6.364	21.375	28.303	57.462
Bruguiera gymnorhiza	60	420	496	542	1.518
Rizophora mucronata	1.399	2.612	12.456	5.873	22.340
Thespesia populnea	0	632	1.620	0	2.252
Xylocarpus granatum	0	420	1.316	756	2.492
Total	**12.500**	**29.200**	**51.667**	**75.000**	**168.367**

Fig. 6: A) Replanted A. marina, six months old (left); B) Replanted A. marina, five years old (centre); C) 2 year old R. mucronata (right) Photos: Henriques Balidy



The development of the replanted area over the years is shown in the Figure 6 below. The replanting has involved mainly villagers from the Zongoene community, sometimes assembled in their hundreds, for the replantation campaigns as depicted below. The voluntary involvement of the community was very crucial. So much so that the CDS-ZC engaged 10 community people to work fulltime for pay on mangrove replantation.

Fig. 7: Development of replanted mangrove area at Limpopo River estuary (left).

Fig. 8: Before and after replanting (below) Photo: Henriques Balidy

Mangrove management and way forward

The Ministry for Land, Environmentand Rural Development (MITADER) is the focal institution in mangrove restoration. MITADER is also a legislative and focal point for instruments pertaining to mangroves and estuaries. MITADER is represented by the Centre for Sustainable Development of the Coastal Zone (CDS-ZC), based in Xai-Xai municipality.

The local communities of Zongoene have shown their appreciation for the project that is bringing their mangrove forests back to life. The 10 community workers employed in the project continue in their daily activities of raising the nursery, replanting and the maintenance of the tidal waters pathways to the replanted mangroves and protecting seedlings from grazers.

While a lot of work still remains to be done (for instance there is need for a study to assess the impact of the replanting activity on people´s livelihoods), indications are that the mangrove replanting activity has been a success in a number of ways. Firstly it has ensured that the community has been able to secure and conserve its main source of livelihood (the Limpopo River estuary). Secondly, the CDS-ZC and local communities engaged in this replanting have engendered a lasting partnership that is aimed at developing and fostering a better understanding of the people´s interaction with nature at the estuary and its surroundings. The replanting process has prompted the natural regeneration of Avicennia marina, the most common mangrove species at Limpopo estuary. The successful rates of regeneration have provide a learning curve as the initiative has faced certain challenges such as crabs grazing on seedlings, an issue that was promptly resolved by planting bamboo to cover the seedlings stems. Project monitoring has been conducted successfully several times, but recurrent floods in Limpopo especially in January 2013 are worrying as it resulted in the loss of about 1 hectare of recently replanted seedlings due to prolonged submersion and some sedimentation.

Given its impact locally and the involvement of the communities, the replanting project has attracted the attention of political leaders in Xai-Xai municipality, and the Governor of the Gaza province (where Xai-Xai is located) has visited the site paving the way for further improvements for the lives of the communities in Chilaulene village. A 13 km road from Xai-Xai was recently upgraded and a new school is set to be built. This mangrove replanting initiative, being the largest and the most successful in the country, was recently proposed for a visit by the President of Mozambique. CDS-ZC is introducing alternative livelihood activities including fish and crab farming, and mangrove honey production to ensure the sustainability of the restored mangrove forest.

Fig. 10: Henriques Balidy (far left) from CDS-ZC and community worker Agostinho Nhanzimo (second left) explaining the replantation project to Eduardo Mondlane University students in May 2014. Photo: Salomão Bandeira

Fig. 9: Replanting campaign with local communities. Photo: Henriques Balidy

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Wasini Community Rallies to Secure Its Future

Lionel Dishon Murage[1] and Jelvas Mwaura[2]

In the face of rapidly diminishing marine fisheries resources, a local community in coastal Kenya is setting the standard in conservation by finding innovative strategies to rehabilitate and restore their coral reefs for improved biodiversity, and the economic and environmental services they provide.

Community members from Wasini village located on Wasini Island (85 kilometres south of Mombasa) have been undertaking coral reef restoration in their community managed area (CMA). The coral transplantation activity, the first and the only such successful initiative by a local community in Kenya and by extension in East Africa region, was initiated through small funding support from the United Nations Development Programme Global Environment Facility Small Grants Project (UNDP GEF SGP) and later on upscaled through the GEF grant of the Kenya Coastal Development Project (KCDP), a World Bank/ Government of Kenya project. This is a participatory community-driven initiative with technical support from Kenya Marine and Fisheries Research Institute (KMFRI) in partnership with the Africa Nature Organization (a local NGO) and the State Department of Fisheries.

Wasini island which is 8 km long by 3 km wide has approximately 1550 inhabitants, residing in three (3) villages, namely Wasini (1,000 inhabitants), Mkwiro (500 inhabitants) and Nyuma Maji (50 inhabitants). Nearly 90 % of the local community members depend on fishing and tourism activities for their livelihoods as the island is a rocky coral crag with no areas available for other activities such as farming. Due to increasing human population on the island and the nearby mainland area in Shimoni, substantial degradation of the coastal and marine resources within the area has been observed in the recent decade. The area now faces several challenges including the degradation and decline of marine biota due to uncontrolled fishing, weak management and recent impacts resulting from massive coral bleaching and mortality events.

The island is well endowed with extensive mangrove forests covering an area of 5 km2 on the Wasini village side of the island which provide protection to the nearby extensive coral reefs. The area around Wasini island is an important ecological hotspot with an extensive coral reef renowned for its high diversity of corals, fish and seagrass species that includes over 250 species of fish and 130 species of

Fig 1. Map showing location of Wasini Island

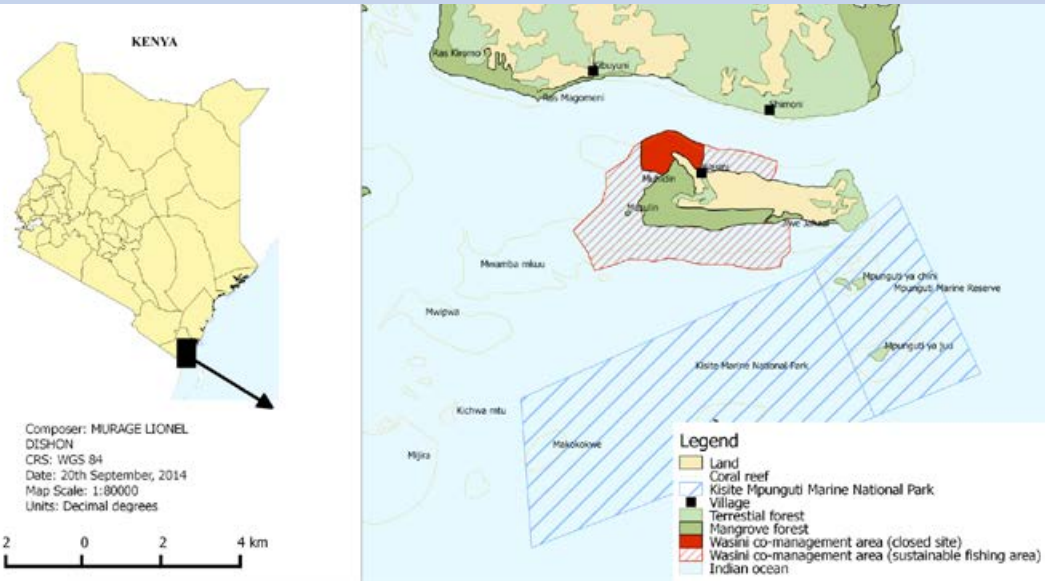

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Fig. 2: Community meeting Photo: Courtesy of KCDP

hard coral. In addition, 5 species of turtles use the marine waters as feeding grounds and an endemic seagrass species (Enhalus acroides) is found within its waters. The presence of the extensive mangrove forests and coral reefs makes Wasini island popular with both domestic and international tourists.

KMFRI and Africa Nature, in partnership with the State Department of Fisheries is supporting the Wasini community in conserving biodiversity resources within their community managed area area, based on sustainable use principles for the benefit of present and future generations.

Nearly, 90 % of the local community is mainly dependent on fishing and tourism activities for their livelihoods and they are increasingly concerned by the rapidly diminishing resources as a result of over-exploitation using destructive fishing gears and negative impacts of climate change such as the recurring coral bleaching events in 1997/98, 2004, 2008 and 2012 that have led to substantial degradation of the coral reef ecosystem. In addition to low education levels, a lack of strong locally-based natural resource management institutions has constrained and limited the local community's ability to respond and adopt sustainable management practices.

In 2008, the local community members joined together to form the Wasini Beach Management Unit (BMU). The BMU committee has been at the forefront in finding sustainable ways to manage the rich marine resources. Efforts by the BMU have led to the establishment of a co-management area to address coral reef degradation, conserve marine biodiversity and develop sustainable income generating options. The BMU established and demarcated a 352 hectare co-management area which also includes a 30 hectare closed area (i.e. no-take zone) which ensures fully protection of corals and fish spawning grounds and as well as attract eco-tourism opportunities.

Support from donors has been very much welcomed by the community, and has enabled the community to make much headway in their efforts to protect and conserve their marine resources. KCDP and UNDP GEF SGP in partnership with the Wasini BMU have a shared interest in coastal and marine conservation and in the improvement of local community livelihoods. This includes the recent support in establishing a coral culturing and replanting programme with the primary objective of rehabilitating degraded reefs around Wasini BMU area.
The specific objectives of the KCDP programme are:

i. To develop and implement low-technology restoration techniques appropriate for community-based efforts in order to improve coral reef condition;
ii. To increase local community awareness of the vulnerability of coral reefs to human pressures and the importance of healthy reef habitat for sustainable fisheries and their socio-economic well-being.
iii. To improve coral cover, biodiversity and the function of coral reefs as a nursery ground for marine biota, as well as a tourism attraction;

The reef restoration activity included training 40 participating community members about the biology of coral, the challenges facing coral reefs, and the importance of active management. They were also trained in the low-technology restoration methods currently available, including mapping and coral transplantation on selected degraded areas.

The first activity before any restoration activity programme involved community meetings where issues of degradation and its causes were discussed at length, and remedies identified.

Based on previous research experience in coral transplanting and literature reviews on common restoration practices, ten (10) simple steps were developed for community-based reef restoration in Wasini BMU area:

Fig. 3: A Degraded Reef (left), and Conducting a Baseline Survey (middle), Donor Site (right)
Photo: Courtesy of KCDP (All)

Fig. 5: Construction Phase (left); Collection of Coral Fragments (centre); Transplanting of Corals in Nursery (left). Photos: Courtesy of KCDP

- Local community and key stakeholders holding a series of meeting to discuss and reach a consensus on the need for active reef restoration
- Identification of degraded reefs in Wasini
- Baseline survey of degraded areas
- Identification of donor site(s)
- Hands-on training on reef rehabilitation techniques
- Construction of nursery beds and concrete blocks
- Collection and translocation of coral fragments from donor to nursery beds
- Transplanting coral fragments into nursery beds
- Transplanting nursery-grown corals onto bare hard substrate in degraded area and/or onto concrete blocks
- Regular monitoring and maintenance of transplanted corals.

Since most of the degraded areas were seen to comprise mostly unstable coral rubble, it was agreed that concrete blocks would be used to build typical pyramid reefs. The pyramid type concrete block frame was selected so as to provide a strong footing to which the corals could be attached.

The surface is used to anchor the coral fragments, while the block also acts as an artificial reef to attract fish. The next activities was to calculate the dimensions of the concrete blocks, and deploy them to the degraded areas or sand bottom area. In the long term, through joint monitoring by the KMFRI technical team and the trained community members, it is expected that the programme can be expanded and replicated to cover more areas along Kenyan coast and elsewhere in East Africa identified as co-management areas.

Through the KCDP Project, a 15 hectare degraded coral site has been restored, and through awareness and community capacity building, there is increased appreciation and understanding of the ecological value of reefs and transplanting techniques. The more than 40 community members trained have embraced the use of this low-cost artificial reef structure (i.e. concrete blocks) as a model for coral reef rehabilitation and conservation. The same Community members have been trained on reef monitoring techniques and the monitoring of transplanted corals as part of exit strategy for KCDP. A recent field visit to the Wasini area indicated substantial recovery of rehabilitated area in terms of coral cover and fish, with tourism activities such as snorkelling and SCUBA diving picking up; enhancing income generation for the BMU members and community at large.Through upscaling and replication of reef restoration work in other degraded reefs, it is envisaged that there will be benefits to the natural resources and their management, as well as to the livelihoods of the many people residing in Wasini and elsewhere.

These include reversal of processes of coral reef degradation, recovery of coral and fish populations, and increased resilience and resistance of ecological processes to climate change. Others are a reduction in resource user conflicts and illegal fishing practices, and effective monitoring, control and surveillance (MCS) of the community management area.

Fig. 7: Community Members Discussing the Design of the Concrete Blocks (left); Transplanting of Corals from Nursery to Concrete Blocks (centre); Wasini Community BMU leader Mr. Abubakar being presented with restoration field equipment by Dr. Joseph Kamau - KCDP Biodiversity component leader (right). Photo: Courtesy of KCDP

Boats at Algoa Bay Yatch Club, South Africa. Photo: Yoon Kim

Mangrove Restoration: Sharing experiences

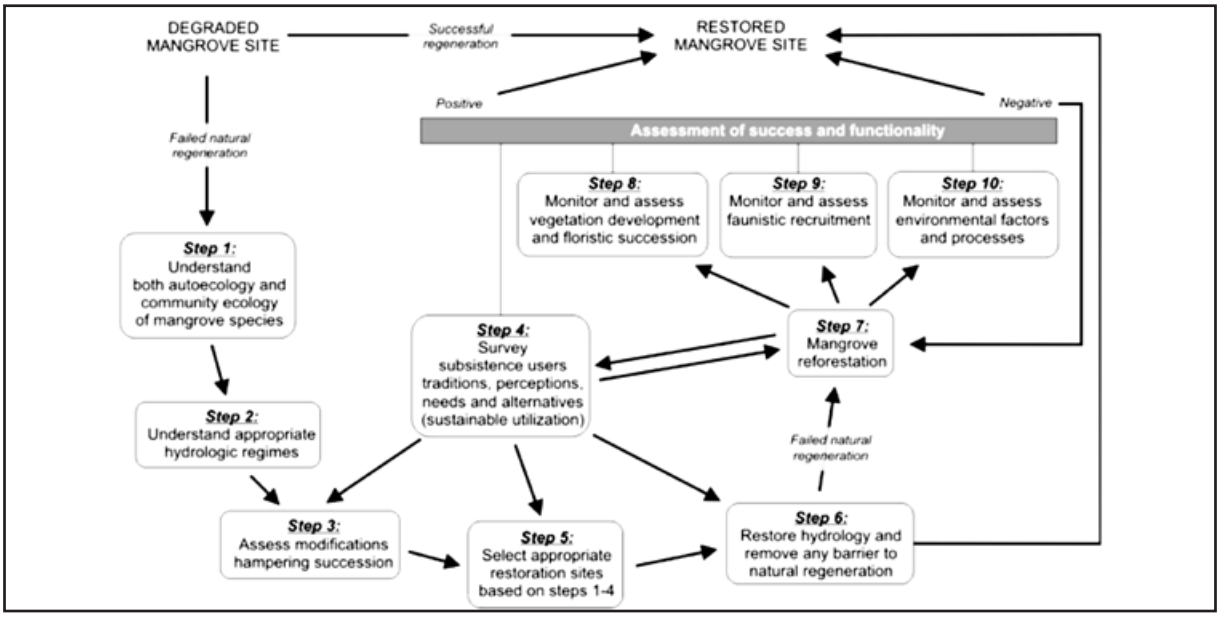
By Jared Bosire, World Wide Fund for Nature, Kenya (WWF-KCO

Fig. 1: Mangrove die-back due to cyclone impact in central Mozambique. Photo: Jared Bosire

The Western Indian Ocean (WIO) Region covering 10 countries supports about 1 million hectares (ha) of mangroves, which is about 5% of the global coverage. The largest of these forests is found in Mozambique, Madagascar, Tanzania and Kenya. Other regional mangrove countries include Mauritius, Seychelles, Comoros, Somalia and South Africa (Bosire et al. 2012). These mangrove ecosystems provide a wide array of ecosystem goods and services, thus making them critical both to local communities and national economies. Total economic valuation (TEV) of mangroves based on both marketable and non-marketable ecosystem components suggest that mangrove ecosystems have very high TEV values of up to US$10 million/ha/year depending on site productivity and concomitant management regimes (Constanza et al. 1997, Barbier 2000). In the context of climate change, the global role of mangroves as carbon sinks has become more appreciated as they sequester about 3 - 5 times more carbon per unit area than any other forest ecosystem (Donato et al. 2011) and the global economic cost of estimated carbon emissions of 0.24 Petagrams (Pg) CO2/year by land-use change in mangrove ecosystems is as high as US$10 billion per year (Siikamaki et al. 2012).

Mangroves can normally recover naturally (after degradation) if there are no environmental obstacles impeding regeneration (Fig 2). Such obstacles include: disrupted hydrology, debris/weeds, altered sediment characteristics and limited propagule dispersal. This then may necessitate removal of such obstacles to allow natural regeneration, and where natural regeneration is either too slow or completely impaired, then human intervention may well become necessary. Due to the unique intertidal environment where mangroves grow, and adaptation of different species to varying environmental conditions within a limited area, assessment of site conditions to determine any necessary physical modification and selection of suitable species is key. This assessment is also important to determine whether direct planting of propagules or establishing a nursery from which to transplant seedlings is appropriate. Lack of this practical experience and ecological understanding has seen widespread poor site and species

Scheme presenting possible mangrove restoration pathways depending on site conditions and functionality [Modified after Stevenson et al. (1999) and Bosire et al. (2006)] in Bosire et al. 2008




CONSERVATION

Scientists replant mangroves

selection leading to very common mangrove restoration failures globally. Additionally, there is normally limited or a complete lack of ecological monitoring to determine the extent of ecosystem functioning recovery in mangrove plantations.

While there have been many mangrove restoration attempts in the WIO region, many of these have not been documented, making objective determination of the success or otherwise of these attempts difficult. The most detailed data available is from Kenya where mangrove restoration has been practiced for the last 25 years (Kairo 1995, Bosire et al. 2003). Most of these attempts have been led by the Kenya Marine and Fisheries Research Institute using a scientific approach which combines guided community restoration campaigns and scientific monitoring (Bosire et al. 2004, Bosire et al. 2005, Bosire et al. 2008). Gazi Bay on the south coast of Kenya has been the epicentre of this dual approach.

At Gazi Bay about 100 ha of different species have been restored using direct propagule planting, transplanting, and in some cases broadcasting depending on species and site conditions. Many of these attempts have been highly successful in terms of plantation establishment and return of various ecosystem functions e.g. biodiversity, nutrient recycling, wood provision, erosion control and carbon sequestration among others (Bosire et al. 2008).

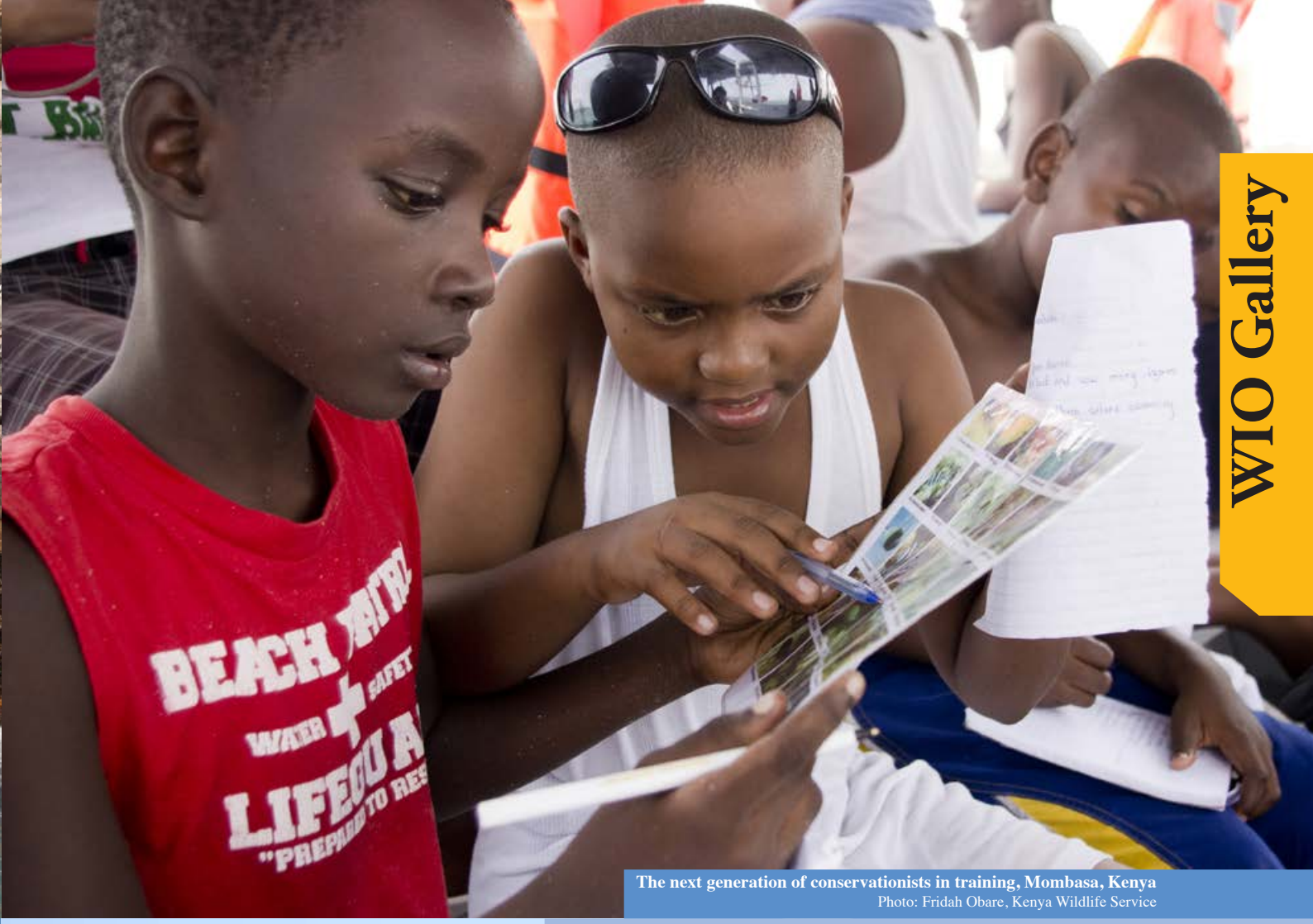
Some of these successful mangrove plantations now form part of the mangrove acreage which has been set aside for a carbon financed project (Mikoko Pamoja) which will bring in about 12,000 US$ per year for the next 20 years to support mangrove conservation and community livelihoods. However these restoration activities will need to be scaled-up and replicated in other areas of the country and across the region where natural regeneration has been impeded. An assessment of mangrove restoration efforts around the region is necessary to document lessons learnt and promote experience sharing.

Fig. 3: Kenyan mangrove scientists on the left (Jared Bosire and James Kairo) leading a community mangrove restoration campaign covered by the country's leading newspaper. (top)

Fig. 4: A 12 year old *Rhizophora mucronata* **plantation at Gazi Bay Kenya. (below)**
Photo: Jared Bosire (both)

Penguin Colonies at Algoa Bay , South Africa. Photo: Yoon Kim

Participants of the training course for MPA Professionals on Understanding and Communicating Climate Change on a field trip, Algoa Bay , South Africa Photo: Yoon Kim



The next generation of conservationists in training, Mombasa, Kenya
Photo: Fridah Obare, Kenya Wildlife Service

Participants of the Strategic Adaptive Management Course (SAM), on a snorkelling exercise in Mafia Island. Photo: Jennifer Oleary

Fishermen returning with their fish traps. Photo: Fridah Obare, Kenya Wildlife Service

Towards a Community-managed Future

Lawrence Sisitka (Associate; Environmental Learning Research Centre, Rhodes University, Grahamstown, South Africa)

The WIOMSA magazine is proudly entitled 'people and the environment'. This is not by accident, as it is becoming increasingly evident that all people; communities, fishers, conservationists, scientists, NGO personnel, government officials, need to work together if our marine heritage and marine resources are to be protected and conserved for the future. All the articles in this issue of the magazine have highlighted the role of many different people, from individuals such as Pascal Yaa in Mombasa, to the restoration team of scientists and community members in the Seychelles, and the community-based organisations in Wasini and Kuruwitu, in the conservation of the regions precious biodiversity. Also evident, particularly from the Kenyan stories, is the growing recognition by coastal communities of the need to protect their dwindling resources (pro)actively, not only for the sake of the ecosystems and species themselves, or just out of scientific interest, but also out of a pragmatic need to secure a future for themselves and their children. And it is clearly in the hands of such communities, except in the most remote, unpopulated areas, that the future rests.

One of the more interesting developments in terms of the establishment of (formal or informal) protected areas has been the relatively recent shift from government or NGO driven proclamation to community-led conservation initiatives.

Certainly, traditional societies developed sophisticated systems for the management of their resources, establishing local laws, such as the 'Dina' in Madagascar, to control harvesting. However these, by themselves, are perhaps not adequate to deal with the pressures of the 21st century, including exponential growth in some coastal populations, and, of course, climate change. A combination of traditional practices and indigenous understandings, scientific knowledge and modern management techniques is needed. And the location for this must be within the coastal communities, supported where necessary by external governmental and non-governmental agencies and research institutions.

Over the past 10 – 15 years there has been growing discussion of approaches such as co-management and community-based management, and, yes, there have been some very positive developments in this direction. However, there have also been some challenges, including the lack of a clear shared understanding of what is meant by these terms; the (perceived and/or real) lack of capacity within communities to play a leadership role in management; and the unwillingness of some conservation agencies and governments to relinquish control. Again, there have been major steps taken to address these challenges, but there is still some way to go before the ideal of community management, in most areas, can be realised.

The communities themselves often recognise this. At a meeting with community representatives on Mafia Island in Tanzania in 2014, the question was asked whether the communities ever saw a time when all aspects of the management of the Mafia Island MPA would be carried out by community members. The very clear, articulate and pragmatic response was: 'Yes, not in my generation though, but certainly in the next.' This took me back a couple of years to a meeting I had with community members on Mafia where we discussed the same question, and how to move towards genuine community management of the MPA. The consensus then was that we needed to start looking at the next generation, today's high school learners, to identify those with a real passion for the Island, and the marine environment; those who went out of their way to learn about the wildlife around them; those who showed real leadership qualities, and volunteered for environmental activities, such as clean-ups or monitoring activities. In other words we needed to find the next generation of Pascal Yaas.

These learners could then be mentored and supported through their schooling and into tertiary education, to become the future marine scientists and MPA managers. The future is indeed in the next generation, but we must start now to identify and nurture the future leaders; only then are we likely to realise the dream of a community-managed future.

Fig. 1: Discussions with Community Representatives on Mafia Island, Tanzania
Photo: Jennifer O'Leary

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WIOMSA's mission is to generate the best in marine science through its comprehensive research funding programming and then use the results to ensure that the marine environment is understood, protected, enhanced and maintained for the benefit of everyone that works and lives on the coastal areas of the Western Indian Ocean.

WIOMSA's vision and activities are based on the notion that quality science leads to better governance and management, which, in turn ensures a sustainable & stable marine environment needed in efforts to reduce poverty and ensure a better life for us all in the region.

WIOMSA, operates as a regional umbrella organization in Somalia, Kenya, Tanzania, Mozambique, South Africa, Madagascar, the Seychelles, Mauritius,the Comoros Islands and Reunion with a network of membership of over 1200 regional and international scientists, over fifty academic and marine research institutions and in partnership with organizations like SIDA, NEPAD, UNEP, EU,USAID and IOC/UNESCO.

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