Conserving the Biodiversity of the Cacheu Mangroves National Park

Our Achievements

Turing Foundation

Wetlands International

IBAP

About the project

From 2015 to 2018 Wetlands International, IBAP and other partners implemented a ground-breaking initiative to conserve the mangroves, tidal flats, dryland forests and seagrass beds of Cacheu national park and its buffer zone in Guinea Bissau. Long ignored by the conservation community this beautiful area is home to many threatened species such as manatees and marine turtles, provides important breeding and staging habitat for hundreds of thousands of migratory birds and serves as a nursery ground for countless species of fish. Unfortunately the park has been heavily degraded as a result of slash-and-burn agriculture practice and suffers overexploitation of natural resources.

With support from the Turing foundation we have worked towards conserving and restoring this unique wetland ecosystem:

1. With communities and park authorities we **developed plans for improved management** of the park and its buffer zone;
2. We introduced ecological mangrove restoration to **rehabilitate abandoned rice-fields**;
3. We implemented **conservation measures** on the ground and supported communities to reduce their impacts on natural resources by introducing **sustainable livelihoods alternatives** to harmful practices;

Here we take stock of what achieved during the project, working closely with local communities, our government partners and other NGOs. Also we sketch our ambitions for future work in Guinea-Bissau and elsewhere in the region.

Colony of Terns and Gulls in Cacheu Natural Park

Location of the target area in West Africa

In a nutshell: Our Achievements

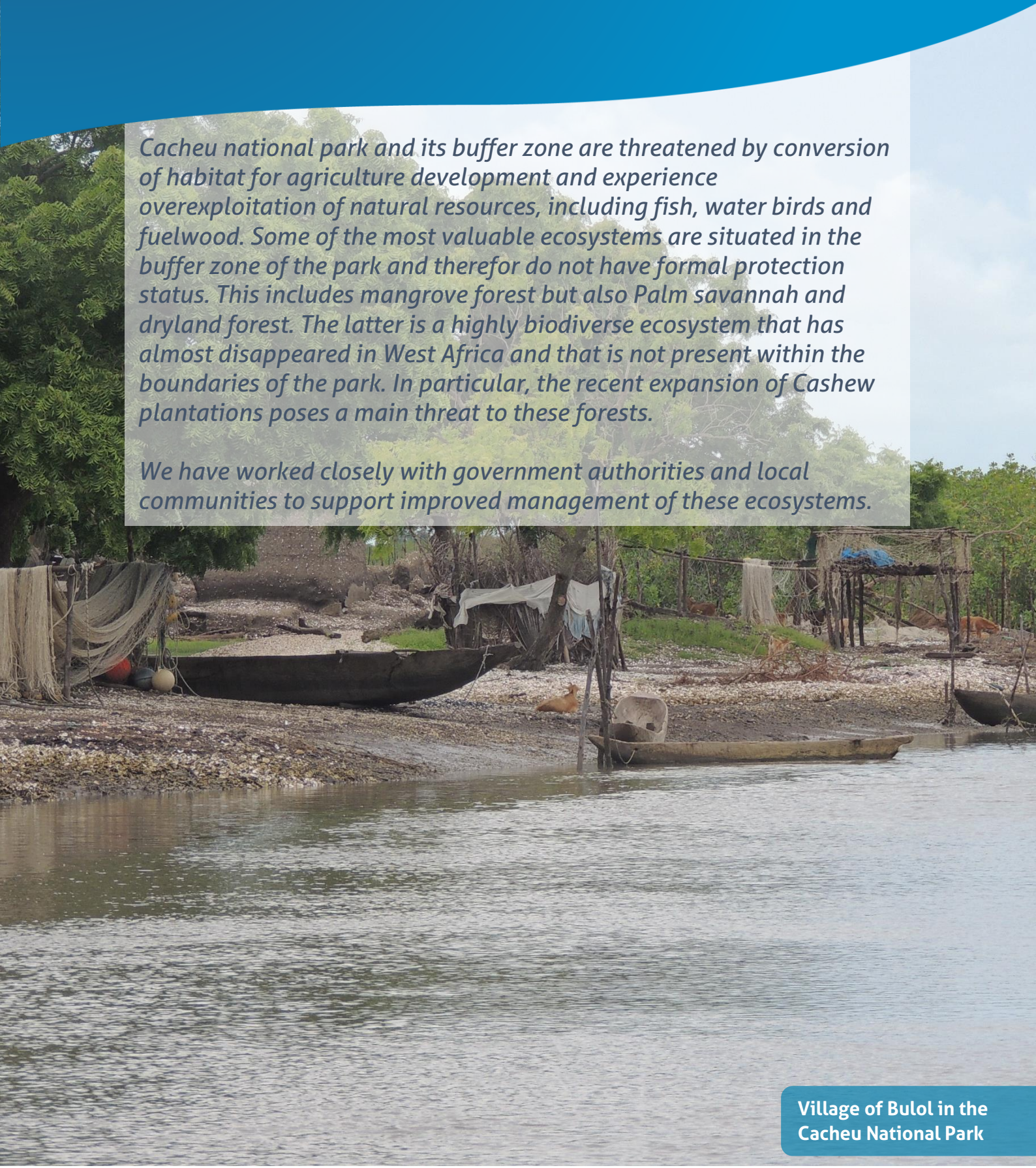
- **8.000 ha community-based protected forest** in the buffer zone of Cacheu established under government law and managed by communities;
- **200 ha of mangroves restored,** using an ecological mangrove restoration (EMR) approach, demonstrating a potential **cost reduction of up to 90%** compared to conventional planting projects; IBAP and LVIA **replicate EMR on 149 ha**
- **Avoided forest degradation** by introducing solar salt production and fish smoking techniques that reduce use of mangrove fuelwood by 80%
- **7 villages provided with sustainable livelihood alternatives** to harmful practice reducing pressure on natural resources and providing 1000s with increased income
- **Poaching (fish, birds) in the park substantially** reduced through community awareness campaigns and increased patrolling
- Government authorities invited us to support development of a **national agenda for wetland restoration and conservation**

***Avicennia* seedling finding its feet in our restoration site**

1. Supporting improved management planning of Cacheu National park and its buffer zone

Cacheu national park and its buffer zone are threatened by conversion of habitat for agriculture development and experience overexploitation of natural resources, including fish, water birds and fuelwood. Some of the most valuable ecosystems are situated in the buffer zone of the park and therefor do not have formal protection status. This includes mangrove forest but also Palm savannah and dryland forest. The latter is a highly biodiverse ecosystem that has almost disappeared in West Africa and that is not present within the boundaries of the park. In particular, the recent expansion of Cashew plantations poses a main threat to these forests.

We have worked closely with government authorities and local communities to support improved management of these ecosystems.



Village of Bulol in the Cacheu National Park

Development of a 8000 ha community-based protected forest

Together with communities from Mata UCO, Catchalam and Nangabouthche we developed a 8000 ha community-based protected forest area in the buffer zone on the south-side of the national park.

During our field assessments the forest (dry forest, palm savannah and mangrove habitat), was identified as an area of prime conservation concern considering its high biodiversity values and religious and cultural values for the local community. Unfortunately the area is under threat of encroachment for agriculture expansion and mining practice.

To address these threats with communities and park officials we first developed a management plan for the forest. Amongst others we agreed on a zoning, assigning 84% of the land surface for conservation, while allowing 13% of the land to be used for sustainable development (see figure 2). A small buffer zone was created in between.
This zonation facilitates enhanced protection of the most sensitive ecosystems whilst allowing for the development of local activities like harvesting of timber and non-timber products and developing fallow land for agriculture.

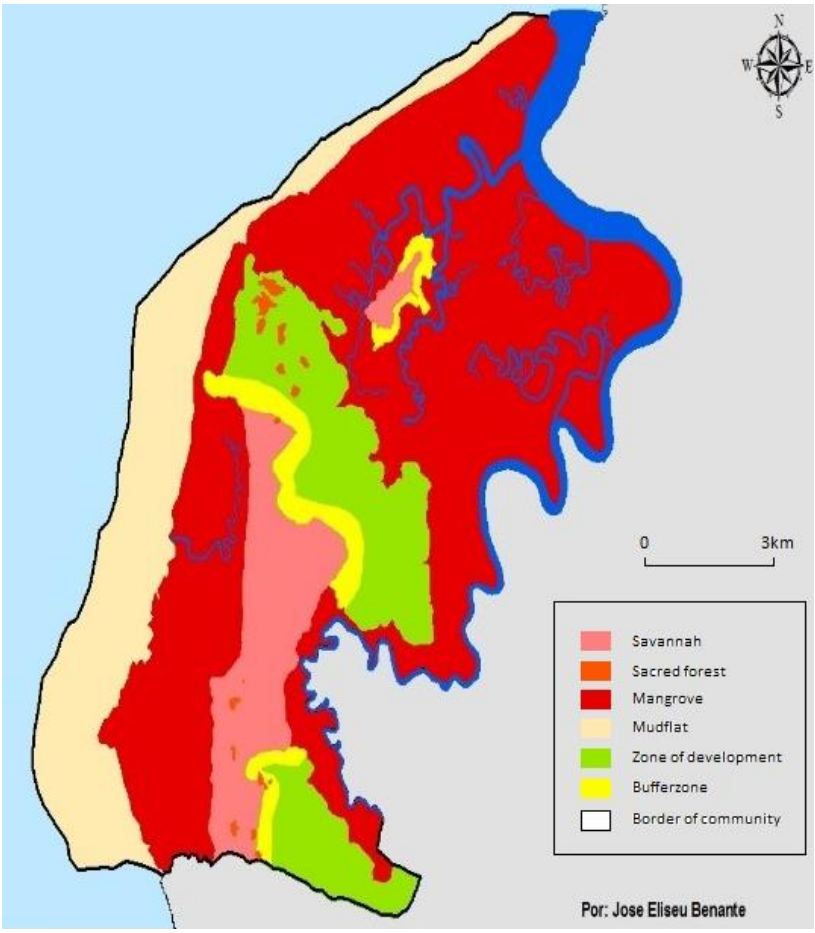


Figure 2: Different Management zones of Mata de Uco

Figure 1: Community meeting to discuss the community-based protected forest

Figure 3: Tern eggs in the Cacheu national park

Figure 4: Confiscation of illegal nets

A committee composed of 24 members of the villages and national park authorities was established that will oversee the implementation of the management plan. We supported them to develop an operational action plan to define the annual activities between 2017 and 2022. Arrangements were made for government agencies to provide technical support to the committee and to guide implementation of the management plan during the coming years.

The community forest is being registered with the Ministry of Agriculture to ensure formal protection under government law. The signing of a formal decree is in its final stages of completion.

Informed decision making based on monitoring data

Our 3-year field monitoring efforts, implemented with communities and park authorities, provided valuable data on trends in water bird populations, ecosystem health and threats (fishing, egg collection, bird poaching and fire wood collection) in the area (see figure 3).

We used the monitoring results to raise awareness of threats and informed hundreds of local fishermen about regulations for fisheries and natural resource extraction. The data helped set priorities for management planning and for patrolling activities by park authorities, leading to a substantial reduction of unsustainable activities. Amongst others, dozens of illegal nets were seized (see figure 4) and illegal collection of eggs in water bird colonies was curbed.

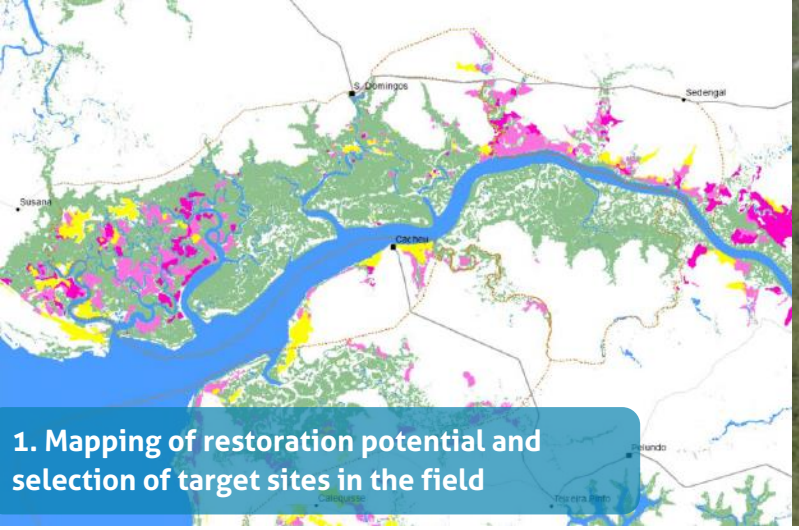
Our monitoring data were shared with authorities at a national level to increase the awareness of the importance of the park. Monitoring activities will be sustained by park officials in the years to come.

2. Mangrove Restoration

In the last decades, large tracts of mangroves have been converted for the development of rice fields within Cacheu national park as well as in its buffer zone. Many of these rice fields are abandoned after a few years as salt water intrudes and soils acidify. While some abandoned sites are recolonised by mangroves naturally, many other don't. They remain as wastelands without vegetation growth and experience ongoing and irreversible deterioration of soil conditions.

In total we restored 200 hectares of mangroves in 5 sites, mostly within National park boundaries; 58.5 hectares of mangroves were established through planting, while 141.9 hectares were restored through the Ecological Mangrove Restoration (EMR) approach.

Dike breaching in Cacheu



1. Mapping of restoration potential and selection of target sites in the field

Ecological Mangrove Restoration: Photographic Overview

2. Breaching dykes to restore hydrology

3. Erosive forces widen the breaches

4. Tidal flows recreate creeks and remediate the soil

5. Propagules are swept in by the tides and settle naturally

Textbox 1: Ecological Mangrove Restoration (EMR)

Recent scientific studies revealed that mangrove restoration projects that exclusively rely on the planting of seedlings often yield poor results. In many cases trees are planted in the wrong locations and as a result in some regions over 80% of projects have failed. Single species planting does not yield a well-functioning and diverse mangrove system.

In recent years Experts from the Mangrove Action Project have trialled the so-called Ecological Mangrove Rehabilitation Approach. Rather than relying on active tree planting, this approach focuses on creating the enabling conditions for natural mangrove recovery. Many degraded sites experience disturbance of hydrology, sediment flows, and soil chemistry and as a result conditions are no longer suitable for mangrove growth. This can be addressed by reversing these conditions for example by removing embankments that obstruct tidal flows or by taking measures to improve soil conditions. Mangrove planting is only applied if seedlings fail to return naturally.

Research has shown that the approach yields a more natural and diverse mangrove forest, often at lower cost when compared to traditional tree planting projects.

Mapping of restoration potential and site-selection

Consultancy agency Altenburg & Wymenga and IBAP performed a GIS assessment to identify land use in the target area. Based on satellite imagery they mapped the distribution of mangroves, active rice fields and identified more than 1000 abandoned rice field sites, totalling 13.000 ha.

During subsequent ground-truthing surveys we assessed the status of the abandoned rice fields, clustering the sites in three categories:

- Sites that have become dry and highly saline (tannes) or that contain acid sulphate soils that cannot be remediated. These areas should be considered as permanently degraded, although they have some ecological values as feeding and resting places for water birds.
- Sites with a very advanced state of regeneration; these are typically old sites, where embankments have eroded, paving the way for mangroves to come back naturally.
- Sites that do not regenerate naturally due to ongoing hydrological disturbance by embankments, leading to desiccation of the soil, salinization and acidification.

We selected a subset of sites in the third category, situated within park boundaries as target sites for our restoration work.

Restoration measures

We mobilised a group of community members to implement the mangrove restoration works. Following a series of trainings to familiarise the team with mangrove restoration principles, we applied EMR on 150 hectares of land.

In strategic locations we breached the embankments that inhibit tidal flows into the abandoned rice fields and dug small channels to facilitate a proper distribution of water across the area, anticipating a revival of tidal fluxes and remediation of the salinized and acidified soil crust.

In a few sites we applied active planting. This allowed for direct comparison with sites where we focused on hydrological restoration. We also planted mangroves in areas that did not show signs of ongoing hydrological disturbance, but that do not regenerate naturally as a result of changes in soil chemistry or the lack of a seedbank. Previous experience has shown that low density planting may yield healthy mangroves in such places, likely due a positive effect of the planted seedlings on soil conditions and microclimate. Our briefing document '*to plant or not to plant*' discusses the different aspects of mangrove restoration approaches.

Figure 2: Monitoring soil elevation

Figure 3: Monitoring mangrove growth

Monitoring protocol

We designed a monitoring protocol to measure the success of the different restoration approaches. Amongst others, through repeated measurements we mapped (changes in) soil salinity, PH, mangrove sapling height, number of leaves and species composition to assess the functionality of the ecosystem (see figures 2 and 3). During monitoring missions in the target sites, we noted marked signs of recovery following the breaching of the embankments: the destruction of the embankments in the abandoned rice fields and subsequent recovery of hydrology improved the soil quality by flushing out salt and acids, by bringing in nutrients and by making the clay softer and more suitable for mangroves to settle. Along with the tides large numbers of propagules entered the restoration sites, leading to rapid seedling recruitment and consequent mangrove establishment (see photographic summary).

IBAP will continue the monitoring of the sites in the coming years, to enable long-term tracking of our restoration measures.

Lessons learned

The monitoring results have demonstrated the importance of Ecological Mangrove Restoration in Cacheu. While previous planting projects yielded mixed results, our EMR measures demonstrated a rapid recovery of enabling conditions and a mangrove recolonization rate that was faster than expected.

This was nicely illustrated in the village of Apilho. Restoration through planting of *Rhizophora* was carried out in 2016. However, soon after we restored the hydrology in this site, *Avicennia* mangroves began to overgrow the entire area (see figures 4 and 5). This shows the strength of restoration through EMR and the weakness of planting of mangroves: the biophysical circumstances favoured a different mangrove species, that colonised the site naturally once we breached some bunds and dug some creeks that facilitate tidal exchange and flushing of salt out of the system.

We made a provisional assessment of costs of EMR measures as compared to traditional planting approaches. We concluded that EMR, if implemented at scale, might be up to ten times cheaper in Guinea Bissau, as there is no need for the establishment of expensive nurseries and implementation of time intensive planting efforts. This offers substantial opportunities for upscaling of the approach. However it should be noted that costs of EMR measures are highly site specific, depending on the types of interventions that are required to enable large-scale mangrove recovery.

We engaged local communities and government agencies in the monitoring of our results and organised several workshops to share our lessons learned with other organisations. Also we invited the Mangrove Action Project to provide a regional training on ERM.

This joint learning and outreach convinced the Italian NGO LVIA to replicate the approach in a 149 hectare area in the National park, together with IBAP.

Figure 4: Replanted *Rhizophora* in Apilho, 2017

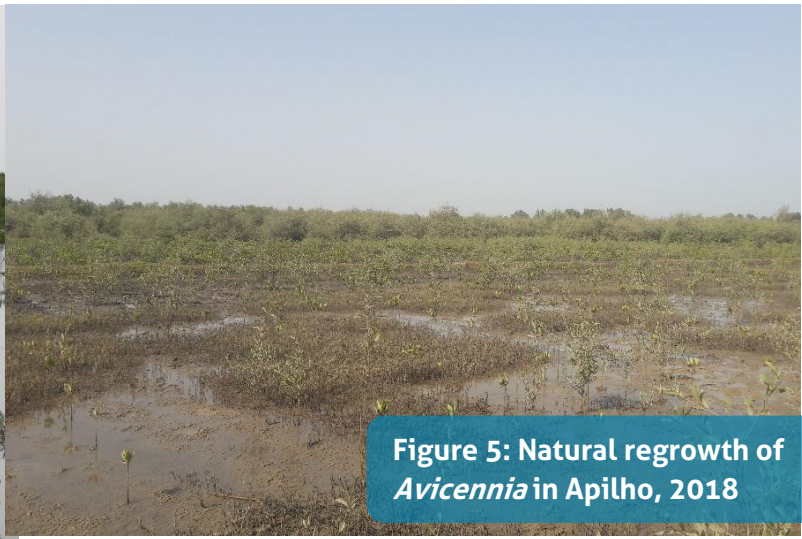


Figure 5: Natural regrowth of *Avicennia* in Apilho, 2018

3. Sustainable livelihoods development and conservation

We worked closely with local community based organisations and government agencies to develop sustainable alternatives to harmful livelihoods activities and to implement conservation measures on the ground.

This work is rooted in an intensive campaign to raise awareness about the importance of conserving and restoring the natural values of the area. Through regular broadcasts via the Cacheu and São Domingos radio stations we were able to inform thousands of people about our project and the conservation challenges in Cacheu. We organised dozens of seminars and community meetings to train and organise community-based organisations in our target villages. Subsequently we engaged them in the planning and implementation of the livelihoods and conservation measures and in monitoring.

Flourishing home garden in Apilho

Decrease dependency on fuel wood

Communities in the Island of Dapack used to boil seawater to produce salt, consuming large amounts of fuelwood. We introduced a new approach to salt production that makes use of solar heat instead and provided communities with the equipment required to implement the technique (see figure 6). This saves no less than 3.1 kilo of wood per kilo of salt produced, contributing to a reduction of mangrove loss. In the village of Plindan a fuel-wood efficient oven was installed to reduce the use of fuel wood for fish smoking. This resulted in an estimated decrease of 80%. Besides the actual construction of a large three-compartment stove, we created a women's association, that will support collaboration on the production and marketing of the fish, ensuring communities fetch a better price for their product.

Promoting sedentary rice farming

Beyond restoring mangroves in abandoned rice fields, the project also helped communities to improve the productivity of existing rice fields. This prevents their abandonment and subsequent conversion of nearby mangroves. Our field assessment demonstrated that many rice fields experienced substantial productivity loss in recent years, due to improper design of hydrological infrastructures (canals, embankments). Together with local agriculture specialists we helped communities to enhance distribution of freshwater and prevent saline intrusion on 52 ha of rice fields in Dapack community, amongst others by strengthening the ring dike that surrounds their fields. This resulted in a doubling of the harvest from 260 to over 500 kilo's per ha per year.

Figure 6: Solar salt production

Figure 7: Women getting water at a well

However this production still falls short of historic production levels.

Future projects may address this by introducing salt tolerant rice varieties and building capacities to adapt farming practices to changing environmental conditions. This will pave the way for a transformation towards a more sustainable sedentary rice cultivation practice.

Livelihoods support in return for conservation measures

In return for their engagement in conservation measures (supporting patrolling or field monitoring efforts, ensuring protection of critical habitats, preventing overexploitation of natural resources) eight villages received financial support to start sustainable income-generating activities to improve their livelihoods.

The project supported 3 villages to develop home gardens providing over 170 families a stable source of income. The main vegetables produced were chili and tomato for domestic use and trading on the market. Villages received technical training to ensure wise use of water, fertilizers and pesticides and provided materials for the establishment and maintenance of wells and fences (see figure 7).

Elsewhere we supported construction of wells, latrines and a rice husking machine, depending on the need of the communities involved.

Next steps

The project demonstrated a range of options for improved management of mangroves and associated coastal ecosystems in Cacheu. With park authorities and communities, we developed co-management arrangements for management of the park and its buffer zone and helped communities to develop sustainable alternatives to harmful practices. We introduced Ecological Mangrove restoration as a highly promising approach to rehabilitating abandoned rice fields and supported enhanced protection against poaching, land conversion and unsustainable use of fuelwood.

We are confident that National park authorities and local communities will be able to independently sustain and upscale these interventions in the years to come.

However we see substantial opportunities to introduce these and other interventions elsewhere in Guinea-Bissau. The minister of Environment has invited us to contribute to the development of a broader vision for wetlands restoration and management across Guinea-Bissau. This offers major opportunities for implementing Ecological Mangrove Restoration across tens of thousands of hectares and for bringing the sustainable livelihoods and conservation measures to scale.

We will be developing new initiatives to implement this work in Guinea-Bissau and elsewhere in the region.

Further Reading

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