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Oceanium Dakar: The daily struggle for the integrated community-based protection of West Africa's marine and coastal ecosystems

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Abstract. The coastlines and deltas of West Africa have suffered—and continue to suffer—significant environmental damage. Although they fulfill crucial functions, their mangroves have been subjected to widespread destruction. The Senegalese NGO Oceanium has been combatting this phenomenon since 2006 by sensitizing and involving the surrounding populations. The "*Plante ton arbre*" (Plant Your Tree) project is a rare example of the large-scale participatory restoration of a severely threatened coastal ecosystem. Its results deserve to be analyzed in greater detail, but it has already demonstrated that a proactive initiative designed to be friendly to people, as well as to the environment, really can make the difference.

Keywords. Mangroves, Senegal, reforestation, local communities, awareness-raising, mobilization, participatory method, large scale, replicability, conservation, halieutic resources

1. Introduction

Mangroves play an ecological, but also economic and social, role essential to the coastal regions and communities of Senegal. These amphibious forests manage to survive, and even thrive, in brackish wetlands at the mercy of ocean tides. In so doing, they underpin the existence of the people of the Casamance and Sine-Saloum deltas. Fish, shellfish, countless butterflies and a multitude of birds find, between their roots and in their branches, an ideal place to develop and grow. The mangroves also act as a protective barrier against the winds, recycle large quantities of organic material, and improve the quality of the water, making it more suitable for rice-growing. Finally, when sustainably farmed, their leaves, bark and flowers offer a wide diversity of products of exceptional nutritional and therapeutic value, foremost among them being mangrove honey.

Figure 1. The Oceanium Logo

In Senegal, as in many other tropical countries, these

ecosystems have gradually been destroyed.[1] Since 2006, however, the Senegalese NGO Oceanium has been mobilizing local communities to restore the mangroves. Created in 1984 by Professor Jean-Michel Kornprobst, and subsequently headed by Haïdar El Ali, Oceanium is an environmental protection agency. In its early days, most of its activities centered on the sustainable management of the marine environment. Today, its actions extend over land as well as sea, and are led by a team of professionals and volunteers in Senegal and in neighboring countries (Gambia, Guinea-Bissau, Mali and Burkina Faso).

In a few short years, more than 400 villages have carried out the largest mangrove reforestation program in the world. This paper briefly presents the NGO, retraces the history of the project, and tries to answer a number of key questions: Why and how was the program conducted? What, in concrete terms, are Oceanium's working methods? How can we ensure that the restoration is sustainable?

The actions implemented by the NGO are designed in a way that reflects a particular strategy based on the participatory protection of natural areas and resources, a strategy put into practice in the "*Plante ton arbre*" program. With the publication of the interim reports, it is time to assess whether the initial restoration targets have been met, and to weigh up the social and environmental impacts of the efforts undertaken, while outlining the future prospects.

2. Participatory protection of natural areas and resources: principles

2.1 From the creation of protected marine areas to the fight against deforestation

Using intervention methods based on listening, exchange, awareness-raising, and joint action with local communities, Oceanium sets out to change mindsets and behaviors. The primary goal is to ensure that local people understand the importance of the struggle to protect their natural heritage and get involved in it, themselves becoming actors in the good management of their environmental resources.

Oceanium's main missions are:

- Environmental education. This begins with an awareness-raising effort aimed at populations whose relationship with nature is often self-evident, but who frequently do not, or at least not fully, perceive the forces that are at work and that threaten the environment in which they live. The Oceanium team shoots its own documentary films, and then tours of schools and villages, organizing debate screenings (*cinéma-débats*), at which it initiates the discussion, offers explanations, and listens to people's reactions and experiences. Depending on the response, it offers everyone the opportunity (through further films, discussions, and easily-accessible scientific literature) to learn more about the implications, modalities and means of action.
- The central means of action is the participatory reforestation of the mangroves. With its permanent network of regional coordinators, the organization sets up large-scale planting campaigns to restore the mangroves in the Casamance, Sine-Saloum and Saint-Louis regions. But the reforestation effort is not limited to restoring the marine or delta ecosystems. Building on its own experience, and faced with the magnitude of the damage caused by the destruction of plant cover throughout the area, Oceanium has undertaken to support and organize the planting of Palmyra palms and many other tree species across Senegal (in the regions of Thiès, Tambacounda and Kolda).
- In a separate but complementary strand of this restoration drive, the Oceanium teams promote or support the creation of community-managed Marine Protected Areas (MPAs), and ecotourism facilities to provide the necessary funding. One of the most successful achievements in this respect was the creation in 2003 of the Ker Bamboung MPA and an ecotourism camp in the Saloum delta, along with the opening of two new MPAs in the Casamance delta.
- To give fresh impetus to sustainable and human development, Oceanium has set up a microcredit scheme, the Aliniha project, which aims to combat poverty by improving the living conditions of disadvantaged women in Kayes (Mali), Tambacounda (Senegal) and Gaoua (Burkina Faso) through a combination of microcredit, environmental protection and support for female entrepreneurship.
- Finally, Oceanium refuses to resign itself to the disappearance of outstanding marine species. The organization is therefore active in the rescue and specific protection of manatees, dolphins and turtles. Once again, this work is done with the involvement and participation of local groups sensitized to the defense of wildlife (fishermen, villagers, youth associations, etc.).

2.1 Projects designed with and for local people

One of the key indicators of the success and legitimacy of Oceanium's projects is the support and strong involvement of the local population. The activities developed by the organization are rooted in community involvement, and must benefit local communities. The aim is to support local dynamics, steering local people toward a form of development that is as endogenous and sustainable as possible. When the synergy works, the protection of nature generates both short and long-term revenues that offset the gains that could have been made from devastating over-exploitation.

By way of example, local small-scale fishermen, with the support of the organization, set up West Africa's first working Marine Protected Area (MPA), covering 7,000 hectares in the Saloum delta, and financed by the construction of an eco-guesthouse inside the MPA at Keur Bamboung.

1 UNEP-DEPI, Mangroves of Western and Central Africa, UNEP-WCMC, 2007, p.27.

Held up as an example to follow, the project is now overseen by a management committee made up of 14 villages. The mangrove reforestation projects also galvanize considerable local participation.[2]

3. "Plante ton arbre": the implementation approach

The mangrove restoration program was rolled out in seven main steps, from the training of the intervention teams (1) through to the observation and monitoring of the restored ecosystems (7), via communication for conservation (2), action planning and coordination (3), collecting (4), planting (5), and evaluation (6).

Step 1: Planning the action, training the teams

From July to the end of August, Oceanium runs a series of training courses for its teams. From the logistics people to the mappers, to the *cinéma-débat* moderators and technicians, everyone follows sessions tailored to their own field of competence to perfect their skills. They have already been given environmental training, with a particular focus on understanding and preserving mangrove ecosystems. "*Oceanium*" as the NGO's president Haïdar El Ali proudly declares, "*is also a school!*"[3]

Step 2: Communicating to raise awareness

For three months, from July to September, Oceanium sends out its fifteen *cinéma-débat* units to ply the roads and trails of Senegal, insisting on the importance of individuals and communities taking ownership of the reforestation initiative. This awareness-raising and behavioral transformation campaign is summed up by the program slogan "*Plante ton arbre!*" (Plant Your Tree). The teams have organized almost 2,150 *cinéma-débats* in the villages, reaching out to more than 300,000 people with the message of mangrove reforestation.

One of the great advantages of this communicative approach is, of course, its drawing-power, but also its ability to trigger subsequent discussion. It also helps that the local populations often recognize themselves in the projected film footage, which makes it far easier to explain the approach through this means. This empowerment by example, and the exchanges that ensue after each projection, also help to forge bonds of trust with villagers. Finally, due to the huge importance of the radio in Africa's rural areas, the organization's teams also take part in numerous local and national radio programs.

Oceanium now knows that it can count on thousands of planters to achieve its goal.

Step 3: Coordinating, team-working and planning

Throughout the campaign, from May to November, the logistical and monitoring aspects of the reforestation operations call for an internal organization focused primarily on combining efficiency with solidity and adaptability.

In addition to its national headquarters in Dakar, Oceanium has three regional bases: at Bignona and at Kolda in Casamance, and at Toubacouta in Sine-Saloum. In total, the various project phases—awareness raising, seed collecting, reforestation, and monitoring—occupy about a hundred people.

Step 4: Collecting propagules and improving living standards

The propagules are collected by groups from women from mid-July onward[4] in sectors where the mangrove is thriving. Often assisted by their menfolk and children, the women harvest the propagules from the trees and store them in bags, which will subsequently be sent by truck to the reforestation sites. Collecting the propagules in the mangrove swamps is arduous work, and may impinge on the other activities of village life; the organization therefore pays the collectors (1.5 euros per bagful of propagules), which enables the women to generate income and to meet the needs of their families.

Step 5: Transporting, sorting, aligning and planting

Once the bags of propagules have been brought in, they are transported to the reforestation site. Before being planted, the propagules are sorted and counted by the women, who pass them on to the planters, standing in lines two meters apart. Holding bowls full of seeds, the planters can now commence the task of reforestation. This step will run from mid-July to the beginning of November. As with the collectors, Oceanium incentivizes the groups of planters by paying 7.5 euros per hectare planted.

Step 6: Measuring and classifying

As soon as an area has been planted, the mapper teams, nicknamed "the GPS boys", arrive at the site to measure and classify each parcel of land. All the sites replanted by local groups from 2008 to the present day have been measured, classified, data-processed and logged in a dedicated database.

Step 7: Monitoring the trees, and watching them grow

By mid-November, the trees are planted. The total surface area that the organization has helped restore covers almost 12,000 hectares in the mangroves of Casamance, Kolda, Sine-Saloum, and even Saint-Louis, where trials are currently being held. This is the world's largest mangrove reforestation program. But as every guardian of nature who has ever done any gardening knows, it doesn't stop there. The planting must be done carefully and wisely, but it is only one step in the process. The essential thing is for the tree to grow, and for the ecosystem to finally recover both its strength and its

2 Cf. Summary table of mangrove reforestation campaigns in Section 3.4.

3 Haïdar El Ali, opening the team training seminar in Dakar, July 21, 2010. Following the change of government in 2012, Mr. El Ali is now Senegal's Minister of the Environment and Sustainable Development.

4 It is traditionally from this period onward that the seeds are deemed ripe enough for planting.

balance. For this reason, monitoring comities are set up and supported in each village community in the program, and actions are regularly organized to protect and clean young plants.

As they develop, the mangroves absorb large quantities of carbon from the atmosphere, helping to slow down climate change: over the course of 20 years, the reconstituted mangroves of Senegal will be able to capture more than half a million metric tons of CO_2.[5] The project has been registered by the United Nations Framework Convention on Climate Change (UNFCCC) and will be recognized by the issuance of certified and verified "carbon credits". These credits will enable the businesses that have financed the Oceanium project, through the Livelihoods Fund, to reduce their carbon footprint by combining abatement actions (cutting their emissions) with carbon offset, by means of credit schemes with a powerful social and environmental impact.

4. Restoring Senegal's mangroves: overview 2006-2012

4.1 Context: Damage to the mangroves prior to the program

The mangroves of Senegal have sustained serious damage for several decades, especially in the Casamance delta, where some 67,000 hectares of this unique ecosystem have disappeared. The droughts of the 1970s and 80s, urbanization, overcutting for charcoal production, and the building of roads that cut off the circulation of water have all combined to destroy vast areas of mangrove.[6]

Without the contribution made by the trees, the water has become too salty for rice-growing. The fish and shellfish have lost their habitat for reproduction and growth. And logically enough, the communities that lived on resources from the mangroves are now beset by poverty.

4.2 2006 to 2007: the trial period

In 2006, Oceanium, together with the people of Tobor village in Casamance, planted 65,000 mangroves on a damaged strip of land. This participatory reforestation experience was something of a pilot run, and proved highly conclusive. On the human level, all of the villagers—aware that their natural resources were vanishing—were quick to mobilize following the awareness-raising and coordination meetings staged by the NGO. On the environmental level, the recovery rate of the plants was 85%.

This early result motivated the teams to continue the adventure. The following year, in 2007, 550,000 mangroves were planted in ten Casamance villages. In 2008, the organization launched "Operation 5 Million Mangroves" in the same region. In all, 5,302,000 trees were planted in the space of six weeks. And by mobilizing more than 32,500 people from 110 different villages, the project showed that it reflected a genuine popular concern.

4.3 2009: rollout

The year 2009 was, in a sense, the realization of the partnership and know-how acquired by Oceanium and the local communities. With the support of new financial partners—Groupe Danone and the foundation Insolites Bâtisseurs, as part of a carbon-funding scheme—the NGO was able to be more ambitious in terms of surface areas, awareness-raising, and methodology.

In three months, from August to October 2009, more than 36 million trees were planted by over 80,000 people from 323 villages in the regions of Casamance and Sine-Saloum. The environmental education effort was also unprecedented, with 200 *cinéma-débats* organized, reaching a total of some 45,000 people. "*Never before have so many trees been planted in so little time*", said the Senegalese and international media in November 2009.

To achieve such a result, Oceanium had to improve its organization. It introduced training for its employees, to enable them, on the one hand, to perform accurate mapping and monitoring of mangrove stands (GPS training) and on the other, to step up the quality of the awareness-raising campaign (*cinéma-débat* training).

4.4 2010 to 2012: full-scale implementation

In 2010, the story continued. More than 62 million trees, covering more than 4,700 hectares, were planted by just under 110,000 people from 408 villages. In 2011, with the support of the Livelihoods Fund, 4,200 hectares were restored, and a further 460 in 2012. In total, almost 12,000 hectares of mangrove have been restored by the people of Senegal.

The Senegalese government is also involved in the project. A protocol agreement between Oceanium and the Ministry of the Environment and the Protection of Nature[7] provides for the monitoring, training and involvement of agents from the designated departments, acting alongside the communities.

Table 1. "*Plante ton arbre*": campaign results, 2006 to 2012

Year(s)	# propagules planted	Surface area (ha)	Planters involved
2006-2008	5,615,000	400	n/k
2009	36,000,000	1,900	78,726
2010	62,000,000	4,700	109,650
2011	42,000,000	4,200	85,765
2012	4,830,000	460	8,500

4.5 Reinforcing the internal organization and extending the field of action

5 Mangrove plants consist of 90% carbon, and the sediments they help stabilize also store large quantities of carbon. Mangroves are therefore excellent carbon sinks.

6 United Nations Food and Agriculture Organization: "*Loss of mangroves alarming*", FAO publications, 31 January 2008, Rome, Italy.

7 The *Protocole d'accord des Plantations 2008-2009*, signed in 2011 between the Senegalese Ministry of the Environment, represented by Mr. Djibo Ka, the Department of the Environment and Classified Institutions, Groupe Danone, and Oceanium, concerns the monitoring and supervision of plantations.

Thanks to the experience it has acquired over the years, and the support of local communities, Oceanium has been able to extend its field of action in Casamance and Sine-Saloum, and to meet the challenge of restoring damaged areas.

The organization seeks to keep to a reasonable size, to ensure flexibility and responsiveness, but during the reforestation campaign it nonetheless employs some one hundred people, most of them from the areas concerned. The network it mobilizes includes coordinators, area managers, village relays, drivers, bag checkers, and handlers.

The teams have significant logistical resources, including a fleet of 4 trucks, 11 people-carriers, 8 4WDs, 60 "Djakarta" motorbikes, and 10 canoes.

Oceanium now insists not only on the need to put everyone's commitment into practice, but also on the indispensable nature of training and of multi-agency networking, as it seeks to enrich its links with women's organizations, small-scale entrepreneurs in the social, ecology and solidarity-based economy, popular education movements, agroecology activists, and small farmers' groups.

5. *"Plante ton arbre"*: a socially & environmentally coherent program

5.1 A dual success

By integrating all of the energies that came together to produce this result, the President of Oceanium feels that what the organization has "*achieved with the local populations is exceptional*" and certainly goes well beyond its initial ambition.[8] This success nonetheless confirms that precise, graduated but ambitious goals can be achieved even in a context where the consensus of opinion among coastal environment experts was that there was no hope. The now famous "integrated approach" has fully demonstrated its effectiveness on a large scale in the restoration and protection campaign undertaken in Senegal.

Today, Oceanium is trying to set up or support new income-generating activities for the communities involved in ecosystem conservation. The structure is initiating, or taking part in, a number of pilot programs to ensure that local populations, and in particular Senegalese women, can make a living from transforming the products of what is now a more sustainable form of fishing, and from small-scale oyster-farming. Elsewhere in the country, it is promoting the pooling of traditional know-how with data from research and action programs in order to disseminate the benefits of agro-ecological and agro-forestry practices.

5.2 Exchanging, listening, acting and moving forward together

Oceanium is built on an inclusive environmentalist philosophy, for which it makes no apology, and which is constantly updated. The idea that village-based ownership is crucial must have tangible consequences. One must be able, in particular, to refrain from imposing one's own priorities, to allow for the complexity of local social relationships by making a conscious effort to keep the conversation going, and to sustain a process of sharing that is both as broad and as deep as possible. Experience shows that another condition of success is, without doubt, to vary the communication tools and the messages they convey in order to reach out to the greatest number.

Of course, many other organizations active in environmental conservation have also realized the value of a participatory approach and have found a way to integrate community input into every step of the project management cycle. But words have to be turned into reality on the ground, and here much remains to be done. Too many meetings or workshops have become "participatory" only to produce yet another report, but little in the way of actual listening, or of lasting results. One must take the time to develop dialogue and to build trust, by proving one's effectiveness in action.

In the words of Haïdar El Ali, "*the whole world needs to realize the importance of environmental protection, and must meet the challenge of nature—which is the challenge of the millennium!*" To this end, he calls on "*NGOs and local associations to act with local populations, collaboratively and without intermediaries,*" adding that "*NGOs must set themselves [ambitious] targets for coordination with local communities, and must work hard to achieve them. In the space of 4 years, we have gone from one replanting village to over 400. This means that Oceanium has found solutions that are applicable locally and reproducible globally. I invite [all willing participants] to do the same, because nature doesn't wait: this is an emergency. During the ripening season of the mango, the cashew, and indeed the mangrove propagule, we are replanting on a massive scale, because our economy and our societies depend on it.*"[9] In short, everywhere, the time has come for action.

5.3 A visible recovery of natural resources

Oceanium coordinator Albert Seydi, who comes from the village of Tobor in Casamance, has observed the phenomenon first-hand: "*the halieutic resources are gradually returning; the fish and the oysters are increasingly abundant. We are also finding species that had disappeared from our waterways. Not to mention the role played by the mangroves as a natural barrier against salt: last season, we were able to recover 30 hectares of rice fields.*"[10]

In the Marine Protected Area of Keur Bamboung, the same observation is supported by studies carried out by the IRD. The data collected from 2003 to 2007, and then from 2008 to 2010, by different research teams, demonstrate what local people have seen for themselves, namely that the creation of the MPA was followed by an increase both in diversity of species and in overall numbers of the larger fish much valued by the local fishing industry.[11]

8 Interview with Haïdar El Ali, Dakar, January 11, 2013.

9 H. El Ali, speech at the workshop on overfishing and land-grabbing, Global Social Forum, Dakar 2011.

10 Albert Seydi, "*Mot de remerciement et d'encouragement*" (A word of thanks and encouragement), during the Mangrove Caravan's stopover in Tobor in December 2010.

11 Tito de Morais L., Simier M., Raffray J., Sadio O., "*Suivi*

6. "My Mangrove, My Life"[12]

In a few years, the mangroves restored and preserved by the communities will be teeming with thousands of tons of fish per year,[13] a valuable resource for the whole of Senegal. It will also play its dual role as a crucial natural barrier against rising sea levels and as a carbon sink, a key asset in the fight against global climate change.

This result would of course be completely beyond our reach without the commitment and sustained mobilization of the people of Senegal to protect and preserve these ecosystems. Another important aspect—now that we are beginning truly to understand the complex interactions between marine and terrestrial environments—is to be able to extend our knowledge to other mangrove zones and to other types of plant cover in Senegal and the rest of West Africa.

7. Conclusion

The Oceanium project "*Plante ton arbre*" is a rare example of large-scale ecosystem restoration with and by local people. The reasons for its success include: the link perceived by the villagers between the disappearance of the mangrove and the decline in food resources; the ability of Oceanium to sensitize, mobilize, and coordinate the action of local communities; planting methods easily implemented by a large number of villagers, and therefore easily replicated; a supervisory team structure and logistics setup adapted to a project of this type; and, finally, a well-structured measuring and monitoring system.

The project continues: the challenge now is to pursue planting while also initiating long-term actions aimed at protecting the mangrove and making its resources economically viable for local communities. Efforts must also focus on the spreading the use of "hands-on" environmental education approaches and on restoring plant cover in coastal and inland areas.

8. Acknowledgments

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12 Title of workshop on reforestation monitoring and income generation for teams and partners, July 2012.

13 The surface area of Senegal's mangroves is estimated at 2,000 hectares; the average fish and shellfish yield is estimated at 90 kg/ha, with a maximum potential of 225 kg/ha.