Improving the traditional salt exploitation system by sun-dried salt production technique on tarpaulin in Bali Mandinka, Republic of Gambia

Richard DACOSTA[1] et Dr. Mamadou SOW[2]

Summary

Wetlands International and IUCN have implemented a mangrove project in in Guinea, Guinea Bissau and Sierra Leone. The aim of the project is to halt degradation of these coastal forests following drought and abusive resource exploitation. One of its objectives is to improve the living conditions of communities which depend on the mangrove forests and promote good management practices.

Salt production is a major driving force behind the loss of mangroves. In West Africa, salt is either produced by being cooked in Guinea, Guinea Bissau and Sierra Leone, or by sun-dried crystallization in the Sahelian parts of the Gambia and Senegal. The cooked salt consumes a lot of wood from the mangrove and the sun-dried salt is less productive in the local communities.
In Guinea, one estimates that the production of 1 kg of salt requires 3.1 kg mangrove wood.

Wetlands International and IUCN therefore introduced a method that is productive and also prevents deforestation, the socalled sun-dried salt technique 'on tarpaulin. The sun-dried salt technique on tarpaulin avoids the clearance of 125 hectares of the mangrove in the production of 1,000 tons of salt. The sun-dried salt is therefore an alternative method to the traditional cooked salt, not only in Guinea but also in Sierra Leone and Guinea Bissau, all countries that produce cooked salt.

Moreover, this technique has been tested in the Gambia in villages that traditionally produce sun-dried salt. Through this technique, a family produces 1,650 kg of salt in one 22-week cycle. The improved technique multiplies one family's production by 7.5, giving a higher quality product. It also extends the production cycle by 8 weeks, which could significantly increase profits. It also adds the daily benefit of time and less hard work.

The investments needed for this improved technique are light and can be easily covered by the income generated.

[1] Wetlands International Afrique, Dakar-Sénégal
[2] UICN Dakar-Sénégal

Introduction

The mangrove ecosystem is characterized by a strong productivity profitable to many animal and plant species. These are in turn the source of abundant wood resources and aquatic products (fish, shellfish, crabs). Mangrove forests also form an effective barrier to salt water intrusion thus protecting the coastal agricultural areas of West Africa..is the areas are also a refuge for many endangered species, constitutes a link for migratory waterbirds and other animals. The loss of mangrove forests in West Africa has not only caused local shortages for woon but also led to increased salinisation of coastal agricultural areas and has led to a significant drop in local fish stocks.

The West African coast is for a large part covered by mangrove forests. However, the combined effects of drought and over exploitation of resources have drastically reduced the surface area of this vital environment which now occupies no more than one million hectares as opposed to three million less than 50 years ago. The most significant human threats are clearings for agriculture and aquaculture, **the use of wood for domestic purposes, fish smoking, salt cooking and shell burning and the use of wood for construction.** This deteriorating situation is accelerated due to demographic pressure that is increasing on the coast. It is combined with climatic degradation which endangers rural watershed production systems.

In order to provide answers to those constraints, national and even local initiatives for mangrove conservation and sustainable use have been promoted in the past. However, their impacts have been limited and did not address the root causes. The limits of national management strategies of this ecosystem are imposed by the transnational character of certain activities in the mangrove, particularly fishing and harvesting wood for construction. In addition there are emerging industries with adverse impacts such as oil, bauxite and other minerals which present a pollution risk. Environmental preservation and conservation of the mangrove ecosystem thus requires a regional approach that integrates lessons learned, experience and expertise in the targeted countries. Therefore, the West Africa Mangrove Initiative, an IUCN and Wetlands International project covers six West African countries composed of Mauritania, Senegal, the Gambia, Guinea Bissau, Guinea Conakry and Sierra Leone **(Figure 1)**.

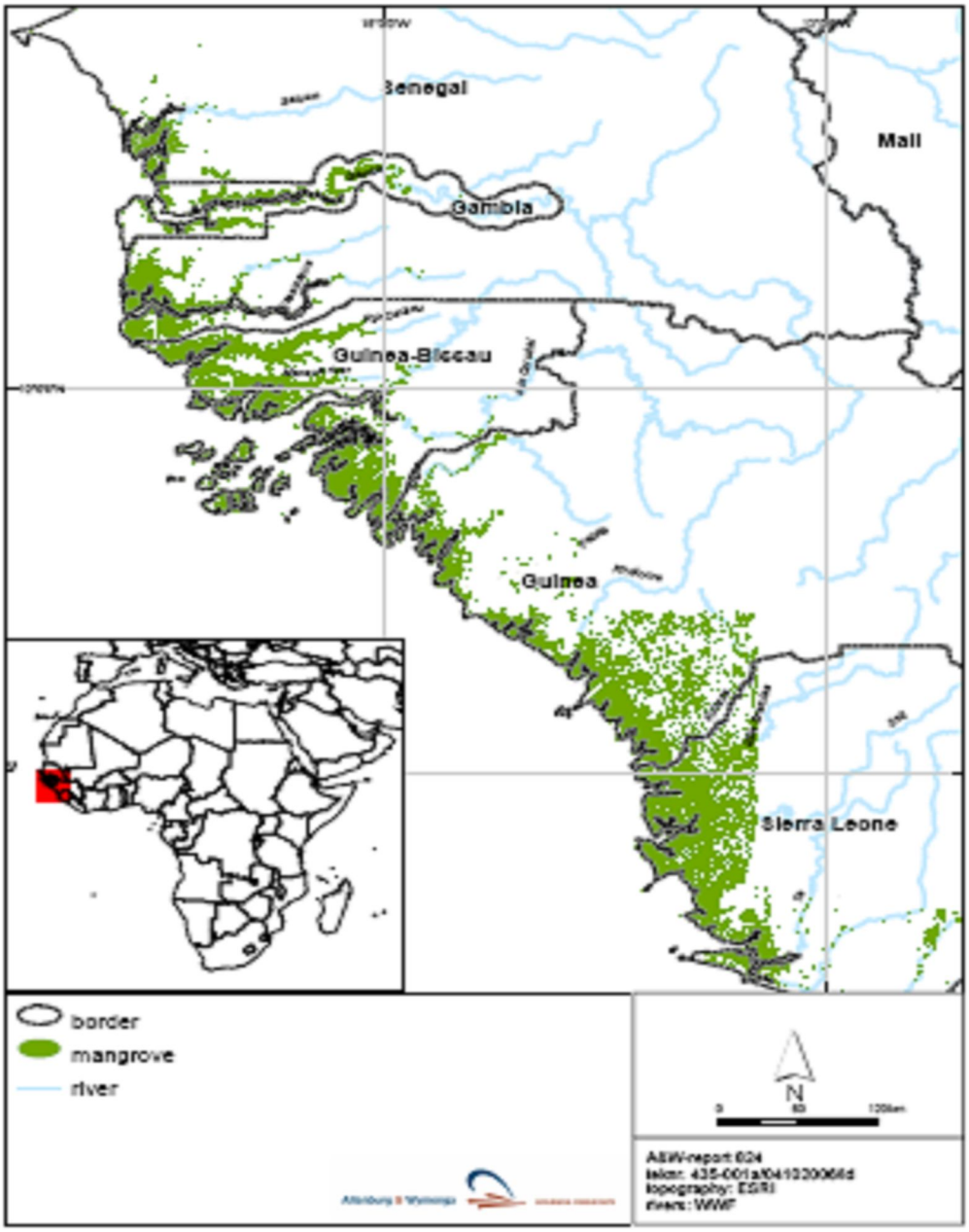

Figure 1 : WAMI area of intervention

The objectives of this project are to:

- Establish a baseline of the ecosystem through ecological, climatologic, socio-economic, cartographic and political studies,
- Develop an action plan for improved mangrove management in sub-regional maritime and costal conservation, incuding the prevention of mangrove clearance.
- **Improve living conditions of mangrove dependent communities and promote better management practices**

Methodology

One of the initiatives of this project related to the last objective has been to popularize the sun-dried salt production technique on tarpaulin.

The village of **Bali Mandinka, district of Jokadu, North Bank Region** is located approximately 50 km north east of Banjul, on the right shore of Miniminiyang Bolong. Tree local communities in the Gambia (Bali Mandinka, Jassobo and Buram) have been trained durint six days (1th – 6th april 2009)

1. Salt production techniques

The sun-dried salt production technique on tarpaulin was used in Guinea as an alternative to the cooked salt technique that consumes a lot of mangrove wood. It proved productive (yield, hardship and workload). Even though in the Sahelian area, namely in the Gambia, salt production does not require the use of mangrove wood, the technique performed greatly proved very productive compared to the traditional sun-drying technique of salt production.

1.1. Traditional technique

This technique relies on trapping the water from the ocean in evaporation basins of 25 sq meters and half a meter deep (**Photo 1**). Evaporation takes 4 months (January to April) to obtain crystallization in block forms. These blocks are then manually broken to obtain large crystals that are repeatedly washed before drying and stocking. This hard work (**Photo 2**), with high intensity in manpower engages the whole family over two and a half months (April – June) of the year.

Photo 1 : Evaporation basin

Photo 2 : Women breaking crystallized salt in block forms

1.2. Improved technique

In order to test the sun-dried salt on tarpaulin, WAMI mobilized three technicians from Guinea over three weeks who trained the communities in Bali Mandinka, Jassobo and Buram in the technique based on preparing a bittern saturated with sodium chloride that is easily crystallized on plastic tarpaulins. The bittern is obtained by washing salty earth in craters of approximately 50 cm of diameter (**Photo 3**). The crater is made by assembling wood of 1 cm of diameter and is made waterproof using recycled plastic bags and straws covered by clay. It lies on wooden supports of5 cm of diameter.

The bittern is collected in a basin (Length = 1.5cm; Width = 1m; Depth = 50cm) covered with a plastic tarpaulin. The bittern is also crystallized on plastic tarpaulins (Length = 5m; Width = 2m) that are tied to the ground by wooden poles (**Photo 4**). One tarpaulin can crystallize 80 liters of bittern per day. A total of 3 sets of craters and 9 tarpaulins were put in place. The equipment needed is composed of: wooden scrapers to collect the salted ground, plastic tarpaulin of 250µ deep, brooms with brush, sponges, ropes and buckets. A production unit is composed of 6 craters and 10 tarpaulins for which an investment of approximately 50,000 CFA Francs (110 US $) is needed.

Photo 3 : Production system and bittern collection

Photo 4 : Bittern evaporation tarpaulins

2. Results

The data below comes from the reported daily production of salt from 1 to 6 April 2009 in the village of Bali Mandinka. Nine tarpaulins were raised and thirty-one harvest were carried out. The average daily per tarpaulin is around 18 kg (Table 1).

Table 1 : Quantity of salt produced per day

Date	B1	B2	B3	B4	B5	B6	B7	B8	B9	**Total Jour**
01-avr-09	18,1									**18,1**
02-avr-09	18,4	18,2								**36,6**
03-avr-09	18,3	1 8,1	18	18,3	18,1					**72,7**
04-avr-09	18,1	15,6	18,2	17,6	18	18,3	17,6			**123,8**
05-avr-09	17,9	17,8	18	18,2	17,9	18,5	18,2			**127**
06-avr-09	18,1	18,1	18,1	17,8	18	17,8	18,4	18,2	18	**162,5**
TOTAL	**108,9**	**88, 3**	**72,3**	**71,9**	**72**	**54,6**	**54,6**	**18,2**	**18**	**558,8**

In total, 558 kg were produced which amounts to approximately 11 bags of 50 kg. With the 75 tarpaulins provided to the 3 communities (25 bags per community), the new technique enabled them to produce more in quantity and quality (Figure 2). In fact, during the production period (January to May) the average yield in Bali with the traditional system varies between 15 and 50 bags of 50 kg. That represents a production of approximately 15 days with the new method.

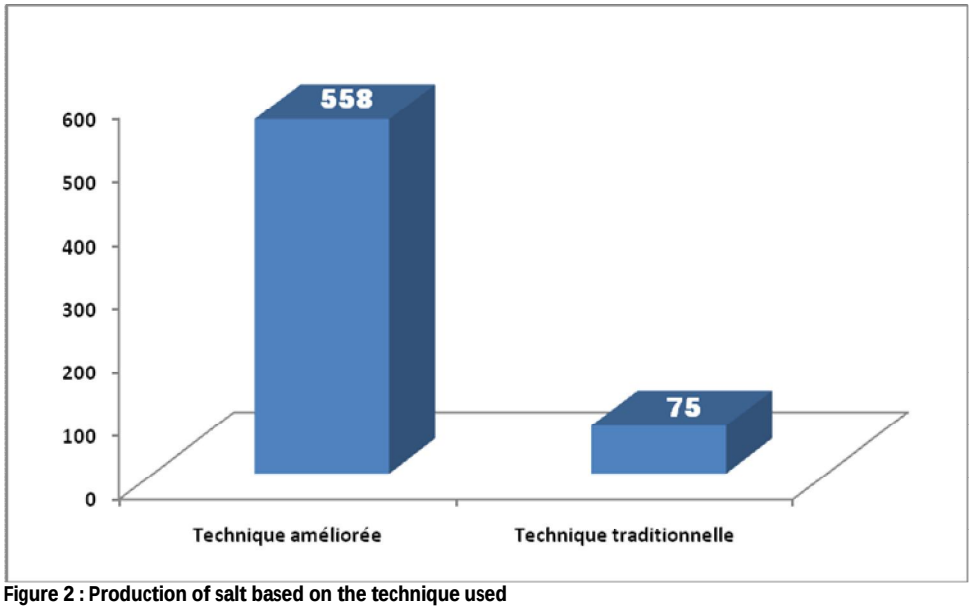

Figure 2 : Production of salt based on the technique used

This graph indicates that the improved technique multiples annual production by 7.5. Moreover, the quality of the product is clearly superior: the texture is more refined (**Photo 5**), the salt is cleaner and thus commercially more competitive. A local market study indicated that the salt produced traditionally is negotiated at 57 US$ per ton compared to 76 US$ for imported product from Senegal which is of the same quality as the improved technique. All this data indicates that the improved technique is more productive and financially more profitable.

Photo 5: Sun-dried salt on tarpaulin (fine crystals)

Photo 6 : Traditional sun-dried salt (big crystals)

3. Comments and conclusions

The production of sun-dried salt on tarpaulin is an adaptation of techniques of salt men in Guerande and those in the French Ré Island. It was used in Benin and Guinea as an alternative to producing cooked salt that consumes a lot of wood from the mangrove. P. Gelin estimated that the production of 1 kg of salt in Guinea required 3.1 kg of mangrove wood. In 1989, the report from the *Schéma Directeur de la Mangrove (SDAM)* estimated the consumption of mangrove wood to produce cooked salt in maritime Guinea at 93,000 tons. More recently, in the evaluation report of Univers-Sel activities in Guinea (2008), it was estimated that 1,000 tons of salt produced using the sun-dried salt technique on tarpaulin avoids clearing 125 hectares of mangrove. The sun-dried salt turns out to be a good alternative to traditionally cooked salt, not only in Guinea but also in Sierra Leone and Guinea Bissau, countries that produce cooked salt.

The Gambian experience from the WAMI project shows that this technique is also of great interest in the Sahelian area because it saves time, increases yields, improves quality and reduces hard labor.

- **Time saving:** The crystallization in evaporations basins used in the traditional technique starts three months (January to March) after putting water whereas the improved technique permits a bittern to crystallize as early as November. This enables the production cycle to be extended to 5 to 7 months: The traditional technique lasts from January to May whereas the improved technique lasts from November to May.

- In addition, the traditional technique requires a permanent presence to collect and

stock the salt, while with the improved technique, once the bittern is obtained and poured onto the tarpaulin in the morning, the producer can undertake other activities during the day and return to collect the salt in the evening.

- **Yield and quality:** It has already been indicated that for the same period of work of 5 months (January to May), the production with the traditional technique is of 1,650 kg against 12,276 kg for the improved technique, a 7.5 time increase, and the quality of the salt is also improved. With the possibility that the new technique offers to extend the production cycle to 7 months, the total volume production of salt could go from 12,276 to 16,740 and will enable a significant increase of revenues for the producers.

- **Hard labor:** Preparing the evaporation basin and collecting the salt are the main tasks in the traditional technique. They require a lot of energy in a restrictive environment: heat, wind,... Preparing and maintaining the filters, collecting water to wash the salted ground and the laying of the tarpaulins are the main tasks of the improved technique. They are less tiresome and require less time than in the traditional technique.

In Benin and Guinea, the sun-dred salt production technique on tarpaulin is an alternative to the high consumption of mangrove woodwhen cooking salt. The experience undertaken in Gambia indicates that it can also be an alternative to the weak productivity of traditional saline salts.

4. **Recommendations and suggestions for future research**

In the WAMI project area, it is possible to foresee sharing the sun-dreid salt technique on tarpaulin to not only preserve mangrove wood but also to improve communities' revenues.

Its popularization in Guinea Conakry, Sierra Leone and Guinea Bissau and in Casamance (Southern Senegal) will help reduce the cutting of mangrove wood to cook salt. However, the Guinean experience has shown that market competition for cooked salt is not always in its favor. A study of value chain and awareness are essential to change that tendency.

In the Sahelian area such as the Gambia and in the Saloum (Senegal), its diffusion will help improve productivity and competiveness of this product, subsequently those of the producers. Here, the choice of for diffusion of this technique must look at areas where the wind erosion does not risk spreading the sand on the crystallization tarpaulins.

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