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Uncertainties and conflicting
environmental adaptation
strategies in the region of
the Pink Lake, Senegal

Incertitudes et stratégies litigieuses
d'adaptation de l'environnement dans la
région du Lac Rose, Sénégal



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Uncertainties and conflicting environmental adaptation strategies in the Region of the Pink Lake, Senegal

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Abstract

Between the 1970s and 1990s, decreasing rainfall and devastating droughts that hit the Sahel region have led to major environmental changes ever observed. In rural Senegal, droughts combined with deforestation caused a drastic reduction of natural resources. This has undermined the precarious livelihoods of vulnerable households who were dependent on rainfed agriculture and livestock. Facing food insecurity, people have responded with subtle strategies of income diversification and social innovation. In the Sangalkam rural community (Dakar Region), people started a business by extracting and selling salt from the Pink Lake's stretch of smooth water, initially to supplement the income of their families and afterwards to engage in a commercial production. Gradually, as the salt mine was producing its 60,000 tons per year for domestically family use and export, migration waves not only spread quickly on the site, but also tourist facilities have been developed around the immediate surroundings of the Lake. Migrants and natives, working on the site, also called "Salt Diggers", have contributed in some way, to the creation of new social and economic spaces. Over the years, they have reshaped the social and spatial relations and have become key players in collectively managing their own immediate environment. However, some of their innovative responses to the environmental stresses are not free from conflicts and tensions. Based on empirical data collected since the late 1990s, the paper focuses on self-organization of the Salt Diggers, the social, societal and environmental uncertainties resulting from their activities, but especially on existing interventions and possible actions to protect the site.

Keywords: Senegal, Pink Lake, Salt extraction, Migrants, Salt diggers, Climate adaptation, Social and societal uncertainties

Résumé

Dans les années 1970 et 1990, la baisse des précipitations et les dévastatrices sécheresses qui ont touché la région du Sahel ont entraîné les grands changements environnementaux actuels jamais observés. Dans les zones rurales du Sénégal, les sécheresses combinées à la déforestation ont provoqué une diminution drastique des ressources naturelles. Cela a remis en cause les précaires moyens de subsistance des ménages les plus vulnérables qui dépendaient de l'agriculture pluviale et de l'élevage. Face à l'insécurité alimentaire, les populations ont répondu avec des stratégies de diversification des revenus et par l'innovation sociale. Dans la communauté rurale de Sangalkam (Région de Dakar), les habitants ont commencé une activité économique en extrayant et en vendant le sel extrait du Plan d'eau du Lac Rose, dans un premier temps pour compléter le revenu de leurs familles ; et ensuite, pour se lancer dans une activité commerciale de production à grande échelle. Au fur et à mesure que la mine de sel continuait à produire ses 60.000 tonnes par an pour un usage domestique et pour l'exportation, non seulement les migrations se sont rapidement propagées, mais des infrastructures touristiques ont été développées sur et autour du lac. Les migrants et les «autochtones», appelés aussi «récolteurs de sel», qui travaillent dans le site ont contribué, en quelque sorte, à la création de nouveaux espaces sociaux et économiques. Au fil des ans, ils ont remodelé les rapports sociaux et spatiaux et sont devenus des acteurs incontournables dans la gestion de leur propre environnement immédiat. Cependant, quelques-unes des réponses novatrices apportées ne sont pas libres de conflits et de tensions. Basé sur des données empiriques recueillies depuis la fin des années 1990, le papier s'intéresse à l'auto-organisation des «récolteurs de sel», aux incertitudes environnementales sociales et sociétales qui résultent de leurs activités, mais aussi et surtout aux interventions existantes et aux possibles actions entreprises pour protéger le site.

Mots-clés: Sénégal, Lac Rose, extraction de sel, migrants, «récolteurs de sel», adaptation aux changements environnementaux, incertitudes sociales et sociétales

Uncertainties and conflicting environmental adaptation strategies in the Region of the Pink Lake, Senegal¹

1 Introduction

Epistemic uncertainties (frames as memory structures) and ontological uncertainties (inherent variability of the system) are being subjects of an extensive body of research in Social Science, Economics and Technologies (Shackley and Wynne, 1996; Tannert et al. 2007; Sanjay Chandrasekharan and Stewart, 2007; Spiegelhalter and Hauke Riesch 2007). Ontological uncertainty in water management and socio-technical environmental systems are becoming an interesting and outstanding topic above all in the low-income countries where water resource is scarce and/or natural resources are being over-used. According to Brugnach et al. (2008) "Uncertainty refers to the situation in which there is not a unique and complete understanding of the system to be managed". This paper is using an adaptive management approach to look at flexible solutions, used by the "salt diggers" (a community of Lake's workers in Senegal) to adapt to environmental strains, changing conditions and often unexpected situations.

In the last few years, discussions about national "public goods" (such as water, nature, resources, etc.) have been repeatedly raised in the academic forums and the civil society around the Globe in general and in Africa and Senegal in particular (Mbow, 2008; Mertz, 2010; Boudreau, 2010; Sall, 2011; Hummel et al, 2012). Several authors (Bellah, 1984; Etzioni, 2004; Laimé et al., 2008) have expressed support for the restoration of community as a new form of social integration and a revival of commons. The concepts of commons have had a long tradition in the academic interest of the United States (Putnam, 2000; Ostrom, 2010; Bollier, 2010). Nowadays they are being seriously considered in Europe (Helfrich, 2010; Hessel, 2010) and in several low-income countries in Africa, Latin America and Asia. Some countries such as The Netherlands, Nicaragua and Uruguay have even passed laws banning privatization of some resources, for example water. As far as water is concerned, terrifying privatizations, known as PPPs - Public Private Partnerships (mixed-ownership, management, lease and concessions contracts) are currently occurring in Africa. Strong and influential private corporations such as *La Lyonnaise des Eaux*, *Saur International*, *Suez* and *Veolia* (France) *Thames Water* (Germany), *Aguas de Barcelona* (Spain) have already "conquered" the water market in Europe, Latin America and Africa (Kerf, 2000; Budds and Mc Granahan, 2003).

It must be said that natural resources have played, and continue to play a special role in shaping African societies. In fact, environmental issues have opened a new breach in the dichotomy colonialism-environmental stress by introducing a reconsideration of the interactions between humans and nature (often local environment) but also the various modes of agricultural and cultural expressions. Thus, for a long time, sociologists and historians have linked the different degradations of Africa's natural environment with colonization. The colonial incursions had, it must be remembered, promoted a series of ownership of land, natural resources like water, forests, minerals, but also a new way to practice extensive agriculture (especially the culture of peanut). A kind of apocalyptic vision of the destruction of African nature has been repeatedly described in old archives and books on Africa and even on other continents colonized by Europe (Boilat, 1853; Vail, 1977; Kjekshus, 1977; Crosby, 1983; MacKenzie, 1997).

Approaches to conserve land and forests referred most of the time to the scientific and business models of Europe. Rural populations were largely excluded from preservation strategies of

¹The draft of this paper was first presented in South Africa in the Durban Conference on *Climate Change and Conflict: Where to for Conflict Climate Change Adaptation in Africa* organized by ACCORD (African Centre for the Constructive Resolution of Disputes), 15th and 16th of September 2011. Some of the empirical materials have been used in May 2012 in the author's presentation on "Conflicts and competition between locals and new elites on control over resources in Senegal and Benin" at the VAD 2012 in Cologne (Germany).

ecosystems and their indigenous knowledge and/or local authorities were often not taken into account. One must therefore recognize that, in lots of cases, “colonizers” have even accused the “colonized” of being responsible for the destruction of their own ecosystems. African populations were often accused of using destructive agricultural practices, wasting water and grazing on a large scale, which in the long run, have led to a series of desertification, droughts and famines (Mortimore, 1989). The argument against the common “good/property” and modes of community management of Africans, often mentioned by the colonizers, was seen as rational practices where Africans were trying to maximize the joint exploitation of the natural resources at lower cost. However, in most African societies, collective resource managements were or are still observed, most often with traditions of socially circumscribed use. Moreover, traditional authorities, customs and religious ideas were most often reinforced by the constraints over exploitation of resources. Thus, dispersion systems of herds over wide areas, or moving animals seasonally between pastures and watering places and/or stretch of smooth water were and continue to be common in Africa. These types of practices remain nowadays explicit expressions of community management of local places, spaces and environment (natural resources).

It is in fact, in rural areas, where people are living in impoverished conditions, and where they are most often exposed immediately to ecological hazards and are resource-dependent that such practices of common management of resources are mostly observed. Natural resources such as water, vegetation cover and/or soil are very often protected by communities. Those resources remain of immense interest for these populations in order to keep them in a usable form as well as their maintenance for equitable access (Reij et al, 1996).

Communities are often mobilized to become custodians of their own environment and resources by promoting resilience to the impacts of climate change (Scheffran et al. 2012). They are working for the revitalization of indigenous initiatives for local development and therefore resisting any kind of privatization. Livelihoods often place those communities and their priorities at the centre of the local development; in other words, at the centre of local initiatives or coping strategies helping to transform natural resources in a productive use. Because of the complex nature of the environment, the dynamics of livelihood strategies (e.g. productive activities, investment initiatives and reproductive choices) can respond flexibly to people’s changing situations and contexts. In Senegal, the Pink Lake can be seen as an illustrative example of an “indigenous and endogenous” management, of exploitation and common management of a stretch of smooth water resource that has long been embedded within the local cultural and environmental practices.

This paper is looking at the case of the salt diggers or “salt collectors” of the Pink Lake, also called, in local language, **Retba Lake** in the rural area of Dakar, in Senegal (Sow, 1995; Sow, 1999; Sow, 2002). It investigates how communities manage the conflicting climate adaptation strategies sustainably, in a kind of bottom-up community driven approach. The paper explores the fascinating topic of an African dynamic natural ecosystem with particular emphasis on symbolism and space management on a daily basis. It is interested in how the dynamics of migrations, the social hierarchies and the revival of common struggles are reflected in the local space of the Lake Rose. The community of salt diggers is understood here in the wider sense, as something denoting people united by close ties of sociability, a kind of “subculture” and common sense of belonging to the same group, a “community spirit” (Tönnies, 1887). Most of them are organized into a – Management Committee – (M.C.), a kind of platform regrouping local initiatives and actions. But it is difficult to say, in the case of the salt diggers, whether everyone is driven by the same interests that the community wants to defend. The salt digger’s community itself is currently highly decomposed. It is also difficult to say really whether the notion of community employed by Tönnies has the same meaning for them. In other words, the interests between the different actors are not always sufficient to form a “community of spirit or action”. Some salt diggers do not necessarily have interest in participating in collective actions as for in their logic they always think to perceive the benefits of combat without paying the cost. And since most of the incentives are not selective (except perhaps the individual sanctions that the M.C. can

afflict on the troublemakers and deviants), some individuals having become “rationals” do not see the matter to fully engage in the social movement. Thus, whilst the M.C. has broad discretion in the “policy” and “social” management of operating activities on the site such as treatment (iodization) and salt trade, it does not participate so far in the management of individual careers (social mobility), access to employment and promotion, etc.

2 Background

The Pink Lake is located in the Northeast of Dakar (along the so-called “Long Coast”) in the rural area, about thirty kilometres from the capital city. It is surrounded by the seaside and the white dunes on its North, East and West and by a conglomerate of villages and new urbanizations on its South. Because of its closeness to the Atlantic Ocean, it can be considered as a LLCA – Low-Lying Costal Area – as it is a contiguous area along the coastal white dunes (around 2 km from the beach) and is less than 10 meters above sea level. It has a fragile status of ecosystem and many environmental and socio-economic shifts are occurring there due to population dynamics (different types of migrations, settlement, tourism, etc.).



In the back of the map, the Island of Gorée one of the most visited places in Senegal and the map indicates the location of the Pink Lake or Retba Lake (see red arrow) within the country. Source: www.our-africa.org

The Lake is fed by abundance groundwater. During the rainy season, it receives a large supply of Sangalkam village backwater and the dry lakes of Thor and Yandal in the neighbouring province of Thiès (CRS, 2002). It is struck by a fragile ecological balance. The lake is 3 meters deep and the salt concentration of 380g/l is higher than in the Dead Sea (340g/l). In the 1970s, as a response to the economical hardship due to persistent droughts, locals began an economic activity by extracting and selling salt from the lake, initially to supply their families’ income (Sow, 2002).



A Satellite view of the Pink Lake, Senegal, Source: Google Earth, 2011

In 1990, the Lake's surface area was estimated to be 4 km²; but only 3 km² in 2002. Since then, the area has shrunk dramatically (Breda-Unesco, 2002). Called "salt mine" by the authorities, the Lake is on the UNESCO World Heritage Tentative List-2005 because of its unique pink colour, a natural curiosity².



Another view of the Pink Lake (Author's picture, 2011)

A kind of «memory of places» is being setting up spontaneously in the immediate surroundings of the Lake because of the different migration waves that have succeeded over time. The evolution of the taxonomies is indeed very instructive as each given name on the Lake's site refers, in fact, to the «historical» reasons and motivations for which it has been given. The names generally refer to the environment or social facts (historical settlement phases, beliefs, etc.). Taxonomies often refer to an appropriation or re-appropriation of a local environment that can have close ties with the development of the income generated by the salt extraction activities; but also to an intelligibility of a visual landscape that makes sense and beauty. On the Pink Lake's site, taxonomies thus refer to spaces of organization both segmental and semi-collective, a kind of territorial ownership daily set up according to various contextual situations and segments (different socialization spaces). But segmentation does not necessarily mean dispersion; on the contrary, the living spaces of the salt diggers are very diverse and somehow intense. Therefore, in their proper language (Wolof, one of twelve Senegalese National languages), the salt diggers have divided the Lake into five adjacent sections called *Har Yalla*, *Hoss*, *Virage*, *Daraji* and *Village artisanal* where most of the economical activities and the management of spaces happen.

² The hypotheses on the pinkness of the Lake are discussed in detail in Sow (2002: 99-100). Some studies (M'Baye, 1989) argue that the symbiosis of the dune reflection is a result of high magnesium chloride content and a bacterial carotene (or carotenoid) which gives this kind of red, pink or orange pigmentation. Carotenoids are tetraterpenoid organic pigments. They are naturally occurring in the chloroplasts and chromoplasts of plants and some other photosynthetic organisms like algae, some bacteria and some types of fungus.

Har Yalla means "While waiting for God". It is located on the north-eastern bank of the Lake. The name comes from an old salt digger (not native to the area) who first made a straw hut in the immediate surroundings of the Lake in order to make most of the extraction. Subsequently, others have joined him. According to anecdotes, he liked to sit in his hut, during the hot weather period, and said he was waiting for God to deliver the difficult task of extracting that he was doing every day. The place has become an area where large piles of salt are accumulated.



Salt transportation (left), salt bagging (middle) and salt iodization (right) - (Author's picture, 2011)

Hoss means "scratch" in Wolof. It comes from the fact that it is precisely this area, which had been the first to be "scratched" with shovels digging for salt in the Lake. Before that, the dry salt was always removed by hands or with rudimentary tools (big sticks, etc.). This area is also located in the eastern part of the Lake, between Har Yalla and Virage, which means "the bend" in French. Today, Virage is the side where the salt is iodized and bagged. Hoss and Virage are also the areas where the big salt trucks are parked and where the loads are carried.

Daraji (meaning "training school") is located on the south-eastern shore of the Lake. It is a place of "digging", created by religious disciples of the Murid community who, during the mining boom of the Lake in the 1990s, have established their headquarters in the area. These disciples, originally organized in groups, "harvest" the maximum of salt and give a part of their earnings after sales to their sheikh, religious leaders of Touba (capital of Mouridism in Senegal). After several years of occupation, the area became heavily populated and barracks were built. The slums of the diggers as well as the "headquarters" of the M.C. of the Lake are located there.

The "Village artisanal", is the French word for "craft village". It is located in the south-western shore of the lake between the fine and white dunes and the old shellfish basin. This is where the camps, hotels, bungalows and commercial art stalls are located. It is also, per excellence, the tourist area of the Lake, with its swimming pools, parking and souvenir shops. It is also where the only paved road connects the Lake to the rest of the country and especially to Dakar and Rufisque.



The craft village (left) and one of the hotels around with bungalows and swimming pool (right)
(Author's picture, 2011)

The Lake is among the most productive in all the coastal areas in Senegal, but also the most threatened by over-exploitation of resources, human settlement and potential coastward migration (hotels, urbanization, slums, etc.) and environmental strains. In spite of its inherent attractiveness for human dynamics, the Pink Lake forms the interface between dry lands and complex marine systems

(superposition of grounded and salted waters). Thanks to its productive ecosystem, the activities organized in the surroundings of the site can take advantage of the full spectrum of mining, terrestrial and marine resources. The activities provide substantial positive contribution and represent a significant portion of the whole coastal economy largely dominated by fishery and mining.



A view of the Pink Lake in Senegal, Source: US.Africa.Tripod.com (Google, 2012)

The site of the Pink Lake supports more than 5,000 people. Since the end of the 1979, the salt is exploited by more than 800 canoes, most of them Senegalese nationals from the surrounding villages, but also by Guineans and Malians, it is to say immigrants. Indeed, day and night, there prevails an intense activity of hundreds of persons engaged in the extraction of salt. The enormous quantity of salt (more than 60,000 tons) extracted from the Lake, each year, is used to preserve fish and tanneries in Senegal and also is exported to the neighbouring countries.

3 Conflict sensitive environmental adaptation

Concepts of social resilience and conflict sensitive climate adaptation offer various meanings. It has been widely recognized that climate change will have significant impacts on socio-economic and ecological systems in local and global locations (IPCC, 2007). The “ecological resilience” terms refer to the ability of a system to cope with or compensate for external shocks and surprises. The resilience concept was first developed for ecological systems (Holling, 1973) but has spread to socio-economic systems, in particular with regard to climate change. “Social resilience” could be, according to Adger (2000: 347) “the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change”. That means, communities are trying to fight against these stresses and disturbances and to give positive responses to the damages caused (Adger et al, 2002; Scheffran et al. 2012). Those resilient communities involve active agents who can decide on how to manage their own environment and anticipate future threats. In other words, they can contribute to the recreation and rebuilding themselves in order to preserve their self-conceived identities, which are often subject to their internal motivations and capabilities (Adger et al., 2002).

The main issue to be tackled here is then the capacity of those communities to cope according to the magnitude of environmental change (temperature, precipitation and other climatic variables). To challenge those environmental issues (vulnerability and possible risks) posed by climate stress to communities, one has to understand the possible strategies and action paths. Some responses could help to diminish harm and develop new opportunities; others may cause additional problems, called mal-adaptation (Agrawal, 2008).

More constructive approaches are often posed to challenge the climate issue matter on socio-political debates. Innovative strategies, which can respond to climate change and conflicting situations by developing beneficial opportunities for solving the problems, are then to be considered. The strategies could involve technical innovations as well as institutional mechanisms to mitigate

conflict and support sustainable peace-building. That means institutions; technicians and stakeholders are often called to design processes that can facilitate cooperation to improve the social resilience of communities and resources.

Climate-induced conflict constellations are defined as “typical causal linkages at the interface of environment and society whose dynamic can lead to social destabilization and, in the end, to violence” (WBGU, 2007:2).

In the case of the Pink Lake, the issue of resource scarcity is a crucial component of understanding the environmental conflicts which are occurring there, but also the intensification of the economic activities on the site of the Lake. Because of the dynamics produced on the site, the Lake has to face a strong demand for salt production, high population density, environmental degradation and unsecured jobs. Seen as such, the lake can be defined as a “chronically vulnerable area”. The variability of the resources (water evaporation for example) on the site is likely to undermine, in the long term, human security by reducing access to the salt mining activities which are central to stable and sustain livelihoods.

4 Data and Methodology

The phenomenon of salt extraction and its corollary (conflicts and tensions) appeared early in some close ethnographies of some scholar works (Mbaye, 1989; Boni, 1992). Only few surveys and studies, however, were designed to capture the detailed conflicts and tensions that the cohabitation between different the lake site’s occupiers (control over resources and land grabbing) and institutions has been causing over the years (Breda, 2002; Sow, 2002; Thiaw, 2005; Ndao, 2012).

Beyond a tiny handful of studies like this, though, published quantitative evidence on the phenomenon seems virtually nonexistent. Far richer and more abundant sources come from old research usually undertaken by biologists or physical geomorphologists which sometimes do not give enough information on population dynamics around the Lake since they are specifically interested in fauna, species, ligneous vegetation tolerance, ecology equilibrium and the study of salinity and acidity (Hébrard, 1973; Reynaud, 1978; Faye, 2010). An interesting study about environment strains and agricultural production has been undertaken in the last fifteen years by Alassane Sow (1998). A. Sow just examined the piezometric fluctuation impacts and the quality of the groundwater on agricultural activities in the close littoral of the Pink Lake. Still, his study has not sufficiently taken into account population dynamics, social sanctions and conflicts of interest. There is then an incomplete knowledge which implies that more data and scientific research must to be undertaken to improve the factual knowledge base of the site of the Pink Lake. Because there is a lack of sufficient understanding of the Pink Lake ecosystem phenomenon by the different actors (“salt diggers”, scientists, stakeholders, and civil society), a lack of consensus on the policy intervention (risk reduction, mitigation and coping) is still prevailing.

It is why the study launched a series of open-ended, exploratory forays into secondary materials for illuminating some questions. It then often found published analyses (newspapers mainly) useful not only for their attempts to understand the entire phenomenon, but for the data on which they were based. In some cases, the study came to see new questions and interpretations in the conflict cases cited here. Having implied that some of the sources of information described above comprise some quantitative materials (student works, articles, newspapers, internet blogs, tourist web pages and sites etc.), while others comprise qualitative data collected over the years, the paper underlines here that these are highly problematic interpretations.

As explained above, this paper is then based on literature and empirical data collected since the end of 1990s up to end of 2011. It discusses the self-organization of the salt diggers, environmental and societal uncertainties resulting from the activities of the salt diggers, and points out the existing and possible common interventions. Previous publications on the Pink Lake (Sow, 2002; M’Baye, 1989;

CESLR, 1988) have been analyzed in the logical view of commons use of the lake's resources. The empirical data is based on systematically conducted semi-structured interviews and ethnographical observations from 1994 to 2002, and later between 2005 and 2011 on several occasions. In May 2011, an in-depth interview was conducted on the site with the General Secretary of the Management Committee of the Lac Rose and various informal questions were asked to the salt diggers. Several times, the researcher had visited the Pink Lake in July 2011. From Europe, call phones have been also made, in early August 2011, to talk with salt diggers and some traders about previous uncompleted discussions (and issues) which were already engaged during his fieldtrips.

5 From family artisanal techniques of exploitation to private companies' extraction

Salt collection techniques practiced in the Pink Lake are original and different from various traditional and modern practices in Senegal (Sow, 2002). The tools used by the salt collectors and loaders are basins, sieves, shovels and spades, canoes with paddles called "*nioss*". The canoes, are usually leased, and transferred to the extractors' ownership who can pay either materially (5 - 6 bowls of salt a day) or in cash. A new factory-made canoe costs around 120,000 - 130,000 CFA (around 185 €). "Salt diggers" earn about 10,000 CFA/day (around 15 €).

According to the Management Committee, in 2011 salt production was estimated to be 50,000 - 60,000 tons per year. During the dry season, production can rise up to 70,000 tons, but during the raining season (*hivernage*) it drops because of precipitation and water runoff. The quality of salt varies over time; currently, the good coarse salt is obtained in June and July.

The salt is exported towards Mali, Ivory Coast, Benin, Burkina Faso, Guinea Bissau, Guinea Conakry, Congo Brazzaville, and Sao Tome and Principe. Ivory Coast remains by far the largest buyer of salt from the Pink Lake with over than 70 % of the total production. In 2011, the price was estimated to be 25 - 30 CFA³ per kilo of salt extracted from the lake. The Management Committee receives a fee (a kind of tax) on each extracted ton, but did not wish to disclose the details. Traders and buyers are usually private logistic/trading companies who are paying the *kolo-kolo* (kind of intermediaries, most of time, doing economic transactions) and purchase the finished and bagged products from the M.C., which is exerting a big lobbying as it is trying to help salt diggers to better know their rights. It can often make pressure on local authorities. Large companies that buy and are involved in the export of salt are: individuals and Senegalese traders, units of tanneries, fishmongers, *Grand Moulins de Dakar*⁴, etc.

According to the General Secretary, diggers and *kolo-kolo* men seem to have a role in the control system. Intermediaries are looking for suppliers and often promote and engage in negotiations between the wholesale companies and individual producers (buyers).

6 Migrations towards the site and "debauchery"

Because of the enormous economic potential (salt mining, tourism, land speculation and urbanization etc.), the Pink Lake is continuously attracting people. Before the 1950s, the waters of the Lake were potable and contained fish that the local population had been fishing. After the drastic droughts in the 1970s, rural-rural movement has affected the region. Rainfall deficits and economic crises encountered in the interior of the country have gradually accelerated the human movement towards the rural area of the Lake. There was also an urban-rural exodus growth in the 1980s when

³ 100 CFA = 0.15 €

⁴ Main Senegalese company for production and export of flour

the first settlers came to sell their crafts to tourists and other visitors, especially pupils and students of secondary schools and colleges who tend to have excursions around the site.

There are both internal and external migrants involved in the salt mining activities. On the one hand, one can distinguish *Baol Baol* or local migrants – coming from the Diourbel region in Senegal and on the other “sub-regional migrants” coming from neighbouring countries such as Bissau Guinea, Guinea Conakry and Mali. Malians are estimated to be 800 persons and Guineans from Conakry to be around 400 (data obtained from the General Secretary of the MC). Therefore sub-regional migrants are practicing dynamics of migrations more or less spread over time and that have been taking advantage of the salt-digging activities. Those migrants remain on the site and supply labour, when seasonal migrants (mostly Senegalese natives) return to their own villages, in the countryside to engage in rain-fed agriculture during the rainy season. Then those “migrant-diggers” often face problems resulting from the non-payment of their daily tasks; because employers and external traders cannot guarantee regular payments. And since most traders buy on credit, “migrant-diggers” can stay for 2 or 3 months without pay. This situation has a direct impact on the economies of migrants who are sometimes forced to borrow money or food products to smooth things over. These are some of the factors that complicate the migrants’ situation in the site and put upside down their initial emigration projects (Thiaw, 2005). For the local diggers, salt harvesting is mostly a kind of transitory activity, a way to earn money in order to migrate to Dakar, the West African sub-region where they intend to set up an informal business or to Europe.

With the salt production boom, “great banditries” and “debauchery” have suddenly appeared. Indeed one of the wanted fugitive companions of “Ino” (famous Senegalese gangster), so-called “Kuruma” was arrested at the site while working peacefully as a salt digger two years after being accused for murder in Kayar (a village located 14 miles in the north of the Lake) in 1994. The Management Committee appealed to remove what they called “unhealthy places.” In 2004, the order was given by local authorities “to clean up” the site of the Pink Lake and to reorganize the facilities. Bulldozers came and destroyed the “village of the diggers” – the temporary settlement of the workers who used to camp on site. It made them move to the surrounding villages and only now come early in the morning to the Lake to work and then go back home. Local rural police (Gendarmerie) is protecting the site from “illegal” occupation. The main reason given for eviction was the construction of new rental homes around the Lake. So it was somehow, according to some salt diggers, “hunting poverty a step further.”

7 “Gendered jobs”

Tasks are divided among men, women and young girls. Generally, men enter the water up to their chest to extract the salt. But before they do this hard job, they have to coat the body with Shea butter to protect their skin from the extreme corrosive salt water. Men also break the salt crusts, which is deposited on the bottom of the salt water, with a post called “*djoj*”. Afterwards, they shovel to fill the canoes which all have a triangular shape (see pictures in below).



Triangular shape of the canoes employed by the Salt diggers (left: Author's picture 2011; middle: taken in Internet, and right: Author's picture, 2011)

Women are in charge of the canoes ashore. They mostly unload the heavy, wet and black salt from the boats; they are loaders and intermediates. They also pile the salt in the immediate surroundings of the Lake. They are paid 1000 CFA (1, 50 €) by boat to unload the salt. Each unloaded canoe is paid either immediately or after the "salt digger" has sold the whole product which can take several months. In that case all women's activities are registered in a book as a record for further payments. Afterwards, women launder and dry the salt in the sun for four days before the bagging which is done by *Kolo-Kolo*, men who bag the dried and often grey or white salt after it has been iodised. Thus there is a gendered and sexual division of labour and tasks around the Lake.

Young girls sell artefacts to tourists in the shores of the Lake and in the surroundings of the bungalows and hotels. The women who work at the Lake represent an important position in the value chain of the Lake salt trade to the rest of Africa. Women do not occupy any functions on the Management Committee Board. According to their comments, the Management Committee has several times heard their voices as they are asking to be seriously considered in all the issues.

8 The Management Committee

Like most stretches of smooth water in arid and semi-arid areas in Africa, the Pink Lake is subject to the characteristic constraints of the Sahel. There is a particularly marked population growing up and which often raises the problem of imbalance between population needs and natural resources. And so very early, the residents along the Lake have had the common desire to establish a collective system integrating hydrological aspects and climate-human factors (demographics, modes of exploitation of the Lake and its immediate surroundings, social and spatial relationships and networking, cultural and agricultural representations, geopolitical and geographical stakes, etc.). The process of preserving a "useful" stretch of small water, anxious to put the salt diggers in the centre of the reflection and the protection of an immediate environment, has especially led to the implementation of a Committee. The creation of the Committee first responds to a requirement of the bigger community, but mostly a rational conservation of a medium, which for many years, allowed them to live and to develop artisanal salt digging and sale activities. Since the 1970s, the salt diggers have observed and witnessed the continuous drying, the disappearance of animal species, the immigration waves towards the site, the decrease and increase according to seasons of salt production, etc. And beyond, they also had the initiative to consider the few complaints and needs of the local population.

The Committee, also called Commission, was found in 1994 and its three main objectives are: organizing the extraction of salt; managing its commercialization; improving the environment of exploitation by organizing it in an orderly manner. The Committee consists of 18 members and is formed by the five surrounding villages. Each member is selected from an influential association of the village. Every three months, the Committee holds extraordinary general meetings where the

activities are evaluated and new decisions are taken. All Committee members are paid by the same Commission, but with wage disparities. The President and the Secretary General seem to be better paid. To function and to gather resources, the Committee generates income from salt trade on the national or international market (around 11,000 FCFA for each ton). However, it does not tax production for domestic consumption. At the end of each year, some of the “plus-value money” or “slip money” is distributed among the villages that form the Committee. Several achievements have also been made so far with the “slip money” gathered: building of a Mosque and the walls of the cemeteries in the villages of Deni Biram Ndao South, construction of classrooms in Deni Biram Nado North and the provision of medication for the dispensary of Wayambam. Since December 1997, and contrary to its ideals of support and mutual assistance, basic foundations in the beginning of its creation, the Committee has actually turned into a GIE (*Groupement d’Intérêt Economique* – Group of Economic Interest) to “better serve” the community of salt-diggers (Thiaw, 2005).

The role of the M.C., in fact, is to everybody benefit from the gradually obtained achievements, but also to give workers a framework of thought and action. It is not a conscious and controlled direction for the destiny of the workers, but it helps to manage the risks rather than controlling them. So the action of the M.C. varies according to experiences and knowledge it has of the different situations prevailing on the Lake’s site; then far from the natural constraints and socio-cultural routine. Decisions are part of a long dynamic process of self-construction; which implies most of the time to look at and interpret what is around them (hence the immediate environment) and act. One must however consider the M.C. as an institution that excels in a social practice which is a function of intense socialization (a kind of policy instrument) playing a significant role in the economic and social life of the Lake.



Management Committee’s office in the site of the Pink Lake (Author’s picture, 2011)

But more than a socialization (obligation to respect rules, implicit and explicit norms of the site), one should say that it is rather a strong sociability (neighbourhood relationship, digger colleagues, involvement in semi-collective action, etc.) that the salt diggers feel committed to. And since the roles that each individual must play in strengthening the achievements are less established, the salt diggers mostly are very aware of the reasons and foundations of their actions. This is why they try, as much as possible, to keep a distance with respect to subjective reasons and arguments for their actions. Far from being “culturally stereotyped”, the salt diggers are trying to highlight the different experiences and different learning accumulated during their own individual trajectory and to draw benefits based on rational calculation logic, tactics and complex strategies. They have an ability to analyze, to make choices and to take personal decisions sometimes after thinking deeply about the advantages and disadvantages of the undertaken actions.

Some workers indeed can become kind of «rational agents». They tend seeking to maximize their interest and avoid making mistakes that could be severely punished by the M.C. The most effective ways are somehow triggered to achieve the searched objective, with calculations and choices often “rational” and taking into account the costs of commitment, gains and risks.

Externally, the Management Committee is involved in outreach activities including salt iodization in partnership with WFP (World Food Programme), UNICEF and MI (Micronutrient Initiative, a Canadian NGO). The Committee also cooperates with the CLM (*Cellule de la Lutte Contre la Malnutrition*), the NGO "ENDA-GRAF 3D (Decentralization/Development/HumanRights)" and the Ministries of Environment, Commerce, Health, Industry, etc. From 1994 to 2004, the Management Committee said it had paid to the Treasury of Senegal 1.1 million CFA every three months (around 1600 €). Since 2004, due to its intensive lobbying, the Management Committee is exempted from the tax payment to the local government (Rural Council).

9 Social climate adaptation strategies

In response to hazards caused by mining and commercialization of salt around the Pink Lake, a capacity for collective action and management of risks (e.g. low paid jobs, unsecured incomes, etc.) has been gradually introduced by the "salt diggers".

In the next paragraphs, some problems and conflicts (salt mining, health, urbanization, etc.) encountered on the site of the Pink Lake are listed as well as few strategies employed to solve the issues underlined.

9.1 Health issues related environmental strains

"Salt diggers" say they are suffering from various skins itching (in French: *démangeaisons*). The local medical units are very aware of the skin itching phenomenon and patients are treated in the medical centres. Salt-diggers (both men and women) are suffering most from dermatological diseases which are the most common skin lesions. They are manifested by deep wounds which can become infected. Local physicians were describing the risk of exposure due to the high salinity combined with the strong solar radiation. The nails, the fingers and toes are usually affected by the strong salty conditions of the water. Women for example are getting more complex disorders including deformities of the foetus during pregnancy. Complications are observed also during childbirth. Most of these diseases occur in the dry season whilst during the rainy season salt diggers rather face malaria. The high humidity is an environment conducive to the spread of mosquitoes, flies but also several other "transmitters" of diseases. Respiratory diseases are also observed among women whose unique main tasks consist of unloading salt. Because of lack of treated and potable water in compliance to sanitation norms on the site of the Lake, salt-diggers often drink directly from the ground water which frequently provokes diarrhoea. Finally, cases of women and men with sexually transmitted infections, some of them related to higher salinity, have been reported (Thiaw, 2005).

From the point of view of the head of the Niaga Medical District (one of the biggest village near the area of the Pink Lake), the state is also aware of those diseases and campaigns of sensitization are undertaken to overcome it. Shea butter is used a lot to protect the skin of the salt collectors. According to rumours and beliefs, rheumatoid can be treated by bathing in the Lake. Local lobbies and traders have not yet found opportunities to use such healing properties commercially (like in some European countries or in Israel) by offering therapeutical baths.

9.2 Preservation of the environment

Local authorities, in cooperation with the Senegalese state are working on the establishment of a "green curtain" around the lake. They aim to prevent the siltation of the lake by planting trees on the adjacent dunes (RS, 2001). Studies on the ecosystem are regularly conducted, according to the members of the Management Committee, by the IRD (Institut de Recherche pour le Développement, a French scientific institution), Senegalese-Japanese Cooperation and the Canadian Cooperation. To

prevent overuse, the diggers leave a part of the Lake in jachère (fallow) for a period of 6 months; so the salt can be regenerated. Generally the seasonal “harvesting” changes are made in October and in April. Areas of digging are then changed twice a year. Machines and engines are prohibited for salt extraction. Due to this prohibition, it has been said that a digger cannot “harvest” more than two nioos (turns or loads) a day, no matter how hard he works. This limitation automatically ensures that one digger would not “harvest” ten times more than another. However, no studies have been carried out so far to evaluate the efficiency of this way of protecting the lake’s ecosystem. For example, there is no information on regulations of the number of the diggers. Also, hydrological and geological data of the lake have not been analyzed in this respect and the studies done by IRD have not yet revealed anything related to that protection system. What is more, signs of man-made environmental degradation, climate change and other threats clearly exist on the site but their impact on the availability of the salt resource has yet to be established.

Many villagers from the area adapt to depleting water resources and reduced value of rain-fed cultivated land by selling their land for the construction of houses. The neighbourhoods of growing city of Dakar and the recreational activities of the Lake site have attracted estate companies. Therefore, urbanization and the proliferation of construction pose a threat to the lake’s watershed due to the obstruction of water runoff. In this context, the big confusion about land use policies on the Lake appears to be very problematic (Traoré, 1997). Also, the shells covering the soils of the watershed are used for construction purposes and industry, which could further disrupt the ecosystem of the Lake.



A satellite view of the Hotels and Bungalows in the Pink Lake (West side), Source: Google Earth, 2001

9.3 Problems of sensitization

Few civic societies draw the attention of users of the Lake to the degradation and the risks that it poses to salt diggers (loss of business, environmental stress, etc.). In other words, there is an inability to evaluate the cost of substitution of these activities. Social issue post normal positions (that is to say a deep dialogue between researchers, policy makers and citizens) and positions of experts (knowledge and results built by researchers to inform the policymakers) have not been yet set up and implemented.

9.4 Land control and regulations

The new situation of the Pink Lake is now converging trends which affect local public policies as well as changes in the organization of activities on the site. Since the 1970s, the decentralization process has given rise to significant territorial changes, but they have a very small effect on the salt diggers on the Lake's site. Successive reforms (Law on the National Estate, the Decentralization laws of 1996, the territorial subdivisions, etc.) have transferred power to local authorities increasing their responsibilities in the areas of natural resource management and control of land. This decentralization of political and administrative organization tends to give to the country (the rural community above all) an autonomous space of initiatives and mobilization for both public and private actors. It allows the opening of the issue to multiple private and public stakeholders while taking into account that the definition of territory is inseparable from the configurations of actors it contributes to socialize, since the actors are socially concerned in the framework of repeated interactions.

However, the problem of the laws is that they do not take into account fast enough the various territorial rebuilding and the needs-based organizations (salt diggers, for example). More importantly, their modes of organization as the development of mass activities were most often accompanied by a predominance of national, regional or local economic and social regulations. This reorganization should be inseparable from the productive changes that affect first the salt diggers and then the salt mining companies. The growing importance of the subcontracting issue and the outsourcing of various functions of the extractive companies encourage developing logical site to address issues of employment, remuneration and work.



A view of the growing urbanization in the South-West side of the Pink Lake, Source: Google Earth, 2011

The lake is recognized and classified as a salt mine by the state of Senegal (Ministry of Environment), which however does not collect taxes on its use. Taxes are collected by the State from hotels, tourism and art and craft vendors.

9.5 Direct management of the Lake's activities and the "rights" of the diggers

The economic activities developed in the surroundings of the Pink Lake are closely monitored and managed by the Management Committee of the Lake. None of the companies involved in the extraction pay on slip, and therefore workers' rights are constantly violated. So there are neither guarantees (or wage contracts) for insured workers nor clear forms of dissociation between different employers and the workers. This sometimes creates conflicts.

On the one hand, there is an exercise of an inter-local solidarity that meets a duty of solidarity with the vulnerable groups (migrants, economically disadvantaged workers, etc.). On the other hand, there is a kind of spirit of socialization of the risks linked to the hard work of salt extracting. According to information obtained from the Management Committee, there exists a common fund in which each salt digger must pay an amount of money and can take if needed (in case of disaster or accident, etc.). This fund fits primarily in a charitable and assistance approach.

It is in this context of conflict and simmering tensions that the Management Committee is born and set up. It represents a regulator of economic and social activities organized around the Lake. And because the state and local governments have been unable to manage the problem of extracting, this Management Committee was born voluntarily. There was therefore a "forced transfer" of responsibility for "risk coverage" of employment from the state to this Committee. Although the Committee is every day managing to play down the problems, it must be recognized that the responsibilities that it has been endorsing still have not contribute nowadays to resolve all the types of conflicts occurring on the Lake's site. Some of them are resolved in other juridical institutions (Rural Council, Tribunals, etc.).

9.6 Protection of the integrity of the salt diggers

First, there is an inability of the labour regulations in force in Senegal for the protection of property and individuals, salt diggers working on the site of the Pink Lake; hence there is a need to act promptly because the security and integrity of people involved are at risk and at various levels. One has to say that the professional risks (disease, etc.) are closely intertwined to the point of jeopardizing the physical and psychological safety of the salt diggers "inserted" on particularly vulnerable segments of the hard work activities.

Then, it is because of such breaches that the workers themselves are setting up mechanisms of action that intertwine traditional policy instruments - checks and penalties for failure proved to defined regulations and predetermined local norms. However, the "legal" or "juridical" scope is very small since for the most part, sanctions are applied merely to outline the existing normative or customary obligations. Some examples of conflict resolutions: if somebody is accused of robbery and the crime is proved, the M.C. sanctions that ego to six months without working on the site. If somebody is caught in battle or serious dispute which threatens neighbourly relations at the site, he or she may pay 5000 CFA and may stay 3 months away from work.

The credibility of the system set up by the Committee (and by extension the salt diggers) is often based on the intervention of the "inspection" of conditions of work activities, made all the more legitimate through strong support by all stakeholders (Rural Council, organizations of the surrounding villages, "salt diggers", etc.). There is also the ability to report breaches or lack of predetermined norms. In fact, one of the main indicators of the effectiveness of collective action is the ability to lower litigation and conflicts brought in front of the M.C. which actually seems to be the only "legal" and "recognized" Authority. The Management Committee has been able to transform this breach into a legal and social resource of the action to make an effective defence of the integrity of the workers. But the full construction of this defence is both a complicated and fragile project as it

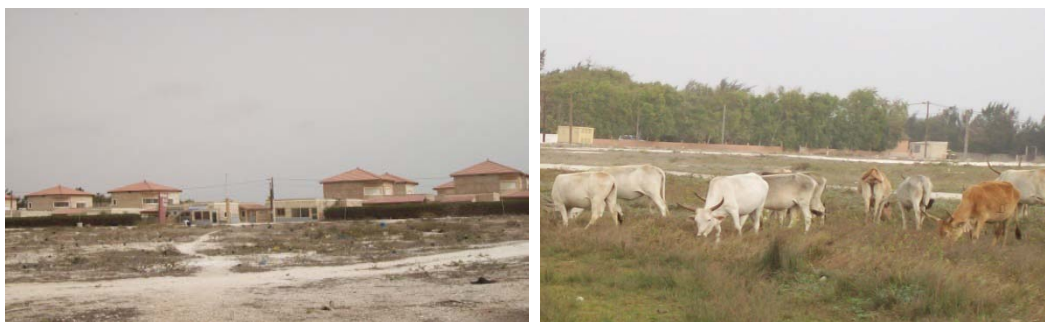
shows different logics of competition. So the more the M.C. has extensive knowledge of workers' grievances, the more it acts on them and at the same time can delegitimize local authorities while adjusting its action precisely depending on experience and knowledge that it has from the social and economic environment of the Lake. Moreover, the decisions are part of complex and dynamic processes of social construction of the same M.C. Rather than attempting to control them, the M.C., in constructing the meaning of its action, plays a key role in damage limitations by managing risks and defending workers' integrity in the absence of a written social legislation. The problems of workers indeed vary according the prevailing situations on the lake's surroundings as they are often brought to the knowledge of the M.C. that also has to deal with the salt market forces and occurring social changes.

10 Conclusions

In Africa, civil society is nowadays becoming very engaged in discussions about "local public goods" such as water, fauna, vegetation, salt mines, etc. (Miguel and Gugerty, 2004; Watson, 2009). The communities can actively involve themselves and decide on how their own environment could be managed as in the case of the Pink Lake in Senegal. They also often discuss about how to anticipate future threats and to cope with climate change.

Since the 1970s droughts and depleting resources, rain-fed agriculture was no longer sustainable for many farmers in the rural community of Sangalkam (Dakar's rural area). Local population from five surrounding villages began extracting and selling salt from the salty Pink Lake. The "salt collectors", estimated 5.000 people working and networking around the Lake, have contributed to the creation of new social and economic spaces and made part of the lake's immediate environment their own. They have made their living from the Lake and the jobs they created represent niches that local authorities cannot fill in terms of employment shortages.

The lake has been recognized as a "salt mine" by the Senegalese State, yet it abstains from collecting taxes on its use. With growing activity commoners formed a Management Committee to represent their interests. Among security, environmental and health issues, a conflict of interest arouse between the commoners and estate companies. A massive construction of rental homes around the Lake threatens the livelihood of the "salt diggers" and this situation is causing a higher risk on the fragile ecological equilibrium.



Growing Urbanization in the immediate lake surroundings (Author's picture, 2011)

Among the strategies implemented by the salt diggers local authorities in cooperation with the Senegalese state, work on the establishment of a "green curtain" to prevent the siltation of the lake by planting trees on the adjacent dunes. A National Plan for Climate change Adaptation has been set up by the Senegalese Ministry of Environment and Protection of the Nature since 2006 and one of its programs is to protect the littoral of the Pink Lake. However, urbanization and the proliferation of construction pose a threat of aggressive physical reactions of the watershed due to the obstruction of water runoff.

Land speculations and grabbing have not been stopped instead the Rural Council has approved a local law to clear off some of the slums of the workers. With regard to land control and regulations, the fact is that the successive reforms have transferred power to local authorities by increasing responsibilities in the areas of natural resource management and control of land. Some autonomous spaces (such as the economic area of the Lake) have appeared and mobilize initiatives from both public and private actors. This has allowed the opening of an 'aggressive' and influent private sector to workers and companies. While the site of the Lake is directly managed by the Management Committee which seems to be the only "legal" authority, the rights of the salt diggers are constantly violated. Apart from the mutual aid they have set up by themselves, their integrity seems not to be protected.

On the one hand, it has been noticed that pressures have often arisen from mismanagement of the Lake water resource, its ecological vulnerability, the growth of the immigrant populations who converge on the site to seek for volatile jobs. Such environment-induced vulnerabilities aggravate the competition for the Lake's resources and for the socio-economic activities. On the other, those environmental strains coincide with a new socio-political and elite patronage and a strong and rampant privatization of the activities in the surroundings of the site. Hence, local communities are often impeded in building sustainable and stable livelihoods.

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