

Full Length Research Paper

Customs and traditional management practices of coastal marine natural resources in Lower Casamance: Perspectives of valorisation of endogenous knowledge

Claudette Soumbane Diatta^{1*}, Amadou Abdoul Sow¹ and Malick Diouf²

¹Department of Geography, Faculty of Human Letters and Sciences (Faculty of Arts),
University Cheikh Anta Diop of Dakar (UCAD), Senegal.

²Department of Biology Animal, Sciences of Technologies Faculty, Institute of Fisheries and Aquaculture (IUPA),
University Cheikh Anta Diop of Dakar (UCAD), Senegal.

Received 1 September, 2019; Accepted 25 March, 2020

In southern Senegal, specifically in Lower Casamance, many marine and coastal resources are of significant sociological importance for Jola populations. They are essential both for worship and for sustenance. Thus, through different customs and practices, the Jola helps to preserve their natural environment, even if their primary motivations were hardly conservation. Perceptions, beliefs, and avoidance practices with regard to different types of places and resources decreed sacred, as well as the symbolism of certain animal or plant resources, indicate the very identity of the people. However, with respect to these sociocultural customs and practices, some are specifically aimed at preserving certain resources for economic and ecological interests. This article proposes an analysis of the contribution of Jola traditions and practices in the conservation of marine and coastal resources. To this end, the methodological approach was based on the principles, methods and tools of the participatory approach. It combined an empirical and participatory approach through semi-structured interviews and observations on the ground.

Key words: Customs, ecological practices, marine coastal natural resources, Lower Casamance, endogenous knowledge.

INTRODUCTION

The populations of Lower Casamance, especially the Jolas, derive from nature the products for their livelihood and for the realization of certain rites and traditional ceremonies. Many marine and coastal resources are considered as sacred. Indeed, the Jolas constitute the majority ethnic group with 57.8% of the total population of

the Lower Casamance. Their settlement in the area was prior to the 16th century (Gueye, 2007). This ethnic group is known for its intimate links with its environment and more specifically with the natural resources of the locality (Thomas, 1959; Pélissier, 1966; Palmeri, 1995). For customary practices, the exploitation of these resources

*Corresponding author. Email: claudettediatta@gmail.com.

is limited, if not prohibited. It is important to know that these practices are customary, in order to address the unsustainable use of these resources. Among other practices common among the Jola ethnic group are: totemism, prohibitions, worship of fetishes, worship and initiation rituals. These practices not only safeguard spiritual and cultural wealth, but also play a leading role in conservation.

Unfortunately, these practices and customs are losing momentum these days. The traditional religion that kept them going is being relegated to the background for the benefit of Islam and Christianity. Certain management rules are increasingly abandoned in certain areas, particularly in the north of the region. However, today, repeated shortcomings and failures offer opportunities to develop these customary practices previously discarded (Cormier-Salem et al., 2002; Geoffroy, 2009; Koy and Ngonga, 2017). In Senegal, particularly in Lower Casamance, this promotion of local customs is still timid even if traditional rules are associated with the management of protected areas such as ICCAs.

This article aims to show the contribution of traditional customs and practices in the conservation of marine and coastal natural resources in Lower Casamance. It highlights local knowledge in a perspective of sustainable resource management. After a presentation of the framework of the study and the methodology deployed, we focused on the practices that have an impact on the conservation of marine and coastal resources. We conclude this paper with a discussion of the foundations of these practices.

MATERIALS AND METHODS

Study area

The Lower Casamance in southern Senegal falls within the administrative region of Ziguinchor. It consists of three departments including Bignona, Oussouye and Ziguinchor. Lower Casamance extends on both sides of the Casamance River and goes from the Atlantic Ocean to Soungrougrou. It is bordered to the east by the Sedhiou region, to the west by the Atlantic Ocean, to the north by the Gambia and to the south by Guinea Bissau. The region covers an area of 7339 km² and an estimated population of 549,152 according to the census of 2013, or about 4% of the population of Senegal (ANSD, 2015). The coastal South-Sudanian climate is relatively humid with average rainfall exceeding 1000 mm in general. The region is dominated by plateaus and vast plains.

In terms of physical geography, Lower Casamance is made up mainly of waterfalls and forests and belongs to the complex and vast West African ecosystem described by Guilcher (1954) and known as the "Rivers of the South" (GRDR-UASZ-IRD, 2017). The terrestrial part includes forest formations dominated by Guinean species such as *Elaeis guineensis*, *Bombax costatum*, *Borassus aethiopicum*, etc. The marine area consisting of bolongs (or inlets), shallows and lowlands corresponds to the limit zone of penetration into the continent of the ramifications of the Casamance main stream (Badiane, 2012).

The majority of ethnic Jola, 57.8% of the population, live with the Mandingos (11.10%), Pulaars (10.5%), Ouolofs (3.9%), Manjacques (3.5%), the Balante (2.9%), Mancagnes (2.4%), the

Sereres (2.70%) etc. (ANSD, 2015). They are divided into several subgroups identified by a language, a denomination, and a separate location. The space inhabited by the Jolas is subdivided into several territories. Each terroir bears the same name as the subgroup that occupies it. We thus speak of Kassa, the soil of Kassa Jola, Karone, Bandial, Blouf, Jola Fogni, Kalounaye, etc.

The study extends to the three departments of the region, namely Ziguinchor, Bignona and Oussouye. In fact, divided into several subgroups, the Jola people, occupy separate territories in the region. Thus, according to the scope of our study, we chose to focus our research on five Jola countries of the region of Lower Casamance. It is in the department of Bignona of the Blouf country to the north, and those of Bliss-Kassa and Bliss-Karone to the West of the North shore. At the level of the departments of Ziguinchor and Oussouye we have the Bandial and Kassa counties respectively situated in the West and in the extreme south of the Ziguinchor region. The municipalities covered in the study in Blouf are Mangagoulack, Kartiack, Mlomp (Blouf), Thionck-Essyl. The other communes of the study are Kafountine located in the Bliss-Kassa / Bliss-Karone area, Djembering, Oukout, Mlomp (Kassa) and Oussouye located in Kassa and Enampore in Bandial.

The villages affected by our study in the department of Oussouye are Djembering, Cabrousse, Ourong, Cagnoute, Mlomp / Kadjinole, Kahinda, Sigamar, Eloubaline and Oussouye commune. In Oussouye, only the villages of Kalobone, Sinkine and Etyas are concerned. In the department of Ziguinchor; these are the villages of Bandial, Essyl, Kamobeul and Selecky. And finally in that of Ziguinchor, it is the villages of Hitou, Haer, Niomoune, Abene, Kafountine, Hillol, Kailo, Saloulou, Mangagoulack, Tendouck, Mlomp Blouf, Tiobon, Kartiack, and Thionck Essyl (Figure 1).

Approach

In this study, we utilised the qualitative method because of the objectives of the study and the nature of the data sought call for a greater emphasis on contextual understanding of the perspectives of the people. In fact, the method consists in contacting the target actors and their practices, questioning and observing them. This approach aims to analyze actions and interactions taking into account the stakeholders' intentions (Dumez, 2011).

For this purpose, a certain number of parameters were taken into account for the choice of the study sites. These are mainly criteria related to the coastal character of the sites and the conservation potential of traditional practices and local management methods. In doing so, geographical areas covering both the maritime and the terrestrial sides of the shoreline, and integrating bolongs (or inlets) and wetlands in contact with the sea or the river are particularly targeted.

Data collection tools include interviews (individual, group or focus-group, informal) and direct observation. The survey covered 5% households in the study area corresponding to a headcount of 376 heads of households, divided according to the proportion of the targeted villages (Table 1). The choice of respondents was not random. The snowball method identified the people who could provide us with the right information. Indeed, some people are distinguished by their knowledge. The snowball method has therefore identified those who could provide us with the right information.

RESULTS AND DISCUSSION

Traditional religion is a basic element in the Jola of Lower Casamance. It is a cornerstone in the management of the natural environment and associated resources. It plays a role in the establishment of particularly close links

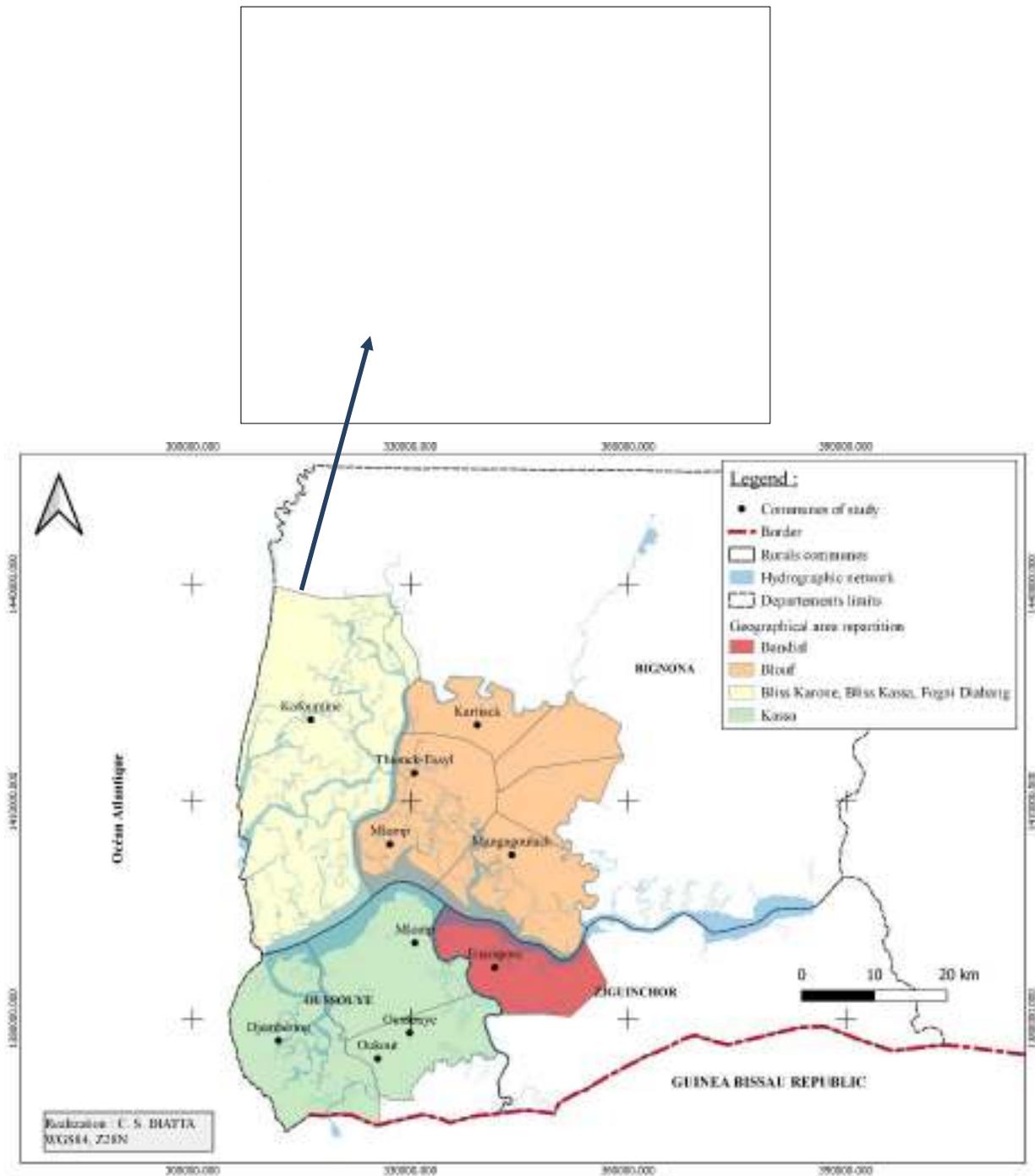


Figure 1. Location of the study area.

between the nature, the people and the supernatural powers of the environment.

Customs and practices conducive to conservation

In Lower Casamance, many marine and coastal

resources are of significant sociological importance. They figure in many West African societies protected for cultural or cultural reasons (Dugast, 2002). The system of taboos, conventions or prohibitions totem, sacred sites, rites are among the traditions that preserve resources. These management practices are still prevalent and are rooted in traditional systems. However, even though they

Table 1. Number of households surveyed by villages in the study area.

| Communes | Villages | Total population | Number of households | Weight of households by village in % | Number of households interviewed per village | Resource persons |
|---------------|---------------------------------------|------------------|----------------------|--------------------------------------|--|------------------|
| Kafountine | Niomoune | 807 | 181 | 12 | 8 | 1 |
| | Hitou | 374 | 52 | 3 | 2 | 1 |
| | Haer | 294 | 41 | 3 | 2 | 2 |
| | Abéné | 2611 | 322 | 21 | 14 | 1 |
| | Kafountine | 6417 | 776 | 51 | 34 | 2 |
| | Kailo | 183 | 22 | 1 | 1 | 1 |
| | Hillol | 56 | 56 | 4 | 2 | --- |
| | Saloulou | 65 | 65 | 4 | 3 | --- |
| Kartiack | Kartiack | 1708 | 287 | 59 | 15 | 1 |
| | Tiobon | 1593 | 202 | 41 | 11 | 1 |
| Mangagoulack | Mangagoulack | 587 | 107 | 25 | 10 | 1 |
| | Tendouck | 1938 | 316 | 75 | 30 | 1 |
| Mlomp (Blouf) | Mlomp Blouf | 2427 | 300 | 100 | 10 | 1 |
| Thionck-Essyl | Thionck Essyl | 8087 | 1022 | 100 | 29 | 1 |
| Djembering | Djembering | 2269 | 409 | 36 | 21 | 1 |
| | Cabrousse | 3993 | 665 | 59 | 33 | |
| | Ourong | 390 | 60 | 5 | 3 | |
| Mlomp Kassa | Cagnoute | 1015 | 238 | 20 | 12 | 1 |
| | Mlomp /Kadjinole | 4478 | 939 | 80 | 45 | 1 |
| Oukout | Kahinda | 362 | 60 | 15 | 7 | 1 |
| | Eloubaline | 243 | 69 | 17 | 8 | 1 |
| | Siganar | 1272 | 271 | 68 | 30 | 1 |
| Oussouye | Oussouye (Kalobone, Esinkine et Etya) | 4135 | 611 | 100 | 18 | 2 |
| Enampore | Bandial | 317 | 78 | 17 | 5 | 1 |
| | Essyl | 306 | 75 | 16 | 5 | 1 |
| | Kamoubeul | 480 | 119 | 26 | 7 | 2 |
| | Selecky | 373 | 194 | 42 | 12 | 1 |
| Total | | 46 780 | 7 537 | 1000 | 376 | 27 |

Source: Diatta et al. (2018).

often move away from the rational by Western standards, they remain important for the conservation of resources.

Sacred sites in Jola environment

As natural and cultural heritage, the sacred natural sites are distinct archetypes pertaining to the cultural, social and spiritual identity of the Jola. They include streams, ponds, forests commonly known as sacred woods, groves, glades, etc. In Lower Casamance, sacred sites are now the only traditional reserves of biodiversity conservation (Fall et al., 2011; Badiane, 2012). The implementation of traditional legislation has helped to preserve these sacred areas. Moreover, thanks to the mysteries surrounding them and the beliefs associated with them, these sacred spaces are at the origin of the rules and practices that guarantee the conservation of

resources. It is the same for the stability of the ecosystems of these environments (Fall et al., 2011).

Thus, the results reveal the existence of sacred sites (sacred water sources, forests or sacred groves, sanctuaries) are jealously guarded by the populations in all the villages of the study. The woods and sacred places (glades) are the most representative (Table 2).

Tributaries (bolongor inlets) traditionally considered sacred by local people are of several types. The most representative are:

i) totem residences comprise 81% of the listed sites, a total of 89 sites. Some of these sites also represent djinn¹

¹Djinn are supernatural creatures inhabiting the Earth and are generally invisible. They can take different forms (plant, animal, etc.). They live near water points, in deserted places, cemeteries and forests ... Their existence is attested by the current which states it in Sura 51 - Verse 56 "": I did not create the jinns and men only to worship me".

Table 2. Sacred sites listed in the study area.

| Localities | Wood sacred | Sacred sea sites | Sacred places (sanctuaries) | Sacred mares | Sacred wells |
|---------------------------|-------------|------------------|-----------------------------|--------------|--------------|
| Bandial | 19 | 11 | 43 | 23 | - |
| Kassa | 89 | 21 | 69 | 17 | 1 |
| Bliss-Kassa, Bliss-Karone | 20 | 48 | 34 | 6 | - |
| Blouf | 44 | 27 | 25 | 39 | - |
| Fogni Diabang | 3 | 2 | 11 | 4 | 2 |
| Total | 175 | 109 | 182 | 89 | 3 |

Source: Surveys (2015).

residences. This is the case of the sites of Ethintou Pissala, Kessito and Fussabe. On the other hand, others are places of ritual practices where the education of the members of the community takes place, in this case, the sites of Etenia, Djata Hounouha Ehindou and Fièques);
 ii) cockpits of geniuses, (13%);
 iii) sites intended for initiatory rites with or without a fetish (4%) and
 iv) sites protected by a fetish (2%). One of these sites (Mitij) is specifically designed for the protection of fisheries resources (Figure 2).

Like the bolong, ponds in Jola countries are also subject to rules of use and access. Their story is directly related to the cultural life of local people. These expanses of sacred water are used for various purposes, the most remarkable of which remain linked to initiatory practices (Figure 3). The majority of the ponds used for religious purposes are related to the rites of passage in Casamance of El Hadji Oumar Foutihou Tall, a Muslim dignitary. The latter would rely on the water or would have 'dug himself' to do his ablutions during his campaign of Islamization. The people come to gather in these sites and invoke the divine graces.

Ponds are good for both men and animals. From an ecological point of view, they fulfil important functions. They serve as habitats and breeding grounds for some species of fish such as carp and catfish. Some ponds, such as Bitini, and Hiyew Katouki are frequented by important bird fauna and reptiles such as crocodiles. They also serve as watering places for wild and domestic animals. Outside the ponds, there are sacred wells. The water from these wells is used during casting rituals. This is the case of the wells of Conon, Jola Karone of Abene, Djinabantang Kafountine and Houwedj in the village of Siganar.

Outside the bolongs and ponds, we have the woods and places or sacred clearings that are of great importance for the Jola populations. Animist places of worship and identity vector of the populations, the sacred groves exist in all the villages of the sample and cover 31% of the sacred sites inventoried (Figure 4). The results of the study reveal that these sites are more

present in the highly animist zones notably Kassa, Bandial, Bliss-Kassa and Bliss-Karone (Figure 5). This considerable number of sacred sites is explained by the vivacity of ancestral religious beliefs. In the Blouf and Fogni Diabang areas located in the Bignona department, many sacred sites have considerably deteriorated or completely disappeared.

The rites

Several rites favour the conservation of marine and coastal resources. They help maintain the balance with nature, but also aim to promote the abundance of natural resources, rains, and the well-being of the community.

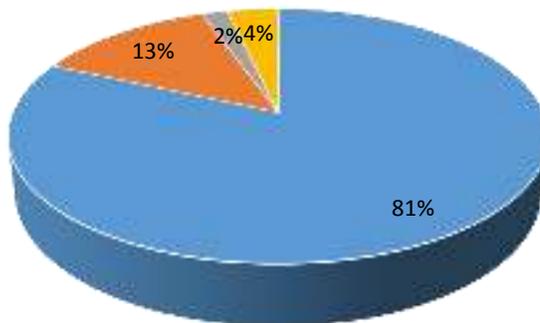
The ritual of initiation

In Lower Casamance, rites of passage are of major importance. The sacred woods that house these ceremonies or those attached to these practices such as ponds and sanctuaries obey very strict rules that must not be transgressed under any pretext. The culprits are severely punished with curses that can sometimes extend to their family and/or their offspring.

The considerable number of sacred reserved for initiatory practices reveals the important place this rite occupies in traditional society (Figures 6 and 7). Thanks to the taboos that surround them, these places provide direct benefits to the natural environment.

The rites of offering to exploit the resources of nature

For the Jolas, some resources retain lasting links with ancestors and harmony with the natural environment. They think, like many other African populations (Goedefroit, 2002; Wala et al., 2003; Koy and Ngonga, 2017), that certain animal and plant resources are possessed or inhabited by the spirit of their ancestors and that maintaining good relationships with them is essential in order to ensure a peaceful life. Animal and



- Residence of totems used or not for religious rites and cockpit of genius
- Presence of djinn or genius
- Presence of fetish only
- Sites reserved for initiation practices with or without fetish

Figure 2. Categories of marine sacred sites encountered.
Source: Surveys (2015).

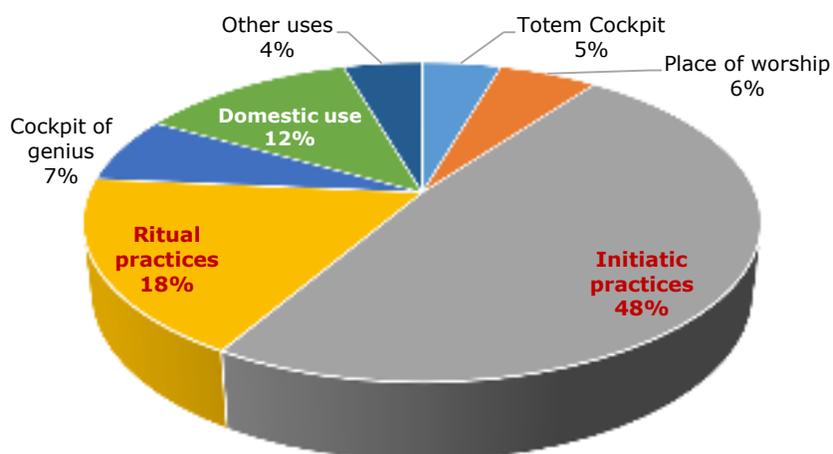


Figure 3. Uses reserved for sacred ponds.
Source: Surveys (2015).

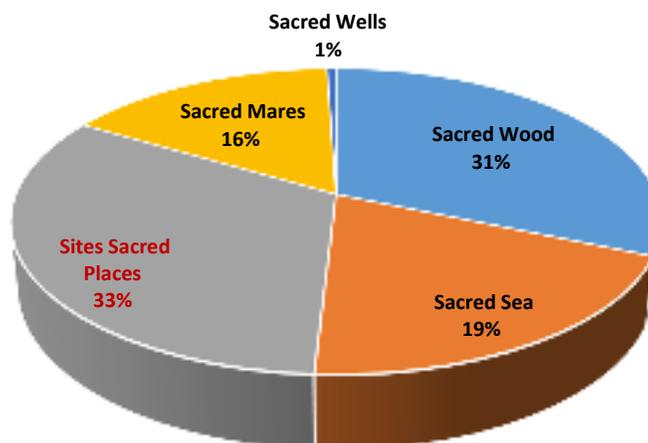


Figure 4. Weight of different types of sacred sites.
Source: Surveys (2015).

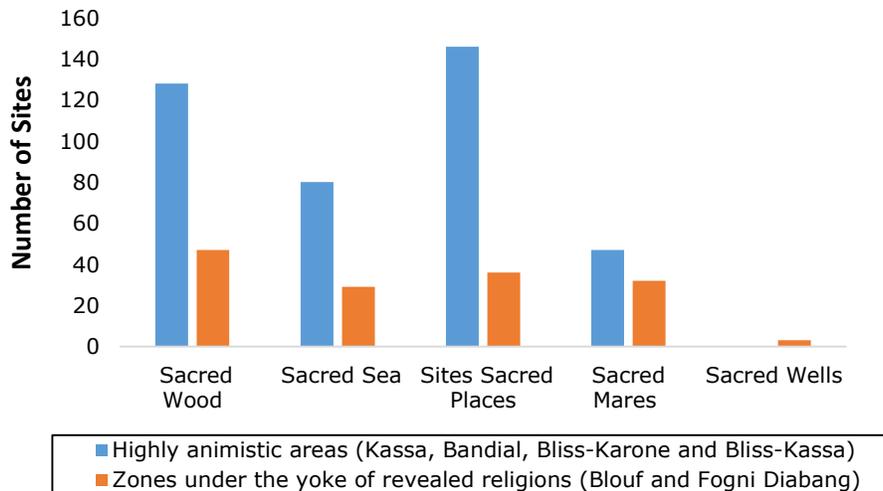


Figure 5. Spatial distribution of sacred sites. Source: Surveys (2015).

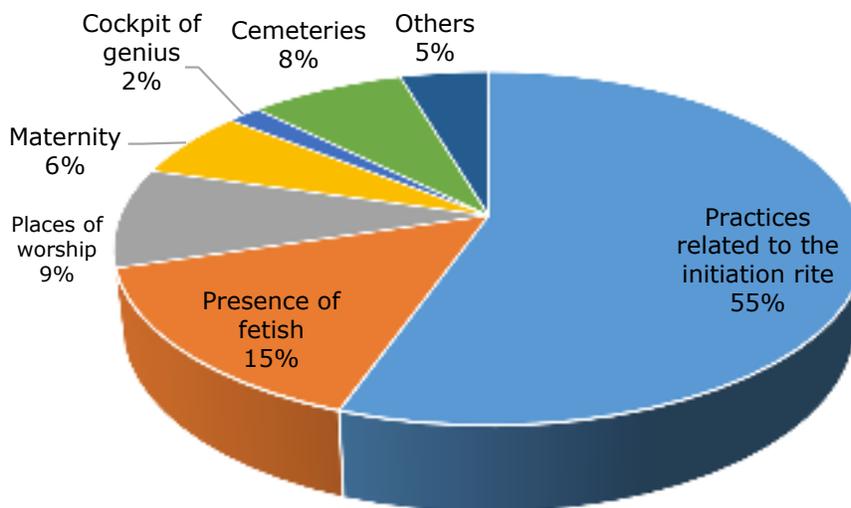


Figure 6. Characteristics of the sacred groves. Source: Surveys (2015).

plant resources can be used to solicit favours and to repair breaks in these relationships. It is the same for the rites of incantation.

This indigenous view of nature explains the ritual that allows access to certain plant species used for medicinal purposes and sacrifices to protective genius. The latter, by his good will, decides to authorize or oppose the puncture (Gueye, 2007). This rite is a guarantee that allows the sampler to have the agreement of the tutelary entity. Several ritual procedures are used by the Jola, but the most common are the offerings of millet, tobacco or rice. The authorization to puncture can be obtained with a silver coin offering as a replacement for tobacco. If the

tree is housed in a sacred place that houses a fetish, it is the palm wine that is given as an offering.

In other cases, no offering is made, just a piece of root is required. The agreement of the genie is testified by the welding of the two extremities where the piece of root was taken the day before. In reality, in the jola environment, many plant species serve as a habitat for geniuses and the most famous are *Ceiba pentanda* (L.) Gaertn., *Khaya senegalensis* (Desr.) A. Juss., *Adansonia digitata* Linn, *Dialium guineense* Willd. Nevertheless, there are some trees with peculiar features as smooth trunks (free from any human action).

In addition to the rituals that precede the collection of

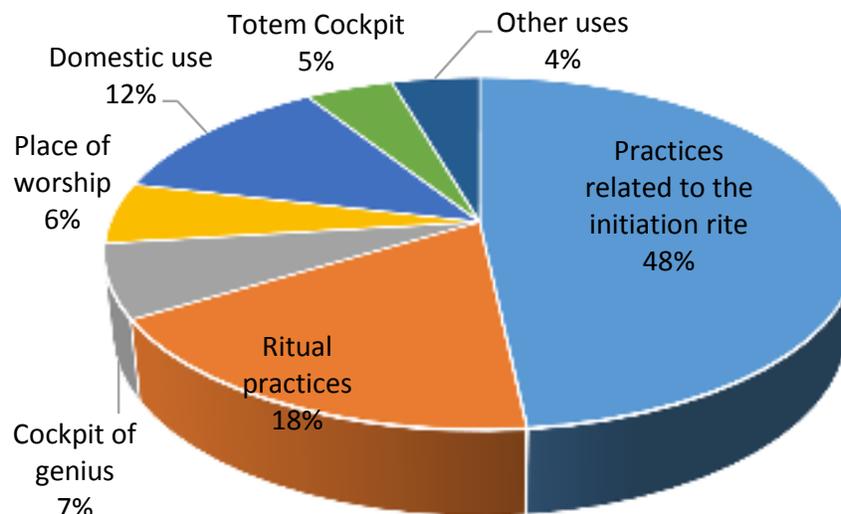


Figure 7. Uses reserved for the sacred ponds.
Source: Surveys (2015).

medicinal products from plants, there are those that precede the felling of a tree. Indeed, the felling of a haunted tree is always preceded by a prayer in which the genius is requested to leave their home. Thus, a few times, a week before slaughtering a cheese-maker, the trunk of the tree is carefully surrounded by gray-gray wrapped in a piece of red cloth, adorned with cowrie shells, having the effect of dislodging the spirits which haunt it (Thomas, 1959).

Unlike plant resources, access to animals is almost non-ritual even though some villages such as Thionck-Essyl and Tiobon used to employ rituals before capturing the manatee. It is an animal considered to be mystical and could not be captured without first performing a demystification ritual to guard against the bad fate that could result from its capture. For this reason, it is not given to anyone to hunt manatees. In the past, its capture required a purification bath. This is still the case today, because even though the manatee is one of the protected mammals, it is sometimes captured accidentally. In this case, the hunter is obliged to carry out the purification rite to protect himself against any misfortune that may result from his act.

Rites for natural resources and abundant rains

Essential elements for survival and the natural resources are the subject matter of ceremonies organized in honor of the deities (ukin) in order to appeal to ensure an abundance of marine and coastal resources. Several sanctuaries namely Oudjireho, Geutoumbuleugi to Eloubaline, Baliba or Balipa to Abene, Hutene to Haer host this type of ceremony. For example, the sacred site of Gniback in the village of Thionck Essyl, people used to

gather once per to ask for resources in abundance. During the ritual, a sample of each resource (fish and forest) is offered to the spirit that lives in the area. In Tendouck, a ceremony known as the *fussabe* is performed to get the fish out of their hiding places and encourage their capture by fishermen.

In the village of Kafountine, a ceremony of prayer and offering is made to geniuses for a successful fishing season. The ceremony takes place at the beach, usually during the opening of the fishing season. The fishermen accompanied by peoples go to the beach where the ritual will take place. At the beginning of the ceremony, milk is poured first into the sea water. An ox that must always be white is then slaughtered, prepared and eaten on site. Nothing should be taken away. The utensils, lids and pots that were used for the preparation of the offering are all cleaned on the spot with sea water.

This ritual is not specific to the natives; it is the Lebu fishermen who settled in the village that practiced it. Over time, this ritual was eventually adopted by all other fishermen², including the natives. However, in the distant past, before the start of the fishing activities, a local rite was practiced in the sacred site of Sougoutoukala³. During the ceremony, a virgin girl was offered to the sea before going fishing to ensure good captures. The virgin girl was then thrown alive in the waters as a sacrifice to the genie.

²The village of Kakountine is home to Lebou, Guet-Ndarien and Niominka fishermen from northern Senegal.

³Sougoutoukala is a sacred forest which is located not far from the village of Abene precisely near the beach of the village of Diannah. It is a Mandingo word that refers to the gift of a virgin girl to the genius of the sacred wood of Kala. The young virgin left in the river near the sacred wood was swallowed by the waters, hence the name of Sougoutoukala. This offering was made every year at the same place.



Photo 1. Altar of libation from Baliba to Abene.
Source: Diatta (March 2014).

Rites also concern natural phenomena such as rain. Indeed, rain is crucial for the regeneration of mangrove, oysters, fish and for the production of rice, an essential commodity for the conduct of certain rites (initiation, ritual practices). Thus, when they are slow to fall, rites are usually performed at the altar of ukiiin to implore deities and ancestors. The sanctuaries where these rites and prayers are performed are numerous. The best known in Lower Casamance is the sacred altar Hussila of Queen Priestess Aline Sitoé Diatta.

Branches of this altar exist almost in each village of Kassa. However, many other altars are known. Among other altars are those of Fiyaye in Eloubaline installed by Queen Aline Siteo, Baliba or Balipa⁴ in Abene (Photo 1) and in the Karone Islands, Esingilite and Badiankussor in Thionck-Essyl, Bahayaye in the village of Cagnoute, etc. There are special rites designed to produce rainfall. This is the case of the ritual known as the Gahule practiced in the Bandal to implore the occult forces to cause the rain to fall. During this ritual, the dances of Signalen or Djibasse are performed. The Edijl rite in Thionck-Essyl also has the power to bring rain even outside of winter. This cult has not been celebrated for many years because of adherence to revealed religions (Islam in particular). With the scarcity of rains, he was resuscitated in 2007 to try to remedy this situation (Photo 2). These rites are often accompanied by songs to attract divine providence. In the Kassa, during the rites of invocation for the rain a song is sung:

⁴ Fetish received from the late Queen of Cabrousse Aline Siteo Diatta and who was installed in the village of Abene by one of these relatives, Queen Anna Sambou. Currently it is the latter who provides supervision of this fetish. People come from everywhere to express their needs so that the fetish intercedes with God to answer their prayer.

Wowahé baliba /Wantantigoé, God does not forget His children.

Rituals for opulence still have great importance for the Jola people. Their execution also promotes the sustainable use of resources making it possible to lessen the impacts of human actions. Hence, the interest of practicing these rites. However, it seems that some rites do not originate in Lower Casamance. This is the case of the ritual for the abundance of fish resources (fish in particular) carried out in Kafountine in the west of Lower Casamance and which was adopted by the natives. Kafountine being a land of welcome, benefited from practices of populations Lebou came from the north of the country. Maintaining this practice suggests that it has a positive effect on the resource, which is why the practice has been preserved.

Taboos

The exploitation of some marine and coastal resources is governed by numerous prohibitions that make it possible to protect against misuse and other destructive practices. Some animal and plant resources are taboo, so their use is generally forbidden. Totems and parts of the mangrove reserved for cultural or cultic practices are among the most obvious examples. Similarly, spaces of cultural interest serving as a refuge for mythical beings (geniuses, ancestors, totems) or used for such ritual practices. In these places, the prohibitions are specific. For some, the taboo involves all resources and leads to prohibitions ranging from exploitation to consumption. For example, totems should not be consumed and their



Photo 2. Celebration of the rite Edijl in Thionck-Essyl.
Source: Surveys (2015).

habitat is protected.

On the other hand, for other species, the prohibited resources can be forbidden to certain people according to the sex and the social position (Leblic, 1998). For example, at some sites used for the rituals, namely Etenia (in Hitou), Djata Hounouha and Ehindou (in Haer), oysters are taboo. Their consumption is prohibited by the uninitiated and women. In other words, the location of resources in these sacred places determines their conditions of use (Appendix 1).

Often, to preserve places of ecological interest, regulate or organize the use and exploitation of certain resources, taboos are instituted. With the system of defense (in Jola Hubene or Hutongh according to villages), one invests for an indeterminate time the environment (zones of spawning) or the resources (seashell) which it contains a sacred power.

In the Jola country, taboos are the basis of natural resource management. It is dangerous to break them, as this can lead to serious consequences for the offender. In doing so, they participate in the maintenance of ecosystems (Artaud, 2014) and the respect of standards established by the community.

Totemism among the Jola of Lower Casamance

In Jola country, each lineage has at least one totem, ewoum in jola considered as the incarnation of the deceased ancestor, the look-alike and protector of the living individual. He is mystically protected by geniuses

and ancestors. However, this protection is reciprocal, since totems watch over the individuals who themselves constitute themselves as guardians of these species. In fact, in jola beliefs, the person can, after death, reincarnate in an animal or in the body of a newborn in the same family. Among the jola of Kassa in particular, Badiane (2012) writes in this connection that: "*the jola kassa grows to the preservation of life. For him, man is an eternity: if he dies, his strength is destroyed, but his vital energy, that is, his spirit remains. His life is then recreated elsewhere and differently. He can be reborn or according to his state of sin, he can go through ways of reincarnation*".

The totemic species found in the Jola environment are generally fish (catfish, carp, rays, sharks, etc.), mammals (dolphin, whale, manatee, porpoise, hippopotamus, antelope, elephant, etc.), or reptiles (Nile monitor, earth monitor, crocodile, snake, etc.) (Appendix 2).

Outside the totems, some animals such as beef and goat are subject to an arbitrary prohibition of slaughter in some Jola countries including Kassa and Bandial. In these countries, these animals are considered sacred. Beef is slaughtered only at specific events such as religious, cultural, funeral ceremonies. In Kassa, for example, if you hurt or accidentally kill the ox, the offender must declare his crime to the fetish named Eloung in Djivente. Through the priest, the fetish sets the fine to pay.

The goat enjoys this sacred status because of its use in ritual sacrifices. As with the Jola, there are also animals in some parts in Senegal and elsewhere. This is the case

in Kaolack where the monitor is highly respected, because the tutelary genius of the city known as Mbossé is manifested in the form of this animal. This status gives it a sacred character in which rites and offerings are made in his honor. People are forbidden to hurt or kill the animal. According to Chretien et al. (1999), "if they are accidentally hit or injured, you can become crippled, or the body may become covered with scales. One falls into a crisis of madness, one spits blood, and death occurs if, quickly, the priestess does not make the appropriate rites to purify the delinquent. If finally the monitor is killed, no one can save the person responsible for the bite of the snake, double the peaceful little saurian. Of course, it is also forbidden to eat the monitor at Kaolack".

Mystic deterrence, an effective way of managing natural resources

When it comes to upholding established rules for resource management, custodians of tradition use mystical deterrence to discourage or warn potential actors. Indeed, while it is true that the belief in supernatural resource managers is still present in the Jola environment, these same powers form the bedrock of a sustained mechanism of mystical deterrence.

In the Jola society, the desire for sustainable stability and sensible use of marine and coastal resources has led to the development of standardization techniques which aim to prevent over-exploitation. This has resulted in dissuasive practices in the supernatural realm. The preservation of natural resources within society and between different communities is so appreciated that there is an institutional and religious organization among the Jola that ensures respect for the established laws. Among the institutions that contribute to the management of resources, prominent fetishes or *ukiin* (boekin singular) feature prominently. The same term, boekin, also refers to the genie, the altar and the sanctuary and where the libations of blood or palm wine are made during the sacrifices (Journet-Diallo, 2007).

The *ukiin* represent invisible elusive forces and play the role of intermediaries between humans and Ata Emit or God the Creator, Master of the sky and the rain. They are hierarchical in individual, lineage or community. Their sacred or genial nature and their purpose are recognized by all. The esoteric field of their activities makes them dominant organs within the Jola society. In fact, they participate in the management of resources by exerting a mystical or at least psychological deterrence on local populations (Badiane, 2012). The permanence of their prerogatives makes them very feared and the prohibitions associated with them enjoy a deep respect.

Penalties imposed on offenders

The taking of resources especially in the sacred spaces

is done with an arsenal of constraints. In the event of violations of the rules governing a taboo resource or a sacred site, sometimes very heavy penalties are imposed on the guilty parties. The arrangements for repairing the offences are established by the Boekin.

Compensation for the fault is mandatory because the penalty is generally not limited to the offender. It can be extended to other members of the offender's family if the wrong is not repaired. The penalty depends on the extent of the fault. Among the most common sanctions are diseases that can sometimes lead to death if the boekin is consulted late or refuses to forgive. Expiatory sacrifices to repair the harm include libations (palm wine) and animal offerings (beef, pork, rooster) in front of the boekin altar.

Basics of traditional marine and coastal resource management practices in Jola countries

In Lower Casamance, certain marine resources are of great cultural importance for the populations. As a result, they are subject to a strong regulatory system that derives from traditional rules and protective geniuses. These regulations deal with total, partial or temporary prohibitions and ensure the survival of the population but also the continuity of certain rituals which performance necessarily depends on some biological resources. The guardians (priests, traditional chiefs) of the tradition remain the guarantors of the respect of the established rules.

Other practices are based on relevant knowledge of ecology. This is the case, for example, of the defensive policy better known as *hubene* or *hutongh* in Jola language. This practice is to taboo some resources because they are lucrative and thus subject to overexploitation. This is the case of some fruit trees (*Elaeis guineensis* Jacq., *Parkia biglobosa* Jacq., *Adansonia digitata* Linn., Etc.), oyster / *Crassostrea gasar*, and the ark / *Senilia senilis*). It is also used to preserve places of ecological interest such as the Kiling-Kiling bolong located in the Kawawana Aboriginal and Community Heritage Area (Diatta et al., 2017).

Some popular beliefs were not conducive to harvesting oysters and in some cases for harvesting wintering mangrove wood. It was firmly believed that it could cause misfortune in the village or a bad harvest. In fact, as soon as the rice is thrown until it matures, picking is not allowed. The mangrove was also subject to such beliefs. Returning the mangrove wood to the village by fagot from the beginning of rice transplanting was likely to lead to a misfortune that would force people to stop rice works. To avoid this, it was necessary to cut the mangrove into small pieces and put it in a basket to bring it to the village (Diatta, 2018).

These beliefs made it possible to limit the exploitation of the mangrove and to show both the importance of rice

cultivation in Jola countries. Although beneficial in terms of conservation, these beliefs are now disappearing unfortunately. Nevertheless, the policy of defense, still retains all its value because of the consequences that may result from non-compliance with the prohibition.

Valorization of traditional knowledge and practices

Local knowledge regarding the marine and coastal environment is little known and little valued in Lower Casamance which is the case for nearly the entire world. Yet the importance of this knowledge in the conservation of marine and coastal resources is very real. This conservation is reflected in the protection of the natural environment, animals, forests, etc. Traditional practices that still exist in this southern part of Senegal have the advantage of allowing sustainable conservation of resources by relying on the sacred that involves taboos. Consequently, they should be protected and valued even at the level of the Convention on Biological Diversity (Ibo, 1994; Cormier-Salem et al., 2005; Da Cunha, 2012).

Thus, neglect of local knowledge can unfortunately lead in the future to their marginalization and annihilation. The traditional religion that helps to maintain practices associated with local knowledge is less and less practiced as people are increasingly opting for monotheistic religions whose practices are not in line with animism. The loss of this knowledge can therefore have a negative impact on resources. In the case of Basse Casamance where nature still exists, it is largely due to practices associated with animism and local knowledge since the sacred still remains today an effective mechanism of protection and regulation in the exploitation of resources. Thanks to the fetishes, natural resources are still preserved and many rites and traditions have been kept intact in several localities (in the southern part of the region). Taking all these features into account, we maintain that the Jola resource conservation policy must be supported and encouraged. Animistic practices should not be banned but must be maintained in order to conserve resources.

DISCUSSION

Traditional Jola society is based on a discipline made up of prohibitions and obligations. Even if some customs are currently getting bogged down, there are still mechanisms to manage natural resources rationally and guarantee community well-being. Our results concerning the customs relating to the sacred sites, confirm those highlighted by numerous research works in black Africa and in several countries of the world.

Sacred natural sites, marine and forest areas of great ecological importance have been saved. In these places, specific species of fish, mammals, reptiles, birds and

crustaceans are protected. All over the world, these sacred areas exist (UNESCO-CNRS-MNHN, 1998; UICN/CEESP, 2010; Wild et al., 2012). Because of the spiritual values attached to them, these sacred natural spaces enjoy great respect. "Restrictions on access or use often apply, and many sites remain in a natural state or almost" (Wild et al., 2012). Thus, in Côte d'Ivoire, it formally prohibits fishing for fish in the Sransi River which shelters sacred catfish. It is also forbidden to make fields around the river to conserve the massif intended to protect the watercourse against drying up (Ibo, 1999).

In the Philippines, some sacred lakes on Coròn Island are only for community members, especially the Tagbanwa people. These lakes are generally used for religious or cultural purposes and to access bird nests, a valuable resource sold to Chinese merchants (Dave De Vera, 2010 cited in UICN/CEESP, 2010). In New Caledonia, especially in the region of Ponérihouen, shelters for totem poles are taboo and may be forbidden for some individuals. This is the case of reefs that are tabooed periodically as they become breeding grounds for some fish species (Leblic, 1998). In the Vanuatu society (an archipelago located in South West Pacific), the taboo areas supposed to be governed and protected by the spirits that reside there contribute to protect the resources by means of prohibitions (Hickey, 2007).

In Lower Casamance, sacred sites are among the least degraded areas. Their access is strictly subject to authorization. Failure to comply with the prohibitions leads to sanctions that can sometimes lead to the death of the offender (Leblic, 1998). The sacredness of these sites justifies their preservation. Moreover, most of them show a better state of conservation compared to spaces that do not have this status. Endogenous secular practices that have preserved these sites have made them habitats of remarkable biodiversity. Accordingly, their cultic and cultural designation gives them a biodiversity conservation status that must be preserved.

Unfortunately, nowadays the customary system has become considerably weakened and many prohibitions have disappeared with the development of Islam and Christianity, just as the modernization of traditional society has led to their deterioration.

The alteration of those sites has been caused by the weakening of the customary system, the disappearance of numbers of taboos with the expansion of Islam and Christianity, as well as the modernization of traditional society. As Dugast (2010) has shown on the impact of Togolese Bassar clan solidarity in the preservation of their sacred groves, this is also "a set configured in a system and whose elements, consequently, have a certain degree of solidarity with each other". This is why, as with the Bassars, the weakening of the clan solidarity makes the existing system falter and affects the durability of the sacred groves, which makes clear that the loss of ancestral customs has consequences for the protection of these sites. As Dugast (2010) writes, sacred groves

"only find their meaning in the global system insofar as it preserves its overall coherence".

The conservation of natural resources is also favoured by certain rites of passage like that of *bukut*⁵. Indeed, his practice entails the imposition of taboos on certain sites and associated resources such as plants, fruits, mangrove, animals, etc. This is the case in many parts of Africa and Oceania (Butare, 2003; Hickey, 2007; Koy and Ngonga, 2017). The prohibitions also concern the practice of agricultural activity strictly prohibited in these spaces of initiation. Koy and Ngonga (2017) highlighted similar prohibitions among Turumbu residents of the Yangambi Biosphere Reserve in the Democratic Republic of Congo (DRC). Moreover, for many other African populations and elsewhere, breaking these rules is punishable by severe penalties (Butare, 2003; Stevens, 2008; Dugast, 2010).

The cultural importance of the initiation of *bukut* lies in instilling in the initiates the virtues of dignity, courage, responsibility, wisdom, endurance, in order to instil respect for cultural values, prohibitions, cardinal social values, and to become familiar with religious dogmas. But, in addition to this function, the initiation of *bukut* also teaches respect for the natural environment (Badiane, 2012). In doing so, it has a significant ecological significance, since it instills into the initiates a respectful attitude towards nature. The various "physical trials and esoteric revelations of all kinds to which he is subjected, dictate to him a profound respect for the community and solidarity with other members of society. They also dictate to him a duty of respect vis-à-vis the elements of nature with which he has a complementary relationship" (Gueye, 2007).

Furthermore, the dependence of Jola populations on natural resources for their livelihood explains the perpetuation of many rites. Among these rites is to ensure the benevolence of the divinities and invisible powers that rule the natural world. In general, among African traditional societies nature is a sanctuary populated by supernatural powers. The latter have specific physical habitations such as streams or forests and would have the ability to watch over the well-being of the living, but also to chastise them when they offend them (Sanogo and Coulibaly, 2003). For example, some Senegalese communities such as the Lebous and the Serere believe that spirits take up residence in certain trees. In most cases, these trees serve as an altar for libations. They are sacred and surrounded by prohibitions. Trees, among other receptacles, serve as residences for *Pangool*⁶ in the Serere society (Cisse et al., 2004; Diouf, 2011; Djigo, 2015). Thus, it is forbidden to cultivate to their trunks, they are not easily pruned and they avoid collecting dead wood (Gravrand, 1973). Their access depends on the prohibitions and taboos fixed by

the venerated power (Diouf, 2011). Among the Bassar, certain places, especially those identified as being occupied by the *ikpalibi* supernatural powers, are among those that are avoided. At some times during the day (Dugast, 2010), "to cross such a place at such a time is to disturb them and to have a violent correction imposed on them in such a way as to dissuade forever the imprudent one from committing to such odd future".

In many societies, these beliefs subsist. The rites for having the approval of the tutelary genius to make punctures on medicinal trees for example stem from these beliefs. Siny (2001) writes that in Cambodia, "before cutting down a tree, the dog *prei* must make a request to the spirits of the tree, *roukhtevoda*, to the geniuses of the soil that govern the space concerned, *neak* to the spirits who keep the forest, *bang* beats. The request must always be accompanied by offerings". There is therefore in the consciousness of the individual the need for a counterpart without which the resource is not accessible (Gueye, 2007).

There are also rites to solicit the generosity of the deities with a view to the opulence of natural resources as reported by Seck (2014) among the *Lébou* and *Guet-Ndarien* fishermen from Senegal and those from the island of *Phú Quý* in Vietnam (Nguyễn Quốc-Thanh, 2016). In fact, the cult of the geniuses of water is present in many coastal Senegalese communities including that *guet-ndarienne* who still practice that of the protective genius of "*Mame Coumba Bang*" at the opening of fishing campaigns. During the ceremony, offerings of milk are made to the protective genius under the direction of a *marabout*. This rite can ensure luck and protection from the tutelary genius (Seck, 2014).

Propitiatory rituals are, in some ways, a system of sustainable management of natural resources. Indeed, as soon as we are aware that the resource is under the control of a superior being and that its accessibility is subject to the agreement of that being, threats of permanent degradation are minimized. Thus, with an ecological approach, it can be said that these practices affect the balance of nature and are beneficial. However, the sustained exploitation of certain species such as medicinal plants contributes to the reduction since the rate of natural regeneration is slow. In addition, the impacts of overharvesting certain plants can, as Bolendjele et al. (2013) wrote in their work, result in deforestation and the disappearance of certain species of trees and herbaceous plants. However, in Africa, medicinal plants are a precious resource for the vast majority of rural populations who use them to provide health care (Mpondo et al., 2012).

Moreover, in the current context where Africa appears as one of the most vulnerable continents to climate change, deforestation will only accentuate the greenhouse gas emissions responsible for this phenomenon. It goes without saying that not all traditional practices favour the conservation of biodiversity. Some practices also have weaknesses that deteriorate

⁵*Bukut* is also referred to as *foutamp* (in the Fogni region), *bugut* or *geurur* (in some *Blouf* villages, including *Thionck Essyl* and *Bandial*).

⁶Spirits of the deified ancestors (Diouf 2011) or the bush (Cisse 2004)

biodiversity (Bolendjele et al., 2013).

The taboo also constitutes a determining principle of the process of biological renewal of species (Artaud, 2014). Indeed, thanks to the obligations to be respected by the various prohibitions, anthropogenic pressures on resources are reduced. Among the bans, the totems attract attention. For the jolas, as for many communities in Senegal (Sereres Niominka, Sereres Ndut, Lebous, etc.) (Dupire, 1991; Dumez and Ka, 2000; Diouf, 2011) and Africa, the totem is the consanguineous relative (Gadou, 2003).

It is strictly prohibited to harm the life of the totem and consume it. For example, among the Bakwe people of Sassandra hunting and eating of the panther is prohibited, as is the warthog among the Niambezeria people of Lakota and manngongoble fish for many Keita families in the Niger Valley (Gadou, 2003). Among the Malinke people of Ivory Coast, the totemic animal is neither killed nor consumed because it is the incarnation of the ancestors (Diomande, 2011). The situation is the same in the Ndut country and in the Lebous where it is forbidden to kill the totem because it is linked to either an ancestor or a genius (Dupire, 1991; Dumez and Ka, 2000). Elsewhere in the world, many cultural groups in Vanuatu (an archipelago in the Western South Pacific) are endemic species of fish, octopus, giant clam, turtle, shark or moray eel, or terrestrial species. In fact, they are strictly forbidden to consume these totemic species out of respect for their ancestors (Hickey, 2007). Prohibitions can vary and bring in some populations the way to hunt or fish animals (Artaud, 2014).

Among the Hindoos, most of the population do not consume the cow for religious reasons (Ferry, 2017). This bovine is presented as the pet of the gods Krishna and Shiva and is endowed with a special character of sanctity and inviolability (Brown, 2016). It occupies a special niche in the Indian psyche, although a large proportion of Muslims, Christians and tribal people, as well as the lower echelons of lower castes has no problem with the consumption of its meat (Desquesnes, 2016).

According to this author, this symbolism of the cow took, in the late nineteenth century, an obvious political dimension because of the presence of British settlers and racists, as well as Muslims who were described as abusers of sacred cows. Indeed, thanks to the Hindu nationalist movements of resistance to the British Empire, the cow becomes a unifying symbol promoting Hinduism as a cultural identity (Ferry, 2017). Beef eaters are then stigmatized. Very quickly, we go from a simple protection of this cattle species to a speech and clearly anti-Muslim acts. This allows high castes, who represent less than 15% of Hindus, to consolidate their political, economic and cultural domination of minorities. In Vietnam, particularly in the coastal villages of the center and the south, the sanctity of cetaceans removes any possibility of their being exploited (Robineau, 1998).

It is clear that all these traditions favor the protection of animals. For example, the worship of the totem reflects its real interest in the preservation of these species. Indeed, by defending the totemic-animal, this practice protects the species. It is clear in this case that the maintenance of the harmony with the ancestors, the geniuses and the divinities motivate this protectionist impulse in the totemic system. Here, the protection of the totem species is the motivation rather than the conservation of resources (Journet-Diallo, 1998).

However, this protection allows conservation of biological diversity, desecration of the sacred and the violation of the prohibitions to threaten the stability of the environment. As evidence, the development of shark fishing in Casamance has resulted in a deep degradation of this resource. Sharks symbolize for many jola populations, the totem have become rare. For example, the saw shark (*Pristis pristis*) has disappeared from Senegalese waters (DPM, 2005). In the West African region, experts are not certain if it has completely disappeared or if there are still one or two small relict populations on the coast of Sierra Leone, and perhaps in Guinea-Bissau (Weigel et al., 2007).

In sum, it must be recognized that, like many communities in the world, several Jola customs and practices seem to have a significant interest in sustainable conservation. Consequently, today, in view of the repeated failures and shortcomings noted in the field of conservation, it is urgent to take into account these traditional practices which have long been shelved (Ibo, 1994; Cormier-Salem et al., 2002).

Conclusion

The behavior of jola populations for certain aspects of their daily lives is determined by ancestor worship, belief in supernatural beings, totemism, and above all, a single God, Ata Emit. The purpose of rites, propitiatory sacrifices, is to allow the living to continue to enjoy the grace and assistance of the invisible whose primary function is a connection with Ata Emit.

The jola people, through different habits and customs (fetish system, sacred natural sites, taboos and forbidden) have helped to preserve the natural environment of Lower Casamance, even if the primary motivations were not the protection of natural resources. As evidence, for most sacred natural sites where biodiversity has been preserved, it is for cultural and not ecological reasons (Dugast, 2002). Nonetheless some resources are preserved for economic and ecological interests. Accordingly, the role of traditional practices in the conservation of natural resources is essential.

In fact, the preservation of animist practices is beneficial for conservation, because if local knowledge is lost, if there are no more taboos or taboos, people will exploit the resources without mercy. It is therefore

necessary, in the context of biodiversity conservation, to preserve the knowledge that still remains and to value those that are disappearing. Significant progress towards the protection of animist practices has been made in some cases. Senegal has chosen to empower local populations in order to cope with the increasingly increasing degradation of marine and coastal resources. In addition, the awareness of the need for more sustainable management of marine and coastal resources has fostered many legal and institutional reforms over the last decade. For example, the environmental code was revised in 2001 for better environmental management.

In 2004, a decree designed to protect natural resources and ecosystems representative of the marine environment resulted in the creation of five MPAs. The most recent measure is the revision of the Fisheries Code, which defines provisions for the management of fisheries resources. These strategic frameworks put at the forefront the participation of local populations in the development and the implementation of the plans of development and local management of the marine and coastal resources. Thus, the State of Senegal has laid the foundations for a new management paradigm that meets local requirements and includes participatory management. The management of marine and coastal resources is based on Laws No. 96-06 and 96-07, namely, the Code of Local Authorities and Transfer of Competences to the Regions, to the Communes and Rural Communities in order to implement these co-management projects for marine and coastal resources. This has led today to the creation of community protected areas, the establishment of CLPAs, etc.

In conclusion, the equitable management of marine and coastal natural resources will result only when a code of management is adopted with rules that are elaborated in collaboration with the local populations

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

The authors thank Famara Diedhiou and Dr Todd Capson for their valuable comments on the manuscript. The support in mapping provided by Dr Barnabé Ephrem A. Diémé is also highly appreciated.

REFERENCES

- ANSD (2015). Service Régional des Pêches et de la Surveillance de Ziguinchor (SRPSZ), Situation économique et sociale régionale 2013. 126p.
- Artaud H (2014). De l'« efficacité » symbolique des interdits à leur fonctionnalité écologique. *Revue d'ethnoécologie* [Online], 6 | 2014:1-

17. URL: <http://ethnoecologie.revues.org/>; DOI: 10.4000/ethnoecologie.2055.
- Badiane SD (2012). *Espaces forestiers de la Casamance amphibie (Sénégal). Déterminisme territorial, biodiversité et stratégies de conservation*. Thèse de doctorat unique. Spécialité: Environnement littoral. UCAD :Dakar.
- Bolendjele W, Risasi E, Kitambala V (2013). « Limites des pratiques ancestrales de la conservation de l'environnement », in *REVUE DE L'IRSA* N° 19 Décembre, Accès sur; HTML du fichier <http://www.unikis.ac.cd/sites/default/files/BOLENDJELE%20W%20%80%99Afi%20%3B%20RISASI%20Etutu%20et%20KITAMBALA%20Vangehanian.pdf>.
- Brown WN(2016).La vache sacrée dans la religion hindoue. In *Annales. Economies, Sociétés, Civilisations*. 19ème année, N. 4:643-664; Accès http://www.persee.fr/doc/ahess_0395-2649_1964_num_19_4_421195., consulté le 15 juillet 2016.
- Butare I (2003). Pratiques culturelles et conservation de la biodiversité en Afrique de l'Ouest et du centre. Actes du Séminaire-Atelier de Ouagadougou (Burkina Fasso) du 18 au 21 juin 2001. IDRC/CRDI, Zoom Edition, 251P.
- Chretien JP, Triaud JL (1999). *Histoire d'Afrique, les enjeux de mémoire*, Editions Karthala/Paris 503p.
- Cormier-Salem MC, JUHE-Beaulaton D, Beutrais J, Roussel B (2002). Patrimonialiser la nature tropicale. Dynamiques locales et enjeux internationaux, Editions IRD, 467p.
- Cormier-Salem MC, JUHE-Beaulaton D, Beutrais J, Roussel B (2005). Patrimoines naturels au Sud. Territoires, identités et stratégies locales, Editions IRD, 551p.
- Da Cunha CM (2012). Savoirs autochtones : quelle nature, quels apports ?. Paris, Collège de France / fayard, coll. Leçons inaugurales du Collège de France, N° 227, pp. 17-60.
- Diatta CS, Diouf M, Karibuhoye C, Sow AA (2017). Sites naturels sacrés et conservation des ressources marines et côtières en milieu traditionnel diola (Sénégal). *Revue d'ethnoécologie* 11:1-22. <http://ethnoecologie.revues.org/2900>
- Diatta CS (2018). Savoirs locaux et modes traditionnels de gestion des ressources naturelles marines et côtières en Basse-Casamance : perspectives de leur intégration dans le système conventionnel. Thèse de doctorat unique. Spécialité: Géographie, option Environnement. UCAD/Dakar, 315p.
- Djigo A (2015). *Patrimoine culturel et identité nationale : construction historique d'une notion au Sénégal*. Journal des Africanistes 85-1/2:312-357. URL: <http://journals.openedition.org/africanistes/4617>
- Diouf I (2011). Croyances et pratiques magico-religieuses traditionnelles à Rome et en milieu sérère: étude comparative, Thèse de doctorat unique. Spécialité: Histoire/Sciences de l'Antiquité. UCAD Dakar.
- Diomande BI (2011). Évolution climatique récente dans les régions nord-ouest de la Côte d'Ivoire et ses impacts environnementaux et socio-économiques, Thèse de doctorat unique. Spécialité: Climatologie et Environnement. UCAD Dakar, 208 pages.
- Desquesnes N(2016).Lynchés au nom de la vache sacrée. *Le Monde diplomatique*, 2016/2 (N°743), P. 17. URL : <https://www.cairn.info/magazine-le-monde-diplomatique-2016-2-page-17.htm>
- DPM Sénégal (2005).Plan national d'action pour la conservation et la gestion des requins Sénégal, 37p. <http://www.fao.org/3/a-bl358f.pdf>
- Dugast S (2002). Modes d'appréhension de la nature et gestion patrimoniale du milieu. In: Cormier-Salem M.C., Juhé-Beaulaton D., Boutrais J., Roussel B. (dir.), Patrimonialiser la nature tropicale. Dynamiques locales, enjeux internationaux, Paris, éditions de l'IRD, Colloques et séminaires, pp. 31-78.
- Dugast S(2010). Bois sacrés, lieux exceptés, sites singuliers, Un domaine d'exercice de la pensée classificatoire, (Bassar, Togo).In : Juhé-Beaulaton D. (dir.) Forêts sacrées et sanctuaires boisés : des créations culturelles et biologiques (Burkina Faso, Togo, Bénin) (Eds) Paris: Karthala, pp. 159-183. http://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers18-02/010050187.pdf
- Dumez H (2011). Qu'est-ce que la recherche qualitative? Le Libellio d'AEGIS, Libellio d'AEGIS, 7 (4 - Hiver), pp.47-58. fhal-00657925f. En ligne : https://hal.archives-ouvertes.fr/hal-00657925/file/pages_47_A_58_-_Dumez_H_-_2011_-_Qu_est

- ce_que_la_recherche_qualitative_-_Libellio_vol_7_nA_4.pdf
- Dumez R, Ka M (2000). « Territoire assiégé Yoff. Un village lébou dans la banlieue de Dakar ». Collection Dossiers régions côtières et petites îles 7. Ed. UNESCO-CNRS – Programme Environnement Université Cheikh Anta Diop de Dakar – Chaire UNESCO, 81 pages. Accès sur: <http://www.unesco.org/csi/pub/papers2/yoff.htm>.
- Dupire M (1991). *Totems serer et contrôle rituel de l'environnement*. In: L'Homme, 1991, tome 31 n°118 : 37-66. http://www.persee.fr/doc/hom_0439-4216_1991_num_31_118_369379.
- Fall SM, Diouf M, Badiane SD (2011). Identification et caractérisation des sites naturels sacrés côtiers et marins en Afrique de l'ouest. Etude de Cas du Sénégal, Rapport du Sénégal, 39 p. URL: http://www.rampao.org/IMG/pdf/identification_et_caracterisation_des_sites_naturels_sacres_cotiers_et_marins_en_afrique_de_l_ouest_sn.pdf.
- Ferry M (2017). Le terrorisme de la vache. laviedesidees.fr. 13 pages. <https://laviedesidees.fr/Le-terrorisme-de-la-vache.html>.
- Gadou D (2003). Préservation de la biodiversité: les réponses des religions africaines. In: Butare I. (2003), *Pratiques culturelles et conservation de la biodiversité en Afrique de l'Ouest et du centre*. IDRC/CRDI, (Eds) Zoom Edition, pp. 47-68.
- Geoffroy ADB (2009). Le passage à l'écriture. Mutation culturelle et devenir des savoirs dans une société de l'oralité. Thèse de Doctorat de Sociologie, Université de Nantes/Université d'Abomey-Calavi. 386P.
- Gueye M (2007). *Sociétés rurales et développement durable. Transformations récentes des agricultures, stratégies paysannes et soutenabilité des systèmes ruraux en Afrique sahélo-soudanienne : cas du département de Bignona (Sénégal méridional)*. Thèse de doctorat, Université de Montréal, Département de géographie, Faculté des arts et des sciences.
- Goedefroit S, Chaboud CB, Reton Y (2002). *La ruée vers l'or rose. Regards croisés sur la pêche crevette traditionnelle à Madagascar*. IRD Editions.
- GRDR-UASZ-IRD (2017). Un littoral en mouvement. Diversité, dynamiques et mutations des territoires frontaliers du sud-ouest du Sénégal et du nord-ouest de la Guinée-Bissau (Ziguinchor, Sédhiou, Oïo et Cacheu). GRDR-IRD. https://grdr.org/IMG/pdf/grdr_atlas_littoral_2017_bat-ld4.pdf
- Gravrand HRP (1973). Le symbolisme serer. *Psychopathologie africaine*, IX, 2 : 237-265. http://psychopathologieafricaine.refer.sn/IMG/pdf/Gravrand-H-Le_Symbolisme_Serer-73IX2.pdf.
- Guilcher A (1954). Morphologie et dynamique des côtes sableuses de l'Afrique atlantique. Cahier d'inf.géogr. n° 1. Paris, pp. 57-68.
- Hickey FR (2007). Gestion traditionnelle des ressources marines à Vanuatu : reconnaître, appuyer et renforcer les systèmes autochtones de gestion des ressources. Ressources marines et traditions, Bulletin de la CPS 20:11-23. URL: http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/TRAD_VF/20/TRAD20VF_11_Hickey.pdf.
- Siny HC (2001). Le touk khmer. *Techniques and Culture* 35-36:509-521. <http://tc.revues.org/313>.
- Ibo GJ (1999). La gestion coutumière de l'environnement en Côte-d'Ivoire. Bulletin du GIDIS-CI 17:6-36.
- Ibo GJ (1994). « Perception et pratiques environnementales en milieu traditionnel africain : l'exemple des sociétés ivoiriennes anciennes ». ORSTOM, 17P.
- Journet-Diallo O (1998). Un monde diffracté. Théories joola du double animal. *Systèmes de pensée en Afrique noire* 15:203-230, accès : <https://span.revues.org/1598>. HTML visité le 15 février 2015.
- Journet-Diallo O (2007). Les créances de la terre. Chroniques du pays jamaat (Joola de Guinée-Bissau). Paris, Bibliothèque de l'École des hautes études.
- Koy JK, NgongaAMM (2017). Pratiques Traditionnelles de Conservation de la Nature à L'épreuve des Faits Chez Les Peuples Riverains de la Réserve de Biosphère de Yangambi (RDC). *European Scientific Journal* 13:328-356. URL: <http://dx.doi.org/10.19044/esj.2017.v13n8p328>
- Leblic I (1998). Caractère naturel ou anthropisé des lieux tabous ou rituels : exemple de la région de Ponérihouen (Nouvelle Calédonie). In UNESCO-CNRS-MNHN. *Natural Sacred Sites, Cultural Diversity and Biological Diversity* P 52.
- NGUYỄN QUỐC-THANH (2016). Les cultes maritimes sur l'île de Phú Quý : maintien et préservation des traditions des pêcheurs vietnamiens. *Moussons* 27:131-146: <http://moussons.revues.org/3563>.
- Mpondo E, Dibong DS, Priso RJ, Ngoye A, Yemeda CFL (2012). État actuel de la médecine traditionnelle dans le système de santé des populations rurales et urbaines de Douala (Cameroun). *Journal of Applied Biosciences* 55:4036- 4045.
- Palmeri P (1995). Retour dans un Village Diola de Casamance, Chronique d'une recherche anthropologique au Sénégal. Edition L'Harmattan, Paris. 397 p.
- Pélessier P (1966). Les paysans du Sénégal, Les civilisations agraires du Cayor à la Casamance », Fabrègue St Yrieux. 939p.
- Robineau D (1998). Contribution des temples dédiés aux cétacés à l'inventaire de la biodiversité (Vietnam). In: UNESCO-CNRS-MNHN (1998), *Natural sacred sites, cultural diversity and Biological diversity*. P. 72.
- Sanogo Z, Coulibaly N (2003). Croyances animistes et développement en Afrique subsaharienne. *Horizons Philosophiques* 13(2):139-152.
- Seck A (2014). Les pêcheurs migrants de guet-ndar (Saint-Louis du Sénégal) : analyse d'une territorialité diverse entre espaces de conflits et espaces de gestion, Thèse de doctorat unique de Géographie, Université de Liège et Université Cheikh Anta Diop de Dakar.
- Stevens S (2008). The Mount Everest Region as an ICCA : Sherpa conservation stewardship of the Khumbu Sacred Valley, Sagarmatha (Chomolungma/Mt. Everest) National Park and Buffer Zone, report for Cenesta. IUCN/CEESP and GTZ.
- Thomas LV (1959). *Les Diola: essais d'analyse fonctionnelle sur une population de Basse Casamance*. Mémoire IFAN, Dakar, n°55.
- UNESCO-CNRS-MNHN (1998). *Natural sacred sites, cultural diversity and Biological diversity*. International symposium, 89p.
- IUCN/CEESP n°10 (2010). Document d'accompagnement à la note d'information. La diversité bio-culturelle conservée par les peuples autochtones et les communautés locales. Exemples et analyses 71p.
- Wala K, Amegadze M, Guelly KA, Kokou K, BATAWILA K, AKPAGANA K (2003). « Connaissances endogènes et gestion de la diversité végétale au Togo ». pp. 123-133. In: BUTARE I (2003), « Pratiques culturelles et conservation de la biodiversité en Afrique de l'Ouest et du centre ». Actes du Séminaire-Atelier de Ouagadougou (Burkina Fasso) du 18 au 21 juin 2001. IDRC/CRDI. Zoom Edition.
- Weigel JY, Worms J, CheikhAWO, FallOR, Da Silva AS, Cardoso L, Da Silva AO, Diémé S, Mohamed-Saleck AO, Morand P (2007). Les enjeux des aires marines et côtières protégées ouest-africaines. Presses universitaires de Perpignan, pp 39-60. <https://books.openedition.org/pupvd/2328>.
- Wild R, Mcleod C (2012). *Sites naturels sacrés : Lignes directrices pour les gestionnaires d'aires protégées*. Gland, Suisse: IUCN.

APPENDIX**Appendix 1.** Sacred places where the rites of intercession for the rain are realized.

| Zones | Villages | Sacred Places | Purpose or reason for Sacrality | Access conditions by gender | |
|--------------|-------------------------------------|-----------------------|--|---|--|
| | | | | Man | Woman |
| Bandial | Essyl | <i>Guounih</i> | Royal fetish | having access to the royal court | Strictly forbidden |
| | | <i>Gueuvi</i> | Royal fetish (only exists in the village of Enampor and Essyl) | having access to the royal court | Strictly forbidden |
| | | <i>Djirengb baval</i> | Fetish | Accessible/Only men have the right to make libations | except women those who have their periods |
| | All villages of the Bandial kingdom | <i>Ufulung</i> | Royal fetish exists in every concession | Accessible | Women except those who have their periods participate in ceremonies but stay away from the sacred place. |
| | Eloubaline | <i>Fiyaye</i> | Fetish | Accessible | except those stained by menstruation |
| Kassa | All villages | <i>Hussila</i> | Fetish | Accessible | except those stained by menstruation |
| | All villages | <i>Ehunia</i> | Fetish | Men can access or attend the ritual while staying away from the sacred place. | except those stained by menstruation |
| | Cabrousse | <i>Buculabe</i> | Fetish | Man | except those stained by menstruation |
| | Djemering | <i>Tanoundarité</i> | Place of worship | Men initiated | Strictly forbidden |
| | Cagnoute | <i>Bahayaye</i> | Fetish | Man | except those stained by menstruation |
| | Ourong | <i>Keuyeukou</i> | Fetish of the king of the village of Esaoute | Man | Strictly forbidden |
| | Tendouck | <i>Bakine</i> | Fetish / Place of worship | | except those stained by menstruation |
| Blouf | Thionck Essyl | <i>Gniback</i> | Place of worship | Men | except those stained by menstruation |
| | | <i>Badjonkossor</i> | Place of worship (current location of the Grand Mosque of Batine district) | | except those stained by menstruation |
| | | <i>Fukankoul</i> | Place of worship | Man | except those stained by menstruation |
| | | <i>Esingilite</i> | Place of worship | prohibited | except those stained by menstruation |
| Bliss-Karone | Hillol | <i>Ewateteninkine</i> | Fetish | Man | except those stained by menstruation |
| | Saloulou | <i>Sonkokounda</i> | Fetish | Man | except those stained by menstruation |
| | | <i>Samou</i> | Fetish | Man | except those stained by menstruation |
| | | Abéné | <i>Baliba</i> | Fetish | Man |

Source: Our investigations.

Appendix 2. Pet totems listed.

| Totemic species living in the marine environment | Scientific names | Families | Villages |
|--|-------------------------------|------------------|----------------------------|
| Saw Shark | <i>Pristis pristis</i> | SAGNA | Babuteume de Thionck Essyl |
| Saw Shark | <i>Pristis pristis</i> | DIEME | Thionck Essyl |
| Hippopotamus | <i>Hippopotamus amphibius</i> | DIATTA abanbanta | Mangagoulack |

| | | | |
|------------------|--|--|------------------------------------|
| Hippopotamus | <i>Hippopotamus amphibius</i> | DIATTA Oulempane | Mangagoulack |
| | | MANGA Eboune and MANGA Elouboureuye, | Enampor |
| | | TENDENG | Keumeubeul |
| | | DIASSY, DIEDHIOU, and DIATTA | Haer |
| Manatee | <i>Trichechus senegalensis</i> | DIEDHIOU Bourombone | Tendouck |
| | | DIATTA | Haer |
| | | DIATTA | Cabrousse |
| | | SAMBOU | Cagnoute |
| | | DIATTA | Mlomp Kassa/ district of Kaddjinol |
| | | COLY djifalon | Mlomp Blouf |
| Hammerhead shark | <i>Sphyrna Spp</i> | DIEME | Hitou |
| | | Bassene | Etama and Bandial |
| | | DIASSY et DIEDHIOU | Saloulou |
| | | TENDENG | Essy |
| | | SAMBOU | Cagnoute |
| | | DIATTA and all families of the district of Kandianka | Mlomp Kassa district of Kadjinole, |
| | | DIASSY, DIEDHIOU, and DIATTA | Haer |
| Crocodile | <i>Crocodilus</i> (<i>Crocodylus niloticus</i> , <i>Crocolylus cataphractus</i>) | DIATTA de Diammo | Hitou |
| Heron | Unidentified species | DIASSY, DIEDHIOU, and DIATTA | Haer |
| Crab, Shark | Unidentified species | DIATTA and DIASSY | Haer |
| Dolphin | <i>Tursiops truncatus</i> | DIATTA and DIEDHIOU | Hae |
| | | Bassene | Etama and Bandial |
| | | DIATTA | Djembering |
| | | DIATTA | Cabrousse |
| | | SAMBOU | Cagnoute |
| Whale | Unidentified species | DIASSY and SADIO | Saloulou |
| | | DIATTA | Djembering |
| | | DIATTA | Cabrousse |
| Partridge | <i>Pternistis bicalcaratus</i> | DIASSY of Thiathies | Saloulou |
| Carp | Unidentified species | SADIO | Saloulou |
| Captain | <i>Polydactylus quadrifilus</i> | SADIO | Saloulou |
| Ark | <i>Anadara senilis</i> | DIASSY | Saloulou |
| Caiman | Unidentified species | DIABANG | Abene |
| Catfish | <i>Naja Spp.</i> | Family | Bouteme |
| Porpoise | <i>Phocoena Spp.</i> | DIATTA Adiona | Djembering |
| Ray | Unidentified species | Families | Cagnoute |

| | | | |
|--|--|--|-----------------------------------|
| Crocodile | <i>Crocodilus</i> | DIATTA, SAMBOU and all families of the district of Kadjifolong and Kandianka | Mlomp Kassa |
| Mermaid | Unidentified species | MANGA | Oussouye |
| Crane | <i>Balearica pavonina</i> | DIATTA | Djembering |
| Earth Monitor or Savannah Monitor or Mouth-Typed Varan of the nill | <i>Varanus exenthamaticus exenthamaticus</i> <i>Varanus niloticus niloticus</i> | TENDENG | Seleky |
| | | DIATTA | Djembering |
| | | DIATTA Etebemay | Mlomp Kassa/ district of Kaddjino |
| Elephant | <i>Loxodonta</i> | BASSENE | Seleky |
| Panther | <i>Pantherus pardus</i> | SAMBOU, DIATTA and MANGA | Seleky |
| | | TENDENG | Essyl |
| | | DIATTA | Djembering |
| | | DIATTA | Etebemay of Mlomp/Kaddjino |
| Snake | <i>Naja viridis</i> <i>Naja nigricolis</i> | TENDENG | Essyl |
| | | DIATTA | Djembering |
| | | DIASSY and DIATTA of the community Karone | Abéné |
| | | DIASSY | Saloulou |
| Hyena | <i>Crocuta crocuta</i> | DIATTA | Djembering |
| Monkey | Unidentified species | DIATTA | |
| Lion | <i>Felis leo</i> | DIATTA | |
| Doe | Unidentified species | DIATTA Etébémay | Mlomp Kassa/ district of Kaddjino |
| Buffulo | <i>Syncerus caffer</i> | DIATTA Etébémay | |
| Antelope | Unidentified species | DIATTA Etébémay | |

Source: Our investigations.