



## Environmental Changes, Agricultural Crisis and Small-Scale Fishing Development in the Casamance Region, Senegal

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### ABSTRACT

*Senegal is a West African country where the fishing industry is one of the most important sources of economic development. However, Senegal is currently experiencing a deep political and economic crisis, partly linked to the Sahel drought. In this context, international interventions have been necessary to sustain the economy, in particular to ensure the survival of small-scale fisheries. The last 15 years have seen an increasing number of development projects in Casamance, the southern region of Senegal. This paper examines these projects and their effects.*

*First, artisanal fishery development at both national and regional level is discussed and its ecological, political, economic, social, and cultural implications are considered. Lastly, the short- and long-term future of small-scale fishing is discussed. Casamance has a strong regional identity because of its environment, population and history, but it is a good illustration of fishery development processes in Senegal and other West African countries, and indeed in all coastal tropical wetlands. One of the main lessons of this study is the flexibility of the farming system, based on agriculture and fishery, and the ability of the population to face environmental changes by diversifying their strategies.*

### INTRODUCTION

Since the 1960s, West African countries have had to cope with a serious environmental crisis, partly linked to the Sahel drought. While traditional agricultural activities have declined, small-scale fisheries have grown, to the extent that the industry is referred to as Senegalese 'blue

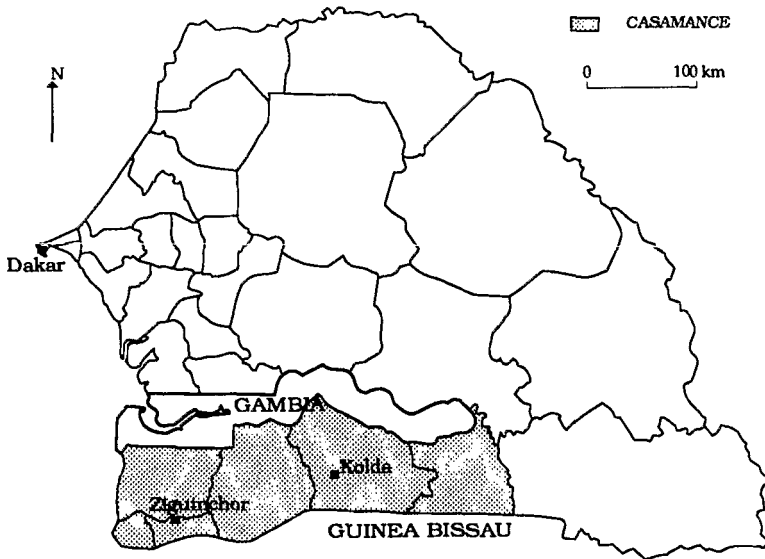


Fig. 1. Prospected area: the Casamance region in Senegal.

gold'. In Casamance, the southern region of Senegal (Fig. 1), small-scale fishery development has been recent, rapid, and impressive. This paper describes processes of change in Casamance and analyses small-scale fishery development at national and regional levels, and the changes and trends in fishery practices.

Data for this paper come from a multidisciplinary program of research, conducted from 1983–89 in Casamance, which focused on the hydrological, biological and socioeconomic aspects of the Casamance fishery industry. The purpose of this study was to analyse the place of fisheries in traditional farming systems and to review aquatic spaces management. Methodology included inventories of fishery techniques, landings and infrastructures, a census of fishermen populations, interviews, and historical surveys.

On a regional level, a typology of the villages and the populations, and a cartography of the fishery data show the importance of changes. A more specific approach indicates how individual and collective strategies are elaborated and to what extent the marketing system is controlled by the local communities. The historical approach explains the conditions of fishery development and the difference between the littoral societies' relationships with fisheries and the sea.

The Casamance case underscores two general phenomena: the surprising development of small-scale fisheries in developing countries

in the last three decades, and the interrelationships between fishery and farming systems as well as between marine and land spaces. This last point leads to an evaluation of the move from agriculture to fishing, and from inland to marine fishing.

## SMALL-SCALE FISHERIES IN CASAMANCE

### Small-scale fisheries: Senegal's main resource

Fishes and other aquatic resources are the principal source of animal *protein* in Senegal (Table 1). Meat and milk consumption is very low, but fish consumption increases regularly. This is due to the development of production and trade, especially towards the hinterland, and also to the urbanisation and growth of the agglomeration of Dakar-Pikine (see Note 1). In the regions of Cap Vert, Delta and the Senegal river, the average consumption of fish exceeds 56 kg/person/year (Table 2). However, in the other regions, the average consumption of fish is lower (13–23 kg/person/year) depending on the standard of living of the rural populations (see Note 2).

The fishing industry is the main source of income for Senegal, followed by peanuts and phosphates. The economic dynamism of the fishing sector—especially small-scale fisheries—is easily seen in the increase in production since 1960 (Table 3), the modernisation of techniques (motorization, purse-seine fishing, large nylon nets), the development of a cash economy and the development of national and international markets. The fishing industry's economic efficiency is in

**TABLE 1**  
Average Consumption of Animal Protein in Senegal (g/person/day)<sup>a</sup>

Protein Source	Region					
	Dakar	Louga	Linguère	Diourbel	Kédougou	Casamance
Fresh fish	14.8	9.9	4.8	0.8	0.2	6.2
Dried fish	2.4	3.4	3.3	6.0	0.3	1.9
Shellfish	0.4	0.4	0.1	0.0	0.0	0.0
Total fish	17.7	13.7	8.2	6.8	0.5	8.1
Total meat	4.2	3.3	1.4	0.9	2.9	2.7

<sup>a</sup> Source: Chevassus-Agnès & Ndiaye, 1980.<sup>1</sup>

**TABLE 2**  
Fish Consumption in Senegal by Region<sup>a</sup>

<i>Regions</i>	<i>Fish consumption (kg/person/year)</i>
Cap Vert	70
Delta (Saint-Louis)	59.9
Senegal river	56.1
Diourbel	23.8
Casamance	16
Eastern Senegal	13
National average	31.4

<sup>a</sup> Source: see Ref. 19.

part due to its *social* importance: fisheries employ around 180 000 men and women. Of this figure, small-scale fisheries employ 27 000 fishermen and around 150 000 men and women in other roles, while industrial fisheries employ only 3000 fishermen.

However, the dynamics of small-scale fishery are *different* in each of the five fishery regions, Grande Côte, Cap Vert, Petite Côte, Saloum and Casamance (Fig. 2). The first three regions, which are most accessible from Dakar-Pikine, the main fresh-fish market, have 68% of the total number of canoes and 85% of the total number of sea-canoes. They are also the most productive, landing 87% of the Senegalese catches (Table 4, Figs 3 and 4). The fishing communities of these three regions Walo-Walo, Lébou and Sérér—are well-known along West African coasts because of their migrations.<sup>2</sup> Their specialization in

**TABLE 3**  
Increase in Fish Landings in Senegal, 1964–80<sup>a</sup>

	<i>Fish landings</i>	
	<i>1964</i>	<i>1980</i>
Small scale fishing	83 300	160 000
Industrial fishing	5 200	80 000
Total	88 500	240 000

<sup>a</sup> Source: Fontana & Weber, 1983.<sup>3</sup>

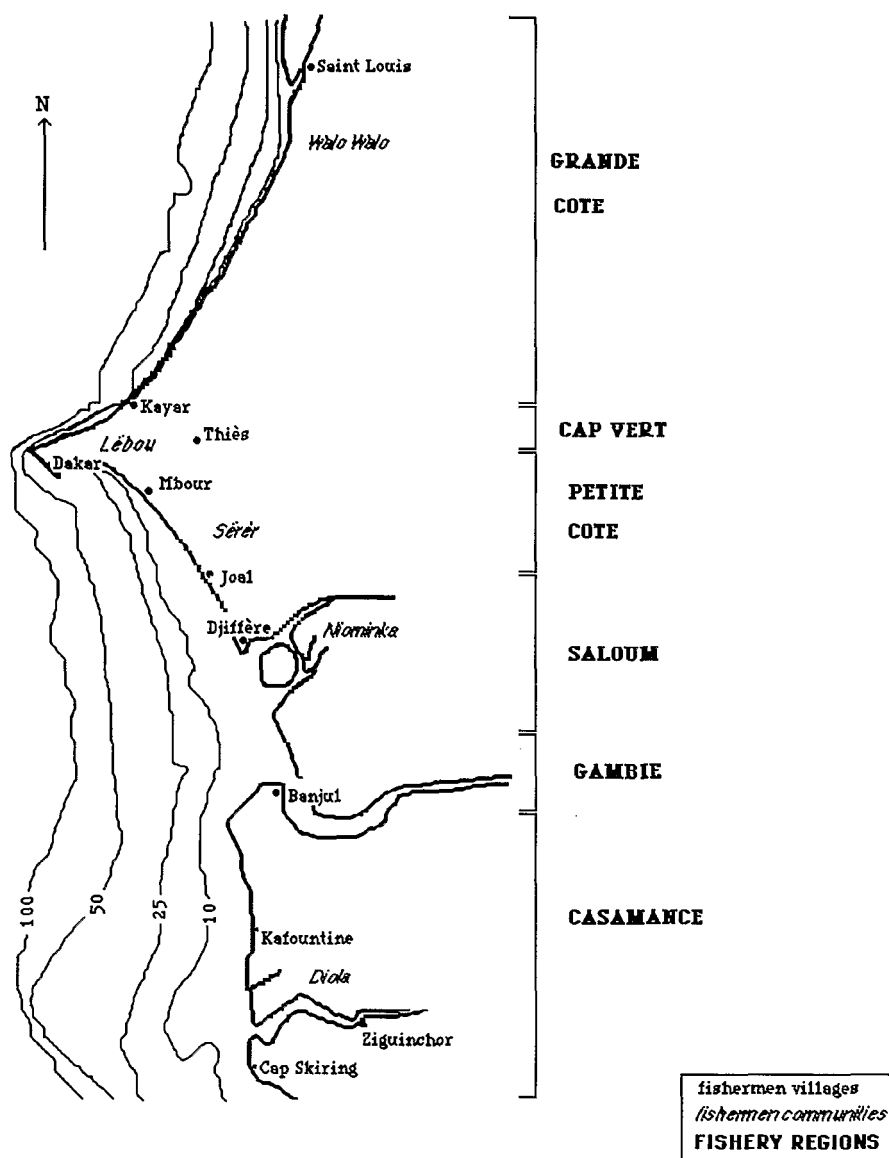


Fig. 2. Senegalese small-scale fishing regions.

marine fisheries is well established,<sup>4</sup> and is based on a sophisticated technical, economic and social organization.<sup>5</sup> On the other hand, the social and economic importance of the Saloum fishing communities is underestimated. In fact, most Saloum fishermen (above all the Niominka) have settled in other coastal regions because of the extreme salinity of the waters around the Saloum islands.

**TABLE 4**  
Statistics for Artisanal Fishing in Senegal in 1985<sup>a</sup>

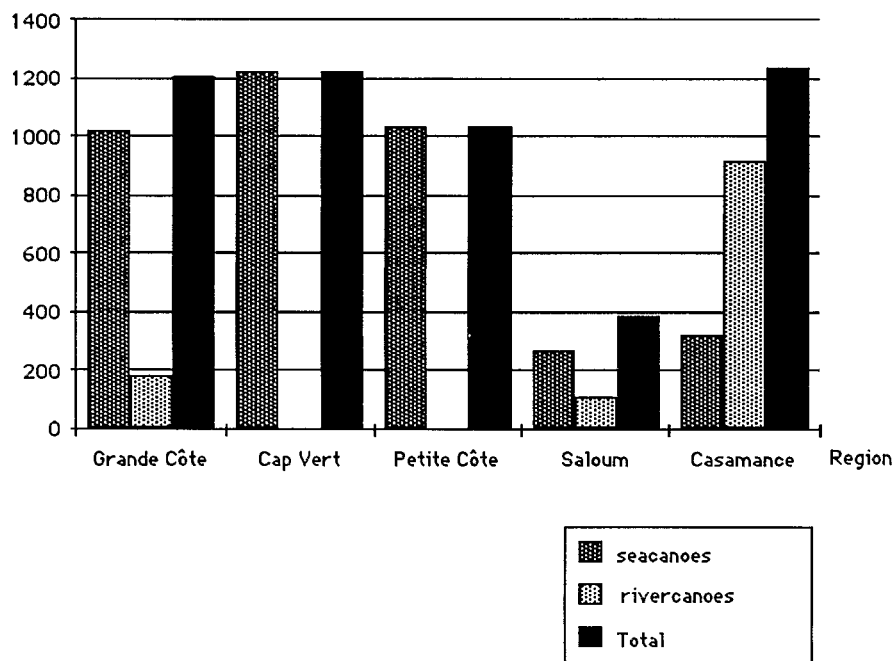
Regions	Sea-canoes		River canoes		Landings	
	(number)	(%)	(number)	(%)	(tonnes)	(%)
Grande Côte	1 023	26	187	15	26 531.1	16
Cap Vert	1 222	32	0	0	31 917.4	20
Petite Côte	1 034	27	0	0	83 687.5	51
Saloum	273	7	115	9	11 762.1	7
Casamance	323	8	916	75	9 497.5	7
Total	3 875	100	1 218	100	163 395.6	100

<sup>a</sup> Source: CRODT, 1986.<sup>6</sup>

### UNDEREXPLOITATION OF FISHING INDUSTRY IN CASAMANCE

Both nationally and regionally, the importance of the Casamance fishery is low, accounting for less than 6% of the total fish landings and

number of canoes



**Fig. 3.** Number of canoes in each Senegalese fishery region.

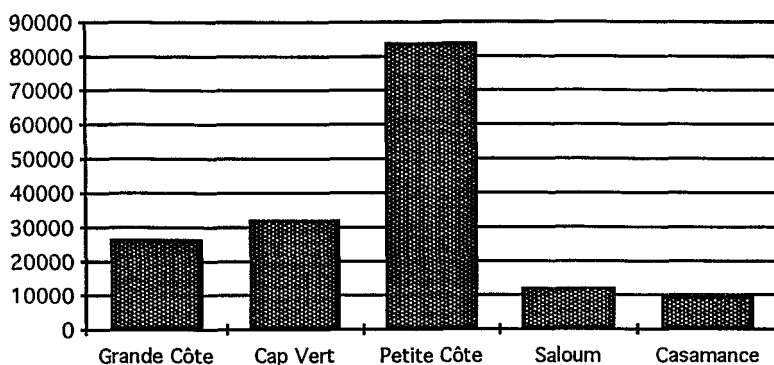


Fig. 4. Artisanal fish landings in each Senegalese fishery region.

only 8% of the total sea-canoes (Figs 3 and 4). In addition, only 12 out of an estimated 75 (see Note 3) species<sup>7</sup> are generally exploited, compared to more than 60 species exploited elsewhere in Senegal (Table 5). Moreover, motorised vessels are not used as in the other coastal regions, the nets are less diversified, and no purse-seines are registered. Finally, most professional fishermen do not belong to Casamance communities but come from the northern coastal regions of Senegal. The local communities—Diola, Mandingue, and Peul—are cultivators and stock breeders. Only a few Diola communities exploit the aquatic resources of the inland waters. This activity is subsidiary, primarily for personal and family consumption, and takes place during the dry season. It is also limited in space; the fishermen exploit only the resources of fishponds and *bolons* (tide channels of mangrove forests) near the villages, never the sea. They fish on foot or with small canoes propelled by paddles. They use simple equipment like pots, baskets, dams, and hoop nets.

The *underexploitation* cannot be explained by ecological constraints. Those conditions are the same as or better than in the other regions, due to the 'upwelling', the large continental plateau (Fig. 2), the importance of the biomass, and the diversity of the coastal wetlands and their resources.<sup>7,8</sup> According to Caverivière and his colleagues,<sup>9</sup> pelagic species are assumed to exceed 90 000 tons and the benthic species 67 000 tons.

The reasons for the late development of small-scale fisheries in Casamance are historically social. The local communities—mainly Diola—have given priority to rice cultivation and exploitation of inland water which was easier to access. The Diola people are well known for their remarkable plough, called *kajendo*, and have developed an

**TABLE 5**  
Comparison of Exploited Species in Senegal and Casamance in 1985<sup>a</sup>

<i>Pelagic species</i>	<i>Senegal</i> (number)	<i>Casamance</i>	
		(number)	(%)
<i>Ethmalosa fimbriata</i>	6 753	926	14
<i>Sardinella</i> spp.	86 807	2	0
<i>Sphyraena</i> spp.	1 178	291	25
<i>Mugil</i> spp.	5 286	926	18
<i>Tilapia</i> spp.	2 131	48	2
<i>Caranx</i> spp.	1 629	112	7
<i>Trachinotus maxillosus</i>	70	35	50
<i>Drepane africana</i>	308	113	37
Others	16 882	69	0
Total	12 045	2 524	2
<i>Benthic species</i>			
<i>Arius</i> spp.	2 148	583	27
<i>Polydactylus quadrifilis</i>	2 153	852	40
<i>Cynoglossus senegalensis</i>	1 562	166	11
<i>Sphyrna zygaena</i>	1 655	229	14
<i>Zanobatus schaeleinii</i>	1 011	68	7
Others	29 351	3 928	13
Total	37 880	5 826	15
<i>Penaeus notialis</i>	946	844	89
Other species	7 378	193	3
Total in 1985	167 249	9 386	6

<sup>a</sup> Source: CRODT, 1986.<sup>6</sup>

archetypal 'rice civilisation' in Africa.<sup>10</sup> In addition, this region has suffered from the effects of colonisation, especially the slave trade. Pacification and unification were slow.<sup>11</sup> The fact that Casamance was far away from the colonial administration, and outside the network of the peanut trade and cash economy, explains its isolation and reinforces its individuality. Until the last two decades, farming systems were based mainly on the rice culture, which employed all the working villagers during the rainy season. However, recently, small-scale fishery has expanded, not only in the inland waters but also in the sea, changing farming systems extensively.



## SOCIOECONOMIC CONDITIONS OF CASAMANCE FISHERY DEVELOPMENT

Casamance small-scale fisheries have experienced explosive growth, due to a combination of factors. First, *Northern, specialized fishermen* introduced new techniques and technologies, taught local rice cultivators sea navigation and fishing and established the fresh-fish market. For these migratory fishermen, marine fishing is culturally valuable. At the beginning of their migration—the end of the 19th century—ocean resources were not exploited and the sea front was free of any fishing installation. Northern fishermen, coming mostly from Saint-Louis, the Lébou villages around Dakar, the Sérèr villages of Mbour and Joal, and the Niominka villages of the Saloum islands (Fig. 2), settled first in the Diola villages and some are now completely integrated in the Diola community. Their number grew after the 1950s, and the most recent CRODT census (April 1984) shows that of 541 sea-canoes registered in maritime Casamance, 223 belong to Northern fishermen. This means there are between 1115 and 2230 Northern fishermen in Casamance.

*Historical and political* factors have also played a part in the growth of small-scale fishing in Casamance. During the first half of the 20th century, Casamance was pacified and unified by French colonial troops who imposed their administration and established a local infrastructure. Building roads and bridges allowed the expansion of peanut culture and trade and, hence, the introduction of a cash economy. After independence, this work was carried on by the Senegalese administration, which tried to integrate the isolated Casamance into the nation. However, this integration has not yet been fully achieved, and the Southern populations sometimes react very violently against the northern seat of power.

Improved transportation has been the catalyst for the opening-up of Casamance and its *economic* and social changes. New roads have enabled the gathering of wild fruits, and local handicrafts and inland-water fishing to become commercial activities. It has also improved contact with other cultures, and thus with other religions such as Islam and Catholicism, and have enabled migration to the cities. After the 1950s, educational improvement, in part due to Catholic influence, brought about in new generations a resentment of the difficulty of agricultural labor and a need for cash to buy manufactured goods. This desire for material and social independence caused many to move to the cities, resulting in a crisis of traditional farming systems.<sup>12</sup>

The crisis of the traditional farming system has been accelerated by

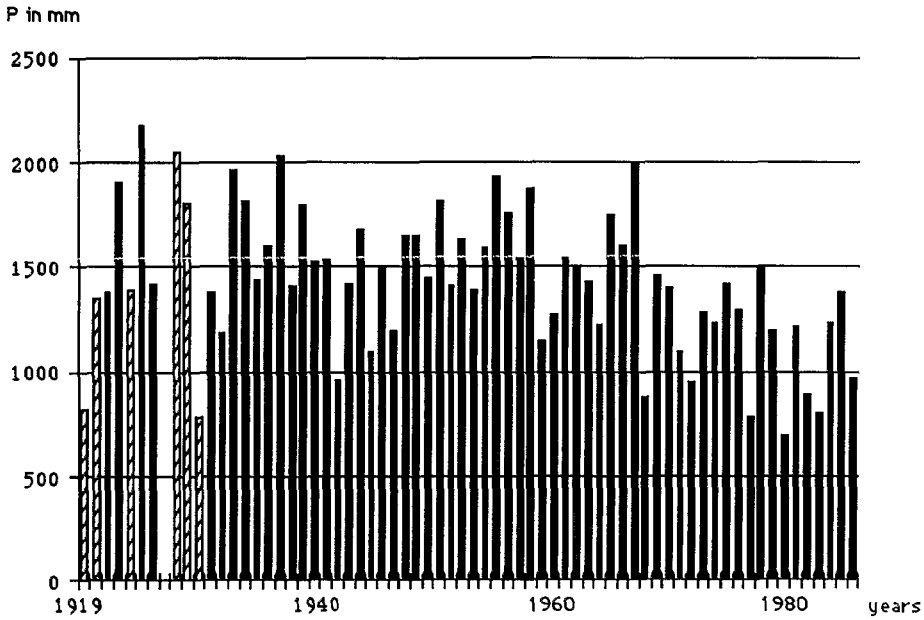


Fig. 5. Annual precipitation of Ziguinchor, 1919-86.

the *Sahel drought*. The average annual precipitation in Ziguinchor, the capital of Casamance, was 1500 mm before the 1960s. It has dropped to below 1000 mm, and is dramatically irregular from one year to the next and from one place to another (Fig. 5, Fig. 6). Moreover, the deterioration of climatic conditions affects other environmental

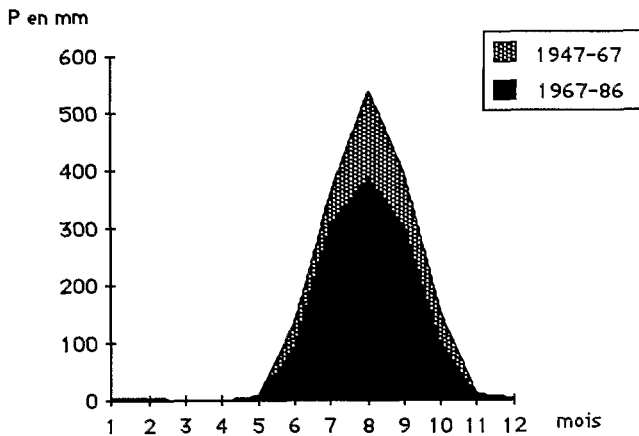


Fig. 6. Comparison of average monthly precipitation in Ziguinchor in 1947-67 and 1967-86.

conditions,<sup>8</sup> for example causing heavy soil and water salinisation, leading to the complete neglect of rice cultivation in many Casamance villages.

In this difficult context, the Senegalese government, and international and non-governmental organisations have tried to sustain the economy and maintain the population of the region by developing all local resources, especially marine resources. Their policy aims to set up suitable structures, from local cooperatives to regional administration of DOPM (Direction Océanographique des Pêches Maritimes), to educate the cultivators (see Note 4) and to give them the means (i.e. credit) to buy motors and nets.

### DIFFERENT ASPECTS OF THE CASAMANCE FISHERY EXPLOSION

The development of small-scale fishing in Casamance has been rapid and impressive,<sup>13</sup> with many relevant elements:

- (1) Landings reached around 14 000 tons in 1985; by contrast, a few years ago, the production was insignificant.
- (2) Fishery systems are diverse: besides the established system based on the exploitation of inland-water resources with dams and baskets, a new system is widely used, based on the exploitation of inland- and coastal-water resources with large nets and motorized canoes.
- (3) Fishery centers are now numerous and extended. The coastal or riverside villages of Casamance exploit their territory's resources. In some villages, small-scale fishing is as important as agriculture, if not more so (Fig. 7). Moreover, in only a short time, new fishery centers have arisen from practically nothing. For example, Cap Skiring (see Fig. 2) had only eight seacanoes until 1984, but is now one of the most important marine fishing centers, with more than 100 migratory seacanoes. Fishermen from Saint-Louis, Dakar and Petite Côte supply the tourist resorts with fresh fish. In addition there is a camp of Guinean men, who dry and smoke sharks and skates for export to West African countries, reserving the sharkfins for Asian markets.
- (4) Casamance aquatic resources play a major role in the regional, national and international markets. Small species such as tilapias (*Ethmalosa mugil*) are sold fresh on the regional market. Other, expensive, species such as crayfish, sole, barracuda, etc. are sold

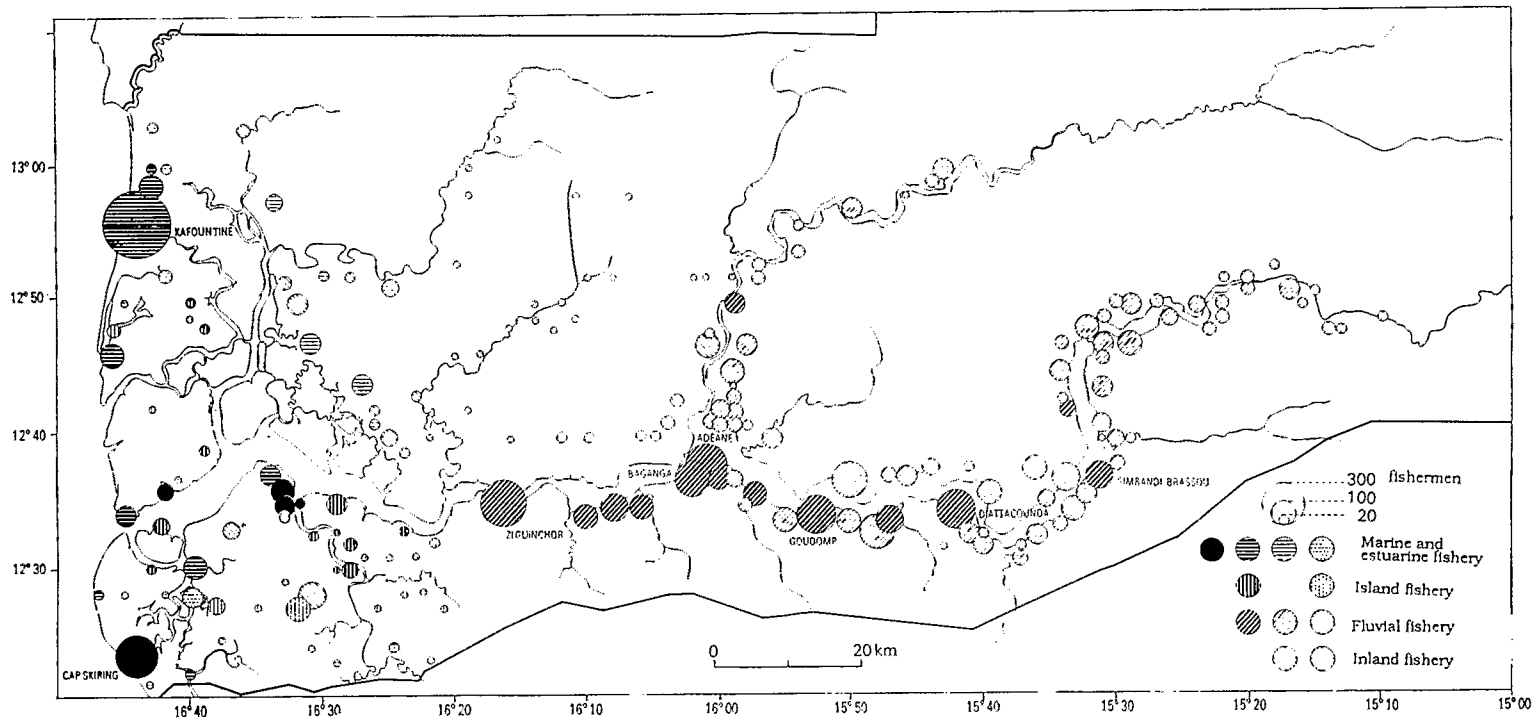


Fig. 7. Location of small scale fisheries in the Casamance villages.

fresh on the national market, but the majority are chilled or frozen for the French market.

Nevertheless, the small-scale production of processed fish is even more important: around 75% of landings are dried or smoked and sold mainly on African markets (Guinea, Niger, Cameroon, etc.). The Casamance putrid-dried fish called *gej* is particularly reputed on the Senegal markets, and Casamance is the principal region of Senegal for shrimp production (up to 1,600 tons in 1981, and around 1,000 tons since), exported mainly to European markets.

- (5) People involved directly or indirectly in fishing, fish processing and marketing are more and more numerous. The census of Diaw in 1985 shows 9,000 fishermen registered in Casamance. Most of them are part-time fishermen, involved also in agriculture. Most full-time fishermen are migrants from the other regions of Senegal. Nevertheless, the local communities are more and more involved in aquatic resource exploitation. Some rice cultivators have even converted to full-time migratory fishermen.

The processes of small-scale fishing development are more complex than they appear at first sight, and require explanation of the key concept of 'conversion'. Among the local communities, there are, and always have been, professional inland fishermen who are very acquainted with their aquatic environment, its tides, ecological niches, seasons, species, and so on. They know and create the means to exploit aquatic resources without destroying them. Resources are consumed by the household, but are also exchanged and sold for other goods. In the island villages of lower Casamance, oyster gathering, extensive fish culture in traditional ponds, and fishery with dams and baskets are practised along with rice cultivation, salt picking, and animal husbandry. The relationship between agriculture and fishing is very close for those 'peasant-fishermen' who manage their aquatic spaces as their land spaces, by technical, economic and social organization. In this way, they set up an aquatic territory.<sup>13</sup> In peasant-fishermen communities, the increasing role of fishing is a response to environmental modifications. This development does not disturb the traditional farming system but, on the contrary, shows its remarkable adaptability to ecological deteriorations and the rise of a commercial economy. Vayda and McCay<sup>14</sup> put it thus: "Some properties of homeostatic systems must at times change so as to maintain other properties that are important for staying in the existential game." On the other hand, the middle and

upper Casamance communities—Mandingue, Balante and Peul—are made up mostly of cultivators and shepherds, without any fishing traditions. Fishing began in these communities with shrimp exploitation by migrant fishermen of the Senegal River, the Toucouleur, in the 1960s, but they have only reoriented themselves to the fishing since the 1980s. Thus, fishing development in these communities is considered to be a *conversion*.

Likewise, *marine fishery* development in all Casamance communities without doubt involves major changes: it implies new fishing techniques such as motorized canoes and large nets, complex social relationships among the crew members (who tend to adopt those of the Northern fishermen),<sup>5</sup> and a new management of the aquatic territory.<sup>13</sup> Until the last decade, local communities were afraid to face the ocean and even the Casamance river, was perceived as dangerous. So, the expansion of the sea migrations shows the land people's conversion to marine life, changing not only their technical and economic organization but also their cultural references.

This conversion is an excellent example of cultural adaptation, but it runs the risk of leading to the subsumation of traditional culture activities, and fishing. Moreover, the increased number of fishermen may lead to overexploitation of aquatic resources, leading to conflicts between local and 'outsider' fishermen communities. Indeed, recent violent events in Casamance (e.g. attacks on the Northern fishermen in Cap Skiring in October 1992 and in Pointe-Saint-Georges in November 1992) give evidence of such tensions and of the competition for aquatic resources appropriation.<sup>15</sup>

## CONCLUSION

Small-scale fishing is one of the most important resources of West African countries, especially since the Sahel drought. It is a major political, economic and social stake, that attracts more and more investments and development projects. In this regard, the Casamance fishery development mirrors national development, because it illustrates roughly the ecological, technical and social conditions of the nation. This means that the same ecosystems—mangrove, environment between land and sea, etc.—are exploited with the same traditional farming systems, based on rice cultivation, oyster gathering, inland-water exploitation and animal husbandry. The communities have quite the same economic and spatial strategies and have to face the same modifications. Overall, Casamance acts as a 'laboratory' for research.

as the changes occurring there are indicative of changes throughout Senegal, and, indeed, throughout West Africa.

One of the major lessons of the Casamance case study is the adaptability of the population and the flexibility of farming systems, linked mainly to the diversification of activities. It suggests the need to study and develop both agriculture and fishing, to maintain the identity of peasant so well analysed by Firth,<sup>16</sup> and to emphasize the diversity of the fishermen communities.

### NOTES

1. From the last Senegalese census of BNR (Bureau National du recensement) in 1988, the inhabitants of Senegal number 7 million. The Cap-Vert agglomeration contains at least 1.5 million inhabitants.<sup>17</sup>
2. Senegal is the fourth largest consumer of fish in the world after Japan (around 86 kg/person/year), Norway (49 kg/person/year), and Portugal (35 kg/person/year). In comparison, the average consumption of fish in the Ivory Coast reached only 19.3 kg/person/year in 1985.<sup>18</sup>
3. The Casamance marine, estuarine, and continental species variety is extremely rich estimated at 75 species. The maritime area contributes more than 50% of the total number of species. Species richness of the transitional area, middle Casamance, is reduced by half, dominated by five or six species. Lastly, in upper Casamance, during the dry season, only the tilapias are abundant because of the high salinity level of the water.<sup>7</sup>
4. A fishing school in Goudomp, one of the main fishing villages of middle Casamance, was built in 1961 to teach local communities sea navigation and fishing. The teachers are Northern fishermen.

### REFERENCES

1. Chevassus-Agnès, S. & Ndiaye, A. M., *Enquête de Consommation Alimentaire de l'ORANO (Office de Recherche sur l'Alimentation et la Nutrition en Afrique) de 1977 à 1979*. Dakar, ORANO Archives, 1980, 27 pp.
2. Cormier, Marie-Christine, Les jeunes Diola face à l'exode rural. *Cahiers ORSTOM Séries Sciences Humaines*, 21(2-3) (1985) 267-73.

3. Fontana, A. & Weber, J. *Aperçu de la Situation de la Pêche Maritime Sénégalaise*. Dakar, CRODT (Centre de Recherche Oceanographique de Dakar-Tiaroyl) Archives, 1983, 121, 34 pp.
4. Chaveau, Jean-Pierre, La pêche piroguière Sénégalaise: les leçons de l'histoire. *Revue de la Mer*, automne (1984) 19 pp.
5. Diaw, Mariteuw, Gestion des unités de pêche et rapports de production: la portée théorique et pratique du système des parts. *L'estuaire de la Casamance: Environnement, Pêche, Socio-économie*, ed. L. Le Reste, A. Fontana & A. Samba, ISRA/Centre Recherche Océanographique, Dakar-Tiaroye, 1986, pp. 203-6.
6. CRODT. *Statistiques de la Pêche Maritime Sénégalaise en 1985*. CRODT Archives, 1986, 153, 98 pp.
7. Albaret, Jean-Jacques, Les peuplements de poisson de la Casamance (Sénégal) en période de sécheresse. *Rev. Hydrobiol. trop.*, **20**(3-4) (1987) 291-310.
8. Pagès, J., Debenay, J.-P. & Le Brusq, J.-Y., L'environnement estuarien de la Casamance. *Rev. Hydrobiol. Trop.*, **20**(3-4) (1987) 191-202.
9. Caverivière, A., Cormier, M. C. & Le Reste, L., Aquaculture. In *Plan Directeur Sud, Approche Globale du Système Pêche dans les Régions du Sine-Saloum et de la Casamance*, ISRA/Centre Recherche Océanographique Dakar-Tiaroye, 1985, pp. 299-316.
10. Péliissier, Paul, *Les Paysans du Sénégal. Les Civilisations Agraires du Cayor à la Casamance*. Fabrègue, Saint-Yriex (Doctoral thesis). 1966, 939 pp.
11. Roche, Christian, *Conquête et Résistance des Peuples et Casamance (1850-1920)*, 2nd edn. Karthala, Paris, 1985, 400 pp.
12. Cormier, Marie-Christine, Les pêcheurs, nomades de la mer? L'exemple des déplacements en Casamance. *Anthropologie Maritime*, cahier 2 (1985) 135-43.
13. Cormier-Salem, Marie-Christine. *Gestion et Évolution des Espaces Aquatiques: la Casamance*. ORSTOM, Etudes et thèses, Paris, 1992, 585 pp.
14. Vayda, A. & MacCay, B. J., New directions in ecology and ecological anthropology. *Annual Review of Anthropology*, **4**(1975) 293-306.
15. Cormier-Salem, Marie-Christine, Désarroi et révolte en terre de Casamance. *Le Monde Diplomatique*. February 1993, p. 19.
16. Firth, Raymond, *Malay Fishermen: Their Peasant Economy*. Kegan, Trench and Trubner. London, 1946, 349 pp.
17. Salem, G. & Jeannée, E., *Urbanisation et Santé dans le Tiers Monde*. ORSTOM, Colloques et Séminaires, Paris, 1989, 549 pp.
18. Chaussade, J., Corlay, J.-P., *Atlas des Pêches Maritimes en France*. Maison de la Géographie, GIP Reclus, Montpellier, 1988.
19. Lagoin, Y. & Salmon, G., *Étude Technique et Économique de la Distribution du Poisson de Mer dans les Pays de l'Ouest Africain. Étude Régionale*. Secrétariat d'Etat aux Affaires Etrangères chargé de la coopération, Larose, Paris, 1967, 114 pp.