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### **Key factors of conflicts in Extensive Fish Farming System in Côte d'Ivoire South and West centre**

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#### **ABSTRACT**

The fish land issue becomes increasingly an area with great focus for the population. People frequently experience conflicts related to the occupation of such spaces. This study that aims to identify key factors in the outbreak of conflict came true in areas of the Center-West and South-western Côte d'Ivoire, specifically in the villages of Luénoufla, Daloa, Meagui and Guéyo. Eighty two (82) people were interviewed, including 74 fish farmers and 8 administrative and municipal authorities respectively through questionnaires and interview guides. It appears from the study that the variables introduced into the logit model are globally significant at the statistical level of 1% and the explanatory variables explain the conflicts to 43%. Variables inheritance, gift, animal intrusion, population intrusion, and lust of the space by breeders are positive and significant. They determine conflicts in Fish Farming Extensive System (SyPiEx). Bycons, those purchasing land, years of experience in fish farming, ethnic Senoufo, the lust of the space by farmers and the claim of the ownership of land by the heads of land, although positively correlated with conflicts are not significant. It is the same for access to education and the possession of the land certificate from the sub-prefect, we mean the administration in charge of land right regulation. Given these results, we suggest a mixed regulatory control systems that is to say a combination of traditional and legal norms.

**Keywords:** Conflict, Extensive fish farming system

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## **RESUME**

Les populations connaissent fréquemment des conflits liés à l'occupation des espaces piscicoles. La présente étude dont le l'objectif est de déterminer les facteurs clés de l'éclatement des conflits s'est réalisé dans les zones du Centre-Ouest et du Sud-ouest de la Côte d'Ivoire, de façon précise dans les villages de Luenoufla, Daloa, Meagui et de Gueyo. Quarante-deux (42) personnes ont été enquêtées dont 34 pisciculteurs et 8 autorités administratives et communales respectivement grâce à des questionnaires et des guides d'entretiens. Il ressort de l'étude que les variables introduites dans le modèle Logit sont globalement significatives au seuil statistique de 1% et que les variables explicatives expliquent les conflits à 43%. Les variables héritage, don, intrusion d'animaux, intrusion de population, et convoitise de l'espace par les éleveurs sont positives et significatives. Elles déterminent les conflits dans les SyPiEx. Par contre, celles achat de terre, année d'expérience dans la pisciculture, l'ethnie senoufo, la convoitise de l'espace par les agriculteurs et celle réclamation de la propriété des terres par les chefs de terres, bien que positivement corrélées avec les conflits, ne sont pas significatives. Il en est de même pour l'accès à l'éducation et la possession de l'attestation foncière du sous préfet. Au vu de ces résultats, nous suggérons une régulation mixte des systèmes de régulation, c'est-à-dire une combinaison des normes traditionnelles et juridiques.

**Mots clés :** Conflit, Système Piscicole Extensif, intrusion

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## **INTRODUCTION**

As in most countries of West Africa, Côte d'Ivoire manage land mostly with customary law, a way of possession of the land that is governed by simple process of appropriation. This form of land ownership is not based on real formal texts recognized by formal institutions. Under it, land transfers occur through inheritance of land rights, delegation of duties between spouses or within the family, ownership right transfers between natives and migrants in various forms, "sale" of land, agrarian contracts<sup>1</sup>. Under the legal system meanwhile, access to land is subject to the submission of supporting documents that proves the ownership of the land. These same rules are those applied to fish spaces. Populations once installed in the area consider themselves as owners of such spaces and appropriated them. The works of<sup>2</sup> clearly reflect this in these words: "...those populations complain the right to manage" their ponds, but face several contradictory statements of the State which want to both ensure free movement of fishermen and the right of local residents to enhance the resources of their land ..."

What are the consequences of this land coveted by people in the study area?

Through this study, an analysis of the determinants of such conflicts will be conducted to elucidate the issues around access to land in Syria by making contributions to reduce existing conflicts and by finding preventive solutions to other potential conflicts.

## **EXPERIMENTAL SECTION**

### ***Theoretical Framework***

The issue of access to land in general is subject to the management of conflict situations. Speaking about the issue of access to land, <sup>3</sup> believe that the conflictual dimension is still mainly explained as essential in the territory planning process, in regional development or management of various local features, according that we express an interest to activities related to agriculture and water. It is in that state of mind that <sup>4</sup> states that the "problems" related to the issues of neighborhood and multi-purpose space are considered important, even central, in the procedures of local or regional governance. Alluding to the various tensions that arise in connection with the execution of the above activities, it has been identified and developed a particular category of disputes dedicated to this object, conflicts of use and neighborhood <sup>5,6,7,8,3</sup>. This is to show the importance of the issue of land tenure conflicts. The work of <sup>9,10,11</sup> corroborates this by saying that "... rural, natural and suburban areas appear as important tensions and conflicts receptacles due to their multifunctional character ...". They think that if conflicts are noticed much more in rural areas, this is just due to the multiplicity of opportunity and revenue generating activities they are full of. The works of Master of <sup>12</sup> are in the same line because according to him, farmers, fishermen and breeders covet the same resources, which create conflicts between them. Indeed, it is often assumed that these rural areas are used to support three types of functions, which induce competing uses and therefore, differences and oppositions between the local economic and social actors: an economic or production function, a residential and recreational function (the campaign as a living, whether permanent or temporary habitat) and a conservation function (protection of biodiversity, natural heritage, cultural and landscape). Users of rural areas (farmers, artisans, neo-rural, tourists, migrants, inhabitants of the outskirts of cities, employees, companies or state services ...) then often oppose the use of it and have different visions, even opposite, of its development and ways to achieve this. Many studies dealing with conflicts over spaces, however do not allow a clear categorization of land disputes. Contemporary researches put more emphasis on the procedures of dialogue and negotiation at local level and are of great interest in terms of territorial governance as they try to identify the areas of cooperation between groups of actors with divergent interests and attempt to highlight

governance tools<sup>13,14,15</sup>. For these authors, the notion of conflict of use and of neighborhood, as implemented, refers to three key dimensions:

- It expresses the opposition between space users whose preferences are antagonistic;
- It involves a commitment of one party, that is to say an action that puts a strain situation in a conflicts situation;
- It can be one of the foundations of territorial innovation. Thus, and if we stay alongside the authors who consider that "society is conflicting production of itself"<sup>16</sup>, our approach conflict remains above all pragmatic in nature and is based on field tools.

Faced with the question of who owns the land,<sup>17</sup> found that the state has the full right to land and may decide of the various services to do, that sums up this excerpt from the study commissioned by the Bagre Dam building (MOB) work commission “. The modern land tenure draws its strength from the law and summarizes, for all those to whom the law is enforceable, in one principle: the land belongs to the State which may, under certain conditions, grant the right of exploitation (mining and quarrying) or the right of ownership (residential courtyard) ... ” The rule of state ownership of land allows him, when its interests is under threat, to take all necessary measures (eviction, relocation ...) to allow the use of land in their areas of usefulness<sup>18</sup>. In view of these various works and legislations, little or none of the outright local population holds in any case these spaces. By cons, some authors rather think that the state should recognize customary land management locally accepted as a right acquired for traditional authorities. This is the case of<sup>19,20,21,22,23</sup>. This reasoning joined those of<sup>24,25,26</sup>. who think that the state should support and encourage "local land management institutions".<sup>27</sup> explains that it is in seeking security as some trust witchcraft that individuals rely on customary land regulation and management process. The confrontation of the works of the above authors found that the land issue is subject to huge controversies thereby contributes to social tensions arising from conflicts. Basing on these works, the variables that might explain the conflicting behavior of people in the study area will be introduced in the analysis model.

## **MATERIALS AND METHODS**

### ***Study area***

This study follows a first stone in the same targeted areas by the SyPiEx project in Benin, Cameroon and Côte d'Ivoire. The working area of the project is the West Centre and West South of Côte d'Ivoire and the districts of Daloa, Méagui, Soubré, Luénoufla and Guéyo districts.

### ***Sample and database***

The target population for the study consists of two actors: administrative (prefects, sub-prefect) and customaries authorities (village chiefs, canton or tribe) in one hand, technical officials (decentralized structures and frame) and the local communities involved in access to fish sites in Côte d'Ivoire (fish farmers or pisciculturists) in the second hand. For the representativeness of the data collected, the selection of units to investigate was made by two different techniques depending on the category of the population.

- For the local communities involved in the exploitation of fish sites, accidental sampling was adopted. This technique consists to investigate only the populations present during the investigations provided they are part of the target population. To this end, it was investigated accidentally, a sample of 74 fish farmers;
- The guesswork sampling technique was used to choose the administrative authorities. This second technique for its part is to investigate individuals that can provide the required information provided they are part of the target population. Thus, eight (08) administrative authorities have been investigated. The main collected data from the sampling investigated (Table 1) are on the one hand, socio-demographic characteristics (gender, age, ethnicity, religion, marital status experience in fish farming) and on the other hand, inheritance, purchase, gift of land, education, lust in space by farmers, ranchers and land managers, land certificate from the sub-prefect, the type of tenure, the mode of access to land, the type of fish farm, the different types of land contract, the existence and frequency of conflict, intrusion of animals, populations or authorities on fish sites, causes of conflict ...).

Data have been collected through interview guides and questionnaires preset for this purpose. Similarly, the collected information was verified by triangulation, iteration and focus groups. The table 1 outlines the populations surveyed by area.

**Table 1:** Sample Composition

Area	West-centre		West- south		Total
	Daloa	Luenoufla	Méagui	Gueyo	
<b>Villages</b>					
<b>Questionnaires</b>	16	19	20	19	74
<b>Interviews</b>	2	0	3	3	8

**Source:** Authors' compilation

## DETERMINANT OF ACCES TO LAND IN EXTENSIVE FISH FARMING SYSTEM

The term “foncier in french” derives from the latin word fundus meaning land. It is defined within the context in which it is used. In geography, it refers to "all human relations involved in the organization of space" <sup>28</sup> and quoted by Cubriolo&Goislard. It also refers to "all rules defining access to land rights, exploitation and control of land and renewable natural resources"<sup>29</sup> quoted by Zongo (2005:5).

We retain from these definitions that land includes a spatial dimension that is space and its management, which involves social relationships that give meaning to the rights to use the land and its exploitation.

In the analysis of the determinants of innovation adoption, perception of a phenomenon, adjustments or changes, two models are most often used. These are the Logit and Probit of Heckman <sup>30,31,32</sup> quoted by Yegbemey & al.. Depending on the nature of the dependent variable (dumb dichotomous or with more than two modalities), multinomial models are also used. Thus, in general, these models are in the form of

$$A_i = f(Z_i) \quad (1)$$

where  $A_i$  is the dependent variable, usually the adaption or perception and  $Z_i$ , those explanatory such as demographic and socioeconomic characteristics. In this context,  $A_i$  represents the conflict, we mean, the perception the target has of conflict and  $Z_i$ , demographic and socio-economic factors. This equation results in the following econometric model:

$$a_i = \alpha_0 + \sum \alpha_j z_{ij} + \mu_i \quad (2)$$

In this model,  $a_i$  is the conflict variable (0 = no conflict and 1 = existence of conflict),  $\alpha$  the parameter to be estimated and  $\mu$  the error term. The equation returns to the simplified form:  
 $A = \alpha Z + \mu$  (3)

Based on the specifications of the model, the variables: gender, age, ethnicity, religion, marital status, experience in fish farming on the one hand, and inheritance, purchase, gift of land type of tenure, land access mode, type of fish farm, contract types of land, education, lust in space by farmers, ranchers and land managers, land certificate from the sub-prefect, existence and frequency of conflicts, animal intrusion, populations or authorities on fish sites and other causes of conflict were entered into the analysis model. The table 2 summarizes the variables considered in the logit model used to estimate the parameter  $\alpha$ . Thus, from the signs of the estimated values and probabilities given by the model, determinants of conflicts were identified with the model being globally significant if  $p < 0.01$  or  $0.05$  depending on the level of significance.

**Table 2:** Variables introduced in the regression model

Variables	Types <sup>a</sup>	Modalités	Signes attendus
Inheritance	D	0 = No ; 1 = Yes	+
Purchase	D	0 = No ; 1 = Yes	+
Gift	D	0 = No ; 1 = Yes	+
Intrusion of animals	D	0 = No ; 1 = Yes	+
Intrusion of populations	D	0 = No ; 1 = Yes	+
Experienceyear	C	-	+
Lust of space by farmers	D	0 = No ; 1 = Yes	+
Lust of space by farmers	D	0 = No ; 1 = Yes	+
Lust of space by customary authorities	D	0 = No ; 1 = Yes	+
Senoufoethnic	D	0 = No ; 1 = Yes	+
Education	D	0 = No ; 1 = Yes	+
Land certificate from sub-prefect	D	0 = No ; 1 = Yes	+

<sup>a</sup>Types : D = discontinuous variables; C = continuous variables.

Source: Authors' specifications

## RESULTS

### *Demographic and socio-economic characteristics of the sample*

The demographic and socio-economic characteristics of the sample are summarized in the Table 3. The survey population is mostly constituted of old people (51.35%). They are followed by the adult population (37.83%) and with only 10.81% young people. The Senufo (18.91%) and Dioula ethnics (10.81%) are more likely to engage in extensive fish farming in the survey area. Bete ethnic, however is less likely to engage in extensive fish farming (10.51%). The remaining 52% are distributed among other ethnic groups such as Bakoués, Yakoubas the Godiés and Malinkés. Muslims are leading in the practice of extensive fish farming with a percentage of 59.45%. They are respectively followed by Christians (27.02%), animist (9.45%) and other religions (4.05%). Almost all of the surveyed fish farmers are allied by common-law with a percentage of 78.37%. Married are only 16.21%. Singles are practically nonexistent (4%).

**Table 3: Demographic and socio-economic characteristics**

<b>Qualitative variables</b>	<b>Absolute frequencies</b>	<b>Relative Frequencies (%)</b>
Small experience year	8	10.81
Middle experience year	25	33.78
Many experience year	41	55.40
allied by common-law	58	78.37
Maried	12	16.21
Single	3	04.05
Educated	47	63.51
Pisciculture as principal activity	15	20.27
Written contract	50	67.56
Land certificate from sub-prefect	9	12.16
Land certificate from the village authorities	23	31.08
Intrusion in the fish farming space	43	58.10
Awareness on land purchasing procedures	13	17.56
Conflicts	24	32.43
<b>Quantitative variables</b>		
Experience in the fish farming	-	-

**Source:** Authors' estimations



Fish farmers who have no education level are more than a third of the sample (36.48%). After them, come respectively those who have a level of secondary education (27.02) and, primary level (25.67%). The smaller part is constituted of those with a university education (4.05%). The remaining 6.75% are reserved to the "other" categories constituted of literate and those who made the coranicschool. More than half of the population surveyed makes agriculture their main activities (66.21%), 20.27% practice fish farming as their main activities while only 2.70% keep livestock ahead of activities. The remaining 10.81% are for other activities except those above mentioned. Three different types of fish farmers have been distinguished for this purpose. These are those who have great experience in fish farming (more than 10 years), those who have average experience (between 5 and 10 years of fish farming practice) and fish farmers with little experience (less than or equal to 5 years). From this analysis, we can see that those who have great experience in fish farming are more than half of the sample (54.05%). They are followed by those who have an average experience (33.78%). Fish farmers with small years of experience are the less numerous (10.81%).

### ***Conflicts determining factors***

The results of the logit model used to determine the determinants of fish farming conflicts are shown in Table 4. From the result of this analysis, it comes out that the model is globally significant at the 1% level ( $p < 0.01$ ) and the explanatory variables explain at 43% the conflict perception. Variables inheritance, gift, animal intrusion population intrusion, and lust of the space by farmers introduced in the model are positively and significantly correlated with conflict in SyPiEx project areas. Variables land purchase, year of experience in fish farming, Senufo ethnic group, the lust of the space by farmers and the claim of the ownership of land by the heads of land for their part, although positively correlated with conflicts are not significant. The education of fish farmers in the relation is negatively correlated and not significant. Finally, the variable land certificate of sub prefect negatively correlated is significant.

**Table 4:**Result of Log it model

Variables	Conflicts model		Bêta	T	Significance
	Coefficients	Standard Error			
Inheritance	14.701**	1.556	2.688	2.983	0.040
Purchase	6.355	1.873	1.849	0.975	0.323
Donation	15.411*	1.555	1.555	3.095	0.079
Animal intrusion	8.181**	0.833	2.102	6.360	0.012
Year of experience	1.063	0.082	0.061	0.547	0.460
Population intrusion	5.295**	0.773	1.667	4.654	0.031
Senufoethnic	1.826	0.870	0.602	0.479	0.489
Lust of the space by the farmers	1.033E11	1.716E4	25.361	0.000	0.999
Lust of the space by the breeders	1.033E11***	1.516E4	20.22	0.012	0.003
Land certificate from the sub-prefect	15.241***	1.156	-2.724	5.554	0.001
Claim of land possession by the customary authorities	4.021E10	1.944E4	24.417	0.000	0.999
Education	0.550	1.024	-0.597	0.340	0.560
Constant	0.002***	2.273	6.229	7.507	0.006
<b>Model summary</b>	<b>Cox &amp; Snell R Square : 43.3%    Explained variable: conflicts in the SyPiEx</b> <b>Chi-square : 42.001</b> <b>Global significance : 0.000</b> <b>df : 1</b>				

\*\*\*: significant value at 1 % ( $P \leq 0.01$ ) ; \*\* : significant value at 5 % ( $0.01 < P \leq 0.05$ ) ; \* : significant value at 10 % ( $0.05 < P \leq 0.10$ )

**Source:** Authors' estimation

### ***Inheritance***

The variable inheritance is positively correlated with conflict and statistically significant at the threshold of 5% ( $p < 0.05$ ). This could mean that the inherited land does not usually have ownership papers. This land can be sold at any time by one of the heirs without the knowledge of the other heirs ensuing conflict both between heirs and secondly between heirs and outsiders.

### ***Donation***

Of a statistical significance level of 10% ( $0.05 < p < 0.1$ ), the access mode donation is positively

correlated with conflict. The lands acquired by "gift" are home to major conflicting tensions. This is explained by the fact that the said given land can be at any time taken back in the case of misunderstanding or jealousy in terms of economic activity that the new owner exploit it for. In reality, the supposed given land is nothing other than a loan that has to be taken back in one or another way.

### **Animals Intrusion**

Like the legacy variable, the intrusion of animals in the SyPiEx is positively and significantly correlated with conflict at the level of 5%. These conflicts are reflected in the fact that on the one hand, animals such as pigs, sheep and goats are introduced in fish spaces, create damage to vegetable crops in the vicinity and also by the owners of spaces that slaughter them.

### ***Intrusion of the population***

The intrusion of the population according to the model is positively correlated with conflict and significant at the level of 5%. This is reflected by the fact that populations introduce themselves in fish sites with the intention to steal fish in the absence of the owners. Similarly, the intrusion of populations results in water pollution through waste dumping of all kinds in the water.

### ***Lust in space by breeders***

With a statistical significance of 1% ( $p < 0.01$ ), the variable lust of space by breeders is positively correlated with fish farming land conflicts. Just as fish farming areas are useful for fish farmers, they are the same for animals. Breeders use these places to water their herds (cattle and sheep). This state of affairs does not allow fish farmers to take pleasure in the exercise of their activities, raising tensions arising out of conflicts. The works of Master of <sup>12</sup> are in the same sawing in that according to him, farmers, fishermen and breeders covet the same resources, creating conflicts between them.

### ***Sub prefect land certification***

The possession of a land certificate from the sub-prefect (district) is significant at the 1% level but negatively related to conflict of fish land. This is explained by the fact that obtaining an ownership paper issued by the government authority is under an indisputable proof of ownership of land as opposed to those issued by the village committee. The significance test let say the possession of the land certificate from the district significantly reduces conflicts or that the land certificate of the sub prefect does not determine conflicts.

Speaking about insignificant variables such as the purchase, the non-significance in relation to conflicts is explained by the fact that purchased land totally belongs to the buyer who decides to make use unlike of those inherited or acquired by gift that the use or utilization depends most often on more than one person. It is also imperative to notify that the land acquired by gift can be resumed possession by its first owner at any time.

### ***Education***

Access to education even nonsignificant is negatively correlated to conflict. This is reflected by the fact that the outbreak of conflicts in the study area is not a function of education of parties engaged in the conflict. It is the same for the ethnic group that is positively correlated although it is not significant. The situation is the same for variables claim of land ownership by the land chiefs, lust of space by farmers and the number of years of experience.

## **DISCUSSION**

Determinants of conflicts of fish spaces appear very little in the literature. Most studies simply study conflicts over land resources, conflicts between farmers and herders or conflicts related to construction land without putting a relationship between land and water. According to <sup>33</sup>, the multiplicity of issues surrounding water resources is a key issue for conflict. Indeed, the water can be seen as an economic good that share several actors, as a natural heritage actively defended by the fishing federation, and finally as an important risk factor. This study has revealed that the intrusion of animals, people and the lust of the fish breeders space are sources of conflict confirms that of <sup>33</sup>. Conflicts interviewed for source, competition between several users such as farmers, fishermen and breeders around the water resource. Breeders need to water their herds, market gardeners are sure to settle on the water banks for the practice of their activities during that fishermen exploit said resource because of the fish resources it contains. This will comply with the work of <sup>12</sup> that revealed that farmers, fishermen and breeders covet the same resources, water.

As revealed <sup>33</sup>, conflicts are mostly based on planning issues or devaluation of property. Populations once intruders spaces in fish fishing fish and pollute the waters around the jet of waste of any kind, which raises conflicts between the parties. Unlike <sup>33</sup>, this study argues that the lust of the space for fish farming does not determine conflicts. Indeed, <sup>33</sup> in his work pointed to the water pollution caused by industrial chemicals as source of conflict. Even in the case of our study, the issue of industrial pollution

is not mentioned, however, there is the pollution generated by the population. However, this does not determine conflicts.

## **CONCLUSION**

Fish farming land is a complex aspect of land more and more subject of strain. After this study on the determining factors of conflicts in Extensive Fish Farming Systems, it appears that variables inheritance, gift, intrusion of animals, population intrusion, and lust of the space by breeders determine conflicts in SyPiEx unlike the purchase of land, the year of experience in fish farming, Senufo ethnic group, the lust of space by farmers, the claim of the ownership of land by the heads of land, access to education and the possession of the land certificate from the sub-prefect.

In view of all above, we suggest that land acquisition be assured by the both procedures, administrative and customary.

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