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The Exploitation of Families' Natural Resources in the Coastal Area of El Salvador

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Abstract: By making a general introduction to the topic of natural resources, this paper presents an analysis in order to identify the exploitation of the natural resources of families in the coastal area of El Salvador, since it is considered an important factor for the management of natural disasters, as well as the knowledge of protection and conservation of resources in the coastal zone, Deforested and polluted mangroves affect the productivity of various species, runoff and the use of agrochemicals. The study was quantitative with a descriptive correlational approach, whose sample was made up of 1,810 families. The survey technique was applied using QuestionPro software. This study was carried out to know the current state of natural resources in the coastal zone, the results show that the majority of people in the coastal zone stated that they were not trained in the management of water for irrigation and fish rearing in 70.5% of the family members of how to treat crops damaged or affected by pests, was found in 61% most families do not have enough knowledge the data of this report is evidenced that in relation to the area near the residences of the family occur practices of the same residents who disfavor the natural resources that are part of the ecosystem where they live, it is evident that in relation to the community if there is a risk of flooding and water overflows, 58.0%, also express that they if they use firewood as a family as fuel for the home either for the kitchen in 79.46%; and other families expressed that they do not use firewood for household chores in 20.6%, they use propane gas for their activities. Most families make use of this resource for the home. In the communities of the marine coastal zone there is a high reduction of salt forest, the poor use and poor care of their natural resources that has led to a progressive damage to the nearby marine ecosystem.

Keywords: Conservation of Natural Resources, El Salvador, Protection of the Environment, Pacific Ocean Coasts, Artisanal Fishing, Techniques

1. Introduction

The combination of physiographic, hydrological, climatic, physico-chemical and bathymetric characteristics previously described determines the productivity, quantity and distribution in the region of the coastal marine resources of Central America [10]. Similarly, distribution has historically

conditioned the use of these recurrent and its relationship with the socio-economic development of the region, Among the environmental problems associated with coastal population centers of Central America are: i) pollution of coastal waters by lack of sewage treatment services ii) alteration of critical habitats for sustaining fisheries, wildlife and other human activities such as tourism and mariculture, for housing and commercial purposes; iii) the development of inadequate or poorly designed coastal infrastructure that favours accelerated erosion processes or exposure of the population to natural hazards [10]. The economic dependence of rural, often poor, communities on coastal lands and resources is one of the main challenges of coastal management [13].

This article focuses on the exploitation of the natural resources of families in the coastal area of El Salvador and who are interested in the proper management of natural resources in the Salvadoran coastal areas, in the last 10 years, has been approached from various points of view. Among the productive activities considered important for economic and social development in El Salvador's coastal areas are tourism, agriculture, fisheries, aquaculture, the fishing industry and maritime transport [5]. Among the largest artisanal fishing communities are those located in the five ports of El Salvador: Acajutla, La Unión, San Luis La Herradura, Puerto El Triunfo and Puerto de La Libertad [11].

The definition of *natural resource* has several concepts. Traditionally, a natural resource is an object or substance; and now adds a surface, a landscape, biodiversity, water, that is, objects, substances or contexts that are useful for any ecosystem or economic sector [5] defines coastal-marine resources as; The material goods and services constituted by territorial waters, estuaries, the submarine continental shelf, coasts, bays, islands, keys, capes, estuaries, mangroves, reefs, underwater vegetation, the sites of scenic beauties and the biotic and abiotic resources within those waters and associated ecosystems. "The coastal-marine strip, in its terrestrial portion, includes 75 municipalities within an area of 7,186 km^2" [6]. Deforested and contaminated mangroves affect the productivity of various species. Runoff and the use of agrochemicals in higher lands threaten the sustainability of ecosystems, which are the refuge for the reproduction and breeding of many species, especially shrimp, whose larvae migrate from the open sea to them. Mangroves are considered important environmental assets, which are subjected to high pressures that alter their composition, quality and extent [7]. Non-returnable plastic materials have increased, feces go to the living waters on the different beaches; affecting the different communitie [12]. The human communities within these ecosystems try to adjust to the environment, considering the change of functioning and structure according to the existing threats. Adaptive capacity is related to self-organization to learn from disasters and improve protection and risk prevention measures [4]. The artisanal fishing dimension is considered the main threat to coastal-marine ecosystems, as the sustainability of livelihoods becomes more vulnerable in the absence of control of illegal practices in territorial waters [2].

2. Methodology

The method of this study is quantitative, which explored the practices of use and conservation of natural resources of families residing in the coastal area; and its relationship to the environment through the use of available natural resources. The design is descriptive and correlative, where the employed variables can relate and propose how the Salvadoran family is located in the coastal area. The collection was at a unique time, from which the family was characterized. In scope, a sample was considered to be at a national level. The sample design defined that the participating families would be those living in communities close to the beaches; with a probabilistic selection based on the total of families/dwellings belonging to seven departments that have access to the sea. The calculated sample was based on finite samples calculated in the Raosoft Simple Size program, which is representative for the calculated population. Then, the distribution of the sample was by conglomerates of families and intentional according to the openness of the community through its directives, and leaders; the safety of the area and the management of the mayoral promoters to enter the communities.

The surveyed population is based in the municipalities of the coastal zone of El Salvador, which have access to the sea. A population of 471,318 was estimated. The sample consisted of 1,810 families, representing the population with a reliability of approximately 99% with a margin of error of 3%, which was distributed intentionally by higher education institution. The selection of survey sites was distributed following clusters of resident families and considering access to communities. The following beaches and coastal communities were visited: five ports, seven islands, 41 beaches and 54 places that group neighborhoods, colonies, cantons and hamlets of urban and rural centers around the ports. One family member per household was surveyed. The distribution of the sample was intentional; and the municipalities considered for this study were selected based on the ease of intervention in the municipal localities and the links with the different universities with those populations. The participating municipalities were 19: Acajutla 1, Chiltiupán 2, Chirilagua 3, Conchagua 4, Intipucá 5, Jucuarán 6, Jujutla 7, La Unión 8, Meanguera del Golfo 9, Puerto de La Libertad 10, Puerto El Triunfo 11, San Dionisio 12, San Francisco Menénd 13, San Luis Ezla Herradura 14, San Luis Talpa 15, San Pedro Masahuat 16, Santa Isabel Ishuatán 17, Usulután 18 and Jiquilisco 19. The sociodemographic characteristics of the members of the participating families were considered in the variables age, sex, residence, marital status and education.

3. Technique

The technique used was the survey. The collection of data was done with mobile devices, using *QuestionPro software*;

and in some cases of difficult access to technologies by rural areas, the printed questionnaire was applied. The sample was collected keeping ethical principles, explaining the objective of the research and clarifying the importance of informed consent, the willingness to answer and the freedom not to answer questions when they deem it appropriate.

The distribution of participants within the communities was for convenience, since the promoters know the communities; and to safeguard the safety of the teams, they made the decision where to start. They visited, intentionally, all the homes that evidenced being inhabited, talked with family members and asked for the support of one of their members to answer the survey freely.

4. Results

To achieve the objective of identifying natural resource use and conservation practices in coastal areas, a scale measuring risk knowledge was used as an important factor in natural disaster management. Knowledge of resource protection was also measured through training-acquired practices and risk practices in the use of natural resources.

Environmental knowledge was measured with two important items: the first on the training they may have received to learn aquaculture, which has become an important point for strengthening human sustainability and the second item is that of knowledge on how to treat crops.

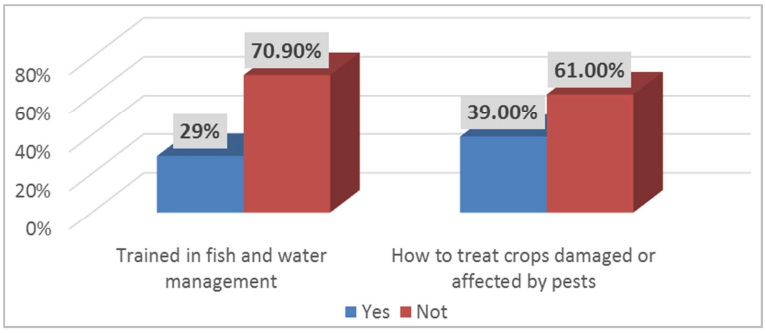

Figure 1. *Environmental knowledge.*

Family members surveyed in this study are not trained in over 70% of irrigation water management; and in fish farming, which implies that proposing an aquaculture or agricultural project would mean that the achievements can be evaluated in the long term as the family members are trained in parallel to the execution of the projects designed. Families try to grow fish and shrimp, but it becomes a failure when they cannot treat the water. As for the knowledge that family members have on how to treat crops damaged or affected by pests, it was found that more than 61% of families do not have greater knowledge. This has important implications in agriculture for sustaining local food security. If in coastal areas the farmer identifies a pest early and knows how to treat it, economic and food losses are reduced and food sustainability is ensured (Figure 1).

On knowledge of natural disaster risks, participants responded on practices in their community that affect climate change and impact on natural disasters, such as timber extraction, floods and river overflows, reduction of mangroves, loss of vegetation and increased beach erosion, loss of aquatic animals and vegetation on the riverbanks.

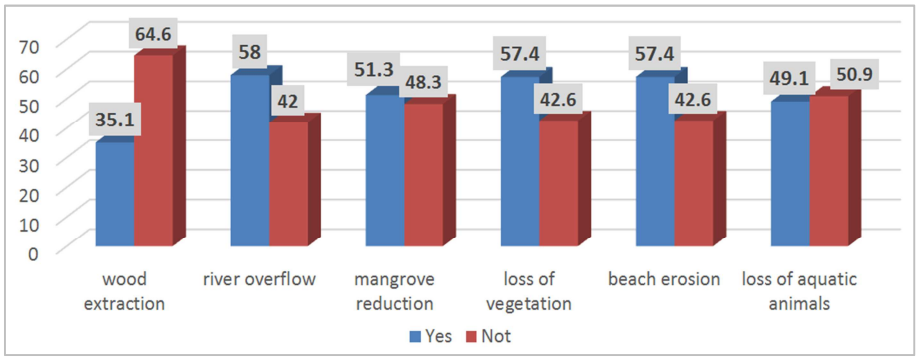

Figure 2. *Knowledge of risks from natural disasters.*

In the area near the family residences, practices occur by the same residents, that disfavor the natural resources that are part of the ecosystem where they live. More than 64% of the inhabitants report that there is no extraction of firewood, that they take it from what the sea returns. 35% say they are extracting wood from mangroves or areas they consider far from their homes. Salty forests have suffered deforestation, Families are aware of floods, but a segment of 42% say that in that area no floods occur, salty forests are deforested. In the communities it is preferred to keep quiet and not to denounce the mangrove felling, since these communities began the migration of families to these areas years ago. The inhabitants

have tried to populate this area, however, the floods do not allow it, they report that in previous years there has been a strong extraction of coal; another situation is the management of the garbage which they say is being thrown into forests away from their homes. They think there is a loss of vegetation and an increase in beach erosion. More than 49% reported a loss of aquatic animals and vegetation on the banks of nearby rivers.

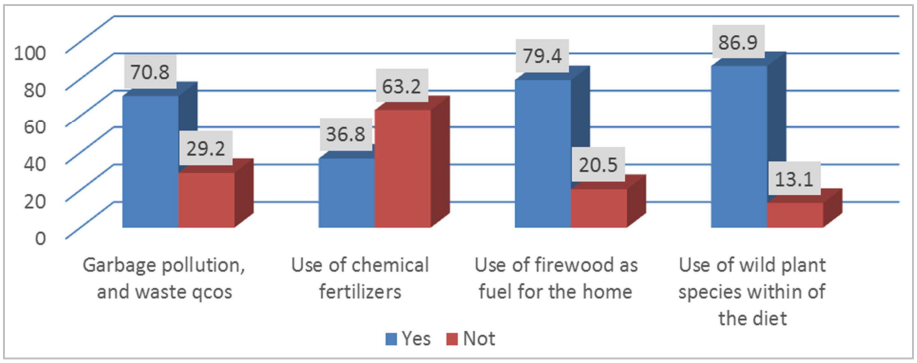

Figure 3. *Risk practices in natural resources.*

The most important questions for this study are related to exposure to pollution due to garbage, chemical waste and to organic human discharge in the coastal area near their homes. They experience various forms of rubbish contamination with 70.8% expressing yes and 29.2% no; One of the reasons is caused by the dragging of garbage from the sea towards the beach, and the other is that caused by individuals who deposit garbage from daily activities in the living waters near the beach which is also dragged to other beaches. Households also become garbage collectors because they do not have an efficient garbage collection service. Given the lack of technological development, 62.3% of families surveyed did not report details of how they use fertilizers due to the poor knowledge of the damage to the environment and the sanctions or judgments that might arise. As a result of the daily practices and economic conditions observed in the communities of the Salvadoran coast, families in this area are forced to use firewood as the main fuel for cooking, Lighting the house, repelling mosquitoes and carrying out other tasks necessary to meet basic needs; 79.4% of the inhabitants of the coastal area report this, although 20% said not to use firewood. As for plant consuption in coastal areas 86.9% do make use of these practices including the use of wild species such as blackberry, chipilín and others, which provide important nutrients for health. Families feed on these wild plant species that require little or no care, are resistant to climate changes, are rich in nutrients, and that reduce anemia; only 13.1% said they do not consume wild species.

5. Discussion

Studies on the practices of utilization and conservation of natural resources by families in the Salvadoran coastal marine zone at the national level are scarce. It was identified that the majority of people in the coastal zone, 70.5%, were not trained in water management for irrigation and fish breeding, and only 28.5% are trained. Here, it was possible to identify the utilization and conservation practices that the inhabitants of the coastal zone carry out, which coincides with the [9] that to address sustainable development in agriculture, forestry, fisheries and aquaculture in a more effective and integrated manner. related processes underway at national and international levels are of great importance to the fisheries and aquaculture sector, including fish processing and trade. which implies that proposing an aquaculture project will have positive impact at a slower rate. Aquaculture, fish production and trade, fishers and fish farmers, fishing vessels and apparent fish consumption were mainly established to determine the contribution of fisheries to food supply.

In relation to the knowledge that family members have on how to treat crops damaged or affected by pests, it was found that 61% of the families do not have enough knowledge. According to the Economic Commission for Latin America and the Caribbean ECLAC, it is important to promote research in order to take advantage of the technology applied in other countries or in some regions of El Salvador, so that crops can adapt to warmer climates, make better use of water resources and control pest diseases, for soil conservation, moisture retention and disaster risk reduction [1].

In the data of this report it is evident that in relation to the area near the residences of the family, practices of the same residents occur that are detrimental to the natural resources that are part of the ecosystem where they live. The surveyed residents report that 64.6% of them express that there is no extraction of firewood, that they take it from what the sea returns, which coincides with the study carried out by the Salvadoran Foundation for Economic and Social Development, Fusades in 2007 [3]. The data reflects how the pressures of population growth influence the state of the environment, the demand for agricultural products and firewood have strongly impacted the change in land use, using 30% of the potential forest area for agriculture as a source of resources for the population. Therefore, an important challenge is to reverse this situation in order to use the land according to its potential.

Fusades, according to the Department of Economic and Social Studies [DEES], and the Salvadoran Business Council

for Sustainable Development [3], the use of firewood in poorly ventilated kitchens; soil erosion and land degradation due to deforestation and agriculture, especially on hillsides and marginal lands resulting in excessive soil loss and leading to sedimentation of reservoirs and riverbeds, as well as losses in agricultural productivity; deforestation and loss of biodiversity resulting from land occupation and cultivation. The family uses firewood as household fuel. The resident families in the coastal zone carry out practices that are detrimental to the natural resources that are part of the ecosystem where they live. 79.46% of residents express that they do use firewood as fuel for the home either for cooking or to produce light; 20.6% of families expressed that they do not use firewood for household chores and that they use propane gas for their activities. The majority of the families make use of firewood for the home, causing deforestation. The economic conditions of the families in the Salvadoran coastal zone force them to use firewood as the main fuel to light the house, to keep mosquitoes away, to cook and to carry out other tasks necessary to satisfy basic needs.

Based on the data of this report it is evident that in relation to the community there is a risk of flooding and water overflows. 58.0% expressed that they do have knowledge of floods which in turn is supported by additional family members. This coincides with the study conducted by Ministry of Environment and Natural Resources [6]. Despite providing all these important services, gallery forests are one of the ecosystems most affected by anthropogenic activity in the country, suffering continuous deforestation and degradation processes, mainly due to the expansion of agricultural activities and the application of unsustainable practices, urban growth and construction of infrastructure, livestock, firewood and timber extraction and small hydroelectric power generation projects.

Also, as for the communities of the coastal marine zone there is a high reduction of salt forest, timber extraction, deforestation, loss of the diversity of aquatic and terrestrial species that inhabit the forest.

6. Conclusion

Studies on the practices of use and conservation of natural resources by families in the Salvadoran marine coastal zone at a national scale are scarce.

Generally, the people who inhabit the coastal zone of El Salvador have limited development opportunities, suffer from social exclusion and poverty, factors that do not foster capacity or generate motivation for their acquisition.

The resident families of the coastal areas carry out practices that affect the same natural resources. The burning of firewood is perceived as a use of the residues of trees that are dragged by the sea and that are found on the beaches.

Knowledge about how to cultivate and prevent diseases, the adaptation of crops to climatic changes, moisture retention and the proper use of the soil is prevailing through formal training.

The resident families of the coastal areas carry out practices that affect the same natural resources. The burning of firewood is perceived as a use of the residues of trees that are dragged by the sea and that are found on the beaches.

It is important to consider that families in the coastal zone do not fully enjoy access to energy. Few families buy gas for their kitchens; the needs, when not satisfied, make it easier for them to look for alternative strategies to survive.

The accumulation of garbage and its use to make retaining walls contribute to sedimentation and loss of nutrients necessary for aquatic animals. The coastal population does not value the loss of aquatic animals and vegetation near their homes.

It is important to consider the contamination of the coastal-marine areas by liquids that are dragged from places closer to the pollutants and by the solid waste caused by the residents of these areas, which coincides with the results of the diagnosis presented in the National Strategy for Change.

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