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**Research Article**

# Pro-Environmental Communication and Behavior in Sustainable Use of Environmental Resources: A Study in Kalpitiya Fisheries Inspector Division, Sri Lanka

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**Abstract:** Human behavior has a multi-dimensional view of resource utilization; thus, vital to examine the behavior of groups in environmental resource utilization. The group was fishing communities in Kalpitiya Fisheries Inspector Division (KFID). Data was collected through various methods subjected to thematic content-based analysis and statistical analysis. The primary source of income is a fishery where marine fishery and brackish water fishery, along with aquaculture, were the sub-categories. Sixteen percent were engaged in both marine and brackish water fishery. A total of 18116 individuals were marginalized in the area. Un-sustainable resource utilization has decreased the area's existing resources, particularly for Internally Displaced Persons (IDPs). Their behavior has created specific environmental problems in Wannimundalama and Manadalakuda. Though education level was not satisfactory (96%), the statistical analysis showed dis-concordant status; neither education nor the source of income affects their poor behavior in resource utilization. Comparing two fishing harbors illustrated that the cultural aspect also affects the behavior. The perception of environmental protection is also poor, IDPs. Gender vice behavior reflected that females are more willing to protect and restore the environment than males. Findings illustrated that the dimensions and categories of the system directly do not decide the behavior of groups in environment resource utilization. Environmental communication is essential and positively impacts human behavior in environmental resource utilization. The study recommends investigating the factors constraining sustainable resource utilization behavior in KFID, emphasizing the necessity of environmental communication.

**Keywords:** Behavior; Environmental Communication; KFID; Marginal Groups; Resource Utilization

## 1. Introduction

Resource utilization is a multifaceted topic. Geography and psychology both try to comprehend how behavior and environment interact. The microphysical ecology affects people's behavior mostly depending on where they are and what they are doing [1]. Carter [2] divided the environment into five dimensions; culture and society, communities, organizations, groups, and families, later influenced by the ecological perspective of Bronfenbrenner [3], which identified interdependent-nested five categories of systems include, including microsystems, mesosystems, exo-systems, macro-systems, and chronosystems which are unswervingly or circuitously effect on human behavior. Recently, there has been a significant increasing awareness that man harm nature more than ever. Thus, environmental problems have become a crucial and timely significant social problem [4]. Today, many scientists, environmentalists, social scientists, and environmental psychologists try to pay special

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attention to human behavior as a root cause of environmental problems [5], [6].

Coastal areas are dynamic environments comprised of various ecosystems that provide plenty of natural resources. Nearly 2.4 billion of the world's population already live in coastal areas [7]. Almost all the coastal cities are increasingly attractive to developmental and tourism-related works. Thus, the coastal environment is under pressure and has undergone rapid changes recently. Malthus and Mumby [8] have listed marine ecosystems to comprise mangroves, seagrasses, coral reefs, lagoonal microbial mats, shoreline features, sub-littoral zone benthos, and overlaying water column features. The pressure on these ecosystems has increased more than ever with coastal poverty.

Much of the coastal poor are dependent on resources found nearby. The long-term resource utilization has led to resource exploitation. When understanding human behavior in resource utilization, it is distinguished that different communities utilize resources differently. There are some marginal lands in the coastal areas. Such as eroded features, marshy lands, and salty lagoonal. People used to live in such coastal marginal areas. Almost all coastal poverty is concentrated in such marginal lands. Kalpitiya peninsula in the North-western coastal in Sri Lanka is quite a good example of this coastal marginal land extent resided of coastal poverty.

Communities inhabited there are fishers. The general area is comprised of fishing communities belonging to several ethnical groups. Heterogeneous fishing communities are solely dependent on fisheries. According to the geological process, the Puttalam lagoon in which Kalpitiya is located is under threat. The formation of barrier islands resulted in the formation of two lagoons, silting up of the Puttalam lagoon, and finally, the formation of a peat deposit in the geological process existing in the future [9].

On the other hand, seawater intrusion and rise also increase the threat. The study area was formerly war-affected, and many fishers live in were shifted from time to time due to this 30-year civil war. The people in the area thus, have no other means of living except directly depending on the lagoon environment. The resource exploitation is hence far more apparent and significant. Therefore, this study aims and is essential to examine people's resource utilization behavior. To achieve the aim of the study, two sub-objectives were considered; (1) find out the socio-economic background and environmental issues and (2) assess the relationship between sources of income, education, and resource utilization.

## 2. Research Methods

### 2.1. Study Area

The group was fishing communities in Kalpitiya Fisheries Inspector Division (KFID). KFID consisted of six Grama Niladari Divisions (GND) (Table 1). Ethnic and religious diversity in the area is significant. Most of the inhabitants are employed in fishery activities is a standard feature.

**Table 1.** The KFID covers GND

| No. GND | Indicator Name | Population |
|---|---|---|
| 629 | Kurugngnampitiya North | 1362 |
| 630 | Periyakudirippu | 1224 |
| 630A | Pudukudurippu | 5956 |
| 630B | Wannimundalama | 1518 |
| 630C | Manadalakuda | 3455 |
| 631 | Sinnakudurippu | 966 |
| 631A | Anawasala | 2440 |

### 2.2. Data Collection

Two methods were used to collect primary data: a structured questionnaire and interviews. A structured questionnaire survey has conducted for a sample of fifty (n=50) individuals living in KFID. The questionnaire consisted of 30 questions. A stratified probability sampling technique was applied to select the model due to the heterogeneity of the study population. The study sample consisted of Sinhale, Tamil, Muslim, and Male populations. Randomly selected thirty (n=30) non-structured in-depth interviews were also carried out to find out how people utilize environmental resources available in the area. Though randomly selected, many respondents were engaged in fisheries activities in the area.

### 2.3. Data Analysis

The thematic content-based analysis and statistical analysis were used to analyze the data. Tabulated data was analyzed to measure the association of contributing factors and poor resource utilization using SPSS version 22. Somers's, Kendall's tau-b, Kendall's tau-c, and Spearman correlation were calculated. The strength and direction of the association between an ordinal dependent variable and ordinal independent variables were measured using Somers's [10]. The connectivity of variables is defined by concordance and discordance. The monotonic relationship variables were analyzed to understand the strength of the relationship between variables using Kendall's tau. To ensure the results, the Spearman correlation was also calculated.

# 3. Result and Discussions

## 3.1. Socio-economic Background and Environmental Issues of KFID

All seven GN divisions comprised fishing communities belonging to different ethnicities. The primary source of income is the fishery. Three sub-categories of a fishery were identified. Marine fishery, brackish water fishery, and aquaculture. Though fishery is the primary source of income, a tourism-related informal or formal model of income and small-scale were found. Among 96% of fishers, 44% depend on the marine fishery, 36% were brackish water fishery dependents, and 16% were engaged in both (Figure 1). 27% of marine fishers also engaged in tourism too. People profited through various coastal ecosystems; 1) mangroves-shrimps, crabs, small finfish, oysters, firewood, as fodder; 2) saltmarsh-some are edible plants, Omari; 3) seagrass-gastropods; 4) lagoon environment-brackish water fishery; 4) seaweeds; 5) corals-sea cucumber; 6) mudflats-barnacles. The study area also carried out aquaculture, shrimp ponds, and crab cages. A handful of inhabitants had dry-fish-making stations. How much they gain is not enough; they have struggled to cope with some severe management problems since 1995 [11].

Among the identified problems are an increase in migration, competition for limited natural resources, resource exploitation, degrading environmental quality, decreased water quality, habitat loss, resource overexploitation, stock depletion, degradation of seagrass beds, degradation of coral reefs, depletion of freshwater resources, loss of biodiversity, and legal/institutional weakness. Due to the sandy, salty environment, drinking water is a rare resource in the area. Those who cultivate red onions (*Allium sepa*), long beans (*Vigna cylindrical*), and potatoes (*Solanum tuberosum*) extensively use agrochemical due to soil infertility led to an increase in the level of hydrogen ions in groundwater, making it unsuitable for drinking purposes. Salinity level also fluctuates due to the rising sea level due to a coastal topography. Therefore, the government and non-governmental organizations have built deep aquifer wells. Bioremediation methods were also practiced around a few deep aquifers to reduce chemical levels in groundwater. However, most residents were out of clean drinking water facilities.

Since 96% were from fishing communities, their education levels were unsatisfactory, decreasing their access to employment opportunities (Figure 2). The Kalpitiya division is one of the poorest DS divisions in the country. Thirty-six thousand one hundred ninety-seven household populations were below the poverty line. Along with the problems, fishing communities around Anawasala, Thotakadu, and Pudukuduiruppuwa were marginalized. These people are victims of the loss of coastal resources. Thus, they depend on coastal and lagoon environment resources. The results of the 2011 census stated that about 18116 individuals' lives had been marginalized.

## 3.2. Relationship Between Sources of Income, Education, and Resource Utilization

An in-depth interview revealed that the increasing human and climate pressure have cyclical effects while directly affecting their livelihoods, influencing their resource utilization behavior. Dry climate increases thickness in mudflat surfaces, decreases lagoon water body area, decreases fish population obstructs fishing access. At the same time, aquifers are too affected by an accumulation of chemicals, reducing access to portable water. Ecosystems too lead to degradation. Thus, the climate variable plays a dramatic role in making marginalized coastal communities in Kalpitiya.

Due to the civil war, the number of internally displaced persons increased and caused severe environmental pressure. When carefully observed, it was noticed and revealed through the interviews that most of the internally displaced persons were Muslims scattered in Wannimundalama, and Mandalakuda also added extra pressure on resources, which led to resource utilization destruct the ecosystem. This behavior was proved by the earlier studies and emphasized by Kularatne [12]; harsh exploitation of resources already destroys natural resources. Excessive use of mangroves, destruction of fishery resources since fishers have been using drift nets and push nets in the lagoon all day though it is prohibited, destruction of seagrasses, improper manner of disposing of garbage and trash, and use of unsatisfactory drainage systems are among them. However, females were more aware of natural resources and joined restoration and conservation activities than men.

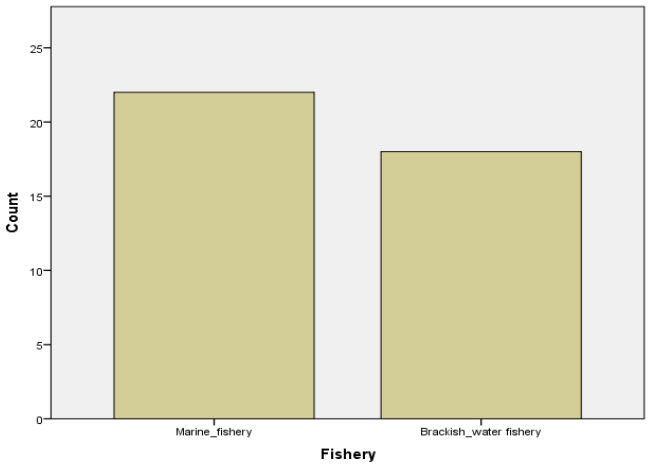


**Figure 1.** Source of income in Kalpitiya FID

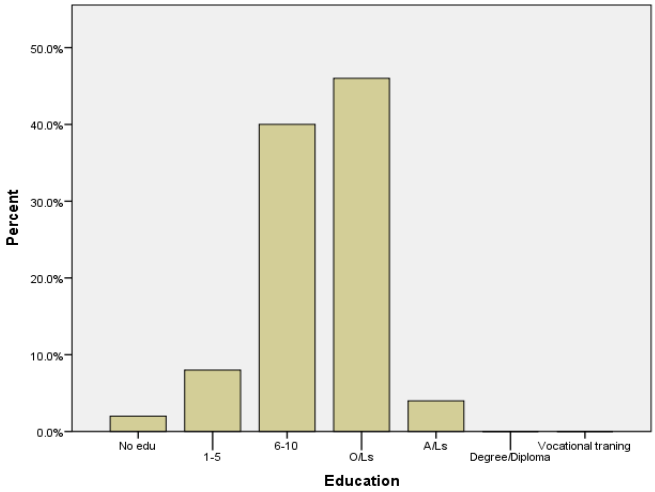


**Figure 2.** Education Status of Kalpitiya FID

More than 79 percent of fishers' behavior in resource utilization was reported in poor status. When their education level and resource utilization again showed, poor behavior in resource utilization was reported mainly among the secondary education category. Those who sit for advanced level also maintained poor behavior in resource utilization (Table 2). Though the collated data showed a relationship between poor resource utilization and education and income, the statistical analysis showed no relationship between either factor between resource utilization. Somers's, Kendall's tau-b, Kendall's tau-c, and Spearman correlation all emphasized little association between the factors 0.080, 0.086, 0.059, and 0.09 were the output values of Somers's, Kendall's tau-b, Kendall's tau-c, and Spearman correlation, respectively.

**Table 2.** Resource Utilization as Per Education Status

| Resource Utilization | Education | | | | | Total |
|---|---|---|---|---|---|---|
| | No Edu. | 1-5 | 6-10 | O/Ls | A/Ls | |
| Poor | 1.00 | 3.00 | 15.00 | 19.00 | 2.00 | 40.00 |
| Moderate | 0.00 | 0.00 | 5.00 | 2.00 | 0.00 | 7.00 |
| Good | 0.00 | 1.00 | 0.00 | 2.00 | 0.00 | 3.00 |
| **Total** | **1.00** | **4.00** | **20.00** | **23.00** | **2.00** | **50.00** |

Apart from their poor general education and unawareness of these natural resources' importance, the exploitation of natural resources has become a crisis in the study area. Lower education has been a common feature among people engaged in fisheries activities in Cantanhêde [13]. However, a previous study also evidenced by Gunathilaka [14], that environmental communication in environmental resource management has shown a positive effect on human behavior. One of the Grama Niladari Divisions in the FID is Anawasala (631A) shows lower education, lack of diverse communication methods, unawareness, and poverty, which negatively impacts the success of environmental communication as well. 63% of participation in mangrove restoration programs also depends on small grants. Only female participants were recognized during the programmers [14]. However, it was noticed that their understanding of how important the mangrove ecosystem survive in the harsh environment has increased (Informal discussions, 2017, 2018 & 2019).

Furthermore, increasing income from other sources and small grants for those who participated in mangrove planting influence inhabitants' willingness to pay for sustainable resource management. The same findings have been reported in the Jaffna lagoon in northern Sri Lanka [15]. Hence, environmental communication is essential and positively impacts human behavior in environmental resource utilization, especially among special groups.

## 4. Conclusion

The negative relationship between resource utilization behavior and education and income reveals that other factors affect this severe use of resources. This study concludes that such long-term behavior will lead these special groups far more remote and marginal, where life will become difficult, while emphasizing how effective environmental communication in shaping human behavior in environmental resource utilization. Hence, the study recommends future research to determine the factors that object to sustainable resource utilization in the area.

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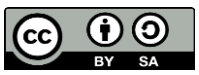

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