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Socioeconomic and Environmental Factors influencing access to resources in a fishing community: A case study in Rekawa, Sri Lanka

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ABSTRCT

Mode of production of a society is an essential element of the social system, and it can be influenced by different socio-economic and environmental factors. Hierarchical arrangements and context-specific rules also can affect the way in which a particular community is organized. This study explores how social structure influences access to resources as claimed by different social segments in a fishing community in Sri Lanka. Because fishery in rural fisher communities requires a high level of communal labour, the role played by the community alongside government and private organizations in different activities of fishing is predominant. Based on a case study in Rekawa – a fishing-community in Sri Lanka, data were collected using participatory rapid appraisal and interviewer guided questionnaire. The study shows that different socio-economic and environmental factors influence different strata in the fishing-community differently when natural resources are accessed. In addition, the social hierarchy through which culture is imposed on anglers would then influence the way in which the access is granted to fishers. Consequently, people of Rekawa fishing-community are likely to reflect their social position in line with the identity they have perceived being a member of a particular fisher-group in the same community.

1. Introduction

Understanding how human behaviour is influenced by different structural factors is important for effective natural resource management and secure sustainable livelihood in the community level (Ban et al., 2013; Byerly et al., 2018; Fischer et al., 2012; Reddy et al., 2017). Resources utilized in fishing activities are considered common properties that can be claimed by everyone in fishing communities and some studies too support this argument specifying that all anglers or fishers have an open access to different fishing resources though this can be varied in accordance with specific cultural influences (Hardin, 1968; Gordon, 1954). However, not every member of a fishing community can obtain equal benefits from resources utilized in fishing activities. For example, some fishers might access fishing grounds with expensive and sophisticated tools whereas some may have limited access to expensive tools. Although, previous studies (Hardin, 1968; Ban et al., 2018; Reddy et al,. 2017) have largely been focused on the ways in which socioeconomic factors that influence human behaviour in fishing-communities or how natural resources have been claimed in a sustainable manner, how different strata of a hierarchically organized fishing-community is influenced differently by those socioeconomic and environmental factors has not been adequately studied. This study thus strived to understand how different strata in a fishing-community were influenced by socioeconomic and environmental factors when fishers representing each respective stratum access natural resources.

Rekawa is a small fishing-community with a lagoon in Hambantota District, Sri Lanka where the majority of community members are socioeconomically similar to each other and they are preferred to identify themselves as "Fishers". In the surface observation, all of them are seen as a homogenous fishing group, but intensive probing unveiled that there are some differences among them. Fishers those who identify themselves as "one day fisher", "multi-day fishers", "beach seiners" or "lagoon fishers" demonstrate different characteristics unique to those particular groups. Fishing gears, numbers of days of a fishing tour, location of fishing grounds are some of the standards used to distinguish each group. One-day fishers operate small motorboats and traditional boats within the coastal range of the sea. Lagoon fishers are limited only to lagoons with non-mechanized boats. Fishing in beach-seiners is limited to beach-seine landing sites. Multi-day fishers explore deep-sea (offshore) using mechanized large boats. Ability to access fishing resources varies among these groups of fishers. They catch different fish species, different sizes of fish under different lay defined standards. Lay defined standards are the standards defined by fishing-community itself without expert knowledge but based on rich-experiences so that those standards can be varied from one community to another.

Moreover, effort employed in fishing by above-mentioned groups may be varied according to the number of labour hours spent on catching one kilogram of fish, fuel and other variables and fix cost items incurred per kilogram of captive fish. In addition to the aforementioned variable, marketing access variable also plays a decisive role, which decides the level of benefit (income) anglers can obtain. So that, this study attempts to identify factors which influence access to fishing resources by different groups in Rekawa. In addition, how those factors influence the members of the Rekawa fishing community to identify themselves as members of a selected group will also be explained.

Previous studies that focus on "access to resources" are limited to delineate about "legal property right based access to resources", and the theories brought up by them are succinct in explaining informal and

unreported ways of accessing resources. The "theory of access" (Ribot & Peluso, 2003) is one important theory that discusses the conventional argument on access to resources. This explains the scope of access, which is limited to property rights, and define access as "the ability to benefits from things" (Ribot & Peluso, 2003). "Things" means material objects, persons, institutions, and symbols. Because of this new theory, some unexplored corners of the concept of access were revisited. Focusing on ability, rather than rights as in the 'property theory', this formulation brings particular attention to social relationships that can constrain or enable people to benefit from resources.

To explain this scenario, Ribot & Peluso (2003) introduced a structural and relational mechanism of access. The structural and relational mechanism consists of several criteria, which can shape access i.e. technology, capital, markets, knowledge, authority, social identities, institute, and social relationships. He further argued that access to property can be influenced by different variables grounded in society, in the sense different determinants can cause inequalities in accessing common properties. For example, social norms, concepts of equity, culture, kinship relations and wider social and political relations like macro-level factors can cause access inequalities, particularly in communities where common properties or resources are accessed by a group of people with different identities. Some of the variables identified within the household level (micro-level) such as gender difference, age of family members (especially in extended families), education level, capital ownership might again cause access inequalities (When claiming property rights). Consequently, different individuals and groups benefit from different ecological services to a variable extent due to variations in access mechanisms and individual capabilities embedded in fishing (Ribot & Peluso, 2003).

Moreover, law of the country partially shapes the way of accessing resources, capital, markets, and labour. Some argue that those who make law would be privileged in obtaining benefits rather than those who adhere to the laws implemented and this is true for fishing communities, though this has been a highly debated philosophical position up to the present day (Watts, 1983; Thongchai, 1994). Nonetheless, both legal and illegal access to government institutions and other authorities tend to be selective along with a number of economic and social lines (Doolittle, 2000). These power dynamics influence the processes of negotiating resource access by various groups as Doolittle (2000) asserts. In the process of negotiating resource access and use, conflicts may be inevitable as found in Rome (Nemarundwe, 2003).

Ginger et al. (2012) explored how geographical factors strongly affect access to natural resources. Peripheral placement of residence in a given locality might again create inequality of access in a particular community, as the centre is allocated for the well-off sections of society (Dzingirai, 1998; Nhira, 1994). More often, access to natural resources shifts depending on the season or the time of the year. For instance, during the drought period, rules of access may be redefined so that some might be excluded from accessing resources, which in turn supports the well-off population to exploit more benefits while in rainy seasons rules of accessing natural resources can be more flexible. Similarly, resource use boundaries across villages may be ignored during times of abundance to allow for resource sharing. In addition, the quality of infrastructure facilities is another key factor that determines the level of access to natural resources. Nemarundwe (2003) found that some of the well-performed fishing grounds were left by anglers due to the deteriorating quality of roads to landing sites.

Ndlovu (2016) considered age as an access determinant factor. Therefore, age is one of

the significant factors that contributes to the entrance to fishing activities and exit from it. Velez & Lopez (2013) have conducted a study with indigenous communities in the Colombian Amazon, and they found a nonlinear significant effect of age on individual harvest. Under the research on coastal community of South Africa, Brick (2011) identified two main characteristics that can control access of an individual to fishing resource, i.e. risk aversive attitude and age. Risk aversive attitude showed a linear positive relationship. Age demonstrated a proportionately increasing relationship with access to the natural resource until a certain age limit and then declined (Brick et al., 2011).

Inequality of access to natural resources explained in "beneficiaries approach to ecological services" presents different scales to understand the nature of inequalities prevailed in a community (Hein et al., 2006). This variation occurred due to access to determinant factors. Each determinant factor has a positive end and a negative end. An individual who is very close to a positive end has a greater opportunity to approach and exploit more benefits than individual who is close to the negative end. Ritemorn (2014) called it as segregation of access. They further explained that due to this segregation process some people become winners and others become losers in the open-access game. Clear identification of loser and winner related to access of ecological services is very important to enhance access equities and improve the wellbeing of socially marginalized people through providing support to increase their ability to extract natural resources in a sustainable manner. The report of Epprecht et al. (2010) also elaborated access determinant for different resources such as access to land, water, forest, fisheries resources, plant genetic resource and the kind.

Studies that have been conducted to explore factors affecting access to natural resources, overall assert that the complexity of society influences accessing natural resources particularly in fishing communities and that in turn affects how people receive benefits utilizing obtained resources. However, those studies have not focused on how fishers form their identity in accordance with the social structure influenced by different socioeconomic and environmental factors so that this research attempts to explore how anglers or fishers perceive their identity in society and to understand the variability of socioeconomic factors that influence access to natural resources.

Mode of production of a society supposedly influences the way in which that society is structured, and the way of production can also be influenced by other grounded factors such as society, environment, belief system etc. As far as a fishing community is concerned, the code of conduct that administers the behaviour among fishers can be influenced by the specific arrangement of the social structure. However, the relationship between constructing social identity among fishers and accessing natural resources has been less studied. The main objective of this study therefore was to explore how anglers perceive their identity in society and to understand the variability of socioeconomic factors that influence access to natural resources.

2. Materials and Methods

A descriptive single case-multiple unit case study was employed as the research design. Rekawa village was selected as the target geographical area of the research because there are different types of fisher groups (such as multi day fishers, one day fishers) living in the same community. So that it was an ideal study-field to understand how access barriers influence fishers to select a particular "type of fishing" thereby being a member of a 'particular fishing-group' and why fishermen are unable to become members of other "types of fisher groups". Data collection was progressed in three

phases. In the first phase, access controlling factors were identified through an intensive literature review. During the second phase, four participatory rural appraisal sessions were conducted to qualitatively explore access controlling factors and identify new access controlling factors. Four PRA were separately organized in four different fishing communities (One-day fishing, multiday fishing, lagoon fishing and beach seine). The third phase of data collection involved a questionnaire survey. Stratified random sample technique was applied in this research. The total sample was 150 and it included 30 fishers from each fishing-group and 30 from one day-fishing boat owners.

The questionnaire was constructed to quantify the impact of access determinant factors that affect accessing natural resources. Access determinant factors were found from the PRA sessions. All the data collected were fed into SPSS version 22. The descriptive and nonparametric statistical test was applied in the data analysis phase whereas qualitative data were analyzed thematically.

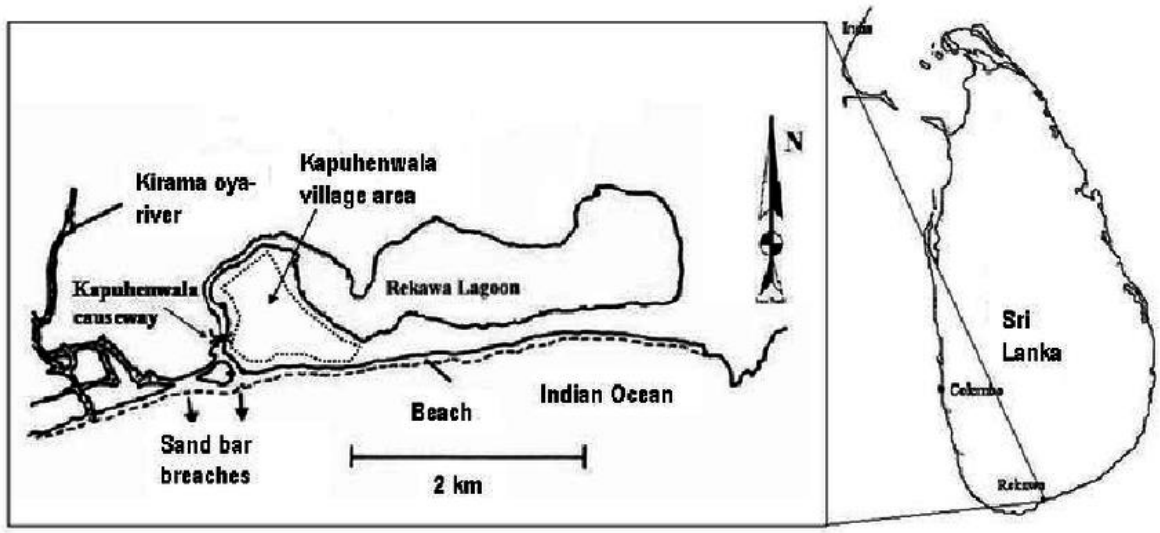

Figure 1. Map of the Rekawa Lagoon and Beach Area

Source: (Gunaratne, 2013).

3. Result and Discussion

Twenty-three access control factors were identified and those factors were categorized into nine sub-categories: Capital, Law, Social Position, Environment, Proximity, Social relationships, Supportive services, Skills and Market. Table 1 displays the percentage of each access control factor by each fishing profile. Percentage values denoted the fraction of respondents who are concerned with a particular factor that influences the access to a particular fishing group. To sort-out the determinants as encouraging factors and discouraging factors, respondents were asked to assign marks from -2 to +2 to each factor. The marks of -2 were allocated for highly discouraging factors and marks can be increased till +2 to express the level of encouragement of that factor. The average

value of -2 to 0 was considered as negative whereas 0 to +2 was considered as positive. Overall, improving or supporting encouraging factors would increase access and entrance to fishing and this can be supported even by mitigating discouraging factors. Access inhibiting factors and access catalysts are given in the last column of Table 1. Overall result and discussion is arranged in line with nine categories of access control factors.

3.1 Capital

The wealth of an angler is vital to be a boat owner of any "Fishery type". There is a social hierarchy in line with carrier progress developed within the society based on the richness of the considered fisherman. In general, anglers start their career life as a crewmember, and once they have accumulated wealth, they would be able to buy an NTRB (Non-Traditional Mechanized Boats) boat for one-day fishing or lagoon fishing. If he succeeds then he can buy an OFRP (Out boat engine Fiberglass Reinforced Boats), after that he can move toward the ultimate success of fishing career, in the sense that a person can become a multiday boat owner. In case of someone who possessed inherited wealth or is able to accumulate wealth through other income resources, that person can start the carrier in any step of the career path without spending much on the first step of the career ladder. According to table 1, having wealth is critical to be a multiday fisher than a lagoon fisher.

Carrier progress of this fisher community depends on the social hierarchy on which fishers are positioned. Socially assigned position influences how a person claims for resources in the community, and also it determines the starting-place where the person should start his carrier path.

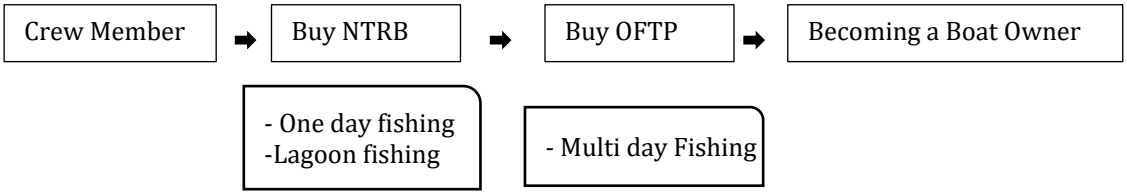

Figure 2. Career path of a fisherman

Source: Field study by authors

Becoming a Boat Owner is the perceived ultimate goal of a fisherman. Boat owners are placed at the apex of the social hierarchy followed by multiday fishers, one-day fishers and crew members. What is noteworthy is that the structure of this society is based on patriarchy. This creates a patriarchal hierarchical system that determines the structure of society so that other identities are supposedly indistinct.

The operation cost is also a determinant that influences access to natural resources in the fishing industry; it is more relevant for existing boat owners. As fuel price increases, this study found that anglers would likely to lose 31% of the total number of fishing days. Even though they have boats, 21% of anglers work as crew members due to the high level of variability in operation cost. One-day fishers have been excluded accessing long distance in the fishing ground and it appears to be a sub-culture-related norm that is adhered by virtue of practice. Norms of the fishing industry are constructed socially in accordance with the past experiences that impact how the behaviour of fishers are administered. As analysis indicates, there

were about 43% of one-day fishers refraining from catching tuna due to elevated price in baits/preys and fuel cost. Price increase in fishing gears too reduced the number of nets used by fishermen, consequently, the number of fishing days, the quantity of fish might be reduced to a considerable extent. The overall impact of the operation cost was recorded as -1.73 which implies that operational cost highly discourages access to fishing grounds where different natural resources are available.

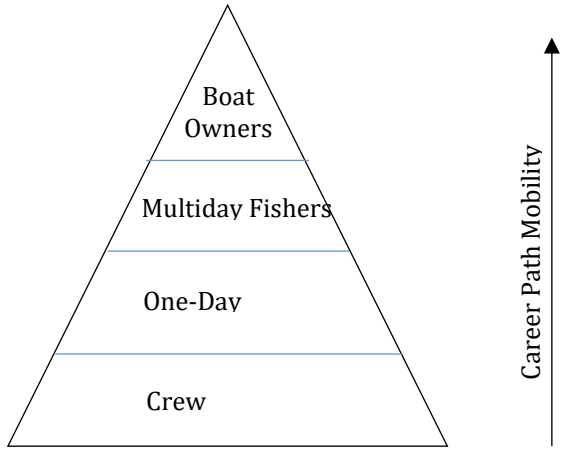

Figure 3. Social Hierarchy in Rekawa Fisher-community

Source: Field study by authors

3.2 Law

Regulations imposed by the government and state law were considered under the formal law of Sri Lanka. Fisheries acts limit the fishing activities to ensure a fair distribution of income and to encourage sustainable use of natural resources. Fisheries and aquatic resources act No.2 of 1996 imposes rules and regulations on issuing license for fishing, regulation of local boat, protection of fish and aquatic resource (prohibiting destructive fishing gears and restricting catching vulnerable species, conservation and delegate authorities and power for government officers to execute the ordinance). In addition to common general fishery act, Rekawa lagoon has its own fishing regulation established in 1982. Under this regulation, the use of any fishing gear other than cast nets and drift nets were prohibited, only fifty drift net fishermen are allowed to engage in fishing, the minimum mesh size of the drift net is limited to four. The registration of beach seine was also regulated under this formal law.

Informal laws have been prepared by community members in accordance with their culture, belief and attitudes which also influence how fishers utilize resources. Sometimes informal laws are more powerful than formal laws. Practices related to beach seine fishing ground (for example restricting numbers of beach seine owner) are imposed upon by informal norms. Boat landing slot of the landing site is also demarcated by customary community-based regulations.

According to the seniority of boat owners, a land space where a boat can be easily landed is reserved. Net laying location of the fishing ground is again demarcated by fishermen; for that, they use first come first served basis theory. The fisher who reaches early in the fishing ground has a great degree of freedom to select net laying water surface.

Lagoon Fisheries Corporation and marine Fisheries Corporation are the local institutes that can directly intervene in the fishing ground access. The Lagoon fisheries corporation closes the entrance to the lagoon and hence entrance is allowed only to its members. Currently, 162 members were registered as members of the lagoon fishing corporation. Therefore, the role played by Lagoon Fisheries Corporation negatively impacts on access to fishing resource in some cases.

3.3 Social Position

Age and physical health status influence access to fishing resources. Each "Fishery type" has a distinctive average age at which an angler should leave the job. The age of retirement is determined by the hardness of the job. Multiday fishing is a very tough task and hence only young and physically strong fishers would engage in multiday fishing. Lagoon fishing and beach seine net pulling consist of a comparatively easy task and very close to the land so that older fishermen also can engage in fishing. Anticipated retirement age of each "Fishery type" is as follows: Multiday boat fishermen 52 years, One-day boat fishers 57 years, beach seiners 61 years, lagoon fishers 66 years. Most of the landside helpers are former fishermen who stopped fishing due to weak physical fitness. Health status of fishermen, furthermore, determines the number of days per year that they can go fishing. In addition to that, muscle weaknesses, back and knees pain can refrain fishermen from fishing.

Psychological factors such as attitude, feelings and perception also affect access to fishing resources. Some of the fishermen are risk-takers and they are willing to trade-off either life risk or financial risks for a greater profit. Others are willing to have comparatively low income under mild risk. 58% of fishermen said that a high level of risks integrated with multiday fishing more often discourages them to engage in fishing in long-distance fishing grounds.

Moreover, gender difference clearly demonstrates the limitation of access to fishing and natural resources. Traditionally, women are not allowed to participate in active fishing in Rekawa. This is a common scenario that can be seen all around Sri Lanka except in Kalpitiya, Puttlam where fisherwomen engage in shrimp catching in lagoons. Women were excluded from active fishing in Rekawa on the basis of traditional norms such as the belief that women's major responsibility is to continue every day activities of a family. In addition, fishing is considered a masculine job in which women participation is decreased. Because it comprises night and multiday work women are kept aside from active fishing. Therefore, except for a few cases, almost every person who engages in fishing are men. Sometimes women can participate in removing fish from nets and sorting them into categories, but they are not involved in a high level of labour required activities in fishing.

3.4 Environment

Environmental factors are external to the person yet uncompromised that limit the access to fishing resources. Due to high wind and behaviour of sea waves during the off-season, fishermen are unable to engage in fishing activities. From April to September is the off-season. Especially "one-day" fishers who use NTRB boats and beach seiners are highly vulnerable during seasonal changes due to the weakness of their fishing gears; they cannot operate fishing activities during this off-season. Multiday fishers are not sensitive to seasonal effect comparatively as high technology helps them to operate fishing

activities even in the off-season. During the off-season, it changes the salinity level of the lagoon due to changes of inflow and outflow of water from lagoon to sea. Due to the frequent fluctuation of salinity, fish species and prawn are low in the off-season.

Environmental pollution and declining fishing resources are correlated. Over extraction of fishing resource, usage of destructive fishing gears, changing the physical environment for development projects, dumping waste into the water body and destroying coral reef and mangrove land are some of the activities that contribute to environmental pollution. This severe environmental pollution significantly affected the lagoon fishermen. Emerging hotel industry of Rekawa remove mangrove cover nearby lands for their construction purpose, dump garbage into the lagoon, change the natural water channel, therefore, 55% of fishers believe that climate is being changed and it negatively impacts on the fish stock in the sea.

3.5 Proximity

Distance to fishing ground and distance to landing site also control the access to fishing resources. Most of the anglers live near the landing sites where they engage in fishing. One-day fishermen live very close and their houses are close to the landing sites. Majority of lagoon fishers live around the lagoon and one side of their garden is bordered by the lagoon. But multi-day fishers scatter all over the village. 65% of the fishermen said that they have been influenced by the distance to the fishing ground from their home to be fishermen of a particular "Fishery type". Delivering fishing gears between home and landing site is also easy when they live near the landing site. Distance to fishing ground determines the time taken to finish a fishing journey. There were 32% of fishermen who are not willing to navigate long-distance for fishing.

3.6 Social Relationship

The social relationship creates exclusive rights on the selected group of members in the community while others might be marginalized from fishing resources. The kinship and friendship is the ticket to enter into multiday fishing. Every member of the sample seems to have a bonding relationship with existing community members. There are no training institutes to train these multiday fishermen. Therefore, it is compulsory to have relationships with experienced fishermen in the boat to get the responsibility of untrained newcomers. The membership of lagoon fishing corporation passes from parents or sibling. The outsiders do not have this opportunity to get the membership. Violation of these community-based norms would cause conflict in the fishing community and hence bonding social capital alongside community norms influence how people access natural resources which are essential for fishing.

Furthermore, commitment to household affairs has a negative impact on accessing fishing resources. When fishermen have a greater commitment to household activities other than income earning, he should stay at home. Widowed fisherman, fishermen with diseased wife or child, fishermen who do not have a strong relationship with relatives, friends and neighbours should uphold a considerably high commitment to the family. 48% of fishermen mentioned that even though they are willing to engage with multiday fishing, they are unable to practice it due to household commitments.

3.7 Supportive Services

Infrastructure development is essential to enhance access to natural resources. Road access, harbour facilities and removing obstacles to enter into the sea from the harbour by boats are very important. Buyers can easily reach the harbour frequently when roads are well furnished and it causes competitive and fair price in the fish market

of the village and it further encourages fishermen to catch a large quantity of fish. During the off-season, NTRB owners cannot voyage their craft into the sea due to absence of wave breaker near to the landing site.

Access to a loan is another crucial factor which determines whether fishermen can go fishing. Every two years fishermen should invest money to purchase new fishing gears and it may cost around Rs.200,000.00. In addition, every six months fishermen should repair the engine and it may cost around Rs. 50,000.00. This recurrent cost can be covered by the loan. 85% of fishers accepted that access to a loan is very important to buy fishing gears.

3. 8 Skills

Researchers who explained fishing resource as an 'open access natural resource' missed the fact that fishing is a complicated job and it needs some experiences of fishing techniques. Fishermen claim that at least five years of experience is needed to be a professional fisherman. Determining the fish-available sea areas is a very difficult task and for that fisherman should train their sensory ability for a long time. Observing water quality, climate condition, the behavior of the sea, an experienced fisherman can decide the fish abundant place. 89% agreed that well-experienced fishermen catch significantly high quantity of fish than low experienced newcomers. Training and knowledge about techniques and instruments are essential for multiday fishers than others. To be a good skipper, it needs at least ten years of experience in multi-day fishing. The multiday boat skipper should have good navigation skills and furthermore, he should have a sound mechanical knowledge to operate and repair the boat engine, GPS, Radar, modern compass, electric winch and fire extinguishers. Several training courses of multi-day fishing techniques are conducted by the Ocean University of Sri Lanka but a very little number of fishermen gets this training opportunity. Majority of fishers take the training in an informal way by participating as a freelance helper in fishing boats, because of the trust in the traditional way of learning through experiences.

3.9 Market

The price is an important factor that determines the final income of fishing, and for that a better price and a perfectly competitive market are needed. Fishermen would experience a number of barriers to obtain a fair market price. Several fish buyers dominate in the "one-day" fishing landing site and they do not allow new buyers to the landing site. They maintain a strong oligopoly market and they collectively decide price and fishermen do not have an option other than selling fish to a given rate by fish buyers. Boat tying fish agreement (an informal agreement between a Fish buyer and a Fisher) too limits the capacity of fishermen to select fish buyers. Once fisherman took a loan from a fish buyer, he is obliged by virtue to sell his fish exclusively to that person who granted the loan. Until the fisherman settles the loan, he should obey the conditions in the agreement. Crewmembers of one-day fishing do not have authority to intervene in fish selling process. When the boat reaches the harbour, that boat and fish should be handed over to the owner and he sells the fish and distributes the share among crewmembers. A small quantity of fish is a limitation to attract fish merchants into the lagoon fish market. However, a comparatively transparent and efficient market can be seen in beach seine fishing. At the end of each net hauling, merchants reach the beach and fish auction starts. The fish merchants who offered the highest price are eligible to buy the whole fish lot. In addition, both net owners and crewmembers have the opportunity to participate in price bargaining and decide to whom the fish lot is sold out.

Table 1. Access control factors influencing fishers to select a fishery type

The major category of access control factors	Access control factors	Fisher community profile				Overall impact to become fishermen
		Beach seine	Lagoon	Multi-day	One day	
Capital	Fixed cost	70%	25%	93%	85%	-1.85
	Operational cost	60%	30%	92%	80%	-1.73
	Wealth	70%	20%	90%	55%	+1.01
Law	Formal law	78%	10%	40%	25%	-1.13
	Informal law	65%	78%	11%	35%	-1.26
	Institutional law	20%	95%	5%	30%	-1.14
Social Position	Physical fitness	15%	20%	94%	70%	+0.85
	Gender (being male)	100%	100%	100%	100%	+2
	Age (getting old)	12%	10%	80%	55%	-1.14
	Risk awareness	10%	20%	60%	50%	+0.76
Environment	Seasonality	82%	0%	0%	45%	-1.54
	Environment pollution	20%	70%	30%	24%	-1.02
	Climate change	48%	55%	31%	45%	-1.13
Proximity	Distance to landing site	55%	65%	12%	54%	-0.54
	Distance to fishing ground	14%	20%	50%	45%	-1.36
Social relationship	Friendship and kinship	80%	90%	40%	55%	+0.47
	Commitment to the family	20%	25%	60%	40%	-0.95
Supportive services	Infrastructure facilities	15%	20%	65%	12%	+0.65
	Access to loan	41%	35%	70%	80%	+1.01
Skills	Training	5%	15%	85%	48%	+0.98
	Experience	18%	14%	45%	65%	+1.12
Market	Reasonable price	53%	45%	65%	74%	+1.34
	Easy access to market	54%	34%	15%	17%	+1.54

Being a male (gender), easy access to market, reasonable price, experience, wealth and ability to get a loan are supportive factors to fishermen to access fishing resources. Fixed cost, operational cost, seasonality, long distances to fishing ground and informal laws are the factors which block open access to fishing resources. Of all those factors having a relationship with existing fishermen, seasonality, fluctuation of income, formal law, fixed cost and wealth are the top critical factors that impact on the ability to utilize

resources from the beach-seine fishery. Institutional laws, relationship for existing fishermen, informal laws, environment pollution level of the lagoon and distance to landing sites severely control the ability to be a lagoon fisherman. Physical fitness, fixed cost, operational cost, wealth and requirement of training experience too control the access to multi-day fishery profile. Operational cost, access to loan, fixed cost, reasonable price, physical fitness are the key factors to decide entry to one-day fishing.

3.10 Policy Implications

Fishery is one of the significant industries in Sri Lanka, as a large number of peasants in the coastal area are engaged in fishery that even occupy a significant portion of the gross domestic production in the country. As the central bank (2019) indicates 83% of the fish production has been contributed by the coastal fishers. The government has thus introduced regulatory policies for fishery in order to increase the fish production while securing social welfare of fishers. In spite of these policies, implementation has been appeared to be challenging since the continuous growth of fishery has declined over the past few years due to a number of reasons. Among many reasons contributed to the decline of the growth of Sri Lankan fishery, the very core principles affecting access to natural resources among anglers played a significant role. This research thus implied the importance of taking structural specificities to careful consideration when polices for sustainable development of fishery are implemented in the ground level.

Although a blanket-approach in which common policy stances and programmes are incorporated can be formulated in order to address some problems of fishery, policy specification is required in the ground level to incorporate specific cultural determinants that significantly influence the behaviour among anglers. For example, social structure unique to Rekawa is different from that of Kalpitiya in Puttalam district as described by the Department of fisheries and aquatic resources, Sri Lanka (2013). Social structure in Rekawa has been organized so as to signify distinguished characteristics among different groups of anglers even within the same community. Multi-day fishing anglers are socio-culturally distinct from one-day fishers or lagoon fishers, for example. There can be different behavioural patterns when they access natural resources. Fishing in a lagoon can be performed by women in some cases, but multi-day fishing in deep sea areas is restricted. A blanket approach in which common policies are included thus is not effective to address unique problems unless structural arrangement that predominantly affects the way of fishing is not taken into careful consideration. Because the inherent segregation attitude among Rekawa influences their social organization, providing the same facilities such as insurance schemes and other welfare schemes to everyone without considering their unique socioeconomic and cultural qualities would certainly hamper the policy implementation process sine the reflections about social identity among different groups can be contested in a common ground.

Moreover, informal yet culturally adopted administration systems in fishery can be challenged due to the introduction of government-intervened administrative mechanisms which are now more commonly implemented with regards to fisheries and aquatic resources. For example, there is an informal mechanism of accessing natural resources and selling fish in the market. This might violate equality and equanimity among anglers but is rigidly embedded with the social structure. In order to improve social conditions of anglers, however, universal polices should be implemented during which the role played by informal-yet-culturally-recognized administrative mechanisms can be aligned strategically. For this, community mobilization programmes and action research projects can be employed. Furthermore, social capital has been one of

the significant contributing determinants that can help mobilize communities.

4. Conclusion & Recommendation

The figure 4 combines key findings of the research to get a better understanding of access inequality in utilization of resources in the fishing industry in community level, reasons for existing access inequality and how fishers respond to those inequalities by selecting particular fishery type (a community profile). This research found that the amount of income earned from fishing resources indicates the level of benefit extracted from the fishing resource by fishermen. Revenue earned has always been depended on the quality of the fish lot and the price that a person can obtain in a given time. Annual fishing quantity is marked by species of fish caught by fishermen, average size (weight) of a fish and number of days fishermen engage in fishing. The fish quantity converts into monetary terms to sell under a given price in the market. Not every one of the fishing community has the ability and permission to extract fishing resources in an equal manner. Furthermore, not every angler receives a similar price for their fish and they might not equally be eligible to receive an equal share of the income. The fish quantity, price and income distribution inequalities occur due to the accessibility to the determinant factors. To mitigate access barriers, fishermen should change their fishing gears, craft, time duration of the fishing trip and fishing distance, depth where fishermen can reach, fish species and quantity caught by fishermen and permission and authority to use fishing resources. Those changes divide fishers into four different fishing-groups or community profiles in Rekawa as lagoon fishery, one-day fishery, multi-day fishery and beach-seine fishery.

Anglers access different fishing grounds to catch fish. Those fishing grounds are not fully open for everyone equally. Each fishing ground consists of different access controlling factors, which influence fishermen to extract natural resource from the fishing grounds unequally. Those access controlling factors are categorized into capital, authority, technology, experience, proximity, environment conditions, market conditions, labour resource, and social position of fishermen. Because each fishing ground is bounded with a set of unique access controlling factors, fishermen should change their fishing effort, mental and physical fitness, socioeconomic and market condition to confront with those access controlling factors. Some of the access controlling factors catalyze access to the fishing ground while others inhibit the access to the fishing ground. In addition to that, the access controlling factors decide the position of fishermen in their carrier as a boat owner or a crew member. As a result of adaptation to specific access control factors, significantly different socio-economic conditions, market condition and fishing technologies exist among fishermen and those variations segment the fishing community into different "Types of fishing" such as one-day fishers, multiday fishers, beach seiners and lagoon fishers. Each "Fishery type" extracts fishing resource in different levels (fish species, quantity and quality make up the fishing resource extraction).

Although a number of research has been conducted by selecting fishing communities for different purposes, it is highly essential to understand the very core of social structure and organization, because the different ways of social organization embedded in culture can affect human behaviour differently. For policy makers supposedly this might be very important since the policy decisions taken at the community level should always elevate the community wellbeing whilst addressing their issues. As delineated in this study, specific social-network arrangements based on rules of social hierarchy play a significant role in everyday fisher life, and therefore research on fishing communities require in-depth sociological and ethno-epistemological considerations.

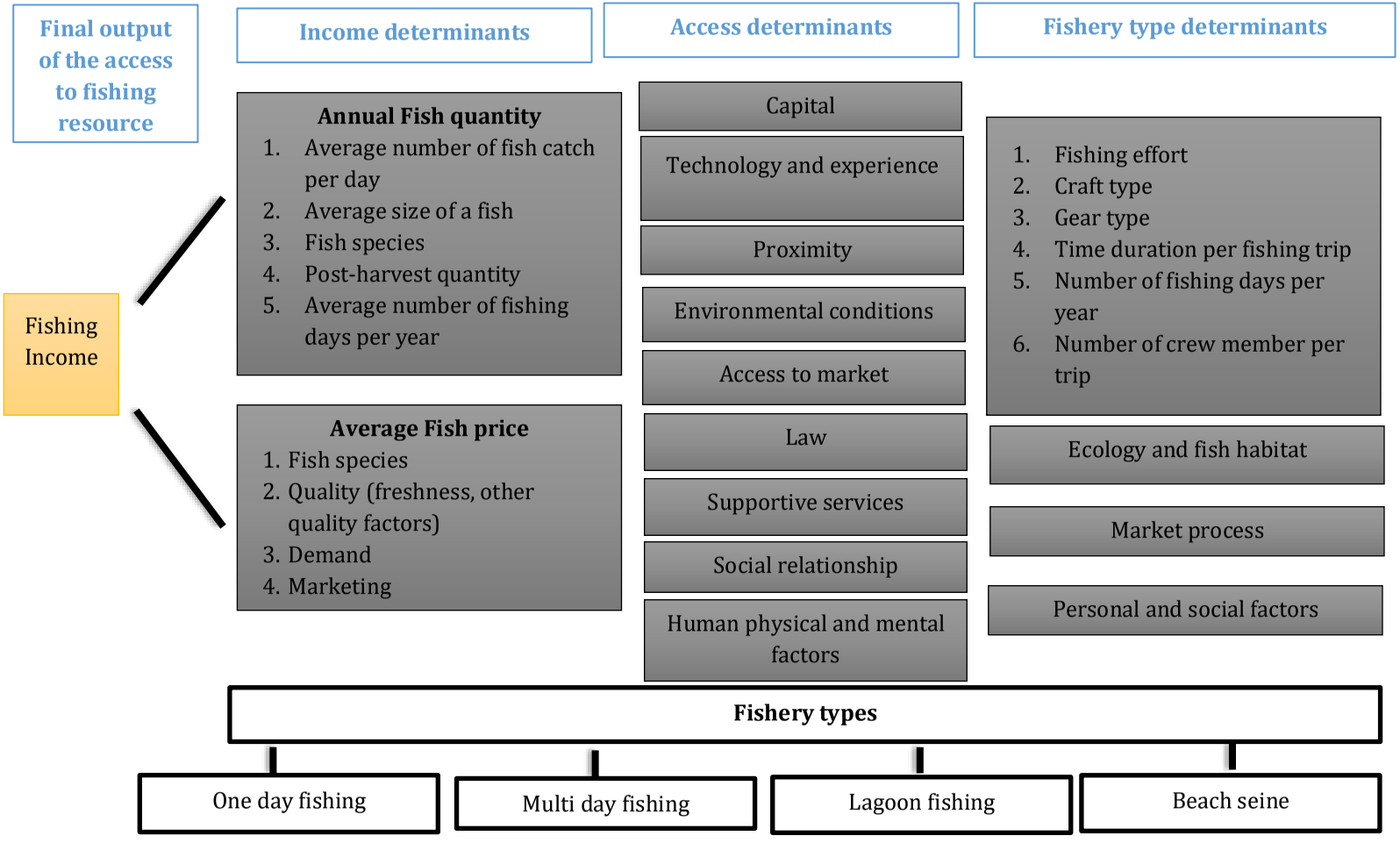

Figure 4. A framework to understand access to fishing

Ethno-epistemology is the way in which community specific knowledge is generated by community members themselves. Future researchers thus are encouraged to employ ethno-epistemological principles when they study specific social segments with a sub-culture such as the fishing community noted above.

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