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EXPLORING THE ETHNOECOLOGY OF FISHERING COMMUNITIES ON BUYAN LAKE PRESERVATION

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Abstract

This study examines the ethnoecology of fishing communities in the conservation of Lake Buyan, with an analytical focus on the cosmos system, Corvus and daily praxis. This study uses a qualitative descriptive analytical method with a basis for data analysis based on cultural ecology theory and generative structuralism. Fisherman behaviour data was obtained from distributing questionnaires using analysis referring to the binary model. This study, which was conducted in May - August 2023, found that the cosmos system or belief in a divine nature and strong magical-mystical beliefs collaborate to form and strengthen cultural capital, social capital and symbolic capital as one unit with rational and irrational knowledge forming a complex system. Corvus. This conception complements the individual and collective habitus of fishing communities through conventions as values, norms and rules that are adhered to physically and mentally. The local wisdom of the fishing community underlies every daily practice. Both in understanding and utilizing Lake Buyan in its functions as a source of drinking water, agriculture, socio-cultural/ religious, economic, recreation or tourism, and ecology. This praxis is also reflected in the results of fishermen's behaviour which is included in the good category with a score of 1.

Keywords: Fishing Community, Ethnoecology, Conservation, Lake Buyan.

I. INTRODUCTION

The fishing community who lives around Lake Buyan has close interaction with the lake ecosystem and the surrounding environment. They depend on the lake's resources for their livelihoods by using the lake's waters for various activities, such as fishing, setting 'fish traps' and nets for catching fish. The role and involvement of fishing communities in the preservation and sustainability of the lake environment is very important.

Studies on community participation in lake conservation were carried out by a number of previous researchers. Endah and Nadjib (2017) who conducted a study on the Use and Role of Local Communities in Preserving Lake Maninjau found that although the community showed a positive attitude towards the environment (environmental attitude), this attitude was not always reflected in actual behaviour. Several behavioural factors, such as cultivating fish using Floating Net Cages (FNC), regulations that are not strictly implemented, and weak supervision in the field, are the causes of suboptimal efforts to utilize and preserve the lake.

The FNC system has been known to influence the condition of lake waters. The results of research reported by Saputra et al. (2017), using the STORET Index and Pollution Index methods at stations located at sampling points near FNC and agricultural activities show that the condition of the waters of Buyan Lake is classified as heavily polluted. There are 7 parameters (turbidity, pH, ammonia and light pollution, nitrate, BOD, COD and sulphide) which exceed the water quality standard threshold in Lake Buyan. However, based on the results of interviews with fishermen, it was said that since 2019, FNC cultivation has no longer been practiced in the waters of Lake Buyan, so the role of fishermen in preserving the lake's waters needs to be explored from other aspects. Likewise, no previous studies have discussed in detail the role of lake fishing communities, especially using an ethnoecological approach that concerns aspects of cultural ecology. Aspects including the cosmos, Corvus, and praxis systems or belief systems, knowledge and daily natural practices of local communities are thought to influence the sustainability of Lake Buyan. These three main aspects are the focus of discussion and are new in this study.

The role of the community around the Buyan Lake area is very important for its sustainability. This is in accordance with the findings of a Santari study which emphasizes the importance of building collaboration with cross-stakeholders including local community organizations/groups in efforts to develop environmental management strategies in Lake Buyan (Santari et al., 2021). Based on this statement, it is important to explore the ethnoecology of fishing communities to provide an in-depth picture of the various active roles of fishing communities regarding the preservation of Lake Buyan, especially through the cosmos, Corvus and praxis systems or belief systems, knowledge and practices or their daily activities, as one the inseparable unity of symbolic concepts and practical applications, as well as measuring fishermen's behavior in an effort to preserve the lake.

Apart from the considerations above, the fishing community is the one who interacts most intensively directly with the waters of Lake Buyan, when compared to other community groups. The fishing community group also understands and makes comprehensive use of Lake Buyan in its various strategic functions. Sutomo et al., (2011) stated that the strategic function of Lake Buyan includes its function as a source of drinking water and agricultural water, religious or socio-cultural functions, economic functions related to livelihoods, also tourism or recreation functions, as well as related to wider ecosystem functions, namely as Subak water sources in parts of Tabanan and Buleleng districts, as well as part of the forest area in the Pancasari Nature Tourism Park (TWA).

The following study will answer the research question regarding in-depth identification of ethnoecology which includes the three cultural ecological systems, namely the cosmos, Corvus, and fishing community praxis systems in the preservation of Lake Buyan with all the challenges of contemporary life.

II. METHOD

This study was carried out in the Buyan Lake area for five months (June – October 2023) targeting the entire population of fishing communities. There is a group of fishermen with a total of 47 members (Chief Fisherman, interview June 2023). The population of fishermen is also the research sample. This study is qualitative research with descriptive analytics. Information was gathered through in-depth interviews with a number of key informants, namely the Pancasari traditional bendesa (traditional head), Pancasari prebekel (village head), hamlet heads, and fishermen. Supporting information is traced from various library sources, journals and mass media news. The data and information were then analyzed by referring to Cultural Ecology Theory and Pierre Bourdieu's Generative Structuralism Theory. The theoretical concept of Cultural Ecology Theory (Toledo 2002:514), includes aspects of the cosmos, Corvus, and praxis or systems of beliefs or beliefs, systems of oral and written knowledge, and praxis or behavior. This means that the complexity of activities as a unit of socio-cultural practice that cannot be separated between conception and application of daily behavior in the waters of Lake Buyan is explored, which describes the ethnoecology of the fishing community on Lake Buyan.

Furthermore, Pierre Bourdieu's Generative Structuralism Theory includes several main concepts packaged in the formulation: (habitus X capital) + domain = practice. This means that praxis can occur in a community group if the components of habitus (habits and perceptions) are crossed with capital ownership (economic capital, social capital, cultural capital and symbolic capital). Economic capital concerns the ownership of material/financial wealth. Social capital includes all relationships between people, such as friendship, colleagues, organizations, birth, nobility, and others. Cultural capital includes mastery of knowledge, educational/scientific level, etc., and symbolic capital concerns the complexity of symbols of power that arise due to the ownership and placement of the three capitals mentioned previously (Harker et al. 2009; Bourdieu 2016, xv-xx; Haryatmoko 2016). Data and information relating to physical data, demographics and socio-cultural activities are analyzed in the theoretical formulation above.

Meanwhile, the binary model is used to measure fisherman behavior, which consists of two possible values, namely yes, given a score of 1 and no, given a score of 0, with interval classes divided into 3, namely the interval 0-0.2 (poor fisherman behavior); 0.3-0.6 (fishermen's behavior is quite good); 0.7-1.0 (good fishing behavior) (Ferdinand, 2014). Behavioral data was obtained through distributing a questionnaire consisting of five questions, including: 1) Do you use environmentally friendly fishing gear (fishing rods, nets, etc.) when catching fish; 2) Are all the fishing gear you use environmentally friendly (fishing rods, nets, etc.) when catching fish; 3) Do you regularly clean water weeds around Lake Buyan; 4) Do you pay attention to the cleanliness of the lake, such as carrying out routine cleaning of rubbish around Lake Buyan; 5) Do you catch fish with a traditional rowing boat? with yes and no answer options.

III. RESULTS AND DISCUSSION

Overview of the Characteristics of Buyan Lake

Lake Buyan or in its ancient name Danu Bulian is geographically located at 8°14'9" – 8°7'9" South Latitude and 115°5'18" – 115°11'20" East Longitude and administratively is the area of Wanagiri village and Pancasari, Sukasada District, Buleleng Regency. Buyan Lake does not have a river, either as an inlet or outlet, so it is only filled by springs in the surrounding area or from rainwater layers in the catchment area (Environmental Service, 2019). The characteristics of Lake Buyan are that it is a confined basin that has no outlet so that all waste that enters the lake will accumulate continuously and affect the quality of the lake water (KLHK, 2020). The Buyan Lake area is included in the national priority lake category II, which requires the involvement of all related parties in its management. This is a priority because there are various complex problems in the area (Indonesian Lakes Forum, 2004).

Buyan Lake has various strategic functions, namely ecological, social, cultural and

economic functions. Ecological functions include the role of lakes as habitats for various types of organisms and their role in regulating soil ecosystems and microclimates. The Lake Buyan area (including Lake Tamblingan) has a very important role in storing rainwater which is vital for the lives of residents in Bali. The Buyan Lake ecosystem, as part of a conservation area, has functions that include regulating water management through infiltration, capture and providing clean water sources. It is important to note that if the quality of the Lake Buyan ecosystem declines, these functions will be increasingly threatened. Residents around the lake depend on water from this lake for various purposes, including traditional ceremonies, household use, and agriculture. This area includes a number of villages, such as Catur Desa (Munduk, Gesing, Umajero, and Gobleg Villages), Pancasari Village, Wanagiri Village (in Buleleng Regency), and Candikuning Village in Tabanan Regency (Sutomo et al., 2011: 78)

Meanwhile, the social function involves the use of the lake as an open area for social interaction by the community, including fishing community groups. The cultural function is related to the sacred status of the lake in accordance with the hierarchical concept of territorial sanctity in the Hindu tradition called the tri mandala. In the tri mandala concept, Lake Buyan is placed in the main position of the mandala because of its location in the upstream part of Bali Island, believed to be the most sacred area and center of offerings. Furthermore, the economic function of Lake Buyan involves the role of the lake as a water source for agricultural irrigation purposes in several *subaks* in Bali, for fisheries, as well as a tourism attraction both locally and internationally (Sudji, 2015; Sutomo et al., 2011: 78).

In an ecosystem, Freiman in research by Hein and his colleagues (2006) provides a definition for stakeholders as entities in the form of individuals or groups who have the ability to influence and/or receive the influence of the ecosystem as well as the environmental benefits provided by the ecosystem. Meanwhile, the International Finance Corporation (IFC), which is part of the World Bank, groups stakeholders into individuals or groups who directly or indirectly experience impacts or have an impact on the environment. Parties included in this stakeholder category include local communities, groups or individuals who care about the environment, government entities, political figures, religious leaders, non-governmental organizations, special interest groups, and the like (Lostarnau et al., 2011). In this study, individuals or groups who directly or indirectly experience impacts or have an impact on the environment focus on the fishermen of Lake Buyan. Data on fishing groups in the Buyan Lake area until 2023 shows that there is only one fishing group, with an active membership of 47 people (Chief Fisherman, interview 2023).

Ethnoecological Traces

Forms of local wisdom involve broad and complex aspects, for example belief systems, harmony in humanism, and harmony with the surrounding environment. In the ecological approach, culture is packaged as a single concept, namely the cosmos, Corvus and praxis system (Toledo 2002: 514). The cosmos system or belief in a divine nature and strong magical-mystical beliefs collaborate to form and strengthen cultural capital, social capital and symbolic capital as one unit with rational and irrational knowledge to form a Corvus system. This conception completes the individual and collective habitus of fishing communities into a convention that is adhered to physically and mentally. The local wisdom of the fishing community underlies every daily practice. Both in understanding and in utilizing Lake Buyan in its function as a source of drinking water, agriculture, socio-cultural, religious, economic, recreation or tourism, and ecology.

Cosmos System

The cosmos system, which concerns belief systems, cannot be separated from myth and religion which also form a unified Corvus system or knowledge beyond the reasoning of local communities. Thus, the mythology in this study is specifically extracted from myths that are the collective knowledge of the settler community, not only in the Lake Buyan area,

but also in two other lakes that are close to each other, namely Lake Tamblingan and Lake Beratan. This knowledge is relevant to conservation efforts or is based on ecological ideology. There are a number of myths related to environmental conservation efforts in the Buyan Lake area, namely the prohibited wood, the gombang dragon and the rakrik dragon, the *duwe* animal, and the yellow *soan* and iron *soan* which are explained in more detail in the Corvus system section.

More specifically, it is related to belief systems that have a religious or religious nuance, very strongly nuanced by Hinduism and the glorification of a number of local religious beliefs or teachings into Hinduism. The name Dewi Danu is known to refer to the ruler of the lake waters including Lake Buyan, who is described as a universal mother figure who always protects, cares for and supports the lives of mankind and all of its creation. The Gong Besi palm leaf manuscript (Tim Penyusun, 1998) describes the name Dewi Danu as part of one of the divine personifications in the water cycle, namely that after the water descends on the mountain controlled by Dewi Giri Putri, it is contained in a natural puddle in the mountain valley called a lake. Next, a number of springs and fountains will emerge with the ruler of the Goddess Gayatri which will flow to form river bodies with the ruler of the Goddess Ganga, and then will irrigate the rice fields with the ruler of the Goddess Uma. This mythological fragment describes the connection between Subak downstream and the lake upstream as a unit of local community ecological knowledge which gave birth to a number of ritual practices of respecting water sources with ecological nuances and socio-religious interactions between farming communities (Subak) and the Buyan Lake fishing community.

Periodic rituals are held by the Subak group at certain times such as *mapag toya*, aimed at praying for sustainable water availability, fertility, avoidance of pests and diseases, and abundant harvests. Large rituals held by local communities or traditional villages in the Buyan Lake area aim to neutralize symptoms of energy disharmony and to save nature and all its contents (Danu Kertih), in the form of: *caru*, *tawur*, *pekelem* in the lake, *piodalan* ceremony at Beji Yeh Mas Temple, Ulun Danu Bulian Temple and other temples in the forest around Lake Buyan (Jro Mangku Gde (assistant priest) Yeh Mas; Yeh Masem village chief; Bendesa (customary head) Pancasari, interview August 2023).

The cosmos system also involves belief in the lake as a source of holy water (*tirta*) for the purposes of various religious ceremonies in Pancasari Village in particular and Kahyangan Jagat Bali Temple more broadly. The sacred site is the center of ritual activity for all Pancasari village residents, in the form of an area where all the pilgrims (sacred artifacts) are purified or held from all the temples in the Pancasari village area and its surroundings to the Beji Yeh Mas Temple. Buyan Lake is also one of the favorite loci for performing the ruwatan rite for self-purification (*penglukatan* 'water blashing'). Several sacred sites and temples located within the Lake Buyan conservation area include: Ulun Danu Bulian Temple, Luwur Sari Temple, Gunung Anyar Temple, Tajun Temple, Beji Yeh Mas Temple, Soan Kuning spring, Soan Besi spring, and Batu Site Meringgit (Juliasih et al., 2022).

Corvus System

The Corvus system, as mentioned previously, involves the complexity of local community knowledge which has both mystical and logical nuances. Local knowledge of settler communities in the Buyan Lake area specifically is also fundamental knowledge for members of the Buyan Lake fishing group. *Tri hita karana*, as a guide to life for the Balinese people in general, is also the basis for the daily life practices of the Lake Buyan fishing community. *Tri hita karana* promotes the development of three harmonious relationships, namely between humans and God in all its manifestations, harmony between humans and each other and harmony with their environment. This context in this study is explored in harmony with God the Creator with all his manifestations as the god of water (God Vishnu), goddess of rivers (Ganga), goddess of springs (Gayatri), agricultural fertility (Sri or Uma), goddess of lakes (Dewi Danu) and so on. Aspects of religious belief that are clearly

visible from the strength and continuity of the cosmos system from one generation to the next are applied in symbolic rituals, as described above.

Myths continue to thrive as oral knowledge and enrich the speech traditions of local communities in the Buyan Lake area and its surroundings. Several myths related to environmental conservation efforts in the Buyan Lake area, namely (1) ban wood, (2) gombang dragon and rakrik dragon, (3) *duwe* animal, and (4) yellow *soan* and iron *soan*. The Myth of Banned Wood. This is the local community's belief in the prohibition of cutting down trees that are categorized as prohibited wood, namely several types of wood that are protected by the government. Those who violate will be cursed by the ancestors and may be subject to customary fines. Manuscripts of Balinese Inscriptions I and II found in lakeside villages or lake coastal areas in Bali mostly state that the Balinese kings of the 10th-12th centuries were concerned with saving forests and lakes through establishing agricultural land and grass fields for animal feed, horse breeding/crossing, and land for planting wood for building materials. The zonation aims to not disturb the sustainability of forest areas and the availability of lake water (Goris, 1986). This knowledge, which includes cultural capital and symbolic capital, is still maintained to this day, even complete with special forest guard officers (*jaga wana*) and lake guards and nurses (*jaga teleng*) who come from the residents of *Catur Desa* (Juliasih et al. 2022).

The next one of Corvus system that contains knowledge about lake conservation is the myth of the Gombang Dragon and the Rakrik Dragon. The Gombang Dragon and Rakrik Dragon myth are popular oral stories, not only in the Buyan Lake area but also in the Tamblingan Lake and Beratan Lake areas. This myth depicts a supernatural battle between the two dragons whose traces are a series of sacred sites from Lake Beratan to Lake Buyan and ending at the Goa Naga Loka temple in the hills of Lake Tamblingan (Bendesa Pancasari, interview July 2023).

Furthermore, the myth of the *duwe* animal tells of the existence of a number of astral faunas that live in the waters of Lake Buyan, such as the *ulam agung* 'big fish', crocodiles and dragons. The appearance of a number of sacred animals cannot be predicted, only at any time, and can only be seen by certain people. The existence of the *duwe* animal is highly trusted by the local community, so they are obedient not to speak rudely, spit, urinate or defecate in the waters of the lake. If it is violated, it will have fatal consequences for the life of the perpetrator (Bendesa Pancasari, interview July 2023). Likewise with the mystical belief in the existence of *soans* or water flow in Lake Buyan. Soan is the local term for the body of water flowing below the surface of the lake. There are two large *soans* that flow from the shores of Lake Buyan, namely the yellow *soan* and the iron *soan*. The yellow *soan* stream is located on the west bank, while the black iron *soan* is on the east bank of Lake Buyan. The myth of the yellow *soan* is closely related to Naga Gombang's journey to his hermitage in Naga Loka Cave. Likewise, iron *soan* is often associated with the passage of magical duwe animals. This is what causes the two *soans* to be sacred and kept sacred. The uniqueness of the fish and plants that live in the yellow soan water flow are yellow in color, while those that live in the iron *soan* are blackish in color. If the *soan* is thought to be polluted, then a *pakelem* (purification) ceremony must be carried out with white ducks and other offerings (Bendesa Pancasari, interview July 2023).

Banned Wood Mythology, the story of the Gombang and Rakrik Dragon, *Duwe* animals, Yellow and Iron *Soans* is the local community's knowledge about the existence of mountains and their forests (Pucak Mangu and Pucak Sangkur), water (lakes and water flow), land (mainland) and its natural phenomena. Local wisdom shows the possession of cultural capital, social capital and symbolic capital in the terminology of Bourdieu's thinking. These three capitals complement the mystical and magical habitus of the local community. The meeting of capital with mystical and magical habits in the realm or life struggles of the lake area settler communities has supported social practices. In this case, the collective praxis is respecting and maintaining the function of

mountains, forests, lakes, mountains and mainland for harmonious living with other creatures (Juliasih et al., 2022).

Myth has similarities with ideology because mythology can be seen as universal truths presented in society's daily flow of thought, so that they become shared knowledge (Barker, 2005). This knowledge is a very strong basis for the way of thinking, speaking and behaving, both when in the middle of the water and on the shore of Lake Buyan. The emanation or dissemination of knowledge was conveyed by the elders or their parents when they were young, as basic knowledge so as not to misbehave in the Buyan Lake area. Thus, this knowledge strongly underlies the process of forming perceptions which leads to daily behavior. Not only when in the Buyan Lake area, but it continues to be held as a life ethic for the Buyan people wherever they are (Chief Fisherman, interview June 2023).

In Bourdieu's concept, this is referred to as a cross between cultural capital, social capital, economic capital, and symbolic capital with habitus or habits formed through parenting or childhood education patterns which underlie the formation of identity or character until adulthood in fishing communities in the Buyan Lake area. The knowledge wrapped in mythology for the fishing community is very meaningful in forming a perception of respecting the waters of Lake Buyan and the surrounding environment from dishonorable attitudes that have the potential to damage the sustainability of the waters of Lake Buyan.

Praxis Buyan Lake Fishermen's Community

The knowledge in individual and collective habitus or what can also be called the Corvus system then underlies every daily practice of the fishing community in the waters of Lake Buyan. The myth of the forbidden wood, Gombang and Rakrik Dragon, the great fish as *duwe* animal, and the two *soan* (yellow and iron water flow) are the individual and collective knowledge of the settler community in the Buyan Lake area. This is what Bourdieu understands as cultural capital. Cultural capital has a very strong symbolic value. The existence of these three capitals is also related to economic capital (lake fishing as a source of livelihood for fishermen). It is this wealth of capital that shapes perceptions and directs social behavior. Cultural, social, economic and symbolic capital has complemented the collective habitus of local communities. This is what drives the community's practice of trying to protect themselves (environmental ethics) not to throw away waste, rubbish, urine or activities that will pollute the waters of Lake Buyan. The practice of environmental ethics is also revealed from the behavior of fishermen before catching fish who always excuse themselves by offering offerings of *canang sari* to ask for safety or secrecy and the catch either on the edge of the lake before carrying out activities, or in the middle of the waters of Lake Buyan. In this way, praxis shows the holistic role of the Buyan Lake fishing community.

The fishing community plays a role as a guardian of the balance of the lake ecosystem. By understanding the life cycles of fish and other aquatic organisms, they contribute to keeping fish populations in balance. Regulate the level of fishing, with the gill net hole size being the size of the *telung nyari* or ± 5 cm and above. The size of the fishing net is about 100 meters long and about 80 cm wide. The net was stretched from a limit of about 50 meters from the edge of the lake towards the deep waters of Lake Buyan. Apart from nets, traps are also used (Chief Fisherman, interview August 2023). Bubu is a form of passive trap which is often referred to as a trap or guiding barrier which allows fishing by restricting fish movement. The trap has a structure like a closed room and the basic principle is to trap the fish's vision so that the trapped fish cannot escape. In terms of appearance and traditional use, traps were originally made from a series of cylindrical bamboo blades with a length of about 1.5 meters and a diameter of about 30 cm. Meanwhile, smaller dimensions are used for shrimp traps with a length of around 30 cm and a diameter of around 10 cm.

Nowadays, Lake Buyan fishermen make fish traps using stainless steel wire with an iron frame measuring a cube about 100 cm long, about 80 cm wide and about 80 cm high. The zone installation of traps covers the lake shore

area up to 50 meters into the waters of Lake Buyan. The method for installing the trap is to place it in a strategic location that is frequently passed by fish, then leave it for one night or one day. Then, the next day, the fisherman who installed the trap returned to remove it, along with the fish that had been trapped inside. It was also agreed that the number of fish traps owned by each member of the fishing group was only 25. One of the reasons why traps are considered environmentally friendly and contribute to resource balance is because the habit of lake fishermen until now is to release small fish they catch (Chief Fisherman, interview August 2023).

Figure 1. Installation of iron traps by Buyan Lake fishermen
Source: Survey, August 2023

This means that practically the fishermen of Lake Buyan have applied cultural capital, especially knowledge about fish resources through various group agreements and it has become a collective habitus for members of the fishing group to use environmentally friendly fishing gear, in the form of nets, traps and hooks, the fishing community helps prevent overfishing which really helps anticipate ecosystem damage. Members of the fishermen's group also participate in monitoring the activities of anglers who come from outside the Pancasari area, including monitoring and prohibiting the spread of fish varieties from outside (Chief Fisherman, interview August 2023).

The fishing community has in-depth knowledge about fish behavior and ecosystem conditions in Lake Buyan. With generations of experience, they have observed fish migration patterns, breeding seasons, and environmental changes that affect the abundance of fish or shrimp. This cultural capital in the form of complex knowledge provides them with valuable insights into the sustainable management of fisheries resources. Fishermen have a deep set of local knowledge about fish behavior and environmental conditions in Lake Buyan. This means that fishermen play an important role as managers of natural resources by ensuring that fishing activities are not excessive. By carrying out sustainable management, fishing communities help ensure the availability of fish for future generations and have a positive impact on the preservation of the Buyan Lake aquatic ecosystem.

Through involvement in determining quotas for the number of fishing equipment owned in the form of nets which are limited to 20 nets and 25 traps per member of the fishing group, the fishing community can contribute to ensuring that the number of fish taken from the lake remains within limits that do not harm the fish population. By complying with fishing quota limits limited to the amount of fishing equipment, fishermen have helped prevent overfishing. Overfishing is a behavior that can result in a decline in fish numbers and threaten the balance of the lake ecosystem. Apart from that, the fishing community also plays a role in determining the size of fish that can be caught, namely only those measuring approximately 5 cm and above or in local terms called *telung nyari*. Fishing practices that are selective in size help conserve fish that have not yet reached optimal reproductive or growth stages. In this way, the fish population in Lake Buyan has a greater chance of sustaining its reproduction, recovery and availability.

Apart from nets, other fishing tools such as hand fishing or fishing nets with certain hook sizes (hook number 3 and above), can also be used selectively. These tools allow fishermen to select fish to catch based on size and type, thereby reducing the risk of catching potentially undesirable non-target species. Even though there are no known fishing season regulations which are an important aspect in managing

fisheries resources, the fishing community really understands the types of fish in Lake Buyan. The fishing procedures and equipment established by the Buyan Lake fishing group really help protect the fish's reproductive period and provide the opportunity for fish to reproduce without disturbance. This has a long-term positive impact in maintaining healthy and sustainable fish populations.

The active involvement of fishing communities in fisheries resource management also helps build a sense of ownership and responsibility for the sustainability of the lake. By feeling involved in management decisions, fishermen will be more likely to support and implement sustainable practices to protect the environment where they earn a living. Overall, the role of fishing communities in regulating and managing the use of fisheries resources in Lake Buyan creates a synergy between environmental preservation and sustainable livelihoods (economic capital). Through local knowledge (Corvus), involvement in determining the rules of the game, and compliance with existing regulations, fishermen become one of the main pillars in protecting fish resources for a better future and preserving the Lake Buyan ecosystem.

Fishermen are also the spearhead in assisting monitoring or early protection against potential spreading activities of non-endemic freshwater fish species in Lake Buyan, for example catfish species which may be predators of fish endemic to Lake Buyan. Taradhipa et al., (2018) reported that there are 7 species of fish endemic to Lake Buyan, as follows: Zebra Fish (Amatitlania nigrofasciata), Tilapia Fish (Oreochromis niloticus), Nilem Fish (Osteochilus vittatus), Goldfish (Cyprinus carpio), Sword Platy Fish variant 1 (Xhiphophorus helleri), Sword Platy Fish variant 2 (Xhiphophorus sp), and Wader Fish (Rasbora lateristriata). These types of fish are called in local language: Zebra Fish, Tilapia, Nilem, Mas Fish, Srembeng Tilapia, Mas Tilapia, and Buluh Tilapia (Deputy Chief Fisherman, interview July 2023). Such non-endemic fish distribution activities are very possible to be carried out either individually or in certain activity groups (Prebekel 'village head' Pancasari, interview June 2023).

Thus, monitoring activities carried out by fishermen in the long term have the potential to reduce negative impacts on the balance of the lake ecosystem. Fishermen also participate in activities to clean the lake from trash and weeds. This activity is in synergy with service officers which is routinely carried out by four field officers from the Buleleng Regency Environmental Service. By helping to clean and maintain the cleanliness of the area around the lake, they contribute to preventing the accumulation of rubbish, weeds and water contamination (Fisherman Chief, interview July 2023).

The behavior of fishermen in this study was measured from the scoring value of the questionnaire distributed which consisted of five questions related to fishermen's behavior in catching fish as shown in the following table. As for results, the behavior score values for groups of fishermen are shown in Table 1 below.

Table 1 Behavioral Component Scores for Buyan Lake Fishermen

Respondent	Total Respondents	Score	Beha-vior Category	Total Respondent Score
All respondents	47 (100%)	1	Good	47
			Total	47
			Average	1
			Category	Good

Table 1 show that 47 respondents (all fishermen) had behavior in the good category. Likewise, the average score of fishermen's behavior in catching fish is included in the good category with an average score of 1. In other words, the behavior (praxis) of Lake Buyan fishermen is an accumulation of ownership of cultural capital, social capital and development of economic capital by supporting sustainability.

Buyan Lake ecosystem by maintaining the sustainability of the lake ecosystem, fishing communities also support local economic empowerment that is environmentally friendly, providing consistent income for fishing

communities (economic capital).

The practical behavior of Lake Buyan fishermen can be a model for empowerment and participatory patterns of local community elements for developing management strategies for Lake Buyan and other lakes in Bali and other areas (best practice). Important fishing groups are involved by related parties in making lake management policies. Their participation in the decision-making process can ensure that local community interests are accommodated in lake conservation efforts. It is important to understand that preserving Lake Buyan is a shared responsibility, including the fishing community, government, NGOs and the wider community. By involving all parties and working together, the sustainability of the lake and its natural resources can be well maintained.

IV. CONCLUSION

The ethnoecology of fishing communities in understanding and utilizing the aquatic resources of Lake Buyan is summarized in the unity of the cosmos or belief system, Corvus or knowledge, and praxis as practice or behavior. The divine cosmos system and strong magical-mystical beliefs collaborate to form and strengthen cultural capital, social capital and symbolic capital as one unit with rational and irrational knowledge forming the complexity of the Corvus system.

This conception forms the individual and collective habitus of the fishing community in the form of local wisdom which is reflected in the praxis (behavior) of the Buyan Lake fishing community which has been proven to be in a good category in preserving Buyan Lake.

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