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STAKEHOLDERS LINKAGE ANALYSIS IN FISHERY ACTIVITIES AT FISH POTENTIAL SITE OF OROMIA REGION, ETHIOPIA

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ABSTRACT

Stakeholder Linkage Analysis in fisheries activities was intended to be carried out in the districts of Adami Tulu Jido Konbolcha, and Bora in the East Showa Zone, as well as in the fisheries production potential of Sokoru and Omonada districts in the Jimma Zone. A systematic questionnaire and checklist were used to gather the data, which were then analyzed using narrative analysis for the qualitative data and descriptive statistics for the quantitative data using STATA software. According to the data analysis, the primary production sources were Lake Ziway/Dembel, Koka Reservoir, Gigal Gibe-1 Reservoir, and Ponds. The dominant and targeted fish species were *Oreochromis niloticus*, *Clarias gariepinus*, and *Cyprinus carpio*. At the local level, the primary stakeholders were identified as fishermen, Woreda Agriculture and Development Offices, Office of Job Creation and Skills, traders, hotels, and restaurants. At the regional level, the Oromia Bureau of Agriculture and the Batu Fish and Other Aquatic Life Research Center were considered stakeholders. In contrast, at the national level, the primary stakeholders involved in fishery activities were the Minister of Agriculture, the Minister of Water and Energy, the National Fishery and Aquatic Life Research Center, and Universities. While some stakeholders supported capacity building with poor connections between them, the bulk of stakeholders supported the technical aspects of fisheries activity. Sustainable water and climatic conditions, along with the presence of a research center, are considered opportunities. However, the Expansion of traditional fishing, Poor resource monitoring, overutilization, and the Lack of a sustainable platform to improve stakeholder linkage were identified as threats to stakeholder linkage in fishery activities.

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INTRODUCTION

In both industrialized and developing nations, fisheries are essential to sustaining human welfare and economic growth. It supports the livelihoods of many people, especially in emerging nations, and provides income and nutritional security to hundreds of millions of rural households. Fishing provides a direct supply of fish, either for consumption or market purposes. According to

Karatas and Karatas (2017), fisheries are not only dominant sources of world protein. In contrast to crop production, fisheries can be produced throughout the year and generate sustainable income. The least developed economies also depend on international fisheries commerce since it provides food, jobs, and revenue (Batista et al., 2014). Approximately half a million individuals in Ethiopia receive direct and indirect

economic support from the fishing industry. Studies have shown that fishing can increase household income by about 7.5%. Lake Koka, for example, supports many rural households through fisheries, with a potential annual yield of 1194 tons (Pal et al., 2025).

Ethiopia is blessed with numerous water bodies that are home to a wide variety of aquatic life. Ethiopian fisheries are harmed by human activity, including illicit fishing practices such as the use of nets with substandard mesh sizes and hazardous plant seeds, as well as a lack of community awareness on sustainable fisheries management and fish processing methods. Fishermen also suffered from a lack of better fishing equipment and poor connections amongst many stakeholders at the recently constructed fishing location (Temesgen and Getahun, 2016).

Linkage refers to the collaboration and communication that is formed between two or more organizations that are working toward similar goals in order to maintain regular communication and increase production (Sadighi, 2005). It serves as the organized means via which resources, information, and technology are transferred across organizations. Strong links between each other are essential to connection efficacy. Strong communication and efficient teamwork amongst all parties involved significantly boost fishing output and enhance rural communities' quality of life.

Any study outcome that lacks proper connections with important stakeholders is worthless. Insufficient connections among various stakeholders limit the flow of information, preventing farmers and fishermen from making use of new agricultural knowledge that could boost their output and productivity (Temesgen and Getahun, 2016). The nation has a modest chance to profit more from the fishing industry, just like it does from other agricultural pursuits, given its present resources.

Ethiopia has an estimated annual potential for fish production of 51,400 tons. Potential fish-rich lakes in the nation include Lake Tana, Ashenge, Hayk, Koka, Ziway, Langano, Awassa, Abaya, and Chamo. The primary commercial species that contribute to the overall landing are *Lates niloticus*, *Barbus* species, *Labeo hori*, *Oreochromis niloticus*, and *Clarias gariepinus*. According to some estimates, approximately 35% to 63% of the potential is fulfilled in fish production, which is substantially below the potential. Among the significant issues facing Ethiopian fish output are overfishing, poor management, inadequate institutional capacity, limited

infrastructure, market accessibility, and fishing practices (Abraham and Mitiku, 2018).

Stakeholder linkage analysis in fishery activities has not received enough attention, and the extension service and technology transfer level still fall short of the resources available. For the fishing industry to benefit more from the resources at its disposal, it is imperative that the primary actors involved in agricultural growth coordinate, integrate, and communicate effectively. The study's goals were to evaluate the linkage status of the main stakeholders and to determine the opportunities, threats, weaknesses, and strengths of fisheries operations in Oromia, Ethiopia's prospective water bodies.

METHODOLOGY

Description of the study area

The study areas of this research cover East Shoa and Jimma Zones of Oromia Regional State, Ethiopia. East Shewa is situated in the middle of Oromia, which connects the eastern and western areas of Oromia. The East Shoa zone borders the West Arsi Zone to the south, the southern Nations, Nationalities and Peoples area to the southwest, North Shewa to the northwest, the Amhara area to the north, the Afar Region to the northeast, and Arsi to the southeast. Two districts of the East Showa Zone, namely Adami Tulu, Jiddo, Konbolcha, and Bora districts, were covered by the row data collection.

The Jimma Zone is situated in Southwest Ethiopia's Oromia National Regional State. It is located between 1689 and 3018 meters above sea level. The research region experiences 1200 to 2400 mm of annual rainfall on average. There are numerous wetlands in the Jimma Zone that support livestock, biodiversity, and socioeconomic activities of the residents. From Jimma Zone, two districts, namely Sokoru and Omonada, were covered. In Sokoru district, Gilgal Gibe I is the main fishery, and farmers' ponds are found in Omonada district.

Sampling procedure and sample size determination

Purposive approaches were used to acquire data for the study. A representative's potential area was purposefully chosen to conduct this investigation. The first step in any intervention is to determine which important stakeholders are responsible for bringing about or impeding change in an innovation system. Before beginning the detailed data collection phase of this project, all stakeholders were identified in the first section.

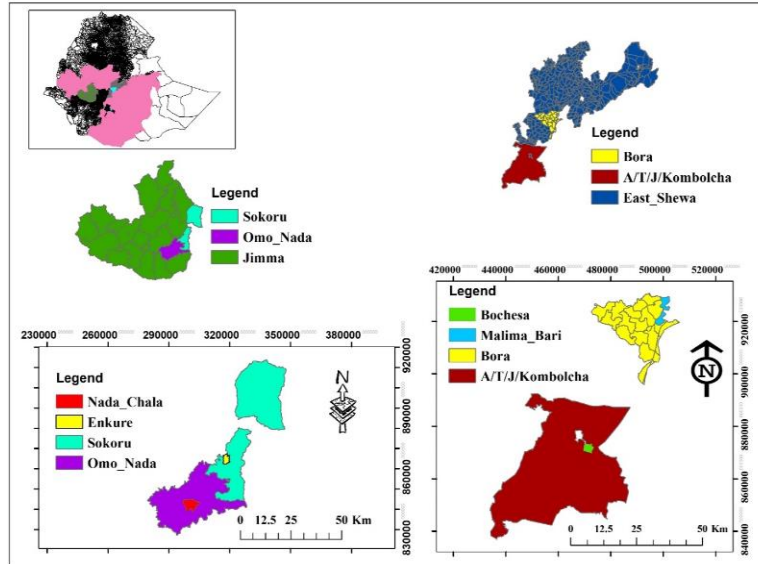


Figure 1. Map of the study area.

Sketched by Teshome (2024)

The goal of this subsection is to list the actors involved in fish production, examining each stakeholder's role and status, the state of stakeholder linkage, knowledge and information sharing, and the operation of the linkage system. Then, the weaknesses and strengths of the stakeholder's linkage to fishing activities were evaluated. An actor linkage map was then used to depict the actors' interactions. Fishing activity was positioned in the middle of the actor linkage map, and other players were connected according to their contributions to the system.

From the total fishermen, the sample size for generating primary data was determined using a formula developed by Yamane, which is determined as:

$$n = \frac{N}{1 + N * e^2}$$

Where, N= population size, n= sample size and e= degree of accuracy expressed as a proportion 0.1 or (90%). The total Population sizes were taken from the District Agricultural Office, which was legally registered for fishery activities (Table 1).

$$n = \frac{173}{1 + 173 * 0.1^2}$$

$$n = \frac{173}{1 + 173 * 0.01}$$

$$n = \frac{173}{1 + 1.73}$$

$$n = \frac{173}{2.73}$$

$$n = 63$$

So, 63 fishermen were used for primary data collection in addition to Key Informant and Focus Group Discussion. From 63 fishermen need to be interviewed, proportionally according to their fishermen population sizes.

$$\text{Sokoru district} = \frac{58 \times 63}{173} = 21$$

$$\text{Omonada district} = \frac{15 \times 63}{173} = 5$$

$$\text{Adami Tullu Jiddo Kombolcha district} = \frac{60 \times 63}{173} = 22$$

$$\text{Bora district} = \frac{40 \times 63}{173} = 15$$

Table 1. Sample size determination.

No	Selected districts/kebeles	Population size	Sample size proportion	Zone
1	Sokoru (Enkure Kebele)	58	21	Jimma
2	Omonada (Nada cala kebele)	15	5	Jimma
3	ATJK (M/wafiko kebele)	60	22	E. Showa
4	Bora (Malima Bar kebele)	40	15	E. Showa
Total population size		173	63	

Type and method of data collection

The study gathered quantitative and qualitative data from primary and secondary sources to get the pertinent information. Both formal and informal survey was used to collect primary data. For the informal survey, participatory techniques such as focus group discussions (4), key informant interviews (12), and personal observation were employed together with checklists. Using a pre-tested structured questionnaire for each group, formal interviews with key stakeholders in fishery production were conducted as part of the survey. Two sets of people were assembled for focus group conversations in order to collect opinions on various topics using preset checklists. Knowledgeable people about the activities in the research region were interviewed as key informants. Reviewing prior research projects, relevant publications and journals, and internet resources were used to gather secondary data.

Data to be collected

In this study, data were collected in addition to some demographic information. Data related to fishery activity, stakeholder identification, the role of each stakeholder in fisheries, Stakeholder linkage, Strengths, weaknesses, opportunities, and threats were collected under this activity.

Data analysis methods

Data analysis was done based on the nature of the data collected for this study. Quantitative descriptive analysis will be used through STATA software. It was presented in the form of frequencies, including minimum, maximum, and mean values, and was presented in tables. Data collected through key informant interviews, focus group discussions, and personal observations were carefully recorded in a notebook, ordered based on their

similarity, and narrated. The interactions of actors, which were created by identifying relevant actors and their relationship to one another and then expressing these in diagrammatic form, were used to depict the interactions of the actors.

RESULTS

Socio-demography of the respondents

The socio-demography of the respondents was collected from a total of four selected fishery potential districts in Jimma and East Showa Zone. The required primary data were collected from systematic fishermen chosen from each district. In both the East Shoa and Jimma zones, fishing is the primary source of livelihood, a day-to-day activity. The collected data confirmed that the male group was more involved in fishery activities than the female group. Analysis of the respondent sex indicated that, among the total households, approximately 83% and 17% were male-headed and female-headed households, respectively (Figure 2).

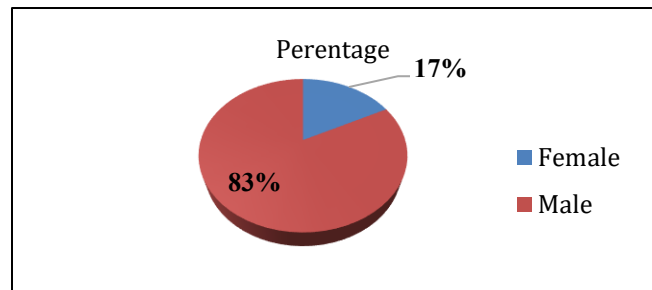


Figure 2. Sex of the respondents

According to survey results, almost 49% of sample respondents were Muslims, making them the majority of households around the study areas (Figure 3). Orthodox, Protestant, and Wakefeta religion followers made up 27%, 18%, and 6%, respectively.

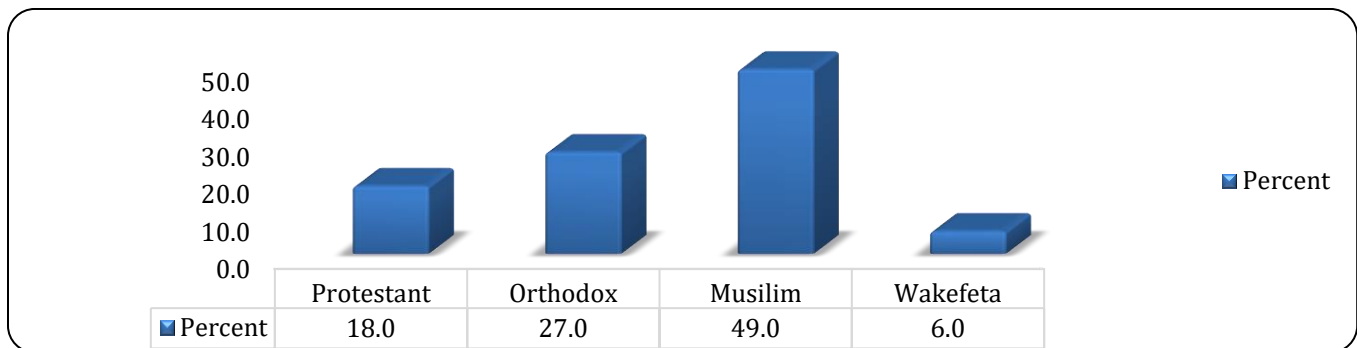


Figure 3. Religious status of the respondents.

Regarding their education, about 49% of fishermen had completed primary school (Figure 4). About 23% had completed high school. Of all respondents, about 12% of the heads of the sampled households had completed religious and adult education programs and were literate. The majority of fishermen have decent standing in terms of education, according to the survey results.

The mean age of the sample household’s heads was 32.1 years, with maximum and minimum ages of 52 and 18 years, respectively (Table 2). The mean household size was collected continuously and calculated with the adult equivalent ratio. Based on Table 1, the mean household size was 2.6, with the maximum and minimum of 8.6 and 0 persons, respectively (Table 2).

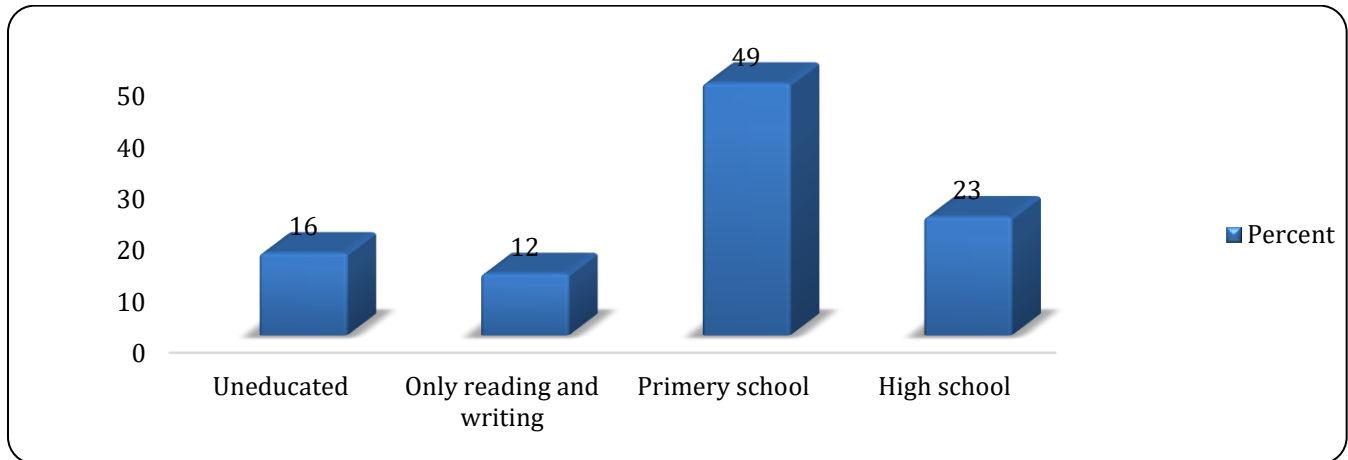


Figure 4. Educational status of households.

Table 2. Age and family size of the respondents

Variables	Mean	Minimum	Maximum
Age (in years)	32.1	18	52
Family size (in adult equivalent ratio)	2.6	0	8.6

About 22.22% of fishing households were single, compared to 77.78% who were married. The average experience of fishing households was 9.47 years, with a range of 2 to 38 years (Table 3). In terms of fishing

experience, 33.33% had five to ten years, 20.63% had two to five years, and 26.98% of fishing households had ten to fifteen years. Merely 19.05% of fishermen had experience between the ages of 15 and 38.

Table 3. Marital status, fishing experience, and fish consumption status.

Category	Indicator	Frequency	Percent
Marital status of the household	Married	49	77.78
	Unmarried	14	22.22
Fishing experience in years	2-5	13	20.63
	5-10	21	33.33
	10-15	17	26.98
	15-38	12	19.05
	Regularly	19	30.16
Fish consumption status	When I do fishing	36	57.14
	Occasionally	8	12.70

Fish contains omega-3 long-chain polyunsaturated fatty acids, which make it one of the most vital foods for your

health. Fish contain 20 essential amino acids that are advised as dietary components for humans, according to

FAO assessment 2014. Additionally, compared to red meat, fish flesh has lower cholesterol and is easier to digest after eating. According to demographic data, the majority of respondents (57.14%) consume fish when fishing in lakes or ponds. As the study area has fishery potential and is active in terms of production, about 38% of the respondents consume fish regularly. However, a few fishermen occasionally use fish meat, especially during feasting times.

Fishery activities in the study area

As the assessment confirmed that, Jimma Zone and East Showa Zone are the main fishery potential sites of Oromia Region. In Jimma Zone, both Aquaculture and capture fishery activities were practiced with selected commercial fish species. Aquaculture farming is mainly practiced through individual farmers, whereas capture fishery activities are performed in a cooperative form. The three main fish species produced by farmers in the Jimma Zone model aquaculture practices were the common carp (*Cyprinus carpio*), African catfish (*Clarias gariepinus*), and Nile tilapia (*Oreochromis niloticus*). In Jimma Zone Gilgal Gibe 1 Reservoir is the primary source for Capture fishery activities. As secondary data

confirmed, four fisheries cooperatives were organized at different landing sites near the Reservoir. In the study area, Sokoru district, one fishery cooperative was organized with 60 members who mainly participate in fish harvesting, processing, and marketing activities. Nile tilapia (*Oreochromis niloticus*) fish species make up the majority of the cache, with African catfish (*Clarias gariepinus*) coming in second in terms of total production.

On the other hand, data collected from East Shewa Zone, Ziway/Denbl Lake, and Koka reservoir is the primary source for fishery activities at Adami Tulu Jiddo, Kombolcha, and Bora district, respectively. The collected data confirmed that Gill nets (Tirmala), Beach Seines (Borata) and Long lines (Hooks) (Mantako) are the most commonly operated gear types on the lake.

According to secondary data, in Lake Dembel/Ziway, around 12 fish species were confirmed to exist. However, the results of the focus group showed that the fish species that are produced mostly at all landing sites of Lake Dembel/Ziway and Koka Reservoir are the Nile Tilapia (*Oreochromis niloticus*), Common carp (*Cyprinus carpio*), Crucian carp (*Carassus carassus*), and African Catfish (*Clarias gariepinus*) (Figure 5).



Figure 5. Leading fish species in all site (Nile Tilapia (a), Crucian carp (b), Common carp (c) and African Catfish (d)).

Stakeholder's identification in fishery activities

Like other Agricultural sectors, the fishery also has a specific approach and system to boost its production and productivity. For any sector development, the participation of different stakeholders has a significant impact on utilizing resources at different levels. Stakeholders were identified through secondary data collection, interviews, and Focus Group discussions. Then the selected stakeholders were grouped into local, regional, and national levels. The study's results confirmed that the governmental structure, from local to federal, was the primary stakeholder observed in fishery activities at the selected site.

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For any sector development, the participation of different stakeholders has a significant impact in utilizing the resources at different levels. Stakeholders were identified through secondary data collection, interviews, and Focus Group discussions. Then the selected stakeholders were grouped into local, regional, and national levels. The study's results confirmed that the governmental structure, ranging from local to federal, was the primary stakeholder observed in fishery activities at the selected site.

Stakeholders at local level

A Stakeholder at the local level is mainly established in the nearby community and resource area (Table 4). In our country, capture fishery activity is primarily performed chiefly in a cooperative manner at a potential site. The collected data also confirmed that fishery activity is mainly undertaken cooperatively on potential lakes and reservoirs. However, Aquaculture activity is undertaken with individual farmers in their backyard or irrigation area. Fishermen, the local community, Businesses, enterprises, and local government were the primary stakeholders identified at the local level.

Fishermen are individuals who participate in fish harvesting, processing, and selling to the nearest market or local consumers. According to a development agent

from Bora and ATJK District, fishery activities are undertaken at night and early morning throughout the year. Fishery is one of the main marketable food items in the potential site and several cities and towns. The collected data confirmed that many local hotels and restaurants prefer to prepare fish food for both local and other users. However, they primarily focus on profit maximization rather than resource monitoring. Data collected from Omonada district indicate that all fish production from ponds is utilized entirely by local communities, particularly those near the farm area. This result shows how aquaculture mainly contributes to the food security of our society. Many of the traders were collecting fish from different landing sites and providing them to the market through value addition.

Table 4. List of stakeholders at local level.

Stakeholder Group	List of stakeholders	Contribution to fishery activities
Fishery Cooperative	Fishermen	Fish harvesting, processing, and providing to the local market
Communities	Residents around the fishery potential lake and reservoir	Resource monitoring and benefiting from the ecosystem
Business and enterprise	Hotels and fish restaurants	Purchasing from a trader and preparing different kind of food, from fish meat, and providing for user
	Traders and Supermarket	Collect fish from the landing site, value addition (Gutted, filleted, and packing), and provide to the local market to the long value chain.
Local Government	Woreda Agriculture and Development offices (ATJK, Bora, Sokoru, and Omonada woredas)	Offer advisory service and training on resource monitoring and conservation.
	Office of Job Creation and Skills	Provide legality to access the lake or reservoir through forming a cooperative

Governmental organizations are the other main stakeholders identified in the fishery sector. At each selected site, the Woreda Agricultural Development Office is established, which is responsible for all Agricultural activities done in the district. The Woreda Agriculture Offices have a different structure with a specific discipline. According to secondary data, the natural resource protection team is primarily responsible for protecting and conserving natural resources worldwide. This group primarily focuses on raising awareness about environmental issues and the importance of natural resources, including fishery activities. They also engage in controlling illegal natural resource utilization.

On the other hand, the Extension team mainly works on facilitating the sector through providing information and technical advice. They also work as a bridge between fishermen and other stakeholders who engage or support fishery activities in different ways. The same result also indicates that the Office of Job Creation and Skill works on organizing legal fishery cooperatives on available resources except aquaculture sites.

Stakeholders at the Regional level

The fishery sector differs significantly from other agricultural activities, which different stakeholders typically run. Batu Fish and Other Aquatic Life Research Center and the Oromia Bureau of Agriculture are in

charge of the fisheries sector at the regional level, and they collaborate closely with fishery communities (Table 5). At the age of 28, Mr. Bobaso Roba, a development agent from ATJK district, approved that the Oromia Bureau of Agriculture should work on Expert capacity building, provision of fishery materials, and facilitate extension activities at all potential fishery sites.

On the other hand, the Batu Fish and Other Aquatic Life Research Center is situated in Batu town, 160 km from Addis Ababa. The center's goal is to sustainably boost

the region's fish production and productivity by generating, adopting, and transferring appropriate information, implementing, and disseminating relevant information and technology related to aquaculture and fisheries. It is one of the main concerned stakeholders actively working for the development of the fishery sector through conducting different research, transferring new information and technology, providing training for Experts, and offering technical advice to fishermen.

Table 5. List of stakeholders at the regional level

Stakeholder Group	List of stakeholders	Contribution to fishery activities
Regional Government	Oromia Bureau of Agriculture	Provide training for fishery experts, facilitate fishery extension activities
	Batu Fish and Other Aquatic Life Research Center	Conduct research and transfer new information and technology, provide training for Experts and fishermen, offer technical advice

Stakeholders at National level

At the national level, a few Governmental organizations were working on fishery activities directly and indirectly at the research site. The primary identified stakeholders in the fishing industry are the Minister of Agriculture, the Minister of Water and Energy, the Institute of Biodiversity and Research, the National Fishing and Aquatic Life Research Center, and universities (such as JU, AAU, and AU) (Table 6) as data collected from the Zone to the district, the Ministry of Agriculture is seen as an umbrella in any Agricultural activities that is responsible for government policy direction and guiding the overall system.

According to the 31-year-old male group discussant from Sokoru District, Mr. Kadir Ali, the Minister of Agriculture, supports the federal or regional fishery sector through providing different capacity-building initiatives, including laboratory enhancements, field logistics, short- and long-term training for Experts. According to the data gathered, the Ministry of Water and Energy is in charge of managing, using, and safeguarding the nation's water resources, which indirectly support the fishing industry. The National Fishery and Aquatic Life Research Center also supports the fishery sector by conducting problem-solving research activities, transferring new information and technology, providing training for Experts and fishermen, and offering technical advice.

Nowadays, some universities work on fisheries, including Jimma University, Addis Ababa University, and Ambo University. Mainly they contribute through training in fishery-related fields and are involved in research on fishery potential areas, including Jimma and East Showa Zone. In Ethiopia, reservoirs are established for the primary purpose of producing electric power for the country. At the same time, they allow for fishery production for the nearest community as well as the country. All electric station controls the reservoir water situation from summer to winter. This directly contributes to the development of the fishery sector with available resources. Gilgal Gibe 1 and Koka Electric Power Generation Station are governed under the Ethiopian Electric Authority. This stakeholder creates a suitable condition for fish production through building huge reservoirs, which is a primary requirement for this sector.

Stakeholders' linkage status in fishery

According to different data, fisheries in sub-Saharan countries are underutilizing their existing potential. The fishery industry primarily provides food, revenue, and job possibilities, particularly in rural areas. To maximize its role in day-to-day human livelihood, fisheries need participation of different potential stakeholders from the local to the national level. According to the assessment results, the governmental organization is the sole and

primary stakeholder operating in the fishery sector, either directly or indirectly, within the study area. The linkage status between each identified stakeholder was simply analyzed through a sketch with a Focus Group

Discussant from each district and each zone. The respondents specify a strong linkage when the stakeholders have a standard plan and have a schedule to implement a fishery-supported idea.

Table 6: List of stakeholders at the National level

Stakeholder Group	List of stakeholders	Contribution in fishery activities
Regional Government	Minister of Agriculture	Support the Regional fishery sector through some capacity building and facilitate short-term training for experts
	Minister of Water and Energy	Conducting a study on the conservation and use of the available water resource, water balance and availability, and sharing information on the water resource.
	National Fishery and Aquatic Life Research Center	Implement research, disseminate new knowledge and technology, train experts and fishermen, and provide technical guidance.
	Universities (JU, AAU, AU)	Research the fishery sector. Support legally organized fishermen by providing fishing materials. Support farmers in potential aquaculture sites, and other operations.
	Gilgal Gibe 1 Electric Power Generation station	Regulate water balance and administer the resource, and allow for legal fishery activities.
	Koka Electric Power Generation stations	Regulate water balance, administer the resource, and allow for legal fishery activities.

The Ministry of Agriculture acts as an umbrella organization, maintaining a continuous linkage among Regional Agriculture Bureaus in areas such as resource monitoring and governance, policy issues, and various capacity-building activities. Figure 6 demonstrates the close relationship between the Ministry of Agriculture, the Oromia Bureau of Agriculture, and the Sebeta National Fishery and Aquatic Life Research Center. This strong linkage implies that those stakeholders had a well-defined plan to work on the fishery sector on capacity building and research. The Bureau of Agriculture has extended its working structure from Zone to District and District to kebele with the same objective. They shared a common understanding and a plan for capacity building among fishermen and fishery experts, encompassing research and technology transfer. However, it had a weak linkage with universities and the Woreda of the Agricultural Office. This weak linkage implies a poor information flow and resource sharing for improving fishery sector. In terms of fisheries operations, the figure also showed a close relationship between the Oromia Bureau of Agriculture and the Batu Fish and Other Aquatic Life Research Center. Fishermen, the Sebeta Fishery and Aquatic Life Research Center, and the District Agricultural

and Development offices were all closely connected to the regional research center, Batu Fish and Other Aquatic Life Research Center. Each research activity and technology transfer process is conducted in collaboration with the District Agricultural and Development offices at the farm level. On this line, the Center uses fishermen as the leading actors for any activity implementation. They provide helpful information and work as a better facilitation for research studies as well as technology promotion. The center also collaborates closely with the National Fishery and Aquaculture Research Center on information and experience sharing, as well as undertaking various research projects in fisheries.

The listed stakeholders' formal and informal linkage types, those related to fishery activities, were identified. The majority of stakeholders had an informal linkage type, which is done via group-to-group or person-to-person collaboration. This type of contact can encourage strong levels of linkage among stakeholders. The Batu Fish and Other Aquatic Life Research Center and the Oromia Bureau of Agriculture had a formal relationship with the specified stakeholder in terms of technology transfer, fingerling distribution, and training for fishery professionals.

and a legal framework for fishery regulation, the expansion of traditional fishing, the absence of a collective plan among stakeholders, and limited participation in the sector restricted to governmental bodies.

Opportunity is a major favorable situation for the development of stakeholder linkage for the fishery sector. As data shows that, fishery sector have an opportunity including presence of ample natural and human made water bodies, fish diversity and suitable climatic condition for fisheries, good experience among fishermen and high demand for consumption and marketing, Presence of Regional and federal Research Center and presence of program and project run by the government to support fishery sector (Like FSRP and LFSDP).

Threats are uncontrollable environmental factors and external factors that could negatively impact stakeholder relationships and lead to significant adverse circumstances. However, Expansion of traditional fishing, Poor resource monitoring, Climate change, and overexploitation of the resource were mentioned as threats to stakeholder linkage in fishery activities.

DISCUSSION

Fishery activities of the study area

There are notable differences in the prospective fish production in Lake Ziway, Koka Reservoir, and Gilgel Gibe. Lake Koka is thought to have a potential yield of 1,360 to 1,500 tons per year, whereas Lake Ziway has the highest potential yield, estimated to be between 3,000 and 6,680 tons annually. Despite the potential, actual fish production in Lake Ziway has fluctuated, even declining from 2,300 tons per year to 1,127 tons per year (Birhanu, 2015). The potential of Gilgel Gibe reservoir is far lower, estimated at 400 tons annually. The vast majority of Ethiopia's fishing operations are artisanal, employing traditional techniques and small-scale enterprises. Of the 15,000 fishermen employed in this sector, around one-third are full-time. According to studies, 94,000 tons of fish might be harvested annually from lotic and lentic environments (Tsfaye and Wolff, 2014).

On the study sites, active fishery activities were performed by individuals and groups of people on these lakes and reservoirs with good fishery potential. In the study area, the majority of households were male-headed, primarily due to the nocturnal nature of the activities performed. According to secondary information, Lake Ziway has a high potential of fish production between 3000 and 6680 tons annually. Lake Chamo, which

generated 4500 tons per year, was the highest producer of fisheries, with 3180 tons coming from the Rift Valley lakes.

In the study area, the key informant interview reveals that communities have adjusted to the central fishery resource, knowing its significance in day-to-day livelihood activities. The water is used in domestic consumption, for watering animals, and irrigation activities. Additionally, the local communities benefited well from fishery activity as an income source and home consumption for the whole family. The participants in fishery activities have many years of experience that help them work with different stakeholders to maximize the benefits gained from the sector.

Fish consumption tends to increase in times when animal meat is not allowed due to religious factors. Orthodox followers need fish food during the feasting time. This finding is consistent with Lemma (2017), which found that fish consumption is significantly influenced by fasting (55 days in March/April, 15 days in August), two days each week (Wednesdays and Fridays), and other times of the week that may not be as prevalent. To accelerate the fishing activities, the government should strengthen market extension, connect fishermen with financial service providers, empower fishery cooperatives, assist fishermen in providing modern inputs and technologies, and improve the extension system (Meded et al., 2020).

Stakeholder's linkage

In Ethiopian fisheries, stakeholder linkages involve a network of individuals, groups, and institutions with varying roles and interests in the sector. These linkages can be categorized into production, technology generation, and post-production, all of which are crucial for sustainable development and effective resource management according to the National Livestock and Fisheries Extension Strategy and Roadmap. Stakeholder linkage analysis in fisheries activities examines the interconnectedness of different groups who have an interest in or are impacted by a fishery, aiming to understand their relationships, influence, and how they interact with the resource and each other. This analysis is crucial for effective fisheries management, as it helps identify potential conflicts, opportunities for collaboration, and the overall impact of management decisions on various stakeholders. Key stakeholders include fishermen, cooperatives, government bodies, NGOs, and research institutions. The main stakeholders

involved in fishing operations were suppliers of inputs, fishermen, cooperatives, local fish collectors, wholesalers, retailers, customers, and lodging establishments. Support for fisheries activities currently comes mainly from Jimma University, Batu Fish and Other Aquatic Life Research Center, Bureau of Agriculture, Sebeta Fishery Research Center, Woreda Office of Agriculture, and non-governmental organizations such as World Vision Ethiopia (Meded et al., 2020). Three market channels for Koka reservoir were found in the investigations. According to Cheffo et al. (2016), these were fishers to customers, fishers to retailers, and fishers to fishery cooperatives to wholesalers.

CONCLUSION AND RECOMMENDATION

In Ethiopia, fishery activities are mainly undertaken in lakes, reservoirs, rivers, other small water bodies, and ponds, which mainly contribute to food security at the household level. Stakeholder Linkage Analysis was examined in the Adami Tulu Jido Konbolcha and Bora districts of East Showa Zone, as well as the Sokoru and Omonada districts of Jimma Zone, in order to optimize its contribution. Based on data analysis, the study concluded that the Oromia Bureau of Agriculture and the Regional Fishery Research Center support the fishing industry. They have a common plan to support the fishery activities of the study area. They mainly work together on providing training for fishery experts and fishermen, providing fishing materials, and fish seed. Overall, the main stakeholders identified at the local or Woreda level included fishermen, Woreda Agriculture and Development offices, the Office of Job Creation and Skills, Traders, Hotels, and restaurants. Universities, the National Fishery and Aquatic Life Research Center, the Minister of Agriculture, and the Minister of Water and Energy were the primary national-level stakeholders on fisheries activities. All stakeholders mainly support the fishery sector through research and technical support. However, they don't have a formal linkage to support the sector with collective efforts. However, the existing potential, the current policy direction, and the presence of the Regional and federal Research Center are the main opportunities for improving all stakeholder linkages for better work. On the other hand, the study identified the expansion of traditional fishing, inadequate resource monitoring, overutilization, and the lack of a sustainable platform for improving stakeholder linkage as threats to enhancing stakeholder linkage in fishery activities

within the study area. Bureau of Agriculture should work on identifying the potential and interests of each stakeholder through creating a sustainable platform. On the other side, the research center also works on improving participation and linkage of different stakeholders in fisheries. Stakeholders at the local, regional, and national levels should collaborate to establish a strong linkage, thereby contributing more effectively to fishery sector development in all directions.

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