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Awareness and Adoption of Indigenous Technical Knowledge in Aquaculture in Some Local Government Areas of Ibadan Metropolis, Oyo State

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Abstract

The study documented and evaluated the extent of awareness and degree of adoption of indigenous knowledge systems in fish farming within selected local government areas in Ibadan, Oyo State, Nigeria. Purposive and random sampling methods were used to identify 122 respondents across four selected local government areas. a total of fifteen (15) Indigenous Technical Knowledges(ITKs) were identified and documented with respect to pond construction, water quality management, feed management, fish health management, and postharvest handling. The study also identified and documented the constraints perceived by the fish farmers, alongside their proposed strategies for addressing these limitations, with the aim of preserving ITKs and enhancing its integration into broader aquaculture practices. The analysis revealed that majority of the sampled subjects (62 respondents, 50.8%) identified indigenous technical knowledge as a knowledge system developed within a community, while 34 respondents (27.9%) perceived it as a culturally rooted value, additionally 60.7% of the respondents indicated that they practice or adopt one or more forms of indigenous knowledge on their farms. The study concludes and recommends documentation, validation, and scientific interventions to integrate indigenous knowledge into sustainable aquaculture practices.

Key words: Indigenous technical knowledge, Aquaculture, Awareness, Adoption.

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Introduction

Aquaculture emerges as the fastest-growing food production sector globally. According to the FAO (2024), global aquaculture production exceeded 130.9 million tonnes in 2022, surpassing capture fisheries for the first time. A significant proportion of this output, over seventy percent (70%) comes from small-scale farmers (Edward, 2009). These farmers often innovate using locally developed methods that align with their environmental and cultural contexts, resulting in unique forms of Indigenous Technical Knowledge. Indigenous technical knowledge (ITK) is farmer-driven and developed through the experiences and practices of farmers. Indigenous knowledge is a traditional type of innovation by the farmers which is stored in their activities and memories and is expressed in the form of stories, songs, myths, cultural values, beliefs, rituals, community laws, agricultural practices etc. (Dohare, 1996). According to World Bank (1998), ITKs are local, tacit knowledge, transmitted orally or through imitation and demonstration, experimental rather than theoretical, learned through repetitions, and are constantly changing. In current time various ITKs are at risk of extinction because of rapid socio-economic and cultural changes accompanied by environmental changes in global scale (Das *et al.*, 2013). ITKs generally exhibits a slow rate of adaptation, making it

vulnerable to extinction due to inability to address new challenges and less competitiveness towards new technologies. It is crucial to document such ITKs of substantial scientific basis and practical usefulness into written, drawing or other forms of recordings to protect such knowledge and also important to identify and preserve these traditional technologies in order to sustain the productivity and protect the ecosystem. Unlike the modern techniques, the ITK has a significant level of adoption either consciously or unconsciously among fish farmers because it has been generously passed on to newer generations by older ones. ITK related to inland fisheries mainly on fish harvesting was documented by Kalita and Choudhury (2004), Goswami *et al*., (2006), and De & Saha (2017). However, very few studies have been conducted on ITKs on pond construction and maintenance, feed management, and fish health management. The indigenous knowledge systems of farmers have never been recorded systematically in written form; hence they are not easily accessible to fishery researcher, extension workers and development practitioners. Therefore, there is an urgent need to identify and document their activities to make effective use of indigenous technical knowledge on aquaculture.

The adoption of ITK in aquaculture has been slow due to various factors, including a lack of awareness and recognition of its potential benefits, and the availability of alternative technologies. However, some aquaculture practitioners and researchers have recognized the importance of ITK and have incorporated it into their practices. For example, a study by Rahman *et al*. (2020) found that small-scale fish farmers in Bangladesh who adopted ITK practices, such as the use of indigenous fish species and herbal extracts, achieved higher yields and profitability compared to those who did not. ITK practices are often based on local knowledge and resources, which are readily available and affordable. The adoption and use of ITK in aquaculture face various challenges, including a lack of institutional support and recognition, limited access to information and training, and the availability of alternative technologies. Additionally, some ITK practices may not be suitable for large-scale commercial aquaculture operations, which require standardized and efficient practices. However, researchers have suggested that a hybrid approach that combines ITK practices with modern technologies can be a promising solution (Abdullahi *et al.,* 2021).

In lieu of the aforementioned above, ITK has the potential to enhance the sustainability and profitability of aquaculture. The awareness, adoption, and use of ITK practices in aquaculture have been documented in various settings, and its benefits and challenges have been discussed. Further research and institutional support are needed to promote the adoption of ITK in aquaculture and to develop hybrid approaches that combine ITK practices with modern technologies. Documentation is the conversion of traditional/indigenous knowledge information processed by communities into written documents or other forms like drawings or recordings ensuring that information is not lost and also to protect communities keeping it as prior art (Adebayo & Adeyemo, 2017). Information on research on the awareness, adoption and documentation of indigenous technical knowledge practiced by fish farmers in Oyo State is very limited, hence, this study seeks to bridge the knowledge gap by identifying, documenting, and analyzing ITK practices among fish farmers in Ibadan metropolis. It also evaluates the level of awareness, adoption, and constraints associated with indigenous technical knowledge, contributing to strategies for sustainable integration into modern aquaculture systems.

Materials and Methods

The study was conducted in Ibadan the capital city of Oyo state, located in the rain forest vegetation belt of Nigeria, covering approximately 3,123.30km square kilometers. Ibadan is reputed to be the largest indigenous city in Africa, it has an estimated population figure of over 5,591,589 million as of 2006 (NPC,2006). The study was conducted in Ibadan metropolis comprising of eleven local governments, which four were purposively selected due to the high level of fish farming activities in the areas. From these selected LGAs three fishing villages were randomly

selected using simple random sampling. The four selected local government areas consist of Akinyele, Egbeda, Oluyole and Ido local governments. A total of one hundred and twenty-two (122) respondents from each of the selected fishing villages were interviewed and data were collected using Google forms. Primary and secondary data were used in this study. Primary data were collected through structured, validated and pretested questionnaires, face-to-face interviews and direct observations. Secondary data were gathered through a review of relevant publications, journals, books and local sources. The collected data were analyzed using both descriptive and inferential statistics, utilizing the Statistical Package for Social-Sciences (SPSS 25.0) and MS Excel 2016.

The extent of awareness of the ITKs and adoption among farmers, was assessed using a structured interview schedule. Awareness of ITK was measured by asking respondents if they knew each of the 15 documented ITK practices, with binary scoring method. Adoption was assessed by asking if they had ever used the practice on their farms. The indices were computed as follows:

$$\text{Knowledge index of ITK} = \frac{\text{Number of farmers who knew the ITK}}{\text{Total number of farmers}} x100$$

$$\text{index of ITK} = \frac{\text{Number of farmers who adopted the ITK}}{\text{Number of farmers who knew the ITK}} \text{x}100$$

Results and Discuss-ion

In the aquaculture, a farmer's socio-economic background and demographic attributes significantly influence their productivity and decision-making. Factors such as age, education, farming experience etc. often determine the approach of farmers towards indigenous technical knowledge or interest towards various new technologies Soumyadip *et al.,* (2018). Some of the socio-economic parameters (Table 1) were undertaken. With respect to gender, this study uses both male and female respondents where (71.3%) were male and (28.7%) were females, indicating that male farmers are more actively involved or accessible in the context of the study area. This is due to cultural norms or gender roles that influence the level of participation of male and female farmers in agricultural activities, including aquaculture. In terms age, categories of respondent ranging of 19 years old to 66 years old were captured in this study where respondents with age group from 31-42 years of age is the highest (55.0%) in this study. The age distribution of respondents in the study could have implications for the level of knowledge, adoptability, and practices of ITK. Younger respondents, such as those in their 30s, may be more familiar with newer technologies and methods, including ITK, due to their exposure to modern education and technology from an early age. On the other hand, older respondents, particularly those in their 50s, may have grown up with traditional farming practices and may be less familiar with newer methods. This could potentially impact their level of knowledge and adoptability of ITKs.

In terms of educational background, (0.8%) of total respondents have No formal education and went to Quranic School, (7.4%) have Primary School qualifications, and (30.4%) have Secondary School qualification, while, (59.8%) have Tertiary education. This shows the level of education can have significant implications for the adoption and application of new technologies or practices, such as the squeeze method for soil testing in aquaculture and many other methods adopted indigenously. Regarding LGA of respondents, the study's findings indicate that (23.8%) of all respondents are from Akinyele, while (27.0%) of all respondents are from Egbeda LGA. And that (24.6%) of the total respondents are from Ido LGA and Oluyole LGA. The result shows that majority (52.5%) of the respondents are from rural area, the higher representation of rural farmers in the study may be attributed to several factors. Such as, aquaculture is often practiced in rural areas due to the availability of natural water bodies such as rivers, lakes, and ponds, which are suitable for fish farming. Rural areas also tend to have a higher concentration of traditional or subsistence farmers who engage in agriculture and

aquaculture for their livelihoods. Moreover, rural areas may have limited access to alternative livelihood options or economic activities, leading to a higher dependence on agriculture and aquaculture for income generation. As a result, rural farmers may be more motivated to participate in studies or research related to aquaculture, as it directly affects their livelihoods and economic well-being.

Table 1: Demographic Description of Respondents

Characteristics	Frequency	Percentage (%)
Gender		
Male	87	71.3
Female	35	28.7
Total	**122**	**100.0**
Age		
19 -30	38	31.2
31-42	67	55.0
43-54	9	7.40
55-66	8	7.00
Total	**122**	**100.0**
Marital Status		
Single	49	40.2
Married	69	56.6
Divorced	4	3.3
Total	**122**	**100.0**
Educational Background		
No Formal Education	1	0.8
Quranic School	1	0.8
Primary School	9	7.4
Secondary School	37	30.4
Tertiary Education	73	59.8
Total	**122**	**100.0**
LGA		
Akinyele	28	23.8
Egbeda	33	27.0
Ido	30	24.6
Oluyole	30	24.6

Total	**122**	**100.0**
Farm Location		
Peri-Urban	33	27.0
Rural	64	52.5
Urban	25	20.5
Total	**122**	**100.0**

Categorization of the documented Indigenous Technical Knowledge (ITK)

A total of fifteen distinct indigenous technical knowledge practices related to aquaculture were identified during the study and organized into five the thematic categories, as outlined in Table 2. Majority of the ITKs documented were on post-harvest practices (33.33%); while, pond preparation, water quality management, fish health management were (20.00%) each, feed management been (6.67%).

ITKs documented

I. Pond preparation
ITK-1 Squeeze method for soil testing.
ITK-2 Use of bamboo fencing for retention of pond dyke.
ITK-3 Traditional spillway using bamboo pipe: constructed to protect the pond from unwanted excess water during flood
II. Water quality management
ITK-4 Immersing banana stem into the pond water to correct water quality.
ITK-5 Use of lime to correct water PH
ITK-6 Beating the water surface of the pond with bamboo for 15-30 min to increase the oxygen level
III. Feed management
ITK-7 Feeding of poultry offal to fish
IV. Fish health management
ITK-8 Salt bath dip for 1-2 minutes to control diseases
ITK-9 Application of salt and Neem leaf (Dongoyaro) to control diseases
ITK-10 Applying bitter leaf to the body of diseased fish
V. Post-harvest practices
ITK-11 Live fish transport in polythene lined bamboo baskets
ITK-12 Drying fish by keeping them over the kitchen fire
ITK-13 Salting and sun drying of fish
ITK-14 Smoking fish in localized oven
ITK-15 Adding palm oil to the water when transporting live fish

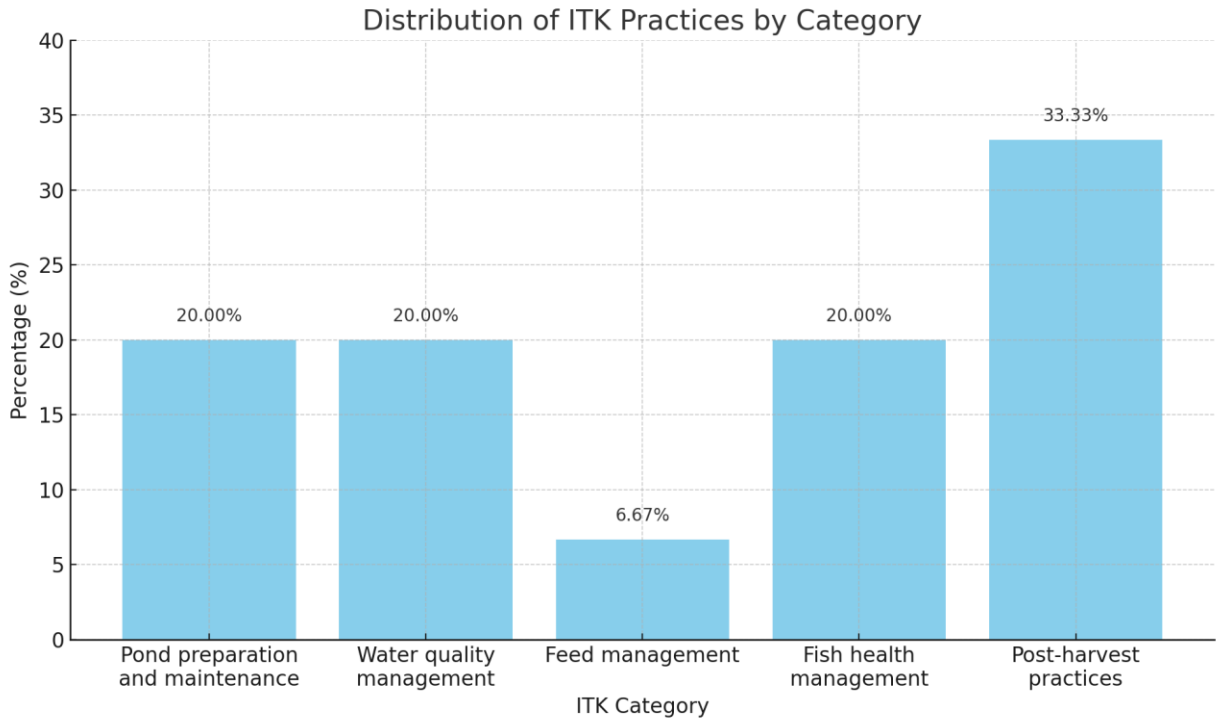

Figure 1: Categorization of the documented Indigenous Technical Knowledge (ITK)

Awareness of Indigenous Technical Knowledge

The study revealed (table 2) that the majority of sampled subjects showed that 50.8% awareness of ITK is based knowledge system developed by a community and also, 27.9% agree that it is cultured value with a mean score of 1.97. And that 65.6% of the respondents believe that they are aware of the indigenous technical knowledge practiced in your fish farming community and that the indigenous technical knowledge was learnt through cultural knowledge. More so, 60.7% of the total respondents practice any indigenous knowledge on their farm. However, 65.6% of the respondents think that the practiced ITK are still relevant. It was deduced from the result of this study that awareness of ITK is based on knowledge system developed by the community and that ITK is learnt through the cultural knowledge. More so, majority of the participants of this study think that ITK are still relevant to practice.

Table 2: Awareness of Indigenous Technical Knowledge

S/N	Awareness	Culture Value	Knowledge System developed by a community	Tradition	Folklore	None of the above	Mean
1	**What term do you think describes**	34(27.9%)	62(50.8%)	16(13.1%)	7(5.4%)	3(2.1%)	1.97

	indigenous knowledge?						
2	**Are you aware of the indigenous technical knowledge practiced in your fish farming community?**	**Yes** 80(65.6%)		**No** 33(27.0%)		**May be** 9(7.4%)	1.42
3	**Do you practice any indigenous knowledge on your farm?**	**Yes** 74(60.7%)		**No** 21(17.2%)		**Sometimes** 27(22.1%)	1.61
4	**How was the indigenous technical knowledge learnt?**	**Parent** 34(27.9%)	**Fish Farmers' Group** 7(5.4%)	**Extension Agent** 16(13.1%)	**Cultural Knowledge** 62(50.8%)	**Personal Observation** 3(2.1%)	**Internet/Mass media** 1.99
5	**Are the ITK practiced still relevant?**	**Yes** 80(65.6%)		**No** 13(10.7%)		**Not Always** 29(23.8%)	1.57

Constraints Faced by Fish Farmers practicing ITKs

Table 3 shows the distribution of responses made by respondents on the constraints faced by the farmers in practicing the ITK knowledge. Where majority of respondents in item 1 which seeks to know if respondents do not get the desired results 36.9% are undecided and 27.9% of the respondents strongly agree that it is a constraint, 35.2% disagree. The mean rating is 2.90. This indicates that a significant number of respondents expressed agreement or uncertainty regarding this constraint, suggesting that traditional farmers face challenges in achieving the desired results when practicing indigenous knowledge (Smith, 2018). 65.5% of all the respondents agree that lack of expert guidance/extension support for the use of indigenous knowledge are a constraint facing farmers in the use of ITK knowledge, and 22.2%, of respondents disagree with a mean score of 3.50. This indicates that a majority of respondents agreed that lack of expert guidance or extension support is a constraint in practicing indigenous knowledge, which could limit the effective use of traditional farming practices. This is supported by the findings of Agrawal (1995) who discusses the importance of extension services and expert guidance in facilitating the adoption and implementation of indigenous knowledge in agricultural practices.

Furthermore, 61.5% of the respondents agree that weak coordination between research and development organization is a constraint to the use of ITK knowledge by farmers and 21.3% disagree that it is not a constraint with the mean score of 3.50. This suggests that a significant proportion of respondents perceive weak coordination between research and development organizations as a constraint, indicating that better coordination between these entities could improve the

adoption and application of indigenous knowledge in traditional farming practices. Indigenous knowledge refers to the traditional knowledge and practices that have been developed and passed down through generations within indigenous communities. It encompasses various aspects of cultural, social, environmental, and economic knowledge that are unique to a particular group of people and their environment. 60.6% agree that there are no training about indigenous knowledge while 26.2% disagree and their mean score is 3.39. This indicates that a substantial number of respondents expressed agreement or uncertainty about the lack of training opportunities related to indigenous knowledge, suggesting that limited access to training resources could hinder the effective utilization of traditional farming practices. The cultural and spiritual values of biodiversity as discussed by Posey (1999) in a complementary contribution to the global biodiversity assessment are diverse and significant. Posey highlights the intrinsic connection between biodiversity and the cultural and spiritual beliefs of indigenous and local communities, emphasizing the importance of recognizing and respecting these values in biodiversity conservation efforts. It was gathered from this study that 41.8% agree that the effectiveness is of the methods are slow 29.5% disagree with the mean score of 3.12. This shows that a significant proportion of respondents expressed concerns or uncertainty about the slow effectiveness of indigenous knowledge in traditional farming practices, indicating that the perceived slow progress or outcomes could be a constraint in utilizing such practices.

Table 3: Constraints Faced by Fish Farmers Practicing ITKs

S/N	Constraints	SA	A	UND	D	SD	Mean
1	do not get the desired results	8(6.6%)	26(21.3%)	45(36.9%)	32(26.2%)	11(9.0%)	2.90
2	Lack of expert guidance/extension support for the use of the indigenous knowledge	17(13.9%)	63(51.6%)	15(12.3%)	18(14.8%)	9(7.4%)	3.50
3	Weak coordination between research and development organizations	23(18.9%)	52(42.6%)	21(17.2%)	15(12.3%)	11(9.0%)	3.50
4	There are no trainings about indigenous knowledge	16(13.1%)	58(47.5%)	16(13.1%)	22(18.0%)	10(8.2%)	3.39
5	Effectiveness is slow	9(7.4%)	42(34.4%)	35(28.7%)	27(22.1%)	9(7.4%)	3.12
6	Materials are not easily available	14(11.5%)	41(33.6%)	25(20.5%)	28(23.0%)	14(11.5%)	3.11
7	No measurement to the use of some materials	18(14.8%)	60(49.2%)	20(16.4%)	11(9.0%)	13(10.7%)	3.48
8	Unwillingness to share the knowledge by	15(12.3%)	36(29.5%)	40(32.8%)	19(15.6%)	12(9.8%)	3.19

	some elders					
9	May not always be accurate	20(16.4%)	57(46.7%)	22(18.0%)	11(9.0%)	12(9.8%)	3.51

SA=strongly agree, A= Agree, UND= Undecided, D=Disagree, SD=strongly disagree

Conclusion

The higher proportion of male respondents (71.3%) in the study indicates that male farmers are more actively involved or accessible in the context of the study area. This is due to cultural norms or gender roles that influence the level of participation of male and female farmers in agricultural activities, including aquaculture. This observation aligns with earlier research indicating that men are more frequently engaged in commercial aquaculture due to land ownership patterns and access to financial resources (Adeogun *et al.*,2010; FAO,2017). Younger fish farmers, such as those in their 30s, may be more familiar with newer technologies and methods, including ITK, due to their exposure to modern education and technology from an early age. On the other hand, older respondents, particularly those in their 50s, may have grown up with traditional farming practices and may be less familiar with newer methods. Mwangi & Kariuki (2015) stated that age significantly affects technology adoption, including ITK. Further studies should apply inferential statistical methods to explore these dynamics more precisely. Also, level of education can have significant implications for the adoption and application of new technologies or practices. A higher level of education may be associated with increased access to information, higher literacy levels, and improved analytical skills, which can positively influence the understanding and adoption of new agricultural practices (Gomez et al., 2017).

Furthermore, ITKs could be more practices and adopted by fish farmers in the rural areas due to several factors such as, the availability of natural water bodies such as rivers, lakes, sand ponds, which are suitable for fish farming. Rural areas also tend to have a higher concentration of traditional or subsistence farmers who engage in agriculture and aquaculture for their livelihoods. Moreover, rural areas may have limited access to alternative livelihood options or economic activities, leading to a higher dependence on agriculture and aquaculture for income generation. As a result, rural farmers may be more motivated to participate in studies or research related to aquaculture, as it directly affects their livelihoods and economic well-being.

Recognizing and respecting the values of ITKs are essential for effective biodiversity conservation, as they promote community engagement, cultural resilience, and sustainable livelihoods. There is need to incorporate cultural and spiritual dimensions into biodiversity conservation policies and practices, acknowledging the significance of local knowledge, practices, and belief systems in fostering biodiversity conservation efforts. Documenting indigenous knowledge can contribute to the safeguarding of cultural heritage, the empowerment of indigenous communities, and the conservation of the natural environment. Also, future research should explore how age, education, gender and locality interact with ITK practices using robust inferential techniques.

References

Abdullahi, B. A., Muhammed, M., Mustapha, M. K., & Kabir, A. (2021). Indigenous technical knowledge in aquaculture: Current status, challenges, and future prospects. Aquaculture Reports, 20, 100651.

Adebayo, J.O & Adeyemo, A.A (2017). Documentation and Dissemination of Indigenous Knowledge by Library Personnel in Selected Research Institutes in Nigeria. Library Philosophy and Practice (E-Journal). 168.Https://Digitalcommons.Unl.Edu/Libphilprac/1628

Adeogun, O. A., Ayinla, O. A., & Ishola, B. O. (2010). Gender analysis of aquaculture value chain in Nigeria. Nigerian Journal of Fisheries, 7(1), 11–19.

Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. Development and Change, 26(3), 413–439.

Das, A., Debnath, B., Choudhury, T. G., Roy, D., Saha, B., & Paul, A. (2013). Indigenous technical knowledge for pond maintenance, fish health management and fish seed in Tripura, India. Indian Journal of Traditional Knowledge, 12(1), 66–71.

De Graaf, G., & Saha, B. (2017). Local knowledge and perceptions of pond fish culture in Bangladesh. Aquaculture Reports, 7, 8–14.

Dohare, D. S. (1996). A study on indigenous technical knowledge on animal husbandry in Mathura district of India (PhD thesis). IURI, Izalmagar.

Food and Agriculture Organization. (2024). FAO report: Global fisheries and aquaculture production reaches a new record high. https://www.fao.org/newsroom/detail/fao-report-global-fisheries-and-auaculture-production-reaches-a-new-record-high/en

Goswami, B., Mondal, S., & Dana, S. S. (2006). Indigenous technological knowledge in fish farming. Indian Journal of Traditional Knowledge, 5(1), 60–63.

Kalitha, B., Choudhury, M., & Ojha, S. N. (2004). Indigenous technical knowledge on pond construction and maintenance, fish seed transportation, and fish health management in Assam hills. Indian Journal of Traditional Knowledge, 3(2), 192–197.

Posey, D. A. (1999). Cultural and spiritual values of biodiversity: A complementary contribution to the global biodiversity assessment. Intermediate Technology Publications.

Rahman, M. A., Islam, M. S., Islam, M. M., Khan, M. N. H., & Hossain, M. A. (2020). Indigenous technical knowledge and practices in small-scale freshwater fish farming in Bangladesh. Aquaculture Reports, 18, 100460.

Soumyadip, P., Sutan, K., Anandamoy, M., & Subir., K. P (2018). Indigenous Technical Knowledge in Fisheries of South Parganas District of West Bengal, India. International Journal of Current Microbiology and Applied Sciences. ISSN: 2319-7706 Volume 7 Number 02(2018)

World Bank. (1998). Indigenous knowledge for development: A framework for action. Knowledge and Learning Centre, Africa Region, World Bank.