



Scope of inland fish farming in Ernakulam – evaluating the extent of Government supports provided to the farmers and its impact on their livelihood.

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ABSTRACT

Rural development can only be achieved in a long-term sustainable manner if a project is financially viable, environmentally friendly, and socially acceptable. Only by preserving resources for future generations without sacrificing current requirements can development be said to be sustainable. One of them is aquaculture. With the rise in the number of population, natural resources have already been depleted due to high demand. The need for blue growth is growing. As the rate of consumption rises, society becomes more affluent. The initiatives of the Blue Revolution range from employment development to environmental protection. The purpose of this survey is to find out how well people are aware of the new breakthroughs and technology that aid farmers and the extend of government supports provided to the people of the state. The study region is in Kerala, the gods own country which is well abundant with natural water bodies and other sources which is under-utilized. This paper focuses attention on the scope of fish farming in making rural areas a developed model to society. Besides these, the paper will evaluate the government's supports for running fish farms. From the analysis conducted in the study, we can came to a conclusion that fish farming contributes income to the households and it enhances their quality of living, health and it increases their social well-being. The area of study is confined to the Ernakulam District. The study makes use of statistical tool like ANOVA to find the relationship between variables

KEYWORDS

Inland Fish Farming, Government Supports, Livelihood, Blue Revolution, Society, Consumption, Environmental Protection.

ABBREVIATIONS

1: MDG - Millennium Development Goals2: SDG - Sustainable Development Goals3: SLA - Sustainable Livelihood Approach4: NFDB - National Fisheries Development Board5: CIFT - Central Institute of Fisheries Technologies6: ICAR - Indian Council of Agricultural Research7: FAO - Food and Agricultural Organization8: MPEDA - Marine Products Export Development Authority9: RAS - Re-circulatory Aquaponics System10: CMIE - Centre for Monitoring Indian Economy

RESEARCH PROBLEM

Fisheries and aquaculture are the keys to ensure food security all over the world. Sustainable aquaculture development and better resource management are becoming the need and demand of the society as the total fish consumption is getting increased day by day and not only that the global aquaculture production is also getting increased. As part of 'Envision 2030' the United Nations Sustainable Development Goals (SDG), the total fish production is planning to increase from 179 million tonnes to 204 million tonnes by 2030 (FAO, State of Fisheries Aquaculture). This study attempts to reveal the real problems and constraints faced by the fish farmers and the scope of aquaculture. There are so many extension services that can be done through various developmental agencies. Value addition programs in fishing, fish cleaning, ready-to-cook fish, etc. can be made available through the adaptation of technologies. The study enquires about the scope of inland fish farming in the development of rural areas as the marine resources are been exploited so far and under-utilising the inland water bodies to meet the needs. Not only that, fish farming is a source of employment and an alternative livelihood option providing safety and nutrient rich food security to the rural people. This study enquires about the people's awareness about the fish processing technologies and their scope. Such programs are under-utilized and even the common men don't have awareness and technology backup. Rural development cannot be achieved unless the people have stability in their financial position. Farm waste is yet another trigger that should be treated carefully. If it is mishandled, it can lead to being ground for the super spread of epidemics. The study also suggests that the schemes should be budget-friendly and the government supports possess delay and is inadequate for the upliftment of fish farming in Kerala.

METHODOLOGY

Research design

The research is purely descriptive in nature. Study incorporated both primary and secondary data. Fish producers in the Ernakulam district provided primary data. Secondary data for the study was acquired by a thorough review of the literature.

Source of Data

For the purpose of conducting the study, the researcher used both primary and secondary data. Through direct interviews and a primary data collection of 400 replies from the district, we learned about their participation in fish farming. questionnaires, which include a five-point scale as well as dichotomous questions for obtaining precise results. The study's secondary sources of information came from Fisheries guidebook from both the Food and Agriculture Organization and the World Bank, ICAR-CIFT research articles, other research centres, and the federal and state governments Websites, books, journals, reports, theses, and dissertations are among the resources available.

Sampling Technique

The samples were chosen proportionately to ensure their presence in the study because the population under study is 1156 people spread throughout 96 local self-government organisations. At this point, the LSGD with no farms were deleted, while those with one farm were considered full. The system created forty sets of numbers, each consisting of ten numbers, using an online freeware called research randomizer. It will be used as the study's sample.

Reliability and validity of the questions and responses were tested to the know accuracy of the study and the Cronbachs alpha is .807.

Introduction

For a variety of reasons, a strong and prosperous fishing industry is required. The world's capture fish, and wild-caught fish are collected to the maximum extent possible. To deal with the dilemma, aquaculture or fish farming is the only viable option, and its success is solely dependent on market demand. In today's hectic world, value-added items or processed meals such as cold storage goods, marinated or coated products, seasoned fishes, cleaned or skin-peeled fishes, and vacuum-packed goods are in high demand. If it is accessible in instant cook mode, people will be happier. Technology advancements might also boost productivity. We can improve feed change and use using innovative feeding technology and approaches. Fish development may be made more cost-effective by using genetic design, hereditary traits, biotechnology, probiotics, and particular upbringing. The use of cage culture and a closed system is a step forward in the field.

Father of our nation Sri Mahatma Gandhi told us that, "India lives in Villages". Till now the situation has not changed yet. Majority of our countrymen is in the same point and only a least portion shifted their homes to cities. Now-a-days the gap between urban and rural areas are increasing due to the unequal distribution of wealth and marginalization of the poor. There is an imbalance in the growth of sectors also. The main objective of rural development is to strengthen the backward areas through various government plans and schemes. This can be achieved only if we make efforts from the grass root level. By educating and through proper health and medical facilities we can ensure a balanced human development. They are the key to development process. Infrastructure facilities like road, electricity, irrigation, markets, communication facilities, agricultural extension programs should be ensured along with employment generation. This can effect in poverty eradication and growth of the poor. After the liberalization, country grows into sustainability but the growth is not reaching the needy. This marginalization should be cleared first for the achievement of a developed nation. Majority of the population depends on agriculture as a livelihood option and they are indebted to the local money lenders as they didn't get enough money from the crops thus they produce. "The green revolution gave India self-sufficiency in food grains, but still it has some drawbacks also. Due to the use of chemical fertilizer, we lost the soil fertility, destruction of eco-friendly pests and insects, poisoning of soil and water, contamination of water resources etc."(NCERT, Economics). Thus rural development in India needs severe attention as it is a major challenge for the development of the nation. They lack even the basic necessities and infrastructure. This development cannot be achieved in a short span of time. Each state needs its own development action plan as the geographical nature is different from place to place. For this a model village development scheme should be formulated by each state according to their needs. Organic farming can be done to ensure nutritious food supply for eradicating poverty in the nation.

Ponds or tanks usually create value to other farming where the water from ponds can serve the agricultural and livestock irrigation needs. Fishes can be reared either intensively or extensively as per the tank capacity. Any aquatic organisms can be reared in a pond as per our needs. Integrated farming can help a farmer in all means as they can fully utilize all the products effectively without any wastages, loss and it can also avoid pollution. It helps the family to increase their nutrition, income, value addition, community benefits, increase market potential, etc. Although the smallholders may not have enough quantity of fish reared in their pond, they have a manageable harvest that can be used for their consumption, farm sales, or through a sales outlet. Better and advanced production techniques can increase the gradual harvest size from the ponds. Crops can be integrated into a closed system of smallholdings. The ponds can serve as a water storage structure irrigating the arms associated with and can feed the livestock efficiently providing a nutrient-rich source of culture system and it is a sustainable way of utilizing water. Esther Wanjiku Patrick and Dr. Assumptah Kagiri (2020) pointed toward building up the components that effect manageability of fish cultivating projects in open optional schools in Kiambu County. The study set up that fish cultivating supportability in open auxiliary schools is extraordinarily influenced by friendly social impacts where perspectives assume a key part. Cost of data sources was another

factor where significant expenses would mean less creation. Innovation demonstrated to affect maintainability since reception of innovation would result to higher creation and hence greater maintainability. Abilities and preparing did likewise have an impact as better abilities and preparing would result to better administration.

Our ancestors insisted on hunting and gathering food for their survival until the Neolithic age. Fishing has also been developed as a means of survival but has gained much popularity and we have witnessed the development of technology in that field. The terms aquaculture, aquaponics, fish farming, mariculture etcetera has gained much impact in the past three decades as the fish, the basic nutrient-rich animal protein showing steady demand all across the world. The world per capita income and consumption rates in fish and fishery products are always in a positive trend for the last decades. Fish culture has been there in existence since 500 BC, which is evident from an article written by a Chinese politician Fan Lei, (The Classic of Fish Culture) portraying the Common Carps (*Cyprinus carpio*). Later Europe and other Asian countries started culturing these carps from China. In this article, the author was stating that fish farming was his major source of income (Ling1977). There are some other writings from 1243 and 1639 AD by Chowmit of the Sung Dynasty and Heu (A Complete Book of Agriculture) citing the relevance of fish farming and the income they generated. Fish farming in Indo-China was practiced for years and they are called pen and cage culture of catfishes which is the native of Cambodia (Dr. N.B Zade et.al).

Objectives

u To understand the Government schemes extended to fish farmers and their effective implementation in the study region.

u To know whether there is any positive impact from running fish farms in the district.

Hypothesis

Ø H0: There is no significant difference between the opinion of respondents regarding the Government support and satisfaction enjoyed by the respondents.

H1: There is significant difference between the opinion of respondents regarding the Government support and satisfaction enjoyed by the respondents.

Ø H0: Fish farming has had no positive impact on respondent's lives.

H1: Fish farming has had a positive impact on respondent's lives.

Limitations of the study

Ø Farmers' reluctance to share information about their revenue from fish farms.

Ø The study's shortcomings are due to their unwillingness to provide personal interviews and farm visits due to the Covid-19 outbreak.

Review of literature

Georgia Pollard (2017) portrays the relevance of aquaponics in ensuring urban food security in Adelaide by analyzing three focus groups selected through purposive sampling. Based on this data, they have made seven hypotheses and came to know that majority of the urban population is not aware of the aquaponic system. However, they showed a positive response towards its future scope.

Food and Agricultural Association (2017) in their report of the technical workshop provides information on the ways of managing natural resources sustainability to reduce poverty among the fisher community. The discussion proposes all the possible promotion mechanisms for social protection that both government and private enterprises can implement. Other than these they provide policies and strategies to cope up with climate changes and natural disasters. Finally, the study finds out some of the risks and vulnerabilities faced by the people leading their livelihood through fishing.

A K Mohanty et.al (2018) draws our attention to the entrepreneurial opportunities in fisheries through business incubation. The study clearly states the technologies for enhancing farm income through entrepreneurship development, which will uplift the standard of living of the people at the bottom of the society. It is enhancing oneself and society. The same can be done by an individual or a group like SHG, Kudumbasree, or as a micro-enterprise. The CIFT and ICAR together providing fish-based entrepreneurship training camps and incubation facilities for the smooth conduct of business and also provides technological backups. This study also portrays the scope of fish-entrepreneurship or encourages innovations in the field of fisheries.

A K Mohanty et.al (2018) has made a significant study on the innovative extension approaches for sustainable development. The authors clearly state the relevance and importance of global fisheries in the study and later on narrow down to the small-scale fisheries which operate on a low investment to accelerate fishery development which will ultimately result in poverty alleviation of the fishers. Unlike India, almost every developing and the underdeveloped nation is still facing poverty and underdevelopment. Fish farming is a way forward to sustainable rural development. The study proposes some relevant extension systems or approaches, which are of great use. With the advent of technologies, we can make use of an innovative mechanism to compete with our competitors and to have better productivity, and ensure market potential. Major approaches propounded in the study include the ABCD approach, Rural Advisory Services, Model Village Extension Approach, and Disruptive Extension Approach.

F. Rajts and C. C. Shelley (2020) discuss ideas to improve live fish transportation practises in Bangladesh during the Covid-19 period. The majority of our states acquired tonnes of harmful and died fish for ingestion during the pandemic. The report acknowledges this issue and recommends methods and principles for maintaining, conditioning, and providing information on providing an aerated live fish transportation system.

Deogratias et al. (2020) examine the effects of rural fish farming in Tanzania's selected areas. The major goal is to determine whether fish farming has a positive or negative impact on household income. It is clear from this study that fish farming provides revenue to the family, increasing their purchasing power and resulting in a higher level of living. The statistical tools ANOVA and multiple regression were found to be suitable for examining the influence of livelihood diversification on fish and fisheries in the study.

Analysis of data

The data for this study was gathered from 400 fish farmers in the Ernakulam district who were registered with the Kerala Department of Fisheries. There are 82 Gramapanchayaths, 13 Municipalities, and 1 Corporation in the research region.

1. H0: There is no significant difference between the opinion of respondents regarding the Government support and satisfaction enjoyed by the respondents.

H1: There is a significant difference between the opinion of respondents regarding the Government support and satisfaction enjoyed by the respondents.

Table:4.1

Opinion of Respondents

Opinion	N	Mean	Std. Deviation
Strongly Disagree	71	1.97	.941
Disagree	144	2.00	.908
Neutral	91	2.96	1.282
Agree	65	2.98	.739
Strongly Agree	29	2.41	.733
Total	400	2.40	1.079

Source: primary data

144 respondents disagree and 71 people strongly disagreed with the supports extended by the government, they are having a standard deviation of .908 and .941 respectively. 91 people possess neutral opinion with a mean value of 2.96 and a standard deviation of 1.282. From among the respondents, 65 people agree and 29 people strongly agree with the government supports. Neutral opinions possess the highest standard deviation.

Table: 4.2

ANOVA

OVERALL OPINION ON GOVERNMENT SUPPORT

	Sum of Squares	Mean Square	F	Sig.
Between Groups	86.411	21.603	22.587	.001
Within Groups	377.787	.956		
Total	464.198			

Source: primary data

The overall opinion of respondents regarding government support is disagreement as the government process is always delayed and inadequate. Not only that, the respondents are not getting any marketing aids to boost their income level. The sig value of the test of hypothesis is .001. This indicates that the null hypothesis can be ignored and can accept the alternative hypothesis that people have a different opinion on the government support and satisfaction enjoyed by them.

2. H0: Fish farming has had no positive impact on respondent's lives

H1: Fish farming has had positive impact on respondent's lives

Table: 4.3

Benefits	Profit earned	N	Mean	Std. Deviation
Economic Benefits	Below 1 Lakh	233	1.31	.463
	1L-2L	147	1.44	.498
	2L-3L	14	1.57	.514
	3L-4L	6	1.50	.548

	Total	400	1.37	.483
Improvement In Standard Of Living	Below 1 Lakh	233	1.18	.389
	1L-2L	147	1.33	.473
	2L-3L	14	1.29	.469
	3L-4L	6	1.17	.408
	Total	400	1.24	.429
Improvement In Educational Status	Below 1 Lakh	233	1.33	.470
	1L-2L	147	1.26	.439
	2L-3L	14	1.79	.426
	3L-4L	6	1.33	.516
	Total	400	1.32	.466
Improvement In Sanitation	Below 1 Lakh	233	1.30	.458
	1L-2L	147	1.44	.498
	2L-3L	14	1.57	.514
	3L-4L	6	1.50	.548
	Total	400	1.36	.481

Source: primary data

Table 4.3 shows the descriptive statistics of improvements in the life of farmers from fish farming. It provides their families with economic benefits, sanitation improvements, a higher standard of living, and educational improvements. 233 respondents are earning an average or per harvest profit of below one lakh, 147 respondents earn an amount between one lakh and two lakh. 14 farmers are having an earning of two to three lakhs and 6 respondents earn between three to four lakh.

Table: 4.4

Benefits from fish farming

ANOVA

Benefits of fish farming		Sum of Squares	Mean Square	F	Sig.
ECONOMIC BENEFITS	Between Groups	2.162	.721	3.142	.025
	Within Groups	90.816	.229		
	Total	92.978			
IMPROVEMENT IN STANDARD OF LIVING	Between Groups	2.056	.685	3.800	.010
	Within Groups	71.422	.180		
	Total	73.478			
IMPROVEMENT IN EDUCATIONAL STATUS	Between Groups	3.600	1.200	5.720	.001
	Within Groups	83.078	.210		
	Total	86.678			
IMPROVEMENT IN SANITATION	Between Groups	2.529	.843	3.724	.012
	Within Groups	89.631	.226		
	Total	92.160			

Source: primary data

Table 4.4 gives the result of the ANOVA test. It depicts that the respondents are having improvements in their

living standards from fish farming. They believe that fish is contributing income to their family as an additional backup which makes them feel secure even in the period of the Covid-19 pandemic. In the case of economic benefits, they are having a mean square of .721 between groups and .229 within groups with an F value of 3.142. It possesses a sig value of .025 which is less than .05. Hence we can reject the null hypothesis and accept the alternative hypothesis. Improvements in the standard of living are having a mean square of .685 and .180 between and within groups with an F value of 3.800 and possess a sig value of .010 which we can reject the null hypothesis at a 1% level of significance. The educational status of the respondent's family has a mean value of 1.200 between the group and .210 within the group. They possess an F value of 5.720 with a sig value of .001 where we can reject the null hypothesis can be rejected at a 1% level of significance and the sig value of improvements in sanitation is having a value of .012. In short, all the sig values in the ANOVA test is having a value less than .05. Hence we can reject the null hypothesis and can accept the alternative hypothesis that fish farming improves the life of respondents.

Major Findings and Suggestions

There are 1156 fish farms in the district. Out of which 400 respondents are chosen randomly from the list through online software. With the data available from the department of fisheries, the major fishing villages are under-utilized as they depend fully on capture fish and they are reluctant to choose an alternative livelihood option. These communities' faces the problems of natural disasters, trawling ban, etc. and they did not have any earnings during such period resulting in low income and poverty. Fish farming can be done in the villages as an alternative livelihood to cope with the off-season needs and to increase the standard of living. Some panchayats are not having any farms and some people have taken a break and restarted farming due to a lack of support from the government. Now there are so many schemes in fish farming offered by the department of fisheries.

Suggestions

- Ø The value chain process of fish has great scope in the country.
- Ø The quality of fingerlings is yet another important factor for production. Most of the farmers face the problem of uneven growth of seeds. This problem can be solved by ensuring the quality of seeds.
- Ø A subsidized pellet supply can contribute towards the cost of operation of farms.
- Ø Periodical assessments by government agencies should be adopted for the effective management of resources.
- Ø Marketing aids should be given to solve the problem of low sales and it can reduce the wastages also.
- Ø There are so many village ponds degrading in the district. Proper usage of which can provide a ground for the development of fish farming.
- Ø Government schemes should be improved to support the common men, so budget-friendly plans should be formulated, as they will increase the productivity as well as food security of the common public.
- Ø A significant portion of the respondents has an opinion that they are not getting subsidies on time and some people opined that they did not receive any benefits even now.
- Ø Training and value addition schemes should be provided to the farmers as it will benefit them to earn more from the farm.

FINDING AND CONCLUSIONS

Findings

- Some of the respondents have faced loss from fish farming and stopped farming and restarted it after receiving any benefits from the government like subsidies, flood relief, etc.
- Most of the respondents sell their product through farm sales and by involving any middlemen in between.
- They have a highly positive attitude towards the adoption of technologies to fish farming and its procurement to reduce wastage and loss.
- Farm wastes are providing as a nutrient-rich fertilizer for the fields or the agriculture associated with the farms. Only less than 10% of people were making it into pollution by a careless throw away into streams and other sources.
- 90% of the people responded that it is environmentally friendly and sustainable.
- People in the fishing villages mostly live their livelihood through marine and inland catches. Fish farming has great scope over there, but it has the least functioned.
- Cage culture of fish farming has wide scope in the country but its function is very low in the district.
- Fish processing is the least undertaken in the district.
- The educational qualification of the respondents is mostly cited as SSLC.
- Most of the family does fish farming as a side business usually undertaken by the housewives as part of their daily routine. Which means that family participation is ensured.

Conclusion

Based on the study of the data gathered, it is clear that farmers who use an integrated agricultural system produce better results than the other modes of fish farming.. However, the farms are an important source of income for households. The Government can support the continuing farmers through farm extension schemes to flourish their operation in the society providing a ground to encourage more people to start an alternative livelihood option. Such schemes can boost these farmers' productivity to extend their business and income through proper training and development. Our central government organizations like ICAR-CIFT are providing technologies and incubation facilities for fish processing, farm mechanization inputs, various fish dryers, ready-to-serve products, etc. Unfortunately, no one in the study region is using those facilities in the study region. The use of these technology backups can enhance the rural poor with entrepreneurship development in both fishing and fish processing are possible. Adoption of such facilities can contribute towards the rural development in the regions.

Respondents expressed that they have begun to farm fish due to several reasons, but now it's a lifeline for them providing better income, nutrient-rich food, and an employment source. Government schemes are there but still, they go back from entrepreneurship as the government process is always possessing delays and inadequate. The majority of the respondents are facing the problem of marketing which can be solved by introducing a centralized system for acquiring the farm products. The introduction of some economically feasible schemes, the better government supports, adequate subsidies, and an overall government audit in all the functioning can also attract some more people to start fish farming. Thus the study proves that rural development can be achieved through implementing fish farms in the rural areas to ensure sustainable development in the region. Hence we can conclude that sustainable rural development is not a far-reaching concept if we adopt this sustainable method of farming into our livelihood.

END NOTES

3916-3923- 1Aswathy C.R., 2Dr. T.G Manoharan, Scope of Inland Fish Farming in Ernakulam - A Long Term Rural Development Strategy, Turkish Journal of Computer and Mathematics Education Vol.12 No.13 (2021), 3916-3923

BIBLIOGRAPHY

1. Journal Article–Print Christophe Bene, Robert Arthur, Hannah Norbury, Edward H Allison, Malcolm Beveridge, Simon Bush, Liam Campling, Will Leschen, David Little, Dale Squires, Shakunthala H, Thilsted, Max Troell, Meryl Williams,, Contribution of Fisheries and Aquaculture to Food Security and Poverty Reduction: Assessing the Current Evidence, *World Development*, 79, 2016, 177-196
2. Journal, Article from a Library Database with a DOI Ian Scoones, Livelihoods perspectives and rural development, *The Journal of Peasant Studies*, 36, 1, 2009, 171-196, DOI: 10.1080/03066150902820503
3. Journal, Article from a Library Database with a DOI Deogratias Pius Mulokozi, Francis Pius Mmanda, Paul Onyango, Torbjörn Lundh, Rashid Tamatamah & Håkan Berg, “Rural aquaculture: Assessment of its contribution to household income and farmers’ perception in selected districts”. Tanzania,, *Aquaculture Economics & Management*, , 2020, DOI: 10.1080/13657305.2020.1725687
4. Journal, Article from the Internet Rajts F and Shelley CC., Mola (Amblypharyngodon mola) “aquaculture in Bangladesh: Status and future needs”. Penang, Malaysia, 45, 2020, 1-4
5. Journal, Article from a Library Database with a DOI Olaganathan Rajee and Alicia Tang Kar Mun, “Impact of aquaculture on the livelihoods and food security of rural communities”, *International Journal of Fisheries and Aquatic Studies*, 5, 2, 2017, 278-283, E-ISSN: 2347-5129, P-ISSN: 2394-0506
6. Journal Article–Print Bijayalakshmi Devi Nongmaithem and, Ajit Kumar Ngangbam,, “Socioeconomic conditions and cultural profile of the fishers in India- a review”, , *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* e-ISSN: 2319-2380, p-ISSN: 2319-2372., 7, Issue 9 Ver. I (Sep. 2014),, 2014, 42- 48
7. Journal, Article from the Internet Nesar Ahmed, The Sustainable Livelihood Approach To The Development Of Fish Farming In The Rural Bangladesh”, , Vol.4, 4, 2009, 1-18
8. Magazine, Article-Print Akpinar N, Talay I, Ceylan.C et.al, , “Rural women and agrotourism in the context of sustainable rural development: a case study from Turkey”, 6, 0, 473-486, *Environment Development and Sustainability*
9. Journal Article–Print Dr. Matthias Halwart, , “The role of aquaculture in rural development”, , *Food and Agricultural Organisation of United Nations (FAO) Rome, Italy, agriculture and rural development*, 2, 2005, 41-44
10. Magazine, Article-Print Rajts F and Shelley CC, Guide to improving live fish transportation with special attention to COVID-19 pandemic in Bangladesh and other tropical developing countries”. Penang, Malaysia: , 2020, *World Fish Guidelines*
11. Magazine articles from a Database/Internet Otto Andreassen, Sustainability in Fish Farming: Global and Local Challenges and Opportunities, 4, 2012, 78-84, <https://www.jstor.org/stable/10.2307/26240392>, *RCC Perspectives*
12. Journal, Article from a Library Database with a DOI FAO. 2020. . , *The State of World Fisheries and Aquaculture 2020*, Sustainability in action. Rome., 2020, 2-52, <https://doi.org/10.4060/ca9229en>
13. Journal, Article from a Library Database with a DOI FAO, IFAD, UNICEF, WFP and WHO. 2020. . , *The State of Food Security and Nutrition in the World 2020*. , Transforming food systems for affordable healthy diets. Rome, FAO. , 2020, <https://doi.org/10.4060/ca9692en>
14. Journal Article–Print Mohanty, A.K., Sajeev, M.V, Sajesh, V.K. & Rejula K. (eds.) , "Enhancing Farm Income through Entrepreneurship Development in Fishing and Fish Processing", *Central Institute of Fisheries Technology*, Kochi, India., 2018
15. Journal Article–Print Georgia Pollard, James D. Ward, and Barbara Koth, “Aquaponics in Urban Agriculture: Social Acceptance and Urban Food Planning, Horticulture”, , 2017, 3,39
16. Journal, Article from the Internet FAO. 2017. . , “Social protection to foster sustainable management of natural resources and reduce poverty in fisheries-dependent communities”. , 2017