



ISSN: 0976-3376

Available Online at <http://www.journalajst.com>

ASIAN JOURNAL OF
SCIENCE AND TECHNOLOGY

Asian Journal of Science and Technology
Vol. 10, Issue, 06, pp.9731-9735, June, 2019

RESEARCH ARTICLE

STUDIES ON SOCIO-ECONOMIC PROFILE, PROBLEMS AND CONSTRAINTS OF SHRIMP FARMERS IN NELLORE DISTRICT OF ANDHRA PRADESH, INDIA

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ARTICLE INFO

Article History:

Received 12th March, 2019

Received in revised form

06th April, 2019

Accepted 26th May, 2019

Published online 28th June, 2019

Key words:

Shrimp culture, *L.vannamei*, Nellore, Problems, Suggestions, Sustainability.

ABSTRACT

Aquaculture over recent years has not only led to substantial socio-economic benefits such as increased nutritional levels, income, employment and foreign exchange, but has also brought vast un-utilized and under-utilized land and water resources under culture. Over the years this sector has witnessed impressive growth where culture practices have undergone considerable intensification. The Present study was carried out from 289 shrimp farmers in 32 revenue villages in 9 mandals of Nellore district. The study is aimed at analyzing the factors affecting the socio-economic status of shrimp farmers in Nellore District. The results revealed that, the Shrimp culture in these areas ignited a socio-economic change in the local economy and reflecting the same at the state level. However, the shrimp culture is facing many problems and constraints for like diseases outbreaks, quality seed etc sustainability. The farmers suggested that, availability of quality seed and other issues need to be addressed immediately. Sustainability of *L.vannamei* culture needs a integrated approach which requires understanding of disease problems, water quality parameters on one side and also to analyse the socio-economic problems of the shrimp farmers, farming practices, problems and constraints in shrimp culture on the other side with appropriate government interventions is required for social acceptable, economically viable and environmental friendly aqua culture practices which will help in win-win situation for the stakeholders and the government.

Citation: Srinivas, D., Ch. Venkatrayulu, Swapna, B., Swathi, A.V. and Venkateswarlu, V., 2019. "Studies on socio-economic profile, problems and constraints of shrimp farmers in nellore district of Andhra Pradesh, India", *Asian Journal of Science and Technology*, 09, (06), 9731-9735.

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INTRODUCTION

Aquaculture is the most rapidly growing food production sector in the world (FAO, 2000) and it accounted for 44.1% of the total fish production. Presently India is the second largest fish producing and second largest animal aqua culture nation in the world. India has quickly become a major player in the global shrimp industry, after the country initiated the culture of *L. vannamei* in 2009 by importing Specific Pathogen Free (SPF) brood stock. The export production of *L. vannamei* increased from 18247 to over 4,00,000 metric tonnes in the country during 2010-11 to 2017-18. (MPEDA, 2017). Shrimp farming is an important activity in coastal waters of Andhra Pradesh in India. The shrimp production has grown at phenomenal rate during the year 1992-1994 and later stated decreasing due disease outbreaks. The fresh water prawn, scampi was introduced as an alternative to *P. monodon* in 1999 was also faced disease problem.

After experimental studies in 2003, Government of India permitted *L.vannamei* (Boone, 1931) in 2009 through import of Specific Pathogen Free (SPF) brood stock. The *L.vannamei* culture has grown significantly from 2009 in AP both in area and production; more than half of the country's production comes from this state only. Presently, the shrimp farming is synonymous with *L.vannamei* culture in Andhra Pradesh. Nellore district which is the Aqua capital of the state with 8123.35 hectares under culture is a significant contributor to the State Shrimp Production. The mandal wise total area under culture along with number of farmers is shown in Table 1. The *L. vannamei* culture in Nellore district gradually replaced the *P. monodon* culture. Like monodon culture, vannamei culture is also facing various problems and threats and is struggling for sustainability as many diseases have been already reported. Further, lack of availability of quality seed, problem of inbred brood stock, production of seed from unregistered hatcheries, high feed cost, spurious drugs, chemicals, usage of banned antibiotics and probiotics, container rejections, issue of traceability, unregistered farming, international market price fluctuations and other related problems also upsetting the

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farmers. Very few studies have been carried out on problems and constraints in shrimp culture, along with issues related sustainability of *L.vannamei* culture. Therefore, the Present study was carried out from 289 shrimp farmers in 9 mandals of 32 revenue villages in Nellore district. The study is aimed at analyzing the factors affecting the socio-economic status of shrimp farmers in Nellore District, problems and constraints and also to identify the various issues from farmers point of view, which in turn may help in drawing policy decisions for the sustainability of shrimp aquaculture sector.

As these three regions are with predominantly culture areas, the present study was under taken, to analyse disease occurrence and socioeconomic profile of farmers and issues of sustainability of *L.vannamei* culture.

MATERIALS AND METHODS

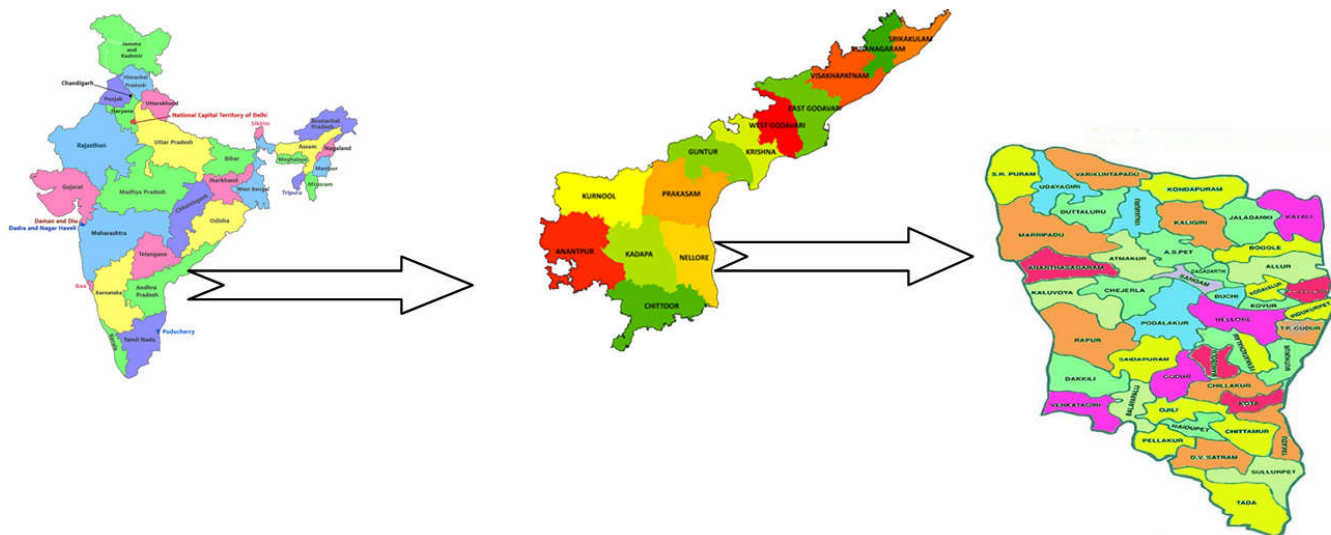
Sample design of the Study: The study was adopted in three stage stratified purpose random sampling. In the first stage, revenue mandals were selected based on the presence of

Table 1. Details Showing Mandal wise Brackish water area under culture area registered and unregistered in Nellore District (Area in Ha)

S. No	Name of the Mandal	No. of farmers Registered	Culture Area Registered	Culture Area Un Registered	Total Area Culture
1	Kavali	210	261.72	100	361.72
2	Bogole	300	538.25	189.55	727.8
3	Vidavaluru	194	628.82	57.64	686.46
4	Allur	109	550.45	183.75	734.2
5	Indukurupet	551	703.72	53.24	756.96
6	T.P. Gudur	146	1019.37	85.17	1104.54
7	Muthukuru	48	88.95	61.85	150.8
8	Venkataachalam	188	221.7	36.39	258.09
9	Chilkur	310	907.74	426.76	1334.5
10	Vakadu	199	494.42	184.28	678.7
11	Kota	163	330.87	100	430.87
12	Manubolu	286	252.13	304.11	556.24
13	Chittamuru	111	216.87	215.6	432.47
	Total	2815	6215.01	1998.34	8213.35

(Source: Dept. of Fisheries, AP, 2016)

S.No.	Study location	No. of villages covered	Number of shrimp farmers covered	Total culture area covered (ha)
1	Kavali – Allur	11	96	396.8
2	Nellore	9	98	313.6
3	Gudur-Kota	12	95	294.7
Total		32	289	1005.1



INDIA

ANDHRA PRADESH

NELLORE

Study area: Nellore district is known as Aqua capital of India, where the shrimp production and culture area is significant. The district lies between 13-30' and 15-6' of the Northern latitude and 70-5' and 80-15' of the Eastern Longitude and extending over an area of 13076 Sq.Kms. The district is having a coast line of 169 Kms and most of the coastal aqua farmers depend on marine shrimp culture sector. For the study purpose, the Nellore district is divided into three locations; Location 1: Kavali – Allur: 11 villages and 96 farmers and 396.8 hectares area were selected. Location 2: Nellore region: 9 villages and 98 farmers and 313.6 hectares area were selected were selected. Location 3: Gudur-Kota: 12 villages and 95 farmers and 294.7 hectares area were selected.

brackish water area and areas of low salinity where shrimp is cultivated. For the study, data was collected from 289 randomly chosen shrimp farmers using pre-tested questionnaire from 32 revenue villages spread over in 9 mandals of three locations in Nellore district of AP for a period of two ears i.e., from 2014 to 2016.20. Meetings with various stakeholders were also held to assess the impacts of shrimp farming in the study area on the basis of shrimp culture practices and its impact on their Socio-economic life.

Surveys and data Collection: The present study made the use of secondary as well as primary data. The methods adopted for this study include pre determined schedule, meetings, rapid

appraisal and surveys. The brief summary of the impact assessment methods adopted by this study are presented in Table- 2.

Table 2. Impact assessment methods adopted by the study

Sl. No.	Description of the method	Description of the Units Covered
1	Survey Method a) Farmers registered with CAA b) Sample Survey	All farmers in the 32 villages Selected shrimp farmers and non farmers or other stakeholders
2	Rapid Appraisal Method a) Focus group discussions b) Semi Structured interview with key stakeholders / informants	Farmers and Non farmers 1. Various farmers associations members at Village, mandal and state levels 2. Village elders, Community leaders and Knowledgeable Persons 3. Government officials 4. Non Governmental Organisations (NGOs)

Sources of the data: The primary data is collected by interviewing the farmers, who are presently doing the culture and also from the farmers who have abandoned the culture recently. The opinions of the stake holders including, feed manufacturers, seed suppliers, hatcheries operators, farm labourers, operators and owners of processing and storage plant units are also taken. Certain information is also gathered from the shrimp exporters. The secondary data is collected from the Department of Fisheries (DoF), Government of AP, Marine Products Export Development Authority, (MPEDA), Ministry of Commerce and Industry Government of India, National Fisheries Development Board (NFDB) Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Government of India, Food and Agricultural Organisation (FAO) and Office of the Joint Director of Fisheries, Nellore district. The collected data was verified with data MPEDA and statistics of Department of Fisheries, Government of Andhra Pradesh for better reliable statistics. As the brackish water culture is mostly in private sector and the culture is a dynamic environment, the actual figures some times vary with the data collected from the respondents.

RESULTS AND DISCUSSIONS

Socio – Economic Profile: A brief profile of the shrimp farmers of the study areas in Nellore district is presented in Table-3.1. It is evident that 43.3% of shrimp farmers had education level of below 10th class (SSC), 35.6% were SSC, 12.8% are Intermediate, 8.0 % are graduate and 0.3% is above graduation level. About more than three fourths of the farmers (89.6 %) had other occupations (agriculture and business sectors) in addition to shrimp farming and only 10.4 % have aquaculture as only occupation. Most of the farmers are small farmers, having a farm size of less than 2 Ha (49.5%) and about 50.5 % of them were large farmers with more than 2 Ha farming area. We can conclude that, shrimp culture is basically a enterprise of small and marginal farmers in Nellore district. The findings are in tune with the statistics of MPEDA and Department of Fisheries. Most of the farmers had more than five years of farming experience (90.4%). The villagers reported that, the development of shrimp farming helped to increase their income.

Table 3. Details Showing Socio- economic profile of shrimp farmers in Nellore District

Profile Characteristics	Frequency	Percentage
a) Education		
Below SSC	125	43.3
SSC	103	35.6
Inter	37	12.8
Graduation	23	8.0
Above Graduation	1	0.3
Total	289	100.0
b) Occupation		
Aquaculture + Others	259	89.6
Aquaculture only	30	10.4
c) Farm size		
1= < 2 Ha	143	49.5
2= 2-5 Ha	101	34.9
3=>5 Ha	45	15.6
d) Experience in culture		
< 5 years	28	9.6

More than two-third of the farmers had regular contact with feed suppliers and extension personnel of the Department of Fisheries (DoF) and other fisheries institutional agencies. The topics of the discussion included issues such as seed quality, disease management and feed management. Their major sources of information related to farming activity were feed technicians, MPEDA and DoF personnel and others. The farmers of 4.2 % only had received training in shrimp farming related areas conducted by State Institute of Fisheries Technology (SIFT), Kakinada and Marine Products Export Development Authority (MPEDA). Most of them wished to have training in disease prevention, seed quality detection, water quality management, application of probiotics and other advances in shrimp farming management practices. The main sources of the information received in related to shrimp farming by the farmers are given in Fig. 1.

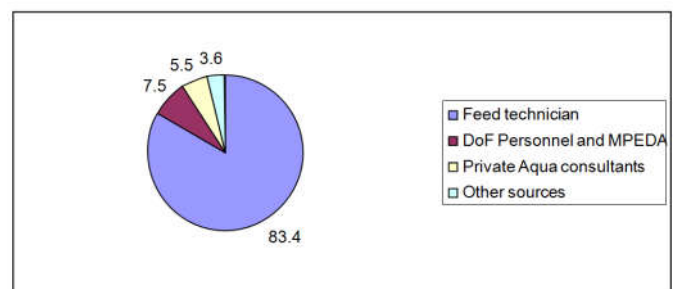


Figure 1. Showing sources of information

Fig 1 depicts that 83.4% of shrimp farmers indicated that local feed technicians and feed traders were their main source of information related to farming. The local feed traders, due to their sharing arrangement with shrimp farmers, regularly visited farmers and provided all necessary information. About 7.5 % of respondents reported that institutional information sources like MPEDA and the Department of fisheries provided them necessary information. 5.5% of farmers indicated that their information sources are from private aqua consultants, printed literature like brochures, newsletters and leaf lets from feed companies. The potential for high and quick returns on investments makes the shrimp aquaculture industry very attractive to farmers (Kim Nguyen *et al.*, 2005) The shrimp culture in the district had made tremendous impact on the life styles of the labour. It provided better standard of living and improved their socio-economic status. Development of shrimp farming has contributed enormously to the local economy as well as that of the state (Kumaran *et al.*, 2003).

The development of shrimp farming led to development of local infrastructure like link roads, transport, communication facilities etc had been possible because of shrimp farming in coastal areas. Similar results were also obtained by H.Vadher and Kapila Manoj, (2014) in their study on socio-economic profile of shrimp farmers of Gujarat state, India. The development of infrastructure facilities like roads, approach roads to the farms and transport facilities made situation more favourable to the labour. The labour reported that every year their standard of living has been improved resulting in increase of income to a tune of 10 to 20%. Shrimp culture has been listed as one of the priority sectors in India by the government for increasing exports and thereby contributing to the foreign exchange reserves (Swathi Lekshmi *et al.*, 2013). The important positive consequence of the shrimp aquaculture is that, it provides regular employment to the men and addition employment to the women directly. It also provides indirect employment to both men and women due to growth of ancillary and allied farm material needs. Aquaculture provides an employment for the period of 6-8 months in a year. The wages in the shrimp culture is generally double the wages in agriculture and most of the labour prefers to work in shrimp farms thus development of shrimp farming in Nellore district has resulted in increasing the income of the farmers. The study revealed in shrimp culture development, there is a growth of shrimp ancillary industries particularly hatcheries and feed plants along with development in feed and feed supplements shops, JCB rental agencies, construction equipments, small feed plants, etc. The Shrimp culture in these areas ignited a socio-economic change in the local economy and reflecting the same at the state level resulting in transformation of livelihoods.

Problems, Constraints and Suggestions: Aquaculture in these regions became a way of life. Though the entrepreneurship skills and hard work abilities of shrimp farmers will attend many challenges, new set of problems will arise from time to time in shrimp farming. This became a continuous cycle. The small and marginal farmers are mostly affected with problems and constraints. The study revealed that 66 % of the farmers consider diseases occurrence is a main problem in culture which is also a main constraint. Disease is now recognised as one of the most important constraints to efficient and sustainable aquaculture production, impacting on food security, socio-economic development, profitability and trade (Subasinghe and Phillips 2002). Besides disease problem the other problems faced by the farmers are non availability of quality seed, high feed cost poor water quality, lack of cooperation among farmers, current/power tariff cost lack of credit and insurance and lack of timely government support. Lack of availability of quality shrimp seed from hatcheries is of great concern to 50% of the farmers. The percentage of high feed cost (49%), poor cooperation among farmers (29 %), poor water quality (21%), and power tariff for shrimp culture (16%), lack of credit and insurance (11%) and lack of government support (7%). Similar findings of lack of availability of quality seed was also reported by Rehaman *et al.*, 2013. The small and marginal farmers are more affected with due to spurious seeds and high feed cost owing to their poor bargaining power. Middlemen are making the situation from bad to worse for these farmers. Quacks are fishing in these troubled waters. About 50% of culture ponds in Kavali region are affected with disease problems, it is 64% in Gudur and 74% in Nellore region. In the entire region diseases occurrence is a common phenomenon and many

diseases are reported in the culture ponds. White Spot Syndrome Virus (WSSV), Black Gill Disease (BGD), Running Mortality Syndrome (RMS), Loose Shell Syndrome (LSS), White Faecal Syndrome (WFS), White Muscle Disease (WMD) and vibriosis are found in *L.vannamei* culture ponds of all the three divisions of the Nellore district. White spot disease is the biggest threat to shrimp farming in these regions. The first recorded observation of white spot syndrome outside East Asia appears to have been in India in early 1993, but the outbreak was not regarded as serious at the time (Rajendran and Vijayan 2000). The first serious epizootic commenced in November–December 1994 in Nellore, Andhra Pradesh on the east coast of the subcontinent (Mohan *et al.* 1998).

Suggestions: Farmers gave various suggestions for overcoming their problems and constraints. The various suggestions given by the farmers are shown in fig 2. More than fifty percent (53%) of the farmers suggested that quality seed from hatcheries should be ensured from registered hatcheries by Coastal Aquaculture Authority (CCA). The quality of shrimp seed from hatcheries is also the great concern for the majority of farmers. Access to healthy and disease free seeds were one of the major requirements of successful farming. The finding is in line with the report given by Kumaran *et al.*, (2003) in his study on shrimp farming practices and its socio-economic consequences in East Godavari District and also report given by Dona *et al.*, (2016) in his study on occupational needs of shrimp farmers in Kerala. The other suggestions include, need to control the feed rates by the government. ensuring the contents and proximate composition of chemicals and Probiotics on the label of the packet to be used for shrimp farming, timely credit and insurance, Price information dissemination to farmers, establishment of disease diagnostic labs and provision of mobile labs at village level, electric tariff concession, technical guidance in BMPs and Government support of extension services. Further, shrimp farmers felt that, the farmers should be educated on the importance of Better Management Practices (BMPs) particularly on water quality and they also felt that a separate reservoir pond should be maintained for drawl of water and filtration of water by every farmer. These findings are tune with the similar problems/constraints presented by Mohan Kumar 2007. The studies by Chanratchakool *et al.*, 2002 also revealed more or less similar findings.

Issues of Sustainability: Pillay (1998) has defined aquaculture sustainability as “the wise and productive methods of culturing aquatic animals and plants, using natural resources in a manner that is environmentally non-degrading, technically appropriate, economically viable and socially acceptable; using the attainment and continued satisfaction of critical human needs for the present and future generations”. Development of shrimp farming in Nellore district has resulted in increasing the income of the farmers. It provided better standard of living and improved their socio-economic status. Along shrimp culture development, there is a growth of shrimp ancillary industries particularly hatcheries, feed plants and aqua shops. Shrimp farming is highly resilient in Nellore district. The farming system in the district has unique features such that the shrimp culture is practiced in low saline waters to creek based waters besides in medium and high salinity waters. There will be mixing of bore well and creek waters with fresh irrigation water for shrimp culture which leads to social tensions and pollution issues at times. The issues of common water drain, inlet and separate outlet have not been

resolved in many areas of the district. In spite of positive impacts of shrimp culture, the negative effects like salinisation of soils, conversion of agriculture fields into shrimp culture ponds, pollution issues related to farms and shrimp ancillary industries are causing social tensions. Studies by Bailey 1988; Primavera 1993; Baird & Quarto 1994; Barraclough & Finger Stich, 1996 shown that, modern shrimp farming has socio-economic costs besides from ecological consequences. The sustainability of *L.vannamei* farming is mainly depended on the quality seed produced in the hatchery from the specific pathogen free brood stock. The study on various issues and problems in *L.vannamei* farming reveals that there is urgent need to create awareness among the farmers to sustain the culture. The farmers should stock healthy disease free seed procured from registered hatcheries only. Implementing Better Management Practices (BMPs) in field level and following strictly the bio-security measures are very important for sustainable *L.vannamei* farming in the state. In this connection it was suggested that a mechanism for seed certification by the state fisheries department has to be developed to ensure supply of healthy and quality shrimp seed. Clear zonation of aquaculture and agriculture areas is the need of the hour. There is need to bring a comprehensive legislation on the practice of BMPs in general and quality of seed in particular in the shrimp farming. Barring few negative consequences, the study reveal that the shrimp culture in these areas ignited a socio-economic change in the local economy and reflecting the same at the state level.

Conclusion

The results of the present study reveal that for sustainability of *L.vannamei* culture an integrated approach is required by understanding disease problems, water quality parameters on one side and also to understand the socio-economic problems of the shrimp farmers, farming practices, problems and constraints in shrimp culture on the other side with appropriate government interventions is required for social acceptable, economically viable and environmental friendly aqua culture practices which will help in win-win situation for the stakeholders and the government.

Acknowledgements

The authors express deep thanks to the Principal, Vikrama Simhapuri University, Nellore for his constant support. We are also grateful to Marine Products Export Development Authority (MPEDA, Kochi), Joint Director of Fisheries, Nellore district and to Sri. Rama Sankar Naik, IAS, Commissioner of Fisheries, Andhra Pradesh, India.

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