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TRAINING MANUAL
1ST INTERNATIONAL TRAINING WORKSHOP ON
TAXONOMY OF BIVALVE MOLLUSCS

Editors

S. Bijoy Nandan
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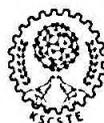


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CONTENTS

About editors / i

Preface / ii

Acknowledgments / iii

CHAPTER ONE

Taxonomy and Faunistic Survey's in India

Dr. Ramakrishna / 1

CHAPTER TWO

Annotated Classification and Diversity of Marine Bivalve Molluscs of India

Dr. N.V. Subba Rao / 25

CHAPTER THREE

Overview of the bivalve fisheries of India

Dr. K. Sunilkumar Mohamed / 47

CHAPTER FOUR

Ashtamudi clam fishery - 1st MSC Certified fishery in India

Dr. K.K. Appukuttan / 54

CHAPTER FIVE

Taxonomy of Marine Molluscs of India: Status and Challenges Ahead

Dr. Biju Kumar A. / 65

CHAPTER SIX

Molecular approaches in taxonomy with special reference to bivalve mollusc

Dr. Hari Krishnan K. / 86

CHAPTER SEVEN

Sampling Techniques for molluscan fauna

S. Bijoy Nandan, Jayachandran P. R., Asha C.V. / 105

CHAPTER EIGHT

Taxonomy of Bivalve Molluscs

Dr. P. Graham Oliver / 115

CHAPTER NINE

Status and species diversity of *Tridacna* in Indian waters

Ecological determinants and stochastic fluctuations of *Tridacna maxima* survival rate in Lakshadweep Archipelago, Monitoring densities of the giant clam *Tridacna maxima* in the Lakshadweep Archipelago

Dr. Deepak Apte / 326

Glossary

Ashtamudi Clam Fisheries: The First MSc Certified Fishery from India

K.K. Appukuttan ¹

Introduction

Ashtamudi lake (Lat. 8° 45' – 9° 26' N and Long 76° 28' – 77° 17'E) is the second largest and deepest wetland ecosystem in Kollam District of Kerala in the South West Coast of India with a water spread of 61.4 km² (6140 ha). The estuary is palm shaped with eight prominent arms and the arms converge into a single outlet at Neendakara to enter into Lakshadweep Sea. The Kallada river which originate from the Western Ghats traverse through the forests 120km and empty the freshwater into the lake. The water spread area from the Neendakara barmouth upto 6-7 km upstream is the estuarine part of the lake with rich biodiversity (Fig.1).

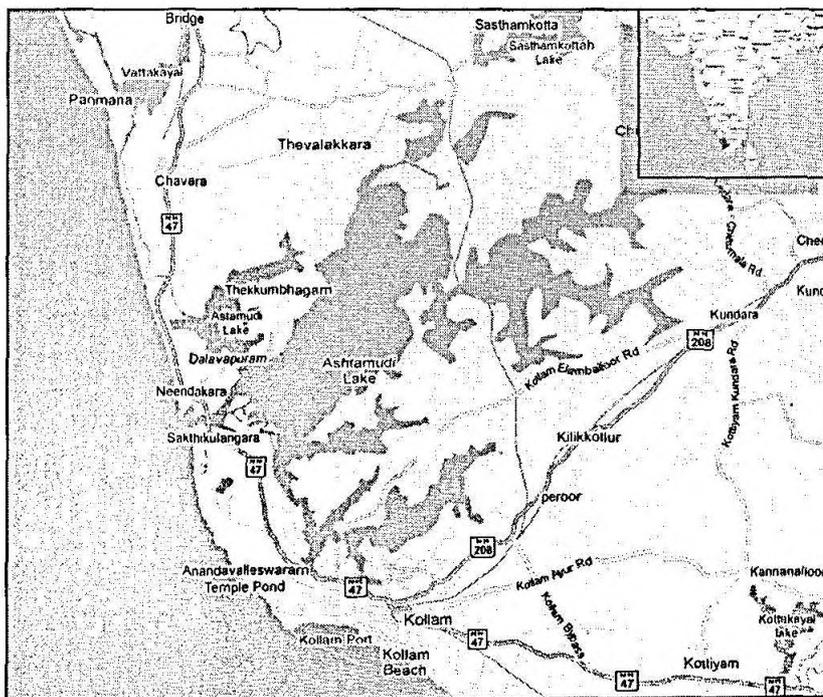


Fig.1. Location of Ashtamudi estuary in the state of Kerala, India.

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Considering the unique biodiversity and the socio-cultural characteristics of this wetland, the International Wetland Commission has declared Ashtamudi Lake as one of the Ramsor Sites in India with effect from Dec. 2002. The major resources of the lake are fin fishes, crabs and bivalves. Among bivalves the shortneck clam, *Paphia malabarica* locally known as *Kallikakka* is dominant with a distribution in 170-180 ha area in the estuarine part and are exploited for export of clam meat since 1981. Followed by this species *Mercia opima*, *Meretrix casta* and *Villorita cyprinoides* are available in lesser saline to freshwater areas in the lake.

Considering the unique nature of fishing methods and fishery management for sustainable yield of shortneck clam practiced by the clam pickers of Ashtamudi estuary, World Wide Fund- India (WWF-India) made a preliminary survey of the fishery in 2010 and requested Marine Stewardship Council (MSC) for Certification of this fishery. Fishery Certification is a voluntary process of assessment to determine whether the fishery qualify the given standards so that the products from the fishery are usually entitled to use eco - label in the market. MSC is the a non profit organization established to promote sustainable fisheries and responsible fishing practices worldwide. The MSC certified fisheries indicate that this product was caught from a well managed and sustainable fishery. Added to that the concept of fisheries certification/eco-labelling is becoming more popular in fisheries trade worldwide.

History of Ashtamudi clam Fishery

Clam picking in Ashtamudi was age old and the demand for clam meat was confined to the local area where it was eaten for generations. Commercial fishing for shortneck clam started with the export of clam meat to Japan from 1981. The demand increased further when export of meat to customers in Vietnam, Thailand, Indonesia and Malayasia in 1980's – 1990's. Along with the increased export demand, the local fish processors in cooking, freezing and exporting also increased considerably during this period. 200 t of meat exported in 1981 has increased to 400 t in 1993 with a total catch of 10,000 t of shell on clams. At that time the fishery was unregulated due to indiscriminate exploitation and harvest of huge quantities of juvenile clams to meet export demand and demand for shell for industrial purpose. The total catch declined to 5000 t in 1993. Recognizing the threat of depletion in stock, the local

fishermen approached the District Authorities requesting for immediate conservation measures. The District Administration in consultation with the Central marine Fisheries Research Institute and with the full co-operation of the clam pickers of the estuary opted for conservation measures viz; closed fishery season from November - December to January - February a three month duration every year (When young clams recruit to the shell fish beds), mesh size restriction for nets used in fishing (>32 mm), clam meat export count restricted to <1400 nos per kilogram meat. These self imposed regulations were followed by the fishermen for the last 23 years and these fishery management measures showed immediate effects, and they clam fishery has sustained landings of around 10,000t/year with stable CPUE. (Fig.2)

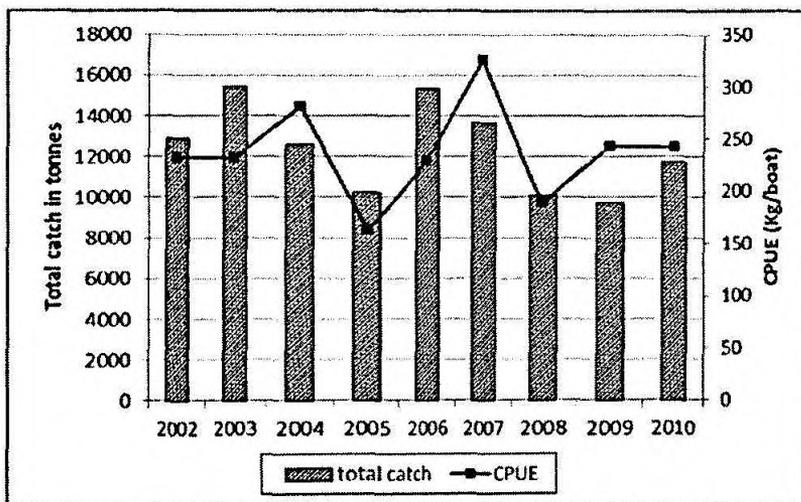


Fig.2. Landings and CPUE of *P. malabarica* from the Ashtamudi Estuary, 2002-2010.

[Source: Mohamed et al, 2012].

Biology of *Paphia malabarica*

This species comes under phylum mollusks, class. Bivalvia, order Veneroida, family veneridae sub family Tapetinae Genus *Paphia* popularly known as shortneck clam. This species is a benthic filter feeder found in the estuarine habitats on the east and west coast of India (Fig.3).



Fig. 3. Photograph of *Paphia malabarica*

Studies on age and growth show that it attain 30mm in 1st year, 38mm in 2nd year and 41mm in 3rd year. (Appukuttan *et al* 1996). Individuals of 1st year class followed by 2nd year class dominate the catch and the maximum size recorded is 52.3mm. The clam enter the fishery at 22 mm and sexual maturity is attained at a mean size of 21mm and mature clams are found in October-January period. Spawning commences in the post monsoon months especially in the December-January period depending on the intensity and duration of monsoon. The clams are profusely spawning in the first breeding season and spawn twice in a year, the second being weak and low fecund. The condition index of the clam (meat weight- shell weight index decline sharply during the spawning season with peak condition index in June – July period. Mohamed *et al* (2013) estimated the clam biomass as 24191.6 t of which short neck clam, *Paphia malabarica* biomass is estimated as 21155.4 t (87.4% of total biomass) followed by 3036.2 t (12.6%) by *Meretrix casta*. The density of clam in different areas of the estuary varied considerably, the maximum observed in areas nearer to barmouth. The length of clam in the commercial catch varied from 25-37mm.

Ecology of the Lake

Ecology of Ashtamudi Estuary has been well studied and recent study indicate that salinity varied from 20.7 to 33.2 ppt, surface water temperature varied from 29 to 30.4° c, dissolved O₂ 4.4 – 6.7 ml/l chlorophyll 2.1 to 6.1 mg/l. and pH varied from 7.9 to 8.22 in the shortneck clam bed area. The sediment texture showed that sand formed major component followed by clay and silt. Presence of organic carbon ranged from 0.03 to 0.08%. Among the heavy

metals mercury content was found to be below detectable level (Mohamed *et al*, 2013). Since the fishing method for clam is selective, retained species in the catches are oyster *Crassostrea madrasensis*, green mussel, *Perna viridis*, yellow clam, *Meretrix casta*, *Sanguinolaria spp* and *Arca sp*. Since the catch is riddled through the net with 30mm mesh before it is taken to boats, small clams and other organisms like polychaetes are not retained in the catch.

Fishing methods

Two major methods of clam harvesting is practiced by fishermen. They are diving and gathering by hand or feet and second, hand dredging by one or two persons using hand dredges. For both they use canoe to reach the clam beds, except in shallow waters. In free diving and gathering the clam, they use hand in collecting clams from shallow waters or use feet to dislodge clams from the shell bed and gather it in the net bags with 30mm mesh size. When they get appropriate quantity they climb back to the canoe, wash the net with catch thoroughly and empty them to the canoe. This is repeated several times and within 4-5 hours they collect approximately 200 kg a day Some of the fishermen use goggles to locate good shell beds (Fig 4&5). The hand dredges is operated by two or three fishermen.

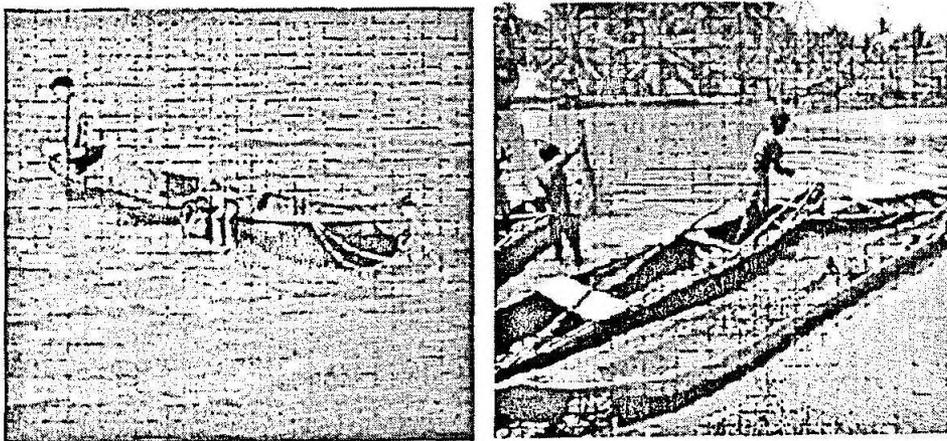


Fig. 4. Fishing by diving, Fig. 5. Catch emptied to the canoe

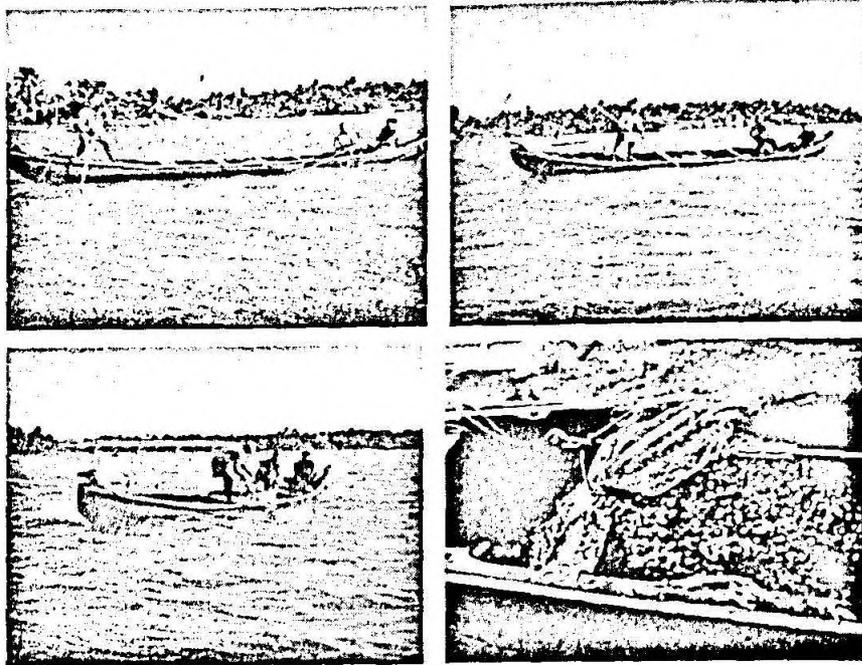


Fig.6. Driving the hand dredge to the bottom Fig. 7. Fisherman dragging the bet bag Fig.8. Washing the net bag Fig.9. A day's catch.

The hand dredge has got an iron handle preferably of 5m long GI pipe with a rectangular metal frame having a conical net bag with more than 30mm mesh size, attached to the stem. The frame has a toothless 60cm wide blade in the lower side of the frame. The dredge is operated from the canoe by one fisherman standing in the canoe and his colleague begin to haul the dredge when the dredge strikes the bottom. The fisherman in the canoe begin to haul the dredge by pulling the rope tied to the cod end of the net bag of the dredge. This action drag the dredge through the bottom for a distance of 2-3 meters and when the dredge is full with the harvest it is thoroughly washed repeatedly to discard the juvenile clams, mud and other organisms. The clam which are retained in the bag is emptied to the canoe and the process is repeated and a day's catch can be 300-400 kg. (Fig.6,7,8 &9).

Short neck clam Fishery Management

The Government of Kerala has overall responsibility for fisheries management within the territorial waters. Powers to manage these fisheries is granted under the Kerala Fisheries Regulation Act 1980. Being an annual renewable resource, clams has to be well managed for sustainable production. Strict regulations are to be imposed in juvenile exploitation and mesh size regulation for achieving this goal. The responsibility for management of



Ashtamudi Clam is delegated to District Fisheries Office. To manage the Ashtamudi clam fisheries there is a Village Clam Fishery Council with 20 members now representing all Stakeholders. (representatives of Local Self Governments, Fishermen, Scientists, Police, Mining and Geology Department, Fisheries Officials, Exporters, Marine Products Export Development Authority) The District Collector is the Chairman of the Council and Deputy Director of Fisheries, Govt. of Kerala is the Convener of the council. The Council started functioning in 2013 and each quarter they meet and discuss management issues. This management system provide opportunities for local fishermen engaged in clam fisheries, a mechanism for regulating the fishery and enforcing the regulation. This participatory management / co-management system is the first of its kind in the country to manage an aquatic resource. Added to that, informations on stock of clams and biological details are collected regularly by the Central Marine Fisheries Research Institute (CMFRI), the Central Institute of Fisheries Technology (CIFT) studied the fishery gear technology and opportunity for economic development are identified by Marine Products Export Development Authority (MPED), all the three institution located at Kochi. Fishermen are well aware of fishery regulation in force and the local police and coastguard are empowered to enforce fishery regulations in this area. Violation of regulation leads to punishment.

Marine Stewardship Council (MSC) Fisheries Certification Principles

Marine Stewardship Council (MSC) is a non-profit organization established to promote sustainable fisheries and responsible fisheries practices worldwide. Only fisheries certified to be sustainable can use MSC logo. (Fig-10) which indicate that the product was caught from a well managed sustainable fishery. *The principles and criteria for sustainable fishery* developed by MSC is used as a standard by an independent third party for voluntary certification. Certification based on the following principles.



Fig. 10. Marine Stewardship Council (MSC) Logo



- Maintenance and reestablishment of healthy population of targeted species
- The maintenance of the integrity of ecosystem
- The Fishery is subject to an effective management system that respects local, national and international laws and standards. (Fig. 11)

World Wide Fund (WWF) since 1999 took special interest in applying Marine Stewardship Council Certification as a conservation measure in small scale fisheries. As an attempt towards certification, WWF-India took up few community based MSC Certification programmes in India. Pre-analysis model is one of the tool to assess the targeted fishery and select it for Certification. Pre-assessment was carried out for shortneck clam Fishery (*Paphia malabarica*) from Ashtamudi Estuary in the South West Coast of India for certification.

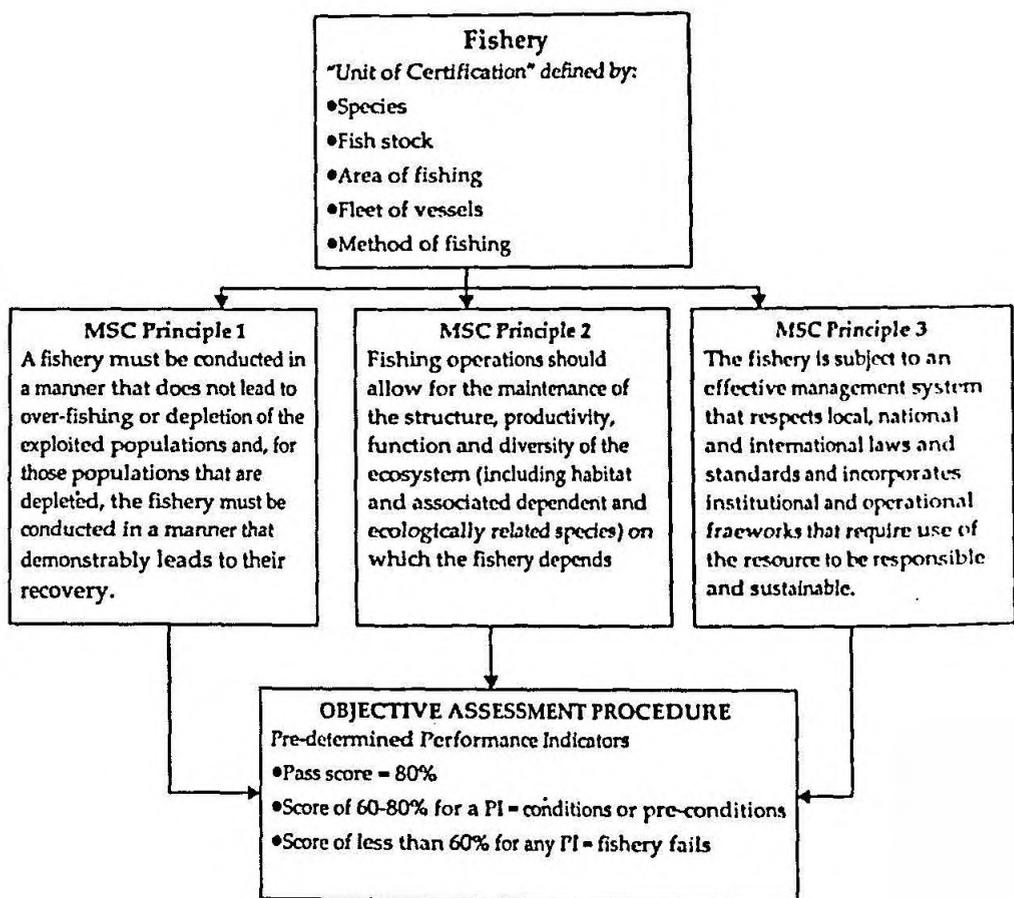


Fig. 11. Flow chart showing the MSC certification principles



The methodology and associated actions for MSC Certification

I. Initial contact with client and Certification Body - MSC

The client has to provide, who might be the client, how to choose a certification body, the unit of certification and possible certification costs and an assessment of the fishing against the MSC's principle and criteria of sustainable fisheries. This is a pre requisite for full assessment.

II. Pre-assessment evaluation

This is the first stage of assessment to provide a client with an evaluation of the possibility of fishery passing a more detailed certification assessment, if necessary for assisting the certification body for full assessment. A qualified individual or a team to conduct the pre-assessment evaluation, a report by the client that indicate the issues generated by analysis of fishery against MSC principles and criteria and identification of actions by client prior to any announcement regarding full assessment are the major actions for pre- assessment.

III. Full Assessment

Step 1: Full assessment is the formal and public evaluation of fishery against MSC's principles and criteria. MSC will advise the public the intension of undertaking the Certification if possible stake holder consultation on assessment team members, appointment of a team of experts, determination of Assessment tree including performance indicators and scoring guideposts for fishery.

Step 2: Evaluate fishery against MSC's principles and criteria for sustainable fisheries and drafting the outcomes. Stake holders are given an opportunity to input to the evaluation, client given the opportunity to respond to the draft report, stakeholders given an opportunity to comment up on selection of peer reviews. Peer review of draft report of the fishery and conditions, stakeholders given an opportunity to give comments.

Step 3: Process involves public involvement and suggestion on whether fishing can be certified or not or any special condition for certification by certification body. MSC shall place final report on website for 21 days.



IV. Certificate issued and Public Report

The certificate issue marks the end of the fishery assessment process. MSC will place the completed final report on website.

V. Post Certification

Surveillance and enforcement of conditions of certification. Surveillance audit required within 12 months after certification and annually thereafter. The results of audit are to be made public via MSC website.

Ashtamudi Shortneck clam (*Paphia malabarica*) Fishery Certification

The pre-assessment made by the WWF- India following the principle and criteria for sustainable fishery developed by MSC showed that the fishery is not subject to any controversial unilateral exemptions to an international agreement, no destructive fishing practices are used, there are mechanisms in place to resolve disputes between fishery and management system, fishery has not been assessed earliest for certification against MSC standards and there are no non-targeted IPI species in fishery. Not an enhanced fishery and this is not an introduced species. For full assessment default assessment tree was used and for performance indicators of various characters Risk Based Frame Work (RBF) was used. M/s. Intertek Fisheries, Certification (IFC), UK did the full assessment. Evaluation process was done by site visits by assessment team in September, 2013. Meetings were carried out during site visit with stake holder and all aspects of fishery and management were discussed. The assessment was announced through e-mail sent to all stakeholders. Risk Based Frame work (RBF) for this fishery was done and RBF workshop was attended by fishermen from the Ashtamudi estuary. All the stake holders were invited to attend the meeting.

The present assessment used standard Assessment tree set out in MSC certification requirement and for each performance indicator, the performance of the fishery is assessed as a 'score'. Some of the issues identified during were stock status, harvest strategy, harvest control, and tools, information on abundance of stock and monitoring (Principle-1) Information and management strategy for retained non-targeted species and discarded species, habitats and ecosystems (Principle 2) Long term fishery objectives, decision making process, compliance and enforcement, research plan, governance and management (Principle 3). These issues were addressed to



improve the performance within a period stipulated by the certification body. An Action Plan was developed for meeting all conditions. The fishery could achieve certification only if the overall score is 80 for all the three principles. The scores achieved for *Paphia malabarica* fishery is Principle-1. Target species 85.4 out of 100, Principle 2, Ecosystem 83.7 out of hundred, & Principle 3. Management system 82.3 out of 100 is the evaluation process. The Fishery attained a score of 80 or more against each of the MSC principles and the assessment team recommended Ashtamudi shortneck clam for MSC Certification. Based on the entire fishery certification process, the Ashtamudi clam Fishery was certified in November 2014 by Marine Stewardship Council. The Ashtamudi Clam fishery is the first fishery certified in India and in the developing world. MSC Certification could be useful in opening up new markets for the sustainable resource. Traceability and further chain of custody are benefits of certification.

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