SOUTH ASIAN ASSOCIATION FOR REGIONAL COOPERATION

SAARC

Policy Brief

SAC Policy Brief 8

Noveber 2019

Shiba Shankar Giri, Shaikh Mohammad Bokhtiar

Policy paths for sustainability of aquaculture diversification in South Asia

Cage culture of grouper, Maldives Photo: Hussein Ahmed

Purpose

The aim of this policy brief is to:

- sensitise South Asian countries on the need of diversifications in aquaculture for its sustainability to meet the global challenges of fish short supply
- identify the opportunities and challenges of aquaculture diversification in the South Asian region
- identify the policies needed to attain sustainability in aquaculture production

South Asian fisheries and aquaculture

With increasing global population, their wealth and health consciousness, the demand on fisheries has been increased. As the capture fisheries are static, aquaculture is the only alternative to meet the future fish demand. Asia shares 89% of the world fish production, and South Asia shares 27.3% of global and 30% of Asian fish production. An additional 27 million tons of fish would be needed to maintain a per capita fisheries consumption of 20 kg, per year in 2030. Aquaculture accounted for 47% of the total fisheries production in the world. But, in many of the South Asian countries the share of aquaculture for national fish production is much higher than that of world average, 75.7 % in Nepal, 57.0 % in India, 56.2 % in Bangladesh and 51.0% in Sri Lanka. Fish accounts for 17% of the global populations' animal protein intake, but the figures in the South Asian region are very high, 60% in Bangladesh and Sri Lanka, and 72% in Maldives. Aquaculture is the fastest growing food sector as well as the world's most diverse farming system in terms of number of species farmed, practices followed and the environments where the farms are located.

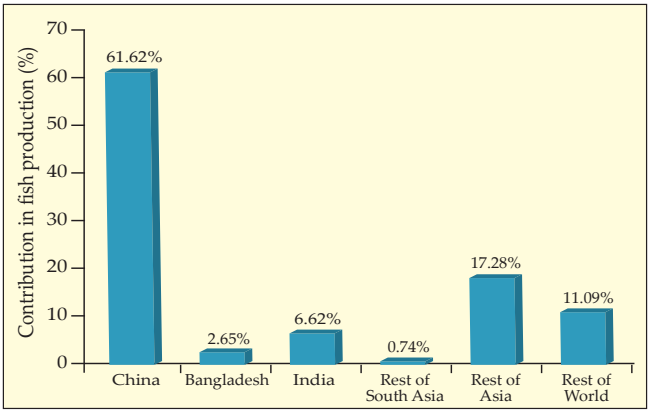

Figure 1. Contribution (%) of South Asian fish production to the global fish production (Derived from FAO, 2016)

The primary drivers of the diversification of aquaculture include market demand, funding opportunities, competition for resources, landscape, environmental and social factors. Extreme climatic events are likely to play important roles in determining the success of future aquaculture industries. At the farm and local community levels diversification can add economic, social and ecological insurance to aquaculture systems, particularly for small-scale and family-based enterprises.

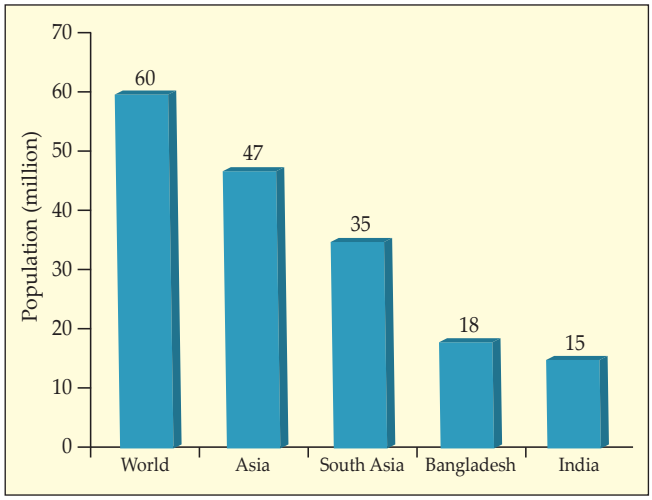

Figure 2. Population (million) engaged in fisheries and aquaculture

Diversification of aquaculture approaches

Diversification of aquaculture sites

Aquaculture is practiced in all types of environments ranging from river, lakes, paddy field, flood plain, reservoirs, ponds, ox-bow lake, seasonal water bodies, cold waters, freshwater, brakishwater and marine waters. The key to developing sustainable aquaculture lies in selecting the most appropriate site. The physical, chemical and biological parameter of the water quality are essential in determining the suitability of a site. Geographic Information Systems (GIS) offers the opportunity to model the water environment and does the zoning plan for aquaculture by identifying the zones for fast growth of the farmed species with lowest operating costs and minimal conflicts between the different uses of the water bodies.

Diversification of aquaculture species

Over the past three decades, South Asian aquaculture has undergone tremendous growth. The region has rich resources of fish biodiversity. The database of fish diversity recorded that India contains information of total 3535 finfish species. Similarly, Bangladesh has over 500 species, Sri Lanka 92 species, Pakistan 234 species, Nepal 230 species, Bhutan 109 species, Afghanistan 85 species and Maldives has only 6 freshwater species. Species diversification in aquaculture has been influenced by various factors viz., consumer preference, growth potential of a species, available aquaculture techniques, cost effectiveness, risk factors, and policy availability. Under the present fast changing climatic condition it may be safer to continue with a species with an established market, technology and management than to domesticate or introduce a new species. Increasing the number of species for farming and spreading of their production may not be the answer under all circumstances.

Diversification of cultivation density

Cultivation density is crucial in deciding the production of a species as it effects the growth, survival and behaviour of the fish. The Asian aquaculture produces a wide range of species in facilities designed for operating with different densities, production cycles, phases and culture intensity. The negative impacts associated with high production densities are reduced growth, deficient nutrient utilisation, increase in the feed conversion rate, poor health, alterations in the behaviour and the deterioration of water quality.

Diversification of production systems

Aquaculture production systems can be classified on the basis of water salinity, species farmed, farming phases, degree of human intervention required, culture density and the location of the facilities. Diversification of aquaculture systems, e.g. recirculating aquaculture systems (RAS), integrated multitrophic aquaculture (IMTA), cage culture, pen culture, raceway culture and offshore aquaculture provide opportunities for using new species in aquaculture systems.

Introducing the modern systems ensure the biosafety of exotic species, eliminate seasonality, be located close to markets, reduce water use and allow effluent treatment. There is scope for further diversification in culture systems, particularly in urban and offshore areas and in irrigation systems. Multicomponent systems, e.g. IMTA can be difficult to manage, as has been seen even in seemingly simple integrated systems such as rice-fish systems.

Diversification of cropping pattern and production cycle

Polyculture practice contributed immensely for the success of aquaculture in South Asia. In polyculture, different species are fed at different trophic levels, leading to greater food utilization in pond ecosystem with higher food production. The recent concept of rotation of cultivable species greatly reduces the environmental damages in aquaculture. Also, the cropping patterns are also modified as per the stocking and harvesting schedules at different cultural regimes.

Diversification and sustainability of aquaculture nutrition

Feed is the major contributor in aquaculture and shares 50-80% of the total production cost. Also, feed has got a significant impact on the quality, safety and nutritional value of farmed fishes. The feed requirements of fish vary in quantity and quality according to the feeding habits, physiological stages of the species, environmental variations viz., temperature, and the amount and type of natural food available in the culture system. There are three factors to consider in the choice of feed ingredients for aquafeeds, (a) quality - nutrient composition and presence of any anti-nutrients (substances that interfere directly with the absorption of nutrients or contaminants) with, (b) quantity – quantum of availability and is in regular supply with, and (c) price of ingredients. Also, the other challenges of fish feed management are feed formulation, feed processing, storage, handling and transport.

Diversification of aquaculture products

The majority of the production of South Asian aquaculture targets the domestic markets. Fisheries products are mostly dominated by fresh fish/live fish marketing. The products may range from live and frozen fishes and shellfishes to 'ready to cook/ ready to serve' convenience products. Processing methods used for aquaculture products include chilling, modified atmospheric packaging, active packing, freezing, drying, thermal processing, and dry and wet smoking. A lot of importance must be given to market survey, advertisement and packaging in order to formulate a successful value added product.

Diversification of markets

The competitiveness of an aquaculture product depends on consumers' preferences in terms of species, freshness, presentation, captured or farmed and price. Fisheries products are of high demand in South Asian markets. Per capita per annum fish consumption in Bangladesh is 25 kg, Sri Lanka 15.7 kg and India 9.5 kg. The per capita fish availability in Maldives is more than 200 kg per annum. Market diversification must be aimed at placing the correct product in the correct format in the correct market segment, at the correct time and at the correct price. Aquaculture in certain South Asian countries depends on the culture, history, and religious beliefs of the people. It is a complex task to launch a new fish or product in a market, whether or not a high quantity of fish is consumed in that market or whether the consumption of aquatic products is low.

Key challenges of diversification

Sustainability of aquaculture depends on its ecological, economic and social considerations. Diversification of aquaculture needs greater attention to environmental responsibility and sustainability; quality improvement and product diversity; improved economic efficiency and benefits to fish farmers; and strengthened business integration along the value chain and economies of scale.

What's in it for me

What's in it for farmers?

- Greater success of aquaculture diversification lies with species choice that are very limited and seasonally available
- The new candidate species with high fecundity and seed survival, tolerance a wide range of culture conditions and climate change, come from lower trophic levels, have cost-effective feed conversion, short production cycles and high consumer preferences

What's in it for researchers and technologists?

- Evaluation is required for potential new technologies, markets, socio-economic and environmental sustainability of diversification
- Research and development, appropriate to the diversification of aquaculture, addressing food and nutrition security, sustainability, livelihood with social issues, and public and private investments

What's in it for regulators?

- While considering the use of non-native species the international guidelines for responsible aquaculture should be followed
- Diversification of culture systems, e.g. recirculating aquaculture systems (RAS), integrated multi-trophic aquaculture (IMTA) and offshore aquaculture should ensure bio-security in the culture of exotic species, reduce water use and effluent treatment

- Grant supports at National and SAARC regional level to initiate and diversify aquaculture
- Development and implementation of aquaculture insurance program that provide coverages the losses due to natural perils
- Networking and collaboration on capacity building among regional, international and donor countries
- Encouraging entrepreneurial participation in the value chains to ensure sustainability

What's in it for market and trade?

- Development of value chain from production to consumption
- Development of SAARC regional BMP, standards for fish and fish products, farm-based Hazard Analysis and Critical Control Points (HACCP), food safety systems and mechanisms to enable product traceability

What's in it for society?

- Strengthening community participation through knowledge and capacity building in culture based fisheries and natural water aquaculture management

What's in it for environment?

- Exchange of potential germplasm among SAARC member states to augment aquaculture diversification
- While choosing the sites, the foreseeable environmental stresses should be considered

Where has this come from

The policy brief is prepared from the outcome of the SAARC Regional Consultation meeting on 'Fish Culture in Cages and Pens in Reservoirs, Lakes, Rivers and Marine Waters for Aquaculture Diversification in South Asia', held in Pokhara, Nepal in 2019. The SAARC member countries nominated their expert representatives to the consultative meeting to discuss country status and future needs for aquaculture in the South Asian region. The governmental, non-governmental and academia also participated in the meeting and discussed the issues.

Resources

Brummett, R., Gockowski, J., Pouomogne, V. and Muir, J. 2011. Targeting agricultural research and extension for food security and poverty alleviation: a case study of fish farming in Central Cameroon. Food Policy, 36: 805–814.

Ellis, T., Scott, A.P., Bromage, N., North, B. and Porter, M. 2001. What is stocking density? Trout News, 32: 35-37.

FAO. 2016. The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.

FAO. 2017. FAO Aquaculture News Letter, No. 56, April, 2017.

FAO. 2018. The State of World Fisheries and Aquaculture 2018 - UN Food and Agriculture Organization (FAO). http://www.fao.org/state-of-fisheries-aquaculture/en

Giri, S.S. ed. 2017. Monographs on threatened freshwater fishes of South Asia. SAARC Agriculture Centre, Dhala, Bangladesh, 305p.

Giri, S.S. ed. 2018. Small-scale fisheries in South Asia. SAARC Agriculture Centre, Dhala, Bangladesh, 137p.

Schmidt,G., Mañanós, E., Ruiz, F. and Pérez, J.L.M. eds. 2011. Diversification of aquaculture: a tool for sustainability. Spanish Ministry of Environmental, Rural and Marine Affairs General Technical Secretariat Publications Centre, Madrid, Spain. http://publicacionesoficiales.boe.es/ (servicios en línea/oficina virtual/Publicaciones)

Shiba Shankar Giri *is Senior Program Specialist (Fisheries) at SAARC Agriculture Centre (SAC), Dhaka, Bangladesh, and is the Head of Fisheries unit of SAC.*

Shaikh Mohammad Bokhtiar *is Director of SAARC Agriculture Centre, Dhaka, Bangladesh*

SAARC Agriculture Centre (SAC)
South Asian Association for Regional Cooperation
BARC Campus, Farmgate, New Airport Road, Dhaka-1215, Bangladesh
| T. +88-2-8141140 | F. +88-2-9124596 | Email: director@sac.org.bd | www.sac.org.bd

Copyright © 2019 SAARC Agriculture Centre (SAC) and authors. All rights reserved.