JUST AGRICULTURE
multidisciplinary e-Newsletter

Quality Issues and Mitigation Strategies to Improve the Quality of Fishes Available in Bhima River Basin

Ankush Kamble[1]*, Amol Kamalakar Bhalerao[2], Shivaji Argade[1], Jayapratha C[1] and Shinoji KC[3]

[1]FEES Division, ICAR-Central Institute of Fisheries Education, Mumbai, Maharashtra - 400061

[2]Training and Education Centre, ICAR - Indian Veterinary Research Institute, Pune-Maharashtra 411005

[3]ICAR-Indian Institute of Soil Science, Bhopal, Madhya Pradesh - 462038

ARTICLE ID: 66

Introduction:

The Bhima River basin is home to a diverse range of fish species, including the Cat Fish, Asian Stinging Catfish, Cyprinus, Rohu, Grass Carp, Kalbasu, Mrigal, Catla, Silver carp, Kolashi, Spotfin barb, Murrel, Tilapia, Dwarf murrel, Indian Glassy Fish, and Mangur, among others. The availability of these fish species provides significant opportunities for the fish business industry in the region. However, it is crucial to address the various quality issues that exist within this sector to ensure the production and distribution of safe and high-quality fish products.This article aims to delve into the important quality issues surrounding the fish business in the Bhima River basin and its associated aspects. By examining these issues in detail, we can gain a better understanding of the challenges faced by fish producers, distributors, and consumers in the region. Furthermore, we will explore potential strategies and solutions to mitigate these quality issues and enhance the overall quality and safety standards in the fish business. Moreover, the article will shed light on the significance of quality control measures and regulatory frameworks in ensuring the safety and quality of fish products. Quality control involves implementing monitoring and inspection procedures to assess the compliance of fish products with specified quality standards and regulations. The establishment and enforcement of appropriate quality control measures are essential to safeguard public health, promote fair trade practices, and maintain the reputation of the fish business. The article will explore the existing quality control mechanisms and regulatory frameworks in place in the Bhima River basin, highlighting their effectiveness and potential areas for improvement.

JUST AGRICULTURE
multidisciplinary e-Newsletter

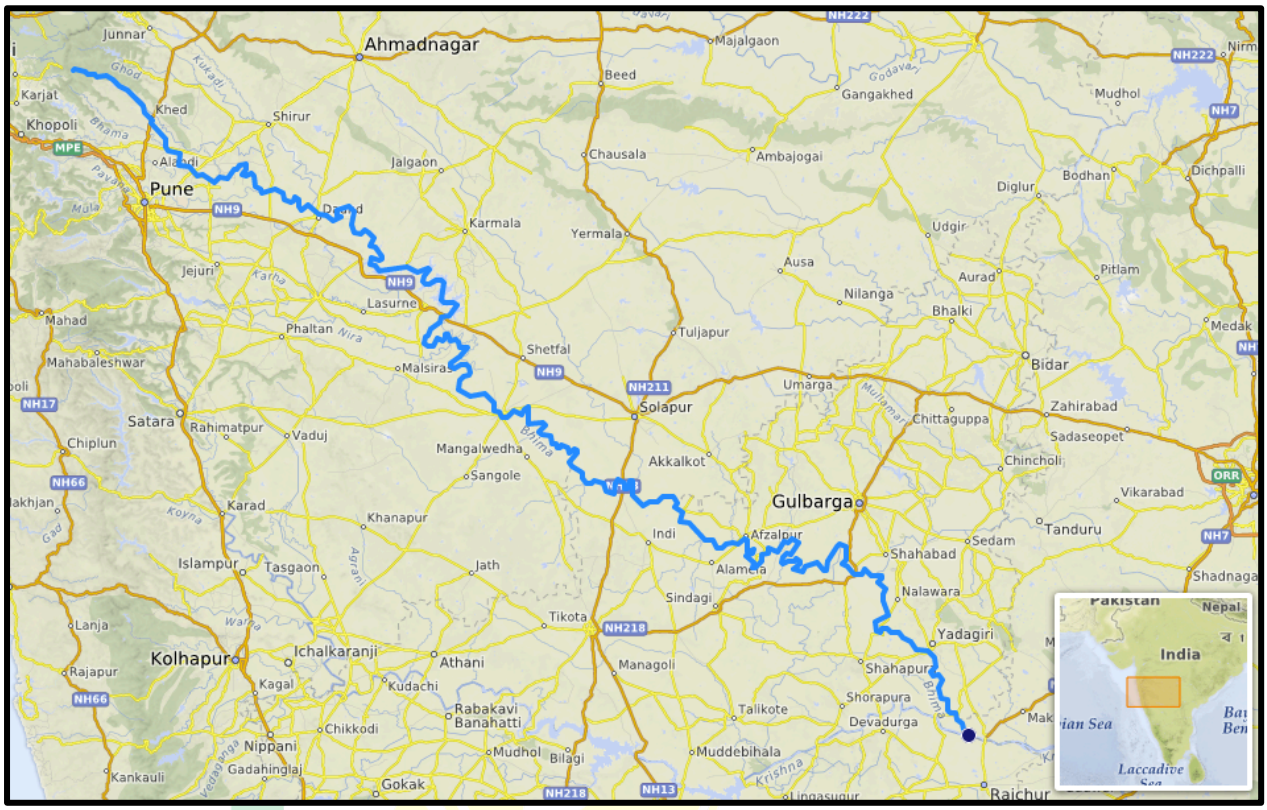

Fig.1 Map of Bhima River, its Origin, flow basin and location in India.

Quality Issues in Fish and Shell Fishes Available in Bhima River Basin

- **Heavy metals presence:** The presence of heavy metals such as mercury, cadmium, and copper in fish harvested from the Bhima River Basin is a significant issue. This is primarily attributed to the industrial and urbanized zone through which the river and its tributaries flow. The discharge of industrial and domestic waste into the river water leads to the contamination of fish with these pollutants. The higher concentration of these heavy metals in fish poses potential health risks to consumers.
- **Declining availability of nutritious fish:** The cumulative effect of pollutants in the Bhima River has created unfavourable conditions for fish, resulting in a decline in the availability of a variety of nutritious fish species. The pollution levels have led to disturbances in the aquatic ecosystem, affecting the natural habitat of fish and reducing their population. This decline in fish diversity and abundance has implications for both the ecological balance and the nutritional needs of the local population.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- **Heavy harvesting of juvenile fish:** The fishing industry in the Bhima River Basin has witnessed industrialization and an increasing demand for fish at the domestic and global levels. This has led to the unsustainable practice of heavy harvesting of juvenile fish. Fishermen often catch fish at smaller sizes, which should be allowed to grow and reproduce. The excessive fishing pressure on juvenile fish has further exacerbated the decline in fish populations and has compromised the overall quality and sustainability of the fishery.
- **Maintenance of freshness in the consumer market:** Ensuring the freshness of fish in the consumer market is a critical quality issue. Fish is highly perishable and susceptible to tissue decomposition, rancidity development, and microbial spoilage. Proper handling, storage, and transportation practices are crucial to maintain the freshness and quality of fish. However, challenges arise due to inadequate infrastructure, lack of cold chain facilities, and limited awareness among fish traders about proper handling techniques. These factors contribute to a decline in fish quality and consumer satisfaction.
- **Discoloration in fish:** Discoloration is another quality issue observed in fish from the Bhima River Basin. Although it does not directly affect the consumption quality or safety of fish, the poor appearance due to discoloration reduces the market value and price received by the product. Discoloration occurs primarily due to delays in transportation and marketing processes, which result in extended exposure to air and improper storage conditions. Proper post-harvest handling practices, including prompt chilling and packaging, can help mitigate this issue and improve the overall market value of the fish.
- **Quality of water and ice used in fish processing:** Maintaining the quality of water and ice used in fish processing is crucial for ensuring overall product quality. During the rainy season, the water quality may not meet the required standards, posing a risk of contamination. This contamination can adversely affect the freshness and safety of the fish. To address this issue, it is essential to establish strict guidelines and procedures for sourcing and testing water and ice quality. Regular monitoring and testing of water sources and ice production facilities should be conducted to prevent potential contamination.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- **Challenges in maintaining quality:** Ensuring the quality of fish products at every stage, from harvesting to marketing, poses significant challenges. The quality of the final product is influenced by several factors, including the quality of the raw materials, processing time, and storage conditions. Each step of the supply chain must adhere to strict quality control measures to minimize the risk of spoilage and maintain product freshness. Implementing proper handling techniques, ensuring adequate storage temperatures, and minimizing processing time are critical to preserving the quality of fish throughout the marketing process.
- **Microbial contamination:** Fish can become contaminated with microorganisms during various stages of the supply chain, including handling, transportation, storage, and marketing. This contamination can occur on fish platforms, landing centres, and processing centres. It is essential to implement proper hygiene practices, such as regular cleaning and disinfection of processing facilities, equipment, and transportation vehicles. Additionally, educating workers about proper handling techniques and implementing effective sanitation measures can help minimize the risk of microbial contamination and ensure product safety.
- **Other quality issues:** Apart from microbial contamination, several other factors contribute to quality problems in fish. The unpredictability of catch, uncontrolled harvesting practices, and inadequate handling, processing, and storage can all affect the quality of the final product. In the case of Bhima River fish, poor quality of raw materials such as water and ice, as well as improper handling practices, contribute to quality issues. Furthermore, the presence of heavy metals in the water and inadequate storage sanitation can also impact the quality of fish. Addressing these issues requires a comprehensive approach that focuses on improving harvesting practices, implementing proper handling techniques, and ensuring the use of clean and safe storage facilities.

Mitigation measures and strategies to improve the quality:

To enhance the quality of fish products, several strategies can be implemented. First, establishing and enforcing strict quality control standards and regulations is crucial. This includes setting guidelines for water and ice quality, as well as implementing proper handling and processing practices. Training programs and educational campaigns can help educate fish

JUST AGRICULTURE
multidisciplinary e-Newsletter

handlers and processors about the importance of quality control and proper hygiene practices. Additionally, regular monitoring and testing of fish products for microbial and chemical contaminants should be conducted to ensure compliance with safety standards. Implementing traceability systems can also help track the origin and processing history of fish, enabling quick identification and recall of contaminated products if necessary. In addition to that some specific measures are recommended as following.

- **Proper Planning for Fish Collection, Transport, and Storage:** Implementing proper planning during the collection, transport, and storage of fishes is essential for ensuring a clean and healthy environment. This includes taking enough care onboard by keeping the deck and fish hold clean and maintaining proper sanitation.
- **Balanced Harvesting of Fish Varieties:** To improve the quality of fish, a balanced harvesting approach should be adopted. This involves carefully managing the catch to ensure the sustainability of fish populations and maintaining a diverse fish community.
- **Minimizing Bacterial Contamination:** Observing proper care in fish handling and maintaining strict hygiene throughout all stages of fish processing can help minimize bacterial contamination. This includes following guidelines for proper cleaning, sanitation, and disinfection practices.
- **Ensuring Sanitary Conditions in Landing Centers and Processing Units: It** is crucial to maintain sanitary conditions in landing centers and processing units where fish are handled and processed. Regular cleaning, proper waste management, and adherence to hygiene protocols are essential to prevent contamination and maintain high-quality fish products.
- **Training and Demonstration for Fishermen and Fish Handlers:** To improve the quality of fish, training and demonstration sessions should be conducted among fishermen and fish handlers. This can include educating them about proper handling techniques, hygiene practices, and the importance of maintaining fish quality.
- **Establishment of Clean and Cold Storage Areas:** Providing clean and adequately equipped cold storage areas is important for preserving the quality of fish. These areas should be maintained at appropriate temperatures to ensure the freshness and extended shelf life of the fish.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- **Proper use of Ice for Fish Storage:** The proper use of ice is crucial for maintaining fish quality. Using sufficient amounts of ice during storage helps to preserve the freshness, texture, and flavour of the fish.
- **Immediate Processing and Handling:** To enhance fish quality, immediate processing and handling measures should be taken. This includes activities such as icing the fish immediately after catch, gutting, removal of ink sac, and proper handling techniques to minimize damage and maintain product integrity.
- **Onboard Handling Techniques:** Proper handling techniques should be followed onboard fishing vessels. This includes practices like icing the catch, gutting the fish, applying glazing for protection, and using antioxidant treatments to prevent discoloration and deterioration.
- **Quality Control and Assurance:** Implementing quality control and assurance measures throughout the entire fish supply chain is vital. This involves regular inspections, adherence to standard operating procedures, and effective monitoring to ensure that the required quality standards are met.
- **Traceability Systems:** Implementing traceability systems can help track the origin and movement of fish products, ensuring transparency and accountability in the supply chain. This facilitates the identification of potential quality issues and enables prompt corrective actions.
- **Public Awareness and Consumer Education:** Raising public awareness about the importance of fish quality and educating consumers about proper handling, storage, and cooking methods can contribute to improved fish quality. This includes disseminating information through various channels such as educational campaigns, brochures, and online resources.
- **Collaboration and Stakeholder Engagement:** Promoting collaboration and engagement among relevant stakeholders, including government agencies, fishing communities, fish processors, and consumers, is crucial for collectively addressing fish quality issues. Regular communication, sharing of best practices, and collective decision-making can lead to effective mitigation measures and continuous improvement in fish quality.

JUST AGRICULTURE
multidisciplinary e-Newsletter

Conclusion:

In conclusion, this article has shed light on the important quality issues surrounding the fish business in the Bhima River basin. We have explored the challenges faced by fish producers, distributors, and consumers in maintaining the freshness, safety, and overall quality of fish products. Several key issues have been identified, including heavy metals presence, declining availability of nutritious fish, heavy harvesting of juvenile fish, maintenance of freshness in the consumer market, discoloration in fish, quality of water and ice used in fish processing, challenges in maintaining quality, microbial contamination, and other factors impacting fish quality. To mitigate these quality issues, various strategies and measures have been proposed. These include establishing and enforcing strict quality control standards and regulations, implementing proper planning for fish collection, transport, and storage, adopting balanced harvesting practices, minimizing bacterial contamination through proper hygiene practices, ensuring sanitary conditions in landing centres and processing units, providing training and demonstration for fishermen and fish handlers, establishing clean and cold storage areas, ensuring proper use of ice for fish storage, emphasizing immediate processing and handling, following onboard handling techniques, implementing quality control and assurance measures, adopting traceability systems, promoting public awareness and consumer education, and fostering collaboration and stakeholder engagement.

By implementing these strategies, stakeholders in the fish business can enhance the overall quality, safety, and sustainability of fish products in the Bhima River basin. It is essential for government agencies, fishing communities, fish processors, and consumers to work together in addressing these quality issues and implementing the proposed measures. Continuous monitoring, evaluation, and improvement are necessary to ensure the long-term success of these initiatives and to safeguard the health and satisfaction of consumers. It is our hope that this article serves as a valuable resource and guide for policymakers, researchers, and industry professionals in their efforts to improve the quality standards of fish products in the Bhima River basin. By prioritizing quality control, promoting sustainable fishing practices, and fostering consumer trust, we can contribute to the development of a thriving and resilient fish business industry that meets the highest standards of quality and safety.

JUST AGRICULTURE
multidisciplinary e-Newsletter

References:

Bhateria, R., and Jain, D. (2016). Water quality assessment of lake water: a review. *Sustainable Water Resources Management*, *2*, 161-173.

Blidariu, F., andGrozea, A. (2011). Increasing the economic efficiency and sustainability of indoor fish farming by means of aquaponics-review. *Animal science and biotechnologies*, *44*(2), 1-8.

Bremner, H. A. (2004). Quality issues and more efficient utilization of the fish catch. In *Developments in Food Science* (Vol. 42, pp. 275-287). Elsevier.

Hasselberg, A. E., Wessels, L., Aakre, I., Reich, F., Atter, A., Steiner-Asiedu, M.,Amponsah,S., Pucher, J.,andKjellevold, M. (2020). Composition of nutrients, heavy metals, polycyclic aromatic hydrocarbons and microbiological quality in processed small indigenous fish species from Ghana: Implications for food security. *PLoS One*, *15*(11), e0242086.

Jayasankar, P. (2018). Present status of freshwater aquaculture in India-A review. *Indian Journal of Fisheries*, *65*(4), 157-165.

Little, D. C., Satapornvanit, A., and Edwards, P. (2002). Freshwater fish seed quality in Asia. In *Rural aquaculture* (pp. 185-195). Wallingford UK: CABI Publishing.