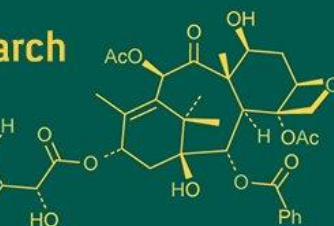
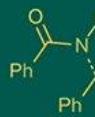


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Assessment of post-harvest fish losses in culture ponds of Dabarabhath Panchayat, Kawardha, Chhattisgarh

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Abstract

Post-harvest fish losses (PHFL) represent a significant challenge to the sustainability and profitability of aquaculture systems. The present study assessed the extent of post-harvest losses in culture fisheries of Dabarabhath Panchayat, Kabirdham district, Chhattisgarh, India. Primary data were collected using the Questionnaire Loss Assessment Method (QLAM), along with geospatial mapping of fisheries resources using the GPS Waypoint Tool. Information was obtained from 18 stakeholders, including fish farmers and fish sellers, from the villages of Dabarabhath and Ghukasa. Post-harvest losses were quantified by estimating both physical (weight) losses and quality-related economic losses. The results revealed considerable variation in losses among cultured fish species, with total monetary losses ranging from ₹ 5,431.50 to ₹ 11,065.55 per 1000 kg of fish harvested. The percentage post-harvest loss varied between 3.39% and 6.41%, with Catla (*Catla catla*) showing the highest loss (6.41%) and Common Carp (*Cyprinus carpio*) the lowest (3.39%). The major factors contributing to these losses included inadequate harvesting practices, improper handling, and lack of effective cooling and storage facilities. The findings highlight the need for improved post-harvest management interventions, including scientific harvesting techniques, proper handling practices, cold-chain development, and storage infrastructure, to minimize losses and enhance economic returns from culture fisheries in rural aquaculture systems.

Keywords: Post-harvest fish loss, culture fisheries, questionnaire loss assessment method, aquaculture economics, Dabarabhath Panchayat

Introduction

Fisheries and aquaculture are among the fastest-growing food production sectors, contributing significantly to global food security, nutrition, employment, and rural livelihoods. According to the Food and Agriculture Organization (FAO, 2026) [7], global fisheries and aquaculture production reached 235 million tonnes in 2024, including 195 million tonnes of aquatic animals, with aquaculture contributing 103 million tonnes (53% of total production and over 59% of aquatic foods for human consumption). India, the world's second-largest fish producer, has witnessed rapid growth in inland aquaculture, enhancing fish production and rural incomes. However, post-harvest losses continue to reduce fish quality, quantity, and economic returns, posing a major challenge to the sustainability of the fisheries sector (FAO, 2026; Kaur & Watson, 2024) [7, 9].

Post-harvest fish losses (PHFL) represent a critical challenge throughout the fisheries value chain, particularly in developing countries where infrastructure and cold-chain facilities remain inadequate (Abelti and Tekka, 2024) [1]. Owing to its high moisture content, neutral pH, and rapid enzymatic and microbial deterioration, fish is among the most perishable food commodities (Mehta *et al.*, 2025; Yadav *et al.*, 2025) [10, 13]. Consequently, substantial losses occur during harvesting, handling, transportation, storage, processing, and marketing. These losses not only reduce the physical quantity of fish available for consumption but also diminish product quality, safety, nutritional value, and market price, thereby adversely affecting producers' income, food security, and resource-use efficiency (Jha *et al.*, 2015) [8]. Post-harvest losses are broadly classified into physical losses, resulting from spoilage, discards, or wastage, and quality losses, arising from deterioration in freshness and market acceptability that lowers the economic value of fish products.

Chhattisgarh is one of India's most resource-rich inland fisheries states, possessing approximately 1.64 lakh hectares of water resources suitable for aquaculture (Bhendarkar

et al., 2017)^[3]. The state ranks fifth in fish seed production and sixth in inland fish production nationally, reflecting the rapid expansion of freshwater aquaculture. Recognizing fisheries as a key driver of rural livelihoods and entrepreneurship, the Government of Chhattisgarh has actively promoted pond-based culture systems across the state (Devi *et al.*, 2017)^[5]. Composite carp culture, dominated by Indian major carps (*Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*) along with exotic carps such as common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), and silver carp (*Hypophthalmichthys molitrix*), constitutes the predominant aquaculture practice in village ponds.

Among the inland fisheries districts of Chhattisgarh, Kawardha has emerged as an important aquaculture-producing region, recording approximately 22,939 metric tonnes of fish production during 2022-2023. Within the district, Dabrabhath Gram Panchayat, comprising the villages of Dabrabhath and Ghukasa, relies extensively on composite carp culture for livelihood generation. Despite increasing fish production, no systematic assessment has been conducted to quantify post-harvest fish losses or identify the underlying factors responsible for these losses at the panchayat level. Existing studies have reported that inadequate harvesting practices, delayed marketing, insufficient icing, poor transportation infrastructure, and improper handling are among the major causes of post-harvest losses in small-scale aquaculture systems (Sahu & Datta, 2020)^[12]. However, these findings cannot be generalized across different production systems because post-harvest losses vary considerably depending on local harvesting practices, infrastructure, market accessibility, and socio-economic conditions.

Despite the increasing importance of aquaculture in Dabrabhath Gram Panchayat, information on post-harvest fish losses at the local level remains limited. Therefore, the present study was conducted to assess post-harvest fish losses in culture ponds of Dabrabhath Panchayat, Kawardha district, Chhattisgarh, using the Questionnaire Loss Assessment Method (QLAM), with emphasis on estimating species-wise physical and economic losses associated with post-harvest handling and marketing.

Materials and Methods

The study was conducted in Dabrabhath Panchayat of Kabirdham district, Chhattisgarh, India, located approximately 12 km east of Kawardha. Primary data, including the geographical coordinates (latitude and longitude) of fisheries resources, were collected using the GPS Waypoint Tool mobile application. The spatial locations of ponds, canals, and fish landing centres were recorded through systematic field surveys. Secondary information related to the study area was obtained from the Dabrabhath Panchayat Office.

Diei-Ouadi and Mgawe (2011)^[6] validated regional post-harvest fish loss assessment using three approaches: The Questionnaire Loss Assessment Method (QLAM), Load Tracking (LT), and the Informal Fish Loss Assessment Method (IFLAM). Based on the approach described by Alam *et al.* (2012)^[2], the present study employed the Questionnaire Loss Assessment Method (QLAM) to estimate post-harvest losses in culture fisheries of Dabrabhath Panchayat. A structured questionnaire was designed to collect information on harvesting practices, handling methods, quality deterioration, and economic losses associated with fish marketing.

Primary data were collected using a purposive sampling technique from fisheries stakeholders in the villages of Dabrabhath and Ghukasa. A total of 18 respondents, comprising 7 fish farmers and 11 fish sellers, were interviewed for the study (Table 1). The collected data were compiled, tabulated, and analyzed to estimate species-wise post-harvest losses in culture fisheries. Post-harvest losses were estimated following the method of Rashid and Sarkar (2020)^[11] using the following equation:

$$\text{Post-harvest loss} = \text{Weight loss} + \text{Price loss}$$

Where:

$$\text{Weight loss} = \text{Quantity of fish lost (kg)} \times \text{Price of fresh fish (Rs/kg)}$$

$$\text{Price loss} = \text{Quantity of degraded fish (kg)} \times [\text{Price of fresh fish (Rs/kg)} - \text{Price of degraded fish (Rs/kg)}]$$

The estimated losses were expressed both in monetary terms (Rs per 1000 kg of fish) and in percentage terms for different cultured fish species.

Table 1: Collecting data from different value chain actors in the chosen villages

Name of villages	Fish farmer (culture)	Seller	Total
Ghukasa	05	06	11
Dabrabhath	02	05	07
Total	07	11	18

A tabular technique was used in this study to present the overall post-harvest loss scenario of Dabrabhath Panchayat fisheries. For each fish species, post-harvest losses were computed using the following formula (Rashid and Sarkar, 2020)^[11]:

$$\text{Post-harvest loss} = \text{Weight loss} + \text{Price loss}$$

Where:

$$\text{Weight loss} = \text{Quantity of fish (kg)} \times \text{Price of fresh fish (Rs/kg)}$$

$$\text{Price loss} = \text{Quantity of degraded fish (kg)} \times [\text{Price of fresh fish (Rs/kg)} - \text{Price of degraded fish (Rs/kg)}]$$

Results

According to this study, land and water resources were categorized into four classes: government area, built-up area, agricultural land, and water bodies (Table 2).

Table 2: Distribution of land in Dabrabhath Panchayat (Sources- Panchayat office)

Land and water resources	Area (Hectare)
Built up area	76.75
Waterbody	9.60
Agriculture field	450.30
Govt. area	65.00
Total	601.65

The fisheries resources of Dabrabhath panchayat are geographically located and mapped using latitude and longitude coordinates collected through GPS-based field surveys. These coordinates enable precise identification of the spatial distribution of ponds, canals, and landing centres within the study area (Table 3). Such georeferenced data are essential for spatial analysis, resource planning, and sustainable fisheries management in the region.

Table 3: Latitude and longitude of fisheries resources of Dabrabhath Panchayat

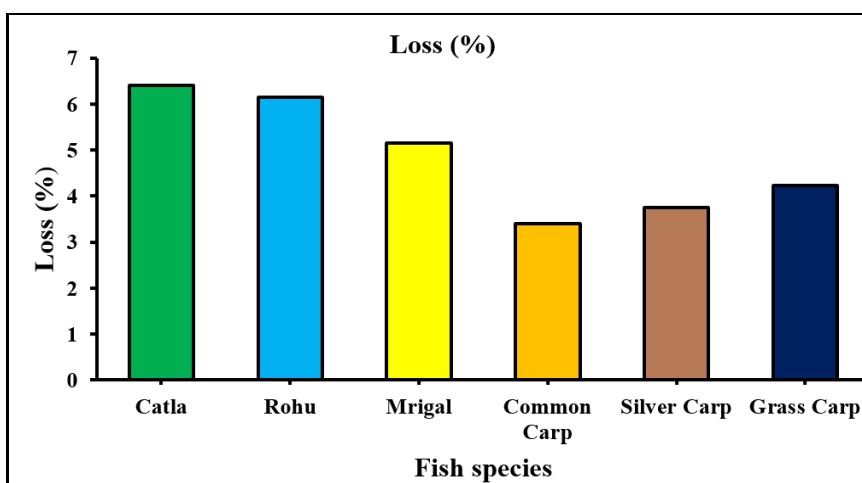
S.N.	Water resources	Latitude	Longitude
1	Pond A (Ghukasa)	22.0606°N	81.2726°E
2.	Pond B (Ghukasa)	22.0614°N	81.2684°E
3.	Landing point (Ghukasa)	22.0610°N	81.2725°E
4.	Canal (Ghukasa)	22.0626°N	81.2744°E
5.	Minimatasarovar (Dabrabhath)	22.0468°N	81.2764°N
6.	Pond A (Dabrabhath)	22.0466°N	81.2768°N
7.	Landing point (Dabrabhath)	22.0462°N	81.2766°N
8.	Canal (Dabrabhath)	22.0469°N	81.2762°N

The post-harvest losses of cultured fish species per 1000 kg ranged from ₹ 5,431.50 to ₹ 11,065.55. As presented in Table 4, the highest monetary loss was recorded in Rohu (₹ 11,065.55), while the lowest loss was observed in Common

Carp (₹ 5,431.50). The percentage post-harvest loss across different cultured fish species varied from 3.39% to 6.41% (Fig. 1).

Table 4: Post-harvest losses of culture fish species (Per 1000 kg)

Fish species	Weight loss			Price loss				Total loss (Rs)	% of loss
	Weight loss (kg)	Price of fish/kg (Rs)	Monetary loss (Rs)	Quantity of degraded fish (kg)	Price of degraded fish (Rs/kg)	Price loss (Rs)	Monetary loss (Rs)		
Catla	15.14	160	2422.40	130.32	100	60	7839.20	10261.60	6.41
Rohu	16.80	180	3024	146.21	125	55	8041.55	11065.55	6.14
Mrigal	12.10	150	1815	98.50	90	60	5910	7725	5.15
Common carp	16.05	160	2568	95.45	130	30	2863.50	5431.50	3.39
Silver carp	18.56	150	2784	94.20	120	30	2826	5610	3.74
Grass carp	17.70	150	2655	92.30	110	40	3692	6347	4.23

**Fig 1:** Species-wise post-harvest loss (%) in culture fisheries of Dabarabhath Panchayat

Discussion

The results of the present study revealed considerable variation in post-harvest losses among different cultured fish species. Catla exhibited the highest post-harvest loss (6.41%), followed by Rohu (6.14%), while Common Carp recorded the lowest loss (3.39%). The comparatively higher losses in Catla and Rohu may be attributed to their greater susceptibility to physical damage during harvesting, handling, and transportation. Similar findings were reported by Rashid and Sarkar (2020) ^[11], who observed that improper handling practices and inadequate post-harvest management significantly contribute to fish losses in the value chain. The study further indicated that price loss contributed more significantly to total post-harvest losses than weight loss across all cultured fish species. For example, in Catla, the price loss (₹ 7,839.20) was substantially higher than the weight loss (₹ 2,422.40). This indicates that deterioration in fish quality during post-harvest operations has a greater economic impact than mere quantitative loss. Such quality degradation reduces market

value, even when physical weight loss is relatively limited. Inadequate icing practices, lack of cold storage facilities, and delays in marketing are likely key factors responsible for the observed economic losses. These constraints lead to rapid spoilage and quality deterioration, thereby reducing consumer acceptability and market price of fish. Overall, the post-harvest loss ranged from 3.39% to 6.41%, highlighting the need for improved harvesting, handling, preservation, and transportation practices. Adoption of scientific post-harvest management techniques and strengthening of cold chain infrastructure can substantially reduce losses and enhance the profitability and sustainability of culture fisheries in the study area.

Conclusion

The present study assessed post-harvest losses in culture fisheries of Dabarabhath Panchayat, Kabirdham district, Chhattisgarh. The findings revealed that post-harvest losses varied among cultured fish species, ranging from 3.39% to 6.41%, with monetary losses ranging from ₹ 5,431.50 to ₹

11,065.55 per 1000 kg of fish. Rohu recorded the highest economic loss, while Common Carp exhibited the lowest loss. The study further indicated that price loss contributed more significantly to total post-harvest losses than physical weight loss, emphasizing the critical role of fish quality preservation during post-harvest operations. Improper harvesting practices, inadequate handling, and lack of cooling and storage facilities were identified as the major factors responsible for these losses. Therefore, the adoption of scientific harvesting techniques, improved handling practices, timely marketing, and strengthened cold-chain infrastructure are essential to minimize post-harvest losses and enhance the profitability and sustainability of culture fisheries in the study area.

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