

ACCESS AND BENEFIT SHARING (ABS) FRAMEWORK FOR SUSTAINABLE FISHERIES MANAGEMENT IN UTTAR PRADESH



Atul K Singh
Somesh Gupta
B. Prabhakar



Uttar Pradesh Biodiversity Board, Lucknow

army printing press
www.armyprintpress.com
Lucknow (0522) 666635



Uttar Pradesh Biodiversity Board, Lucknow

ACCESS AND BENEFIT SHARING (ABS) FRAMEWORK FOR SUSTAINABLE FISHERIES MANAGEMENT IN UTTAR PRADESH

Atul K Singh*

Former Director ICAR-Central Institute of Coldwater Fisheries Research &
Emeritus Scientist ICAR-National Bureau of Fish Genetic Resources,
Lucknow 226002 (Uttar Pradesh)

Somesh Gupta**

Technical Officer
Uttar Pradesh Biodiversity Board, Lucknow

B. Prabhakar**

Secretary
Uttar Pradesh Biodiversity Board, Lucknow

Email: *singhatk@gmail.com/ aksingh56@rediffmail.com
**upstatebiodiversityboard@gmail.com



**Uttar Pradesh Biodiversity Board
Lucknow**

Published by

Uttar Pradesh State Biodiversity Board, Lucknow

2025

Citation:

Singh, A.K., Gupta, Somesh and Prabhakar, B. (2025) Access and benefit sharing (ABS) framework for sustainable fisheries management in Uttar Pradesh. Published by Uttar Pradesh Biodiversity Board, Lucknow, 41 p.

Copyright: Copyright © 2025 Uttar Pradesh State Biodiversity Board, Lucknow

Access and Benefit Sharing (ABS) Framework for Sustainable Fisheries Management in Uttar Pradesh

Access and Benefit Sharing (ABS) refers to the legal and policy frameworks that governs access to aquatic genetic resources and ensure the fair and equitable sharing of benefits arising from their utilization. It establishes mechanisms for Prior Informed Consent (PIC) from resource providers (often local communities, the Biodiversity Management Committees) before access to resources. Further, it ensures that any benefit derived from their commercial use are shared with them (Hand Book on Biodiversity Laws, Access and Benefit Sharing 2019). Access and Benefit Sharing (ABS) is a legal concept under the third objective of the Convention to Biological Diversity (CBD) that requires users of biodiversity to first ask permission before its commercial utilisation, conducting research or development and, where applicable to enter into an ABS agreement with the provider of the aquatic genetic resources (Figure 1).

The National Biodiversity Authority (NBA) is the nodal agency in India for implementing an Access and Benefit Sharing (ABS) mechanism under the Biological Diversity Act (2002). The 2025 ABS regulations, a crucial part of India's updated biodiversity framework, govern how biological resources and associated knowledge are accessed and how benefits from their use are shared equitably with local communities. The ABS regulations mandate that State Biodiversity Boards must decide – either to approve or reject – requests for access to biological resources within two weeks, in consultation with the Biodiversity Management Committees (BMCs), which function as the grassroots implementing bodies of the law. India has introduced new regulations governing access and benefit-sharing (ABS) from the use of biological resources. Brief procedure of obtaining permission for Access to the Aquatic Genetic Resources has been outlined here (Figure 1).

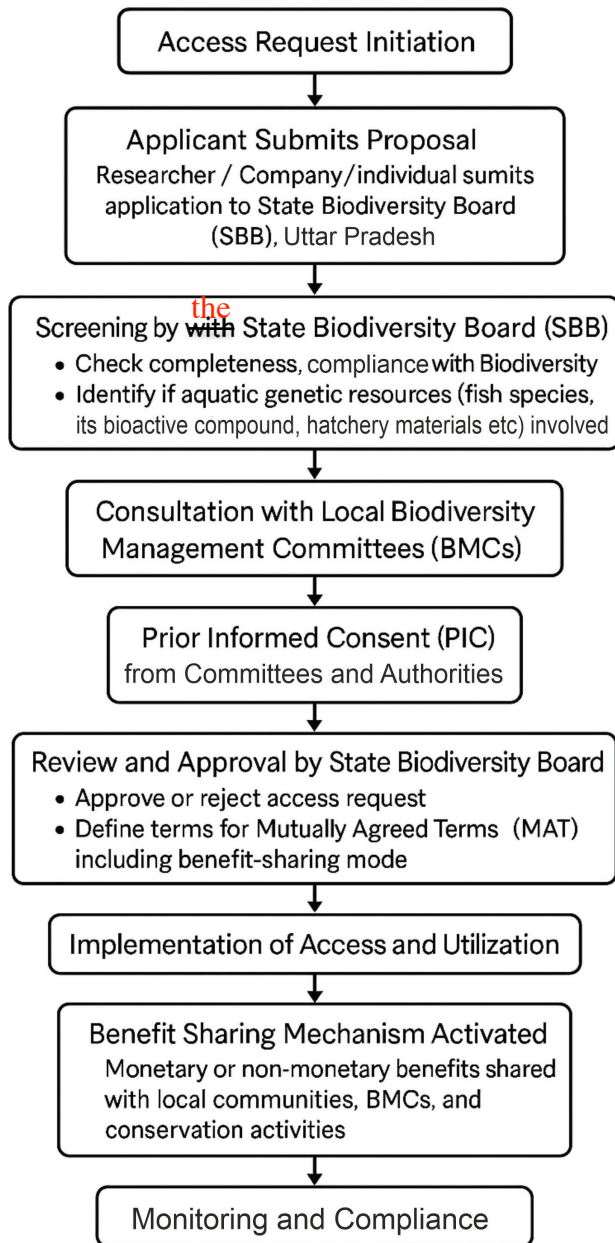


Figure 1: Brief procedure of obtaining permission for Access to the Aquatic Genetic Resources (AgGR)

Benefit-sharing mechanisms

- ❖ Benefit sharing can involve various mechanisms, such as a percentage of the purchase price of the biological resource, technology transfer, sharing of research results, or other mutually agreed terms.
- ❖ Benefit sharing obligations from fish traders can range from 0.2% for the annual earnings of 5 to 50 crores, between 0.4% for the trade of 50 to 250 crore, and 0.6% for the turn-over of above 250 crores according to the National Biodiversity Board (NBA) guidelines implemented by the Uttar Pradesh State Biodiversity Board (UPSBB).
- ❖ For High-Value Aquatic Resources (HVAR), a minimum of 5% of the sale or auction proceeds must be shared, potentially exceeding 20% for commercial use.
- ❖ This regulation also applies to Digital Sequence Information (DSI) within the scope of aquatic genetic resources. DSI refers to the digital representation of genetic material – such as DNA, RNA, or protein sequences derived from aquatic organisms. For aquatic genetic resources, incorporating DSI within ABS mechanisms is crucial to ensure fair and equitable sharing of benefits arising from digital research, bio-prospecting, and biotechnology innovations.
- ❖ Benefit-sharing is mandated for researchers and those seeking Intellectual Property Rights (IPR) based on Indian aquatic biological resources.

Note: The NBA retains 10–15% of the collected benefits for its operational costs.

Non-monetary benefits

Non-monetary benefits, such as scientific training or information for conservation policy choices, are as important as monetary benefits, although they can be less tangible and more difficult to measure. Non-monetary benefits can have significant social, economic, and ecological impacts that can be more sustainable than the monetary benefits generated under ABS agreements (NBA 2025). There may be three types of non-monetary benefits which can be considered non-tangible :

1. The number of research and development results arising from ABS instruments.

2. The number of scientific publications relevant to conservation, sustainable use, food security and public health arising from ABS instruments.
3. The number of joint scientific publications arising from ABS instruments with authors from the provider state, where appropriate.

These non-monetary benefit indicators enable a new connection between ABS and scientific research.

Exemptions and exceptions

- ❖ Traditional uses of fishery resources by local communities for livelihood purposes may be exempted from the requirement of prior approval.
- ❖ Likewise, collaborative research projects between Indian and foreign institutions, approved by the central government, may also be exempted.

In essence, the ABS framework in Uttar Pradesh ensures that the use of fishery resources and their genetic diversity is carried out responsibly, fostering conservation while promoting the equitable sharing of benefits with local communities that have traditionally nurtured and protected these resources.

Monitoring and compliance

- ❖ The implementation of ABS involves measures to monitor the utilization of aquatic genetic resources and ensure compliance with agreed upon terms.
- ❖ Checkpoints are designated at various stages (research, development, pre-commercialization, or commercialization) to collect information and ensure adherence to the regulations.

Key Concepts of ABS in aquatic resources

- ❖ **Genetic Resources:** These include fish species, their genetic material, and associated traditional knowledge.
- ❖ **Access:** Refers to the ability to collect, utilize, or transfer genetic resources.

- ❖ **Benefit-Sharing:** The process of sharing monetary and non-monetary benefits (e.g., access to technology, research opportunities, capacity building) derived from the use of these resources with the providers.

ABS in Fisheries and Aquaculture

- ❖ **Access:** Collection and use of aquatic genetic resources (e.g., brood stock, fry, seeds).
- ❖ **Benefits:** Technology transfer, research collaboration, profits, capacity building and co-authorship from the use of these resources.
- ❖ **Users:** Researchers, hatcheries, biotech companies.

ABS in Asia

Access and Benefit Sharing (ABS) in Aquaculture and Fisheries in Asia is a growing concern due to the region's rich aquatic biodiversity, increasing commercialization of Aquatic Genetic Resources (AqGR), and commitments under international frameworks of Kunming Montreal Global Biodiversity Frameworks (Humphries et al., 2024).

Asia is a global leader in aquaculture; home to major producers like China, India, Indonesia, Vietnam, Thailand, and Bangladesh and rich in endemic fish and shellfish species, many of which are used for breeding, biotechnology, and ornamental trade. Countries in South Asia, like India, have implemented national legislation, such as the Biological Diversity Act (2002) which incorporates ABS principles.

ABS is particularly relevant to aquaculture as it involves the collection and use of aquatic genetic resources for breeding and other purposes. ABS aims to ensure that local communities, who often possess traditional knowledge about aquatic resources, are involved in decision-making and benefit from the commercialization of these resources.

Regional Guidelines (under FAO/APFIC or NACA)

Regional guidelines on access and benefit-sharing (ABS) for aquatic genetic resources (AqGR) are developing under the umbrella of the Food and Agricultural Organisation (FAO), in alignment with international frameworks like the Convention on Biological Diversity (CBD) and its

Nagoya Protocol, and the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). While no single global guideline specifically for AqGR exists, the FAO's Commission on Genetic Resources for Food and Agriculture (CGRFA) is actively working on surveys, explanatory notes, and promoting harmonization of country measures for different genetic resource subsectors, including aquatic ones. While the Network of Aquaculture Centres in Asia-Pacific (NACA) facilitates access and benefit-sharing (ABS) for aquatic genetic resources, it does not issue binding regional guidelines. Its activities are framed by international treaties like the Nagoya Protocol and national laws, which are implemented differently across its member countries. NACA works to build capacity and encourage responsible exchange in line with these broader frameworks (Morrison et al., 2021). Countries are increasingly adopting their own ABS measures to govern access and share benefits from aquatic genetic resources (Humphries et al., 2021). It is important to promote regional cooperation, standardization, and ethical use of genetic resources. Different practices followed in different countries are described and presented (table 1):

Table 1: Regional guidelines, practices and their description

Practice	Description
Community engagement	Involve local fisher folk and indigenous groups in resource-sharing and decision making, to ensure inclusivity and equity.
Material Transfer Agreements (MTAs)	Establish legal tools to document access to aquatic genetic resources and define terms for fair and equitable benefit sharing.
Public-private partnerships	Collaborations for breeding programs with equitable sharing of outcomes. Promote collaborative breeding and conservation programs with transparent and equitable sharing of benefits and out come.
Traceability systems	Implement mechanisms to track genetic resources especially in trans-boundary movement ensuring legal and ethical use.
Capacity building	Strengthen the skills and understanding of stakeholders on ABS laws, negotiation, compliance, and sustainable resource management.

The Biological Diversity Act (2002):

The National Biodiversity Authority (NBA) of India has developed guidelines related to the utilization of biological resources, including those relevant to fisheries and aquaculture, with a focus on access and benefit-sharing (ABS). While the guidelines are broad, they acknowledge the specific relevance of genetic resources for food and agriculture, including aquaculture, and encourage consideration for special measures or simplified access procedures in these sectors.

The NBA plays a key role in regulating access and benefit-sharing, including approving agreements for the use of genetic resources. The guidelines specify that benefit-sharing can be both monetary and non-monetary, depending on what is agreed upon between the applicant (user) and the NBA, in consultation with the State Biodiversity Board (SBB) and Biodiversity Management Committees (BMCs). The NBA guidelines promote research and development focused on conservation and sustainable use of biological resources, particularly in areas like food security and livelihood improvement. The NBA provides a procedural framework for obtaining prior approvals for accessing and utilizing biological resources, including defined time periods for processing applications and mechanisms for approval or rejection(Down to Earth 2025).

ABS applies to:

- Use of wild fish populations or local breeds for breeding programs.
- Development of new aquaculture strains.
- Commercialization of biotech products using aquatic microbes or genetic material.
- Export of biological samples for research or breeding abroad.
- Digital Sequence Information (DSI) and Traditional Knowledge related to fish species.
- Fish seed, brood stock, and breeding material sourced from Indian biodiversity.

However, ABS laws rarely clarify the extent to which activities relating to Aquatic Genetic Resources for Aquaculture (AqGR),

associated digital sequence information on genetic resources (DSI) and Traditional Knowledge associated with AqGR (TKAqGR) are within the scope of their access and benefit-sharing (ABS) measures. National ABS laws regulate the collection and use of this subject matter for research, development and commercialisation purposes, and the fair and equitable sharing of monetary and non-monetary benefits from their use with the provider of the resources.

Who Must Comply?

- Aquaculture companies (including hatcheries, feed companies, exporters).
- Fish breeders (public or private).
- Research institutions using aquatic species for R&D or commercial breeding.
- Fish traders/exporters dealing in species sourced from Indian waters.

A flowchart is presented (Figure 2) showing ABS compliance steps for aquaculture companies, fish breeders, and research institutions. This would make it easier for stakeholders to understand exactly what they need to do.

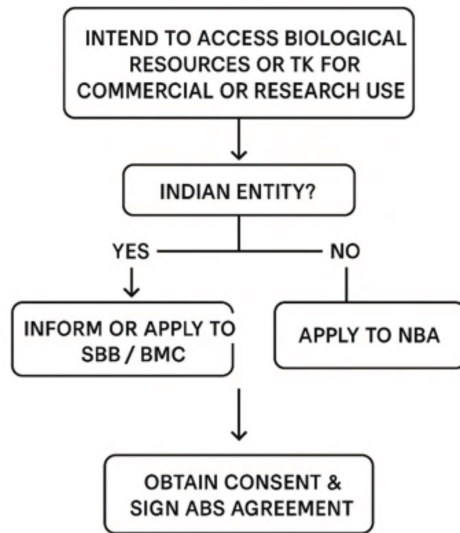


Figure 2: ABS Compliance steps for Aquaculture companies, Fish Breeders and Research Institutions.

Uttar Pradesh State Biodiversity Board (UPSBB)

- The Uttar Pradesh State Biodiversity Board was established during 2006 under the provisions of Biological Diversity Act (2002), to implement the Act's provisions at the State level.

- The Board plays a key role in regulating access to the state's biological resources, including fish, and ensuring fair and equitable sharing of benefits arising from their use.

Biodiversity Management Committees (BMCs)

- BMCs are constituted at the local level (Gram Sabha level) to promote biodiversity conservation, including aquatic biodiversity, and prepare People's Biodiversity Registers (PBRs) also documenting local resources.
- These committees play an important role in decision-making regarding access to resources and benefit-sharing within their jurisdiction.
- Individuals or entities seeking to access fish genetic resources for commercial utilization or research for R&D or biotechnological purposes require Prior Informed Consent (PIC) from the concerned State Biodiversity Board (SBB).
- The terms of Access and Benefit Sharing, whether monetary or non-monetary, are established through Mutually Agreed Terms (MAT) between the user and the provider (local communities/SBB).

Role of UPSBB and BMCs

- **UPSBB:** The Uttar Pradesh State Biodiversity Board (UPSBB) is responsible for implementing the provisions of the Biological Diversity Act, Biological Diversity Rules, Access to Biological Resources and Associated Knowledge. It is the authority for granting approvals for accessing and using biological resources and determining benefit-sharing mechanisms.
- **BMCs:** Biodiversity Management Committees (BMCs) at the local level play a vital role in documenting and preserving local biodiversity, including native fish species and their genetic resources (Table 2). They contribute to the ABS process by providing local knowledge and participating in decisions regarding access and benefit-sharing.

Table 2: Functions of BMC related to Fisheries and Aquaculture:

Key Function	Description / Role in Fisheries & Aquaculture
Preparation of People's Biodiversity Register (PBR)	Documentation of local fish species, aquatic flora and fauna, traditional fishing practices, breeding grounds, and indigenous knowledge.
Conservation of Aquatic Biodiversity	Protection of native fish species, wetlands, and aquatic habitats; prevention of overfishing and introduction of invasive/non-native species.
Sustainable Use of Resources	Promotion of responsible aquaculture practices; regulation of seed collection and resource use in ponds, lakes, and rivers.
Benefit Sharing & Access Regulation	Ensuring fair and equitable sharing of benefits from the commercial use of local fish genetic resources or associated traditional knowledge.
Awareness & Capacity Building	Conducting awareness programmes for fishers on biodiversity conservation, pollution control, and sustainable aquaculture.
Coordination with Fisheries Department	Working jointly with the Department of Fisheries, Government of Uttar Pradesh for mapping fish diversity, developing local management plans, and protecting endangered aquatic species.

Fisheries Resources in Uttar Pradesh

The state Uttar Pradesh located between 23⁰52' -31⁰28'N latitude and 77⁰04' -84⁰38'E longitude is the most populated and one of the largest states of India blessed with vivid aquatic genetic resources (Sarkar et al., 2024). The state contributes about 14.11% of the national fish biodiversity and fishery resources in the state are available in plenty in the form of rivers and their tributaries, reservoirs, wetlands, lakes, ponds and tanks that exhibit rich genetic and ichthyological diversity and offer considerable scope for inland fisheries development and aquaculture. Uttar Pradesh's fisheries sector is experiencing significant growth, with a production of 915,000 tonnes in 2023 against 8.08 lakh metric tonnes in 2022.

The state has quite diverse physiography and the fish fauna ranging from tiny fishes to large fishes (carps) to live fishes (guppy). Out of 7,20,000 ha of water resources, the rivers of this state occupy approximately 7632 km (Table 3). Over the years, these resources in the state are facing threats in the form of pollution, creation of dams, water diversion, habitat destruction and invasion of non-native species, causing great challenges to the freshwater environments. The Ganga (2525 km), the mighty river of the state reports about 129 freshwater species belonging to 27 families from its river system (Pathak *et al.*, 2019). In an assessment, it is understood that 33% of fishes in the state are of ornamental value, while 87% have food potential and 10% are sport fishes. Different rivers viz. Ramganga (596 km), Gomti (900 km), Ghaghara (1080 km), Yamuna (1776 km), Gandak (630 km), Kosi (50 km) serve as reservoir of different valuable fish stocks.

Table 3: Fishery Resources of Uttar Pradesh

Total inland water bodies (lakh ha)	12.42
Rivers & canals (Km)	31,200
Reservoirs (Lakh ha)	1.47
Tanks & ponds (Lakh ha)	1.61
Flood plain lakes/ derelict waters (Lakh ha)	1.33

Fish Diversity in Rivers of Uttar Pradesh:

Species representing high economic and commercial value in river streams of Uttar Pradesh are *Catla catla*, *L. rohita*, *L. bata*, *L. goni*, *L. calbasu*, *Cirrhinus mrigala*, *C. reba*, *Clarias magur*, *Heteropneustes fossilis*, *Channa sp*, *Wallago attu*, *Mystus sp*, *Rita rita*, *Sperata sp*, *Ompak sp*, *Chitala chitala*, *Bagarius bagarius* and numerous Small Indigenous Fishes (SIF) like *Ambassis sp*, *Puntius sp*, *Pethia sp*, *Salmostoma sp.*, *Xenentodon sp*, *Osteobrama sp*, *Nandus sp*, and *Mastacembelus sp*. The overall fish composition of major rivers may be divided into five major groups such as major carps, medium and minor carps, catfishes, miscellaneous fish groups, and exotic species. The fish diversity in different river streams is presented (Lakra et al., 2010) (Figure 3).

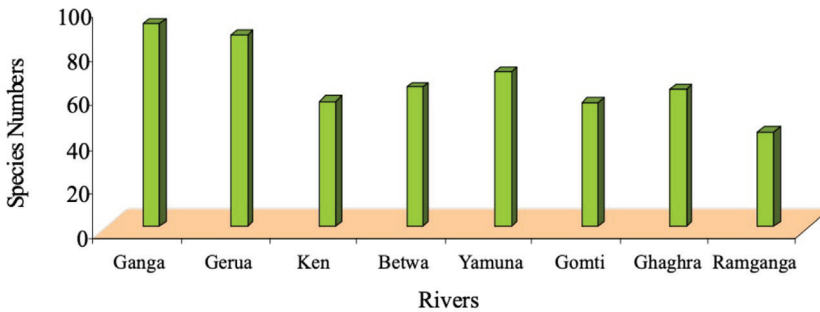


Figure 3: Fish diversity in different river streams in Uttar Pradesh (Source: Lakra, 2010)

In India, the exotic ornamental fish species dominate the aquarium trade, and are propagated for domestic and export purposes. More than 600 non-native ornamental fish species are available in the country to meet the demand of the customers. The domestic market of ornamental fish is over ₹ 500 million and India's contribution to the global trade is 0.08 percent. About 96 percent of ornamental fishes are freshwater species and many of these species escape from culture facilities or they are deliberately released into the riverine system. Some of the biodiversity concerns related to the ornamental fish trade are very serious as nearly 85 percent of the ornamental fish exported is caught from the wild stock. Some of the important ornamental species are *Puntius conchonius*, *P. gelius*, *P. ticto*, *P. sophore*, *Brachydanio rerio*, *Botia morhae*, *Carassius carassius*, *C. auratus*, *Badis badis*, *Barilius barna*, *B. vagra*, etc. (CEBPOL, NBA, 2018; Singh et al., 2025).

Ornamental fish culture and breeding in Uttar Pradesh includes farming popular species like guppies, mollies, and goldfish, which are well-suited for low-input systems, as well as utilizing native fish species for their attractive features. The state has emerged breeding centers and farmers are encouraged to start with hardier, live-bearing fish like guppies and platies, goldfish, barbs, and angelfish also provide high returns. For successful breeding, creating a value chain that includes seed collection, culture, and export, supported by government initiatives like PMMSY, is a key to generating income and employment. Ornamental fish farming is a growing sector in Uttar Pradesh supported by initiatives like the ICAR's Mission Navshakti for empowering women and a government scheme for setting up ornamental fish keeping units.

Drivers of decline in Fish Diversity

The fish diversity is currently facing several threats, which can be summarised as follows:

- **Habitat loss/degradation** (pollution, dam construction, siltation)
- **Overfishing**, including juvenile fish being caught before they can reproduce.
- **Water quality deterioration** from agricultural runoff, industrial discharge.
- **Fragmentation of rivers**, loss of connectivity (which affects migratory species).
- **Introduction of exotic/non-native species** which compete or prey on native fishes.

These factors have led to the endangerment and loss of several native fish species, resulting in declining fish catches from rivers.

Decline in Fish catches from the rivers

(i) Ganga River

- **Decline in fish species:** Between April 2016 and March 2020, CIFRI, Barrackpore recorded a drop of 143 to 104 freshwater fish species along the Ganga – nearly a 30% reduction, driven by altered hydrology, dams, pollution, and illegal fishing.
- **Indian Major Carps (IMC):** Historically dominant, IMCs (rohu, catla, mrigal, calbasu) dropped significantly in Prayagraj. Their contribution to the total catch declined to around 40–45% and presently only 13–15% is contributed in the total catch (Jha et al., ~~2027~~²⁰¹⁷).
- **Rise of non-native invasive fish species:** Non-native common carp, tilapia and African catfish are now making up 25 to 50% of fish landings in Prayagraj, Varanasi, Ghazipur and Ballia signalling a strong invasion (Singh, 2021).
- **Distribution of Exotic (non-native) fishes:** Amongst the exotic species, the common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Hypophthalmichthys nobilis*), mossambique tilapia (*Oreochromis mossambicus*) Nile tilapia (*Oreochromis niloticus*), African

catfish (*Clarias gariepinus*) and sucker mouth catfish (*Pterygoplichthys pardalis* and *P. disjunctivus*) have been recorded in the Ganga (Singh, 2021).

(ii) Yamuna River Fishery (even more alarming)

- **Severe decline in native species:** A recent study shows a drastic fall in indigenous IMCs (rohu, catla, mrigal, calbasu), large catfishes, and many others have largely disappeared.
- **Domination by non-native exotic fishes:** The river is now largely populated with exotic species – common carp (*Cyprinus carpio*), Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*) – while native IMCs (Indian major carps) and others have plummeted drastically in the catch (Singh, 2021).

Aquaculture and seed production in Uttar Pradesh

- Aquaculture production in UP continued to rise, reaching approximately 809,000 tonnes in 2022-23 and 915,000 tonnes in 2023-24. There has been a consistent increase ~~as~~ in production over the years. However, modern tools and techniques can further boost aquaculture production. The eastern districts contributed 47% of the total inland fish production ~~in 2020-21~~ followed by Central (21%), Western (18%) and Bundelkhand (14%) regions. The state is a major player in inland fisheries and is focusing on modern techniques and infrastructures, including a new investment to potentially double its fish production capacity in a short duration.
- Uttar Pradesh fish seed production ^{data} has not been explicitly available in public reports. However, expansion in seed production is attributed to the rising number of fish farmers involved in seed production activities.
 - The state has seen large-scale infrastructure expansion:
 - 49 freshwater hatcheries established, producing ~ 15,043 lakh spawn, and 12,255 lakh fry.
 - 333 fish seed rearing units producing ~ 7,355 lakh fry and 662 lakh fingerlings.
 - Additional production via 1,755 captive seed rearing ponds (198.36 ha area) yielded 357 lakh fingerlings.

Several schemes and programmes are in place to support aquaculture and seed production, such as the **Pradhan Mantri MatsyaSampada Yojana (PMMSY)**.

Recommendations moving forward for restoration of fisheries

1. **Strengthen ranching/stocking** of native IMCs and other declining fish species across UP's river stretches.
2. **Control exotic species** via monitoring, banning releases, and enforcing bans on illegal culture and breeding (Singh, 2024).
3. **Restore river health**—improve flows and water quality; reduce pollution to support native fish breeding.

Key Legal / Regulatory Frameworks

1. U.P. Fisheries Act, 1948

- o Provides general powers to regulate fishing activities, including licence requirements, control of destructive practices, minimum size/weight, breeding fishes, etc.
- o Allows rules to be made to prohibit or regulate nets, fixed engines, pollution, trade effluents, etc.

2. U.P. Fisheries (Development & Control) Rules, 1954

- o Under the Fisheries Act. Some key provisions exist:
 - Prohibition on destroying fish by explosives, poisoning, pollution.
 - Closed season for catching fry/fingerlings (2"-10") and breeding fish in certain times of year in certain areas.
 - Specific prohibited areas for fishing in rivers (e.g. parts of the Ganga between Kanpur and Allahabad) during certain periods.
- o Other Rules help protect juvenile fish, brooders, and maintain stock.

Recent / Ongoing Conservation Projects & Programs

1. River Ranching / Release of Fish Seed & Species Reintroduction

- o Under **Namami Gange**, the Fisheries Department has ~~plans to~~ release several lakhs fish of various native species into the Ganga, as “river ranching” to help restore fish populations and reduce pollution.

- o To date, over 118 million fingerlings of *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, and other native species have been released into the Ganges and its tributaries, including the Yamuna, (CIFRI Annual Report 2024).
- o Endangered species, Chitala (state fish, near-threatened) is being conserved via a “Chitala Conservation & Promotion Project,” with release of over 1 lakh Chitala fish into the Ganga near Varanasi.

2. MoU with ICAR-NBFGR

- o Memorandum between the Uttar Pradesh Fisheries Department and the National Bureau of Fish Genetic Resources (NBFGR) to assist in stocking of *Chitala chitala* and *Ompok bimaculatus* in rivers; technical support & fingerling supply.

3. Hatchery Revamps

- o UP has initiated renovation of several government hatcheries (in Gorakhpur, Basti, Ayodhya, Amethi, etc.) as part of boosting seed production, which is important for both conservation (healthy seed) and for sustaining fish-population restocking.

4. Seed Banks and Subsidies

- o Under schemes like the Chief Minister Matsya Sampada Yojana and Pradhan Mantri Matsya Sampada Yojana, support is given for fish farmers, including seed banks in every Gram Sabha (local village) to ensure local availability of fingerlings, reduce dependence on distant sources.

5. Awareness and Community Engagement

- o Awareness programs (e.g. ICAR’s awareness on depleting fish species in River Ganga) especially focused on issues like overfishing of brooders/fingerlings, habitat loss.
- o Government training/extension for fish farmers regarding better practices, disease prevention etc.

Conservation Goals / Outcomes

- Protecting **endangered/near-threatened species** like *Chitala chitala*, restoring their numbers.

- Maintaining fish biodiversity in big rivers like the Ganga.
- Enhancing ecological balance (e.g. fish release to control nitrogen/pollution, supporting river health).
- Also, improving livelihoods: stocking, hatcheries, subsidies, supporting fishermen communities so conservation links with economic benefit.

Challenges & Gaps

- **Enforcement Issues:** Even though there are laws/rules, issues like illegal fishing (esp. catching fish in closed season, catching fry/fingerlings), pollution from trade effluents etc. still persist. It is advocated to strengthen enforcement during spawning season (tie with Fisheries Act/Rules) and community co-management (river guardians).
- **Habitat Degradation:** Rivers have problems like pollution, siltation, flow modification which affect fish spawning and survival. It is advocated to align river revival mission actions with fisheries outcomes to ensure effluent controls & maintain minimum flows for spawning.
- **Seed Quality & Availability:** Good genetics, disease free fingerlings are crucial; gaps remain in reach, especially in remote/poor areas. It is advocated to expand hatchery upgrades, disease surveillance, and seed certification so that released fingerlings are genetically and epidemiologically suitable. The recent hatchery revamp is a good step to scale further.
- **Awareness at Local Level:** Fisher folk / local communities may not always be aware of laws or best practices, or may depend on harmful practices out of necessity. Expand educational and awareness campaigning along with ICAR Institutes.
- **Monitoring & Data:** Reliable data on population status of many species, especially rare ones, is often limited. Without good monitoring, effectiveness of interventions is hard to judge. It is advocated that setting up a formal, periodic fish-population survey protocol (targeted for Chitala & other indicator species) so ^{that} river ranching outcomes are measured. (Use ICAR/NBFG + CIFRI technical protocols).

- **Coordination:** Across departments – e.g. environment, water resources, agriculture, industries (pollution control), coordination is essential but sometimes weak.
- **Transparent tracking of PMMSY & state funds** – publish a state dashboard (project, central share, state share, disbursed amounts, timelines, monitoring indicators) to enable accountability and transparency.

Updated and Actionable Policy Matrix for Fisheries and Biodiversity Management in Uttar Pradesh

An updated and actionable policy matrix for fisheries and biodiversity management in Uttar Pradesh is presented (table 4 & 5) based on both recent state-level initiatives and aligning with national schemes like the Pradhan Mantri Matsya Sampada Yojana (PMMSY). The matrix emphasizes sustainable production, environmental protection, and community welfare.

Table 4: Policy matrix for fisheries management

Goal	Actions and initiatives	Alignment with National Policy
Enhance fish production and productivity	<p>Promotion of modern technologies: Expand the use of Recirculatory Aquaculture Systems (RAS) and cage culture in reservoirs and open waters and feed mills to increase output efficiently and better production.</p> <p>Creation of fisheries infrastructure: Distribute assets like motorbikes and auto-rickshaws with iceboxes, and set up solar-powered systems to reduce post-harvest losses.</p>	Directly supported by the PMMSY, which provides funding and promotes technology-driven aquaculture and infrastructure development.

	<p>Scientific aquaculture development: Develop scientific aquaculture using bio-flocks and also fish culture in low-lying, saline, and alkaline lands, converting them into productive zones.</p> <p>Fish seed banks: Establish fish seed banks, particularly on village-owned ponds, under schemes like the Pradhan mantra Matsya Sampada Yojana (PMMSY), to ensure the availability of high-quality local seeds.</p>	
<p>Ensure sustainable fishing and resource conservation</p>	<p>Riverine fisheries policy: Enforce a specific policy for sustainable fishing in rivers to conserve natural fauna.</p> <p>Fishing regulations: Strictly regulate fishing seasons, mesh sizes, and the use of destructive fishing gear in inland waters.</p> <p>Habitat restoration: Partner with organizations like the National River Ganga Basin Authority (NRGBA) and NBFGR, Lucknow, to conserve and restore river and wetland ecosystems critical for fish biodiversity.</p>	<p>Follows the mandate of the National Fisheries Policy, 2020, to restore natural productivity and conserve native fish stocks through ecosystem restoration.</p>

<p>Strengthen fishers' welfare and livelihoods</p>	<p>Financial inclusion: Process Kisan Credit Card (KCC) applications and provide insurance to fishers under schemes like the Pradhan Mantri Suraksha Bima Yojana (PMSBY).</p> <p>Community empowerment: Organize fishermen and fisherwomen into cooperative societies to give them greater control and reduce dependence on middlemen.</p> <p>Livelihood support: Provide financial assistance during fishing bans under the PMMSY.</p>	<p>Aligns with the core objectives of the PMMSY to ensure the socio-economic welfare and livelihood of fishers and fish farmers.</p>
---	--	--

Table 5: Policy matrix for biodiversity management

Goal	Actions and initiatives (Updated)	Alignment with National/ international Policy
<p>Conserve aquatic and wetland biodiversity</p>	<p>Native species conservation: Establish fish protected areas and use advanced <i>ex-situ</i> conservation methods like cryopreservation of genetic material for threatened species.</p> <p>River conservation: Plant trees along major rivers like the Ganga and Yamuna under initiatives like the “Ganga Van”.</p> <p>Wetland management: Maintain and restore the ecological integrity and connectivity of natural wetlands to support fish species.</p>	<p>Supports the Biological Diversity Act, (2002), and reflects India’s National Biodiversity Action Plan, which includes strategies for wetlands and riverine ecosystems.</p>

Access and Benefit Sharing (ABS) Framework for Sustainable Fisheries Management in Uttar Pradesh

<p>Protect endangered aquatic fauna</p>	<p>Protect flagship species: Intensify efforts to protect species like Chitala, the Gangetic dolphin and various threatened turtle and other species by curbing illegal activities and raising awareness.</p> <p>Breeding centers: Operate dedicated breeding centers for Chitala and other endangered fish on the lines of turtles breeding centres established in places such as Sarnath and Kukrail.</p>	<p>Implements the provisions of the Biological Diversity Act, which targets the conservation of threatened species.</p>
<p>Ensure sustainable use and benefit sharing</p>	<p>Biodiversity management committees (BMCs): Support the functioning of local-level BMCs, responsible for preparing People’s Biodiversity Registers (PBRs) and regulating access to biological resources.</p> <p>Access and benefit sharing (ABS): Apply updated regulations for commercial access to aquatic biological resources by both foreign and Indian entities, with benefit-sharing provisions.</p>	<p>Directly follows the mandates of the Biological Diversity Regulations, (2025), and the Biological Diversity (Amendment) Act, 2023.</p>

<p>Strengthen institutional capacity and awareness</p>	<p>Interdepartmental coordination: Encourage greater synergy between state departments, as articulated in the Sustainable Development Goals (SDGs) Vision 2030 document.</p> <p>Public awareness: Continue to organize seminars and public campaigns to emphasize collective responsibility in conserving aquatic biodiversity.</p> <p>Scientific research: Partner with institutions like the ICAR-NBFGR in Lucknow to use scientific innovation for policy implementation.</p>	<p>Aligns with the need for coordinated governance and public participation in aquatic biodiversity conservation, as highlighted by national and international frameworks.</p>
---	---	--

Note: National level PMMSY allocations are large and disbursed project-wise to states; many state activities (river ranching, hatchery revamps, seed banks) are delivered through a mix of PMMSY central funding + state budget + private investments.

Fisheries in Uttar Pradesh are covered under Access and Benefit Sharing (ABS) mechanisms

- Fisheries in Uttar Pradesh, particularly inland fisheries and aquaculture, fall under the purview of Access and Benefit Sharing (ABS) mechanisms as mandated by the Biological Diversity Act and its subsequent regulations, including the NBA guidelines.
- Fish populations, including those in rivers, lakes, ponds, and tanks, are considered biological resources within Uttar Pradesh.
- Genetic resources within these fish populations, used for research, breeding, or other commercial purposes, are subject to the ABS framework.

1. Aquaculture production

- **Utilization of Biological Resources:** Aquaculture production involves the utilization of biological resources (fish species) and their genetic material. This falls under the purview of the Biological Diversity Act, which regulates access and benefit-sharing (ABS) relating to such resources.
- **Prior Informed Consent and Benefit Sharing:** If aquaculture operations in Uttar Pradesh involve the commercial utilization or development of new strains or breeds of fish, particularly for species native to India, the user may be required to obtain prior informed consent from the Uttar Pradesh State Biodiversity Board (UPSBB). Benefit-sharing arrangements, whether monetary or non-monetary, would then be established through Mutually Agreed Terms (MAT) to ensure equitable sharing with local communities or the state, citing section 2(c) and 2(f) of the B D Act.
- **Balancing Development and Conservation:** Aquaculture plays a significant role in food production and rural livelihoods in Uttar Pradesh. The ABS framework aims to balance the economic benefits of aquaculture development with the crucial need for conserving biodiversity and promoting sustainable practices.

2. Seed production

- **Genetic Resources and ABS:** Seed production, especially through hatcheries, involves the manipulation and utilization of fish genetic resources (brood stock and offspring). The ABS framework applies to the access and utilization of these genetic resources.
- **Quality and Traceability:** Ensuring the quality and traceability of fish seed is crucial for sustainable aquaculture and genetic resource management. The ABS framework, along with the National Seeds Policy embedded within broader National Fisheries Policies and Schemes, and other relevant acts, aims to guarantee quality control, certification, and traceability in the seed sector. The Department of Fisheries oversees the production and ensuring high quality fish seed to boost aquaculture productivity and sustainability.
- **Nucleus Breeding Centres and Brood stock Multiplication Centres:** To produce genetically improved and disease-free stocks, the establishment of facilities like hatcheries, brood stock multiplication

centers (BMC), and nucleus breeding centers (NBC) is encouraged. The operations of these centres and the genetic resources in many states of India are utilized and are subject to ABS regulations.

- **Non-native Species:** The regulation of seed production for non native species like African catfish (*Clarias gariepinus*), Bighead (*Aristichthys nobilis*) or any other fish like sucker mouth catfish (*Pterygoplichthys perdalis* or *P. disjunctivus*) presents a nuanced situation, as their introduction and widespread use raise concerns about potential negative impacts on native biodiversity (Singh, 2021). While their production is often encouraged for economic benefits, the ABS framework would require consideration of benefit sharing and mitigation of ecological risks as it is documented (Singh 2024).

Addressing ecological concerns

ABS frameworks address ecological concerns by promoting the conservation and sustainable use of aquatic genetic resources. A core objective of ABS is to link the commercial and non-commercial utilization of biodiversity to ecological protection efforts, ensuring that benefits are shared equitably and re-invested in conservation. In the context especially in fisheries, aquaculture and aquatic genetic resources ABS mechanisms evolve a balance between utilisation and conservation (Figure 4).

1. Integrating Ecological Safeguards into ABS Framework

- **Sustainable Harvest:** Set species-specific quotas and seasonal restrictions to prevent overexploitation.
- **Habitat Protection:** ABS agreements should mandate that collection activities must avoid sensitive habitats such as breeding grounds, wetlands, and floodplains.
- **Ecosystem-Based Management (EBM):** Ensure that benefit-sharing arrangements are tied to conservation commitments, not just economic returns.

2. Prior Informed Consent (PIC) with Ecological Conditions

- **Environmental Impact Assessments (EIA):** Require an EIA before granting access to aquatic genetic resources.

- **Conservation-linked Consent:** Approvals contingent upon restoration or replenishment measures (e.g., restocking fish populations).
- **Community Monitoring Roles:** Engage local fishers and indigenous communities in ecological monitoring.

3. **Benefit-Sharing Mechanisms with Conservation Incentives**

- **Monetary Benefits:** Direct part of the revenue into biodiversity conservation funds.
- **Non-Monetary Benefits:** Technology transfer for habitat restoration, training in sustainable aquaculture, and provision of eco-friendly gear.
- **Long-Term Commitments:** Encourage ABS agreements to fund multi-year habitat restoration or stock enhancement programs.

4. **Monitoring and Compliance**

- **Biodiversity Registers:** Maintain updated People's Biodiversity Registers (PBRs) to track the status of accessed species.
- **Traceability Systems:** Use genetic barcoding or tagging to monitor traded aquatic resources.
- **Penalties for Ecological Damage:** Incorporate strict legal consequences for breaches causing habitat degradation or population decline.

5. **Special Focus in Aquatic Systems**

- **Preventing Genetic Pollution:** Avoid introduction of exotic or genetically modified strains without risk assessment.
- **By catch Reduction Measures:** ABS-linked fishing should adopt gear modifications to minimize unintended species capture.
- **Climate Adaptation Integration:** Include resilience-building strategies for species and ecosystems facing climate-induced stress.
- **Sustainable Practices:** The ABS framework, in conjunction with other environmental legislation, promotes environmentally friendly aquaculture practices and aims to minimize the negative impacts of aquaculture on the ecosystem.

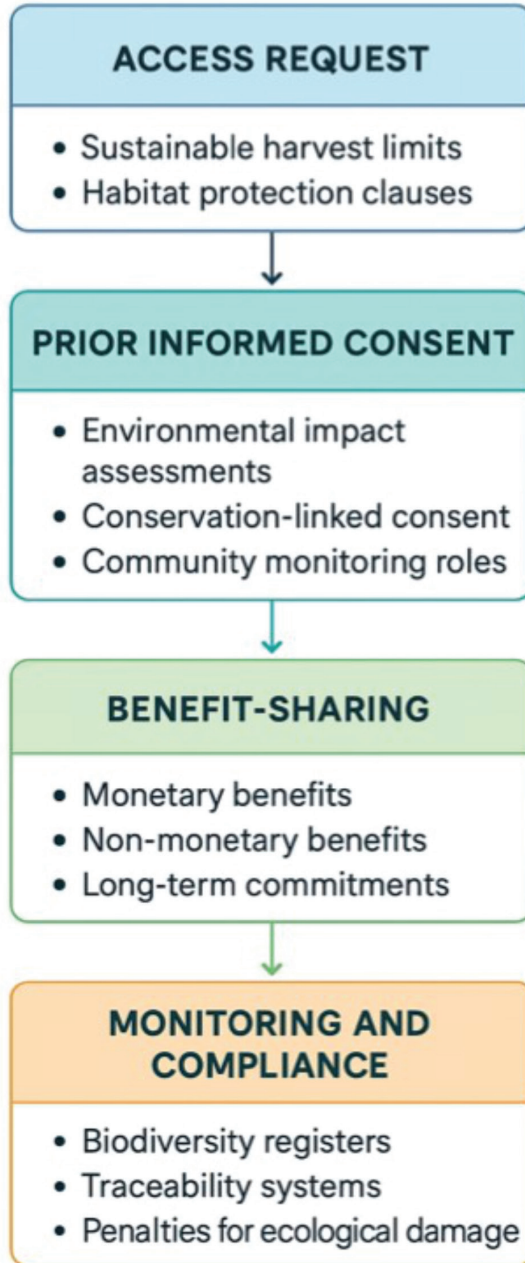


Figure 4: ABS processes and Ecological safeguards

- **Genetic Contamination and Disease Management:** Efforts to prevent the use of antibiotics and pharmacologically active substances in aquaculture to minimize risks to both the environment and human health. Measures to ensure seed quality, reduce inbreeding accumulation, and prevent the spread of diseases.

In essence, the ABS framework in Uttar Pradesh, under the Biological Diversity Act, and subsequent guidelines, governs aquaculture and seed production to ensure the sustainable utilization of fish genetic resources, promote equitable benefit-sharing with local communities, and minimize negative ecological impacts associated with aquaculture activities.

Key Considerations for Stakeholders:

- **Get Prior Approval:** From NBA/SBB before accessing native aquatic resources.
- **Use Standard Material Transfer Agreements (SMTA):** For transparent access/use.
- **Ensure Compliance for R&D & Commercialization:** Especially when patenting or licensing products.
- **Engage Local Communities:** If traditional knowledge or customary rights are involved.

ABS into Practice for Aquatic Genetic Resources

The Access and Benefit Sharing (ABS) framework ensures that the use of aquatic genetic resources contributes to both conservation and community welfare. By linking resource utilization with fair benefit distribution, ABS promotes sustainable fisheries and recognizes the traditional knowledge of local communities that have long safeguarded these resources.

Future Directions

- **Digital Sequence Information (DSI):** DSI will play a key role in ABS by allowing the genetic information of aquatic organisms to be utilized without removing physical samples. In aquaculture and fisheries, DSI supports sustainable breeding programs, disease management, and conservation efforts, while ensuring that

benefits derived from genetic resources are fairly shared with local communities and stakeholders who have traditionally conserved these resources. Emerging information on DSI will regulate and strengthen ABS mechanism.

- **Regional ABS framework:** This will help harmonizing policies across ASIAN/South Asia to manage shared water bodies and species.
- **Private sector engagement:** This will increasingly play an important role of hatcheries, farms and biotech firms in complying with ABS laws.

Recent Policy Shifts for Reform in ABS

The Government of India adapted new ABS regulations which enhance benefits sharing efficiency and maintain support for innovation as well as conservation activities. These rules create transparency standards alongside accessibility provisions for stakeholders who aim to secure economic sustainability for biodiversity management systems.

Key Features of the New ABS Rules

The Government of India has further improved the ABS regulations through streamlined authorization protocols together with a set of equitable compensation frameworks so as to sustain proper biodiversity resource utilization practices. A dual goal between aquatic resource protection and community welfare drives these guidelines to create simplified procedures for compliance. Through the revised rules, the ABS framework offers an enhanced system for granting and notifying approvals which operates with greater operational efficiency. Previous requirements made fisheries commerce and researchers to endure prolonged bureaucratic processes when they wanted access to biological resources. The quick decision-making capability through revised regulations allows officials to make approvals faster. Specific aquatic resources come under certain exceptions from registration requirements when the user establishes defined benefit-sharing terms.

Challenges:

1. Weak implementation of national ABS frame works.
2. Unregulated access to indigenous aquatic resources.

3. Biopiracy concerns, especially in rich genetic diversity areas.
4. Cross-border movement of aquatic species clandestinely.
5. Inadequate informal exchanges among farmers and researchers.

Kunming Montreal Global Biodiversity Framework (KMGBF) Targets

The 2022 Kunming–Montreal Global Biodiversity Framework (GBF) places biodiversity – its conservation, sustainable use, and the fair and equitable sharing of benefits from the utilization of aquatic genetic resources at the core of the global sustainable development agenda. It emphasizes the urgent need to reduce pressures on aquatic biodiversity and to develop practical Access and Benefit Sharing (ABS) arrangements wherever appropriate (Humphris et al., 2024). The KMGBF outlines four overarching goals for 2050, supported by 23 specific targets to be achieved by 2030 (Figure 5), as summarized below:

Goal 1: REDUCING THREATS TO BIODIVERSITY

TARGET 1: Plan and manage all areas to reduce Aquatic Biodiversity Loss:

Ensure that the loss of aquatic areas with high biodiversity value and ecological integrity is reduced to near zero by 2030, while upholding the rights of indigenous peoples and local communities.

TARGET 2: Restore 30% of all degraded Aquatic Ecosystems

By 2030, restore at least 30% of degraded aquatic ecosystems to boost biodiversity, ecosystem services, and ecological connectivity.

TARGET 3: Conserve 30% of Waters:

By 2030, conserve and effectively manage at least 30% of inland water areas critical for biodiversity and ecosystem services through inclusive, well-connected, and equitably governed protected and conserved areas that respect indigenous and local community rights.

TARGET 4: Halt Aquatic Species Extinction, Protect Genetic Diversity, and Manage Human-Aquatic life Conflicts

Take urgent action to stop human-driven extinctions of threatened

aquatic species, restore populations, safeguard genetic diversity, and manage human–aquatic life interactions to foster coexistence.

TARGET 5: Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species

Promote sustainable, legal, and safe use and trade of wild aquatic species, preventing overexploitation and ecosystem harm, while respecting indigenous and local community practices.

TARGET 6: Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact

By 2030, cut the introduction and establishment of invasive aquatic species by at least 50%, prevent new invasions, and control or eradicate existing invasive species, especially in ecologically sensitive areas.

TARGET 7: Reduce Aquatic Pollution to Levels That Are Not Harmful to Fish Biodiversity

By 2030, cut aquatic pollution to levels safe for biodiversity by halving nutrient loss and chemical risks, and by preventing and phasing out plastic pollution.

TARGET 8: Minimize the Impacts of Climate Change on Aquatic Biodiversity and Build Resilience

Strengthen aquatic biodiversity resilience to climate change through mitigation, adaptation, and nature-based solutions that enhance positive and minimize negative impacts on ecosystems.

Goal 2: MEETING PEOPLE'S NEEDS THROUGH SUSTAINABLE USE AND BENEFIT-SHARING

TARGET 9: Manage Wild Species Sustainably To Benefit People

Promote sustainable management and use of wild aquatic species to generate social, economic, and environmental benefits, especially for vulnerable and biodiversity-dependent communities, while upholding indigenous and local practices.

TARGET 10: Enhance Biodiversity and Sustainability in Agriculture, Aquaculture, Fisheries, and Forestry

Ensure that agricultural, aquaculture, fisheries, and forestry areas are managed sustainably by promoting the responsible use of biodiversity. This includes significantly expanding the adoption of biodiversity-friendly practices—such as sustainable intensification, agro-ecology, and other innovative approaches—to enhance the resilience, long-term efficiency, and productivity of these systems. Such practices support food security, conserve and restore biodiversity, and maintain nature’s contributions to people, including vital ecosystem functions and services.

TARGET 11: Restore Maintain and Enhance Nature’s Contributions to People

Restore, maintain, and enhance nature’s contributions to people—including ecosystem functions and services such as air and water regulation, climate moderation, soil health, pollination, disease risk reduction, and protection from natural hazards—through nature-based and ecosystem-based approaches, benefiting both people and the environment.

TARGET 12: Enhance Green Spaces and Urban Planning for Human Well-Being and Aquatic Biodiversity

Significantly expand and enhance the area, quality, and connectivity of green and blue spaces in urban and densely populated areas by promoting the conservation and sustainable use of aquatic biodiversity. Ensure biodiversity-inclusive urban planning that strengthens native species, ecological connectivity, and ecosystem integrity, while improving human health, well-being, and connection to nature, supporting inclusive and sustainable urbanization, and maintaining aquatic ecosystem functions and services.

TARGET 13: Increase the Sharing of Benefits from Aquatic Genetic Resources, Digital Sequence Information and Traditional Knowledge

Implement effective legal, policy, administrative, and capacity-building measures at all levels to ensure the fair and equitable sharing of

benefits from the use of genetic resources, digital sequence information, and associated traditional knowledge. Facilitate appropriate access to genetic resources and, by 2030, substantially increase the benefits shared in line with relevant international access and benefit-sharing instruments.

GOAL 3: TOOLS AND SOLUTIONS FOR IMPLEMENTATION AND MAINSTREAMING

TARGET 14: Integrate Aquatic Biodiversity in Decision-Making at Every Level

Ensure that aquatic biodiversity and its multiple values are fully integrated into policies, regulations, planning, development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments, and, where appropriate, national accounting. This should occur across all government levels and sectors – especially those with significant biodiversity impacts – progressively aligning public and private activities, as well as fiscal and financial flows, with the goals and targets of this framework.

TARGET 15: Aqua-Businesses Assess, Disclose and Reduce Aquatic Biodiversity-Related Risks and Negative Impacts

Adopt legal, administrative, or policy measures to encourage and enable businesses particularly large and transnational aquaculture and fisheries companies, and financial institutions to:

- (a) Regularly monitor, assess, and transparently disclose their risks, dependencies, and impacts on aquatic biodiversity across operations, supply and value chains, and investment portfolios;
- (b) Provide consumers with information to promote sustainable consumption;
- (c) Report compliance with access and benefit-sharing regulations, where applicable.

These measures aim to progressively reduce negative impacts on aquatic biodiversity, enhance positive contributions, lower biodiversity-related risks to businesses and financial institutions, and support sustainable production practices.

TARGET 16: Enable Sustainable Consumption Choices To Reduce aquatic Waste and Overconsumption

Promote and enable sustainable consumption by creating supportive policies, regulations, and educational initiatives, ensuring access to accurate information and viable alternatives. By 2030, aim to reduce the global consumption footprint equitably – halving food waste, curbing overconsumption, and substantially lowering overall waste – so that all people can thrive in harmony with the Earth.

TARGET 17: Strengthen Bio-safety and distribute the Benefits of Biotechnology

Develop, strengthen, and implement biosafety measures in all countries, in line with Article 8(g) of the Convention on Biological Diversity, and ensure safe handling of biotechnology along with equitable sharing of its benefits, as outlined in Article 19 of the Convention.

TARGET 18: Reduce Harmful Incentives by at Least 50%, and Scale Up Positive Incentives for Biodiversity

By 2025, identify and begin eliminating, phasing out, or reforming biodiversity-harmful incentives, including subsidies, in a fair, just, and effective manner. By 2030, substantially reduce such incentives by at least 50% annually, starting with the most harmful, while scaling up positive incentives to support biodiversity conservation and sustainable use

TARGET 19: Mobilize at least 10% per year for Biodiversity from all Sources

Substantially and progressively increase financial resources from all sources domestic, international, public, and private in an effective, timely, and accessible manner, in line with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least 20% per year by 2030, through:

- (a) Increasing biodiversity-related international financial resources from developed countries, including official development assistance, and from voluntarily contributing countries, to developing countries – especially least developed countries, small island developing States,

and economies in transition—to at least 20% per year by 2025 and 30% per year by 2030.

- (b) Significantly boosting domestic resource mobilization via national biodiversity finance plans or similar instruments tailored to national priorities and circumstances.
- (c) Leveraging private finance through blended finance approaches, strategies for mobilizing new and additional resources, and encouraging private sector investment in biodiversity via impact funds and other mechanisms.
- (d) Stimulating innovative financing schemes such as payments for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with appropriate environmental and social safeguards.
- (e) Maximizing co-benefits and synergies of financing that address both biodiversity and climate crises.
- (f) Strengthening collective actions, including those by indigenous peoples and local communities, Mother Earth-centric initiatives, and non-market approaches such as community-based natural resource management and civil society cooperation for biodiversity conservation.
- (g) Enhancing the effectiveness, efficiency, and transparency in the provision and use of financial resources.

TARGET 20: Strengthen Capacity-Building, Technology Transfer, and Scientific and Technical Cooperation for Biodiversity

Enhance capacity-building, technology access and transfer, and promote innovation and scientific cooperation—including South-South, North-South, and triangular partnerships—to support effective implementation. Foster joint technology development, collaborative scientific research, and strengthened research and monitoring capacities to achieve the goals and targets of the Framework.

TARGET21: Ensure That Knowledge Is Available and Accessible To Guide Biodiversity Action

Ensure that decision-makers, practitioners, and the public have access to the best available data, information, and knowledge to support effective and equitable biodiversity governance, integrated participatory management, and enhanced communication, education, monitoring, research, and knowledge management. In this context, traditional knowledge, innovations, and practices of indigenous peoples and local communities must be accessed only with their free, prior, and informed consent, in accordance with national legislation.

TARGET 22: Ensure Participation in Decision-Making and Access to Justice and Information Related to Biodiversity for all

Ensure full, equitable, inclusive, and gender-responsive participation in biodiversity decision-making, access to justice, and information for indigenous peoples and local communities – respecting their cultures and rights over lands, territories, resources, and traditional knowledge – as well as for women, girls, children, youth, and persons with disabilities, while fully protecting environmental human rights defenders.

TARGET 23: Ensure Gender Equality and a Gender-Responsive Approach for Aquatic Biodiversity Action

Promote gender equality in implementing the Framework through a gender-responsive approach, ensuring that all women and girls have equal opportunities and capacity to contribute to the Convention's objectives. This includes recognizing their equal rights and access to land and natural resources, and supporting their full, equitable, meaningful, and informed participation and leadership at all levels of biodiversity-related action, policy, and decision-making.



Figure 5: KMGBF (Biodiversity Plan) has four (4) main goals until 2050 for a “shared” vision and responsibility to halt and reverse biodiversity loss for all aquatic life and 23 targets to be covered action plan by 2023.

Action Plan for Kunming Montreal Global Biodiversity

An action plan for the Kunming-Montreal Global Biodiversity Framework's 23 targets requires national implementation of specific strategies, including protecting 30% of aquatic areas (Target 3), restoring 30% of degraded aquatic ecosystems (Target 2), reducing invasive species by 50% (Target 6), cutting harmful subsidies by 50% annually (part of Target 19), and integrating aquatic biodiversity into all levels of decision-making by fisheries commerce and the Uttar Pradesh Fisheries Department.

Key Areas for Action: The 23 targets fall into three main categories under the four goals as outlined above and the action plan under different targets falling under the four goals are presented as follows:

Goal -1: Reducing Threats to Biodiversity covers Targets 1 to 8 which involves action like:

- ❖ Spatial Planning of all aquatic areas to reduce the loss of high biodiversity areas to nearly zero by 2030 (Target 1).
- ❖ Restoring 30% of all degraded aquatic ecosystems (Target 2).
- ❖ Conserving 30% of aquatic areas under fisheries and aquaculture (Target 3).
- ❖ Halting species extinction and protecting aquatic genetic diversity (Target 4).
- ❖ Reducing the introduction and impact of invasive non-native aquatic species by 50% (Target 6).
- ❖ Reducing all sources of aquatic pollution that harm biodiversity (Target 7).
- ❖ Minimizing the impacts of climate change on aquatic biodiversity (Target 8).

Goal -2: Sustainable Use and Benefit Sharing covers Targets 9 to 13 and involve actions focusing on ensuring nature's benefits are used sustainably and equitably:

- ❖ Ensuring the sustainable and legal harvesting and trade of wild aquatic species (Target 5).

- ❖ Enhancing sustainability in aquaculture and fisheries (Target 10).
- ❖ Restoring and enhancing nature's contributions to people depending on aquatic resources (Target 11).
- ❖ Increasing green spaces and improving urban planning for human well-being (Target 12).
- ❖ Increasing the sharing of benefits from aquatic genetic resources and traditional knowledge (Target 13).

Goal -3: Tools and Implementation covers Targets 14 to 23 requiring actions to address show to implement the frame work effectively and ensure mainstreaming:

- ❖ Integrating biodiversity into all decision-making at all levels of government and business (Targets 14 & 15).
- ❖ Reforming harmful financial incentives, like subsidies, that negatively impact biodiversity (part of Target 19).
- ❖ Ensuring gender equality and women's full and effective participation in biodiversity action (Target 23).
- ❖ Recognizing and respecting the rights and contributions of Indigenous peoples and local communities in conservation efforts.

The Fourth Goal covers that:

The State of Uttar Pradesh must develop integrated spatial plans, sustainable harvesting practices, effective management of human wildlife conflict, and mechanisms for benefit sharing from aquatic genetic resources. In this context, it is important to evaluate specific aquatic biodiversity status, threats, and resources so as to determine which targets are most critical and feasible to address. It is necessary to translate broad targets into concrete, measurable, achievable, relevant, and time-bound (SMART) actions. This will require developing plans for financing biodiversity action, including redirecting harmful subsidies. The authorities must ensure that biodiversity considerations are embedded into policies across the fisheries department and business sectors. Also establish robust frameworks for monitoring, reporting, and reviewing progress toward the 2030 targets.

Outcome

The implementation of ABS in India's fisheries sector represents a crucial step toward ensuring the fair and equitable sharing of benefits arising from the utilization of aquatic genetic resources.

India's legal framework, anchored in the Biological Diversity Act (2002) and the Biological Diversity rules, provides a comprehensive basis for regulating access to aquatic biodiversity while safeguarding the rights and interests of local and traditional communities.

Despite a sound policy foundation, practical implementation in the fisheries domain remains at a nascent stage. Challenges include limited awareness among stakeholders, inadequate documentation of aquatic genetic resources, and the need for stronger coordination between biodiversity authorities, fisheries department and research institutions. However, encouraging progress has been made through initiatives such as the registration of aquatic bioresources, establishment of Biodiversity Management Committees (BMCs), and formulation of benefit sharing mechanisms at local levels.

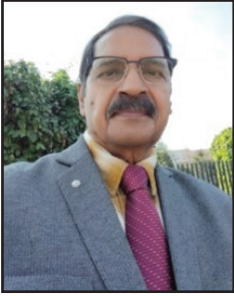
Moving forward, effective ABS implementation in fisheries will depend on strengthening institutional capacities, promoting compliance through awareness and incentives, integrating ABS considerations into fisheries management and research, and ensuring community participation in decision making and benefit distribution. A collaborative ecosystem-based, and transparent approach will be vital to balance conservation goals with sustainable use and equitable benefit sharing – ultimately supporting both biodiversity conservation and livelihoods dependent on India's vast aquatic resources.

References

- CEBPOL, NBA, (2018). Mainstreaming Biodiversity: Inland Fisheries and Aquaculture - A key for food and nutritional security, Published by the Centre for Biodiversity Policy and Law, National Biodiversity Authority, 42p. Copyright @ National Biodiversity Authority, Chennai. ISBN No. : 978-81-940589-5-3.
- Das, B.K., Ray, A., Johnson, C., Verma, S.K., Alam, A., Baitha, R. and Sarkar, U.K. 2021. The present status of ichthyofaunal diversity of river Ganga, India: Synthesis of present v/s past. *Acta Ecologica Sinica*, 43(2); DOI: 10.1016/j.chnaes.2021.10.008
- Down To Earth (2025) Access and Benefit Sharing: New rules for use of biodiversity put in place by Centre. <https://www.downtoearth.org.in › wildlife-biodiversity>.
- Hand Book on Biodiversity Laws, Access and Benefit Sharing (2019) Published by Centre for Environmental Law, Education, Research and Advocacy (CEERA) National Law School of India University, Bengaluru, 150p; ISBN No. 978- 93-83363-75-9.
- Humphries Fran, Charles Lawson, John A.H. Benzie and Clare Morrison (2024) Access and benefit-sharing in global aquaculture: Genetic Resources, Digital Sequence Information and Traditional Knowledge. Published by Edward Elgar Publishing Limited, The Lypiatts15 Lansdown Road Cheltenham Glos GL50 2JAUKEward Elgar Publishing, Inc. William Pratt House Dewey Court Northampton Massachusetts 01060USA.
- Humphries Fran, Benzie John A.H., Lawson Charles, Morrison Clare (2021) A review of access and benefit-sharing measures and literature in key aquaculture-producing countries. *Reviews in Aquaculture* 13, 1531-1548 doi: 10.1111/raq.12532 First published: 26 January 2021.
- Humphries, F. (2018) Sharing aquatic genetic resources across jurisdictions: playing 'chicken' in the sea. *Int Environ Agreements* 18, 541-556. <https://doi.org/10.1007/s10784-018-9403-3>.
- Jha, D.N., Joshi, K.D. and Tyagi R.K. (2017) Declined commercial catch of Gangetic Indian major crops at Allahabad. *J. Inland Fish. Soc. India* 49(1), 11-14.
- Lakra, W.S. (2010) Fish Biodiversity of Uttar Pradesh: Issues of Livelihood Security, Threats and Conservation. Proceedings National Conference on Biodiversity, Development and Poverty Alleviation Published by Uttar Pradesh Biodiversity Board, Lucknow 22, 40-45p.

- Morrison Clare, Fran Humphries and Charles Lawson (2021) A regional review of genetic resource access and benefit sharing – Key issues and research gaps. *Environmental Policy and Law* 51(1):1-24; DOI: 10.3233/EPL-201028.
- Pathak, A.K., Sarkar, U.K., Dayal, R. and Singh, S.P. (2019). UPFBase – A freshwater fish diversity database of Uttar Pradesh, India. *Indian Journal of Animal Sciences*, 89(3), 347-354.
- Sarkar, U.K.; Ajith Kumar, T.T., Sood, N., Singh, R.K., Ravindra Kumar, Tyagi L.K. (Eds) (2024) Sustainable management of fish genetic resources published by Springer Nature Singapore, 264p, ISBN 9819752493
- Singh A K. (2021). State of aquatic invasive species in tropical India: an overview *Aquatic Ecosystem Health & Management*, 24(2): 7–17.
- Singh A.K. (2024) Non-native Invasive Fish Species (NIFS) in Inland waters: Management issues, Strategies and Suggestions. *Fisheries Management and Ecology*. 0:e12747.<https://doi.org/10.1111/fme.12747>.
- Singh, A.K., Sinha, Archana and Yengkokpam S. (2025) Freshwater indigenous ornamental fishes of India: Biodiversity, threats, challenges, and conservation efforts. In *Ornamental Fisheries and Aquarium Keeping Insights from the Indian Aquarium Industry* (Eds) Atul Kumar Jain, Abhinika Jain Rane and Archana Sinha. CRC Press Taylor and Francis Group, Boca Roton, London, New York, 96-113; DOI: 10.1201/9781003318842-3.

About Dr Atul K. Singh



Align

Dr Atul K Singh is former Director of ICAR-Central Institute of Coldwater Fisheries Research (Formerly known as DCFR) and Emeritus Scientist at the ICAR-National Bureau of Fish Genetic Resources, Lucknow. In his 38 year-long research career, contributed significantly towards scientific management of fish germplasm of the country; regulation and management of non-native/invasive fish species; production technology of mono sex population; and Coldwater Fisheries and Aquaculture Development. During active research career, completed over 28 research projects and published over 322 research papers in peer reviewed International and National journals of repute and also published twelve books including publications in Food and Agricultural Organization (FAO). Successfully guided over a dozen of Ph.D students.

For outstanding contributions in the field of Aquatic Science and technology, conferred with Vigyan Ratna award of Government of Uttar Pradesh and also several other prestigious awards such as S. Z. Quasim Gold Medal, Dutta Munshi Gold Medal, Dr K.L. Sehgal Gold Medal, Eminent Indian Zoologist award of Zoological Society of India. Received several prestigious Fellowship awards of many Professional Societies including ICAR-CIFRI Fellowship, ZSI Fellowship award and many others. Served as a member of many National Committees such as National Committee of Introduction of Exotics in Indian waters, Accreditation Committee for evaluation of Agriculture Universities of ICAR, Task Force of Department of Biotechnology, GoI, National Biodiversity Authority, Academic Council of Central Institute of Fishery Education, Board of Management of Uttarakhand University of Forestry and Horticulture, Board of Studies of BBAU, Lucknow. Serving as the Chairman of UP Council of Science & Technology, Member of Uttar Pradesh Biodiversity Board, Member of Research Advisory Committee of the ICAR-CIFRI, Barrackpore, Member of Research Advisory and Monitoring Committee of Zoological Survey of India, Kolkata and many others. Serving as Editor of various National and International journals.

About B. Prabhakar



Prabhakar Bura is a 1993-batch officer of the Indian Forest Service, currently serving as the Principal Chief Conservator of Forests (Monitoring and Working Plan) and Secretary, Uttar Pradesh State Biodiversity Board, Lucknow.

Mr. Bura brings extensive experience in afforestation, wildlife management, biodiversity and wetland conservation, and urban forestry. Over the course of his distinguished career, he has held several key positions, including Field Director, Dudhwa Tiger Reserve (Lakhimpur Kheri); Director, Lucknow Zoo; Divisional Forest Officer, Kedarnath Wildlife Division; and Director, Nanda Devi Biosphere Reserve.

He played a pivotal role in the state's major afforestation initiatives—Plantation Abhiyan 2018 and Plantation Abhiyan 2022—serving as Additional Mission Director during both campaigns.

In the field of urban forestry, Mr. Bura has contributed significantly as Director (Horticulture), NOIDA Authority. Additionally, he has served in several important administrative and managerial capacities, including Additional Managing Director, Uttar Pradesh Forest Corporation; General Manager (Udyog); Chief Conservator of Forests (Land Records); and Forest Economist, among others.

About Dr Somesh Gupta



Dr. Somesh Gupta is currently serving as Technical Officer and Access and Benefit Sharing (ABS) In-charge at the Uttar Pradesh State Biodiversity Board.

With over 25 years of research experience in various aspects of forestry and biodiversity, Dr. Gupta holds a Ph.D. in Botany and has made significant contributions to the conservation and sustainable use of biological resources. His work focuses on the implementation of the Biological Diversity Act, Rules, and Regulations, promoting sustainable utilization of bio-resources and ensuring equitable access and benefit sharing arising from their commercial use.

In addition to his administrative and technical roles, Dr. Gupta serves as a faculty member at several reputed institutions, including JTRI and FTI. He is the author of one book and has published over sixty research papers in national and international journals and conference proceedings.