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FRESHWATER

CASE STUDY

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A TIGER AMONG FISH

Learning more about the Ganga river basin's golden mahseer fish to better protect it

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Map of the Ganga river basin

Introduction

India is home to 15 of the world's approximately 47 species of mahseer, freshwater fish from the Cyprinidae family, which also includes carp and tench.¹ The name mahseer roughly translates as 'mahi' (fish) and 'sher' (tiger), hence it being known as the tiger of the river.² The golden mahseer (*Tor putitora*) is listed as 'endangered' on the IUCN Red List.³ The golden mahseer is the mahseer species on which WWF-India is primarily focusing its conservation efforts, due to the species' conservation status as well as its declining population trends.

Golden mahseer typically live in fast-moving, relatively cold waters, inhabiting hill streams with a rocky and stony substrate, although they've also successfully adapted to introduction in lakes and reservoirs. The golden mahseer is found in the Himalayan foothills, the Indus, Ganga and Brahmaputra basins as well as in the south of India. Most of India's golden mahseer are found in Uttarakhand state, where it is the official state fish. The mahseer can grow to a large size,



A view of the Kolu river near Corbett Tiger Reserve: ideal mahseer habitat ©A.J.T. Johnsingh

up to 275cm and 54kg, and can live over 17 years; due to its size, appearance and behaviour, the mahseer is particularly prized by sports fishers, and has been since the time of British rule.⁴

The golden mahseer's lifecycle is intimately connected with the river's flow: adult fish inhabit foothill rivers and migrate upstream in monsoon conditions to reach suitable spawning grounds; as such, the fish's survival is dependent on the preservation of habitat connectivity and adequate flows. Several other features of the mahseer have implications for its conservation: it only reaches sexual maturity after 4 to 6 years and has a relatively low fecundity.⁵

Funded by the HSBC Water Programme, WWF-India has started work to develop an atlas of golden mahseer distribution and threats as part of a wider advocacy strategy to increase protection for the fish and its habitat, and has also taken steps towards designating a new protected area for mahseer.

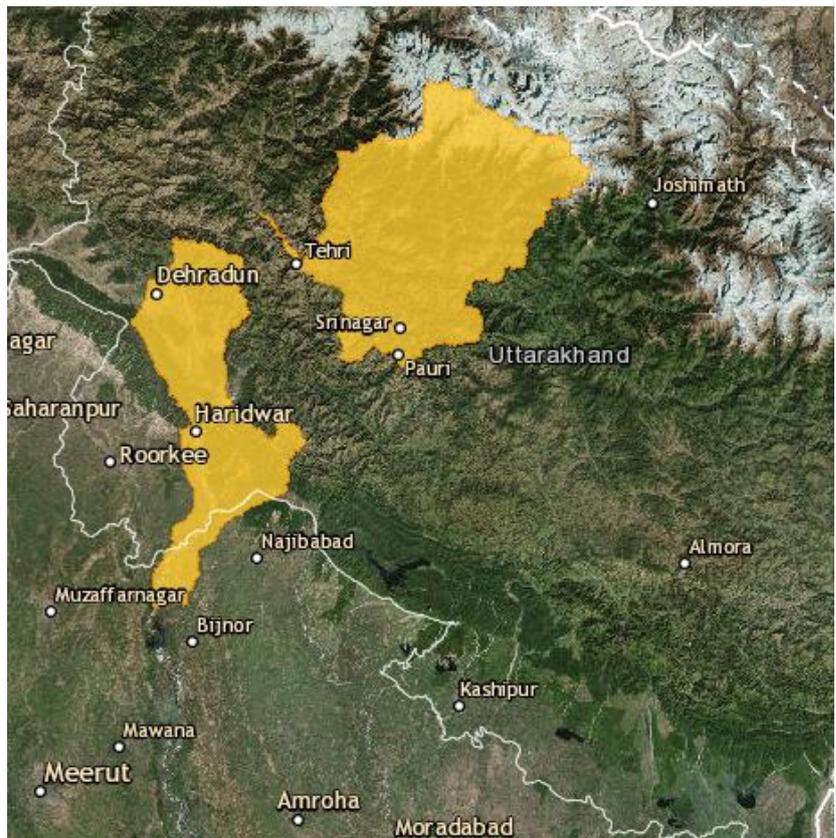


Figure 1: Golden mahseer population range in Uttarakhand and Uttar Pradesh (Source: IUCN, Earthstar Geographics, Esri)

What problem are we trying to address?

Although precise data about golden mahseer populations in India is lacking, indications point to substantial declines.^{4 3} The main threats to mahseer in India are: habitat degradation (from land use changes, riverbed mining and pollution from urban and industrial sources); habitat fragmentation due to infrastructure development, which blocks migration and reduces suitable habitat; climate change; overfishing, including indiscriminate fishing of fish fry and fingerlings at a rate where mortality exceeds recruitment.⁵ In addition to a decline in numbers, the size of mahseer has also been declining, with larger specimens seldom found.⁴

The golden mahseer is not currently listed under the Indian Wildlife (Protection) Act 1972 and lacks a legal framework to protect it, including from indiscriminate fishing. No species are mentioned in the National Fisheries Act and, furthermore, although it bans activities that are harmful to ecosystems and fish, such as the use of dynamites and poison, implementation of the Act is the main problem. Although poor enforcement remain problematic for the Wildlife Act's implementation, WWF (along with others^{4 1}) believes there is an urgent need to list the golden mahseer, ideally under Schedule I, which would afford it the highest degree of protection available nationally.

In terms of mahseer conservation, one of the main constraints is the lack of information about the species' current geographical spread, population size and precise migration patterns.¹ The documentation of past, present, and potential future distribution and abundance of mahseer is vital for understanding population dynamics and planning effective species-oriented conservation programmes. WWF-India's main focus for mahseer conservation is on establishing the species' status and distribution and on identifying crucial river stretches requiring immediate protection as mahseer habitat.

What did we do?

Within the scope of the Rivers for Life programme, primarily funded via the [HSBC Water Programme \(2012-2017\)](#), WWF-India has been focusing on; sustainable water management; biodiversity and habitat conservation; water stewardship; and climate change adaptation. Several areas of work indirectly contribute to mahseer conservation via things like pollution reduction and environmental flows implementation. In addition, WWF-India has implemented several activities directly aimed at mahseer conservation, such as advocacy and the creation of a new protected area.

WORKING IN PARTNERSHIP

WWF-India's mahseer work seeks to involve expert researchers and practitioners from within the mahseer conservation community. Indeed, the mahseer project's inception followed a 2012 workshop convened by WWF that brought together 24 people from civil society, government, academia and the angling community; it included for example representatives from the Indian Council of Agriculture Research, Tata Power Company, the Central Inland Fisheries Research Institute and the Bhutan government.¹

During the workshop, participants discussed mahseer population trends and threats and drew up recommendations for a mahseer conservation action plan, which included launching a research and monitoring programme; strengthening policies and creating a legal framework for improved mahseer conservation; and implementing an awareness raising and capacity building plan.¹ Following the workshop, a [special issue of WWF-India's Panda newsletter](#) was dedicated to the mahseer, including articles from some of the workshop participants.⁵



Ramganga River near Corbett Tiger Reserve © Gerald S. Cubitt / WWF



Mahseer in the Kosi River ©WWF-India

PROTECTED AREA DESIGNATION

Community reserves are buffer zones adjacent to existing protected areas that are used by communities for subsistence activities. Community reserves offer good conservation opportunities, particularly given that it is not possible to designate all suitable mahseer habitats as national parks or wildlife sanctuaries. In addition, community reserves are approved by state- rather than national-level government, making the advocacy process somewhat simpler.

WWF-India – recognising the need to protect mahseer habitats outside of existing protected areas – is currently working with the government of the state of Uttarakhand to designate a 30km stretch of the Kosi River (a tributary of the Ramganga River) near Corbett Tiger Reserve as a community reserve. A 2014 WWF survey⁶ of the stretch found substantial numbers of mahseer (63 caught, measuring between 55-390mm and weighing between 7.5-410g), providing the required justification for the stretch's designation. Initial indications show that the state government is supportive of this plan. In May 2015, a 30km stretch of the Kosi River was surveyed, during which six mahseer occurrence sites were identified; occurrence was attributed to deep fast flowing water and fine gravely-sandy riverbed substrate. Semi-structured interviews with fishers revealed the occurrence of 29 freshwater fish

¹ WWF-Bhutan is also engaged in [mahseer conservation work](#)

species. Fishers also reported that their average catch size had been reduced to 0.75kg/catch and that the average size of fish has also reduced to 9.48 inches – this used to be much higher. According to the local fishers, overfishing using destructive methods (dynamiting and poisoning) and low water flows seem to be the main reasons for this decline.

GOLDEN MAHSEER CONSERVATION ATLAS

WWF-India is developing a golden mahseer atlas for the state of Uttarakhand (where most of India's mahseer population is found), based on species occurrence records, habitat preference (e.g. location of spawning grounds) and threat mapping. Compiling the atlas entails the collection of secondary information from literature reviews, expert reports, interviews with fishers and WWF field site reports from mahseer habitats. Mahseer experts and international conservation groups have contributed crucial information, which has to date been consolidated into species occurrence maps. Data obtained from a planned radio frequency identification system study (see page 6) will feed into the atlas' further development.

If sufficient empirical data is gathered via the secondary information, predictive modelling might be used, which would help build understanding of how the golden mahseer distribution might change based on different land use, climate change, water availability and other threat scenarios. This in turn would help inform conservation programmes, and would help WWF guide development and policy recommendations in the area.

Where will we go from here?

WWF-India's ultimate goal is for the mahseer to be given legal protection via inclusion within Schedule I of the Wildlife Act; reaching this goal will require strong advocacy. In 2017, WWF-India is planning to reconvene many of the mahseer experts who participated in the 2012 workshop to discuss any adjustments to the action plan and also to put together an advocacy strategy.

Going forward, golden mahseer conservation work carried out by WWF-India will no longer be funded through the HSBC Water Programme.

PROTECTED AREA DESIGNATION

Community consultation will be required prior to the Kosi River community reserve's official designation. Indeed, stakeholder buy-in is essential to the success of any such



Gharial crocodiles and mahseer (bottom) in the Kosi River
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reserve. WWF-India will also undertake awareness raising and sensitisation of riparian communities.

WWF-India believes that better-regulated fishing within the reserve – preventing overfishing and the local extinction of aquatic species – can be beneficial both for conservation and for local people. Indeed, indiscriminate fishing reduces the size and quantity of mahseer that can be caught. Given that the mahseer's presence attracts substantial revenue from angling tourism, and given that a single mahseer typically fetches between 200 to 500 rupees (US\$2.9-7.4) per kilo on the market – a substantial sum – improved conservation can also help boost local incomes. The community reserve's location near Corbett tiger reserve is particularly well-suited for local fishers to provide for the market created by its many hotels and restaurants.

Research in Uttarakhand found that there is strong recognition of the mahseer's important economic benefits among local stakeholders, with villagers also pointing to the fish's value as a food source.⁷ Formalising the co-dependence between mahseer populations and local people through something like a payment for ecosystem services scheme, whereby local people would benefit financially from the revenues generated by recreational catch-and-release fishing, has also been suggested as a way of involving local people and providing incentives for conservation.^{8 4}

GOLDEN MAHSEER ATLAS

The mahseer atlas will be used by WWF as a tool to support its advocacy campaign to obtain legal protection for the mahseer, for instance providing evidence regarding the need to protect mahseer populations outside of protected areas. The atlas will furnish information about the fish to help plan and justify conservation interventions and to help advise government regarding proposed developments in identified mahseer habitats.

The atlas will act as a reference for professional and amateur conservationists and other interested parties: at present, there is no single comprehensive reference point for information about golden mahseer in Uttarakhand. The atlas will be written using accessible language to ensure that it is widely used, and it will form part of awareness-raising efforts; indeed, while they are prized by some international anglers and within some parts of India, golden mahseer do not yet elicit as much interest as other more iconic species.⁴ The atlas will be written in English; however, WWF-India might translate the executive summary or main findings into Hindi.

Information from a planned radio frequency identification tagging exercise will feed into the atlas' development. The data from radio tagging of individual mahseer will strengthen the atlas' distribution and habitat preference mapping; it will also build better understanding of the mahseer's annual migration patterns as well as their environmental flow requirements, to feed into WWF-India's wider work on e-flows implementation. The tags will be surgically implanted into the body cavity of each fish. The tagging is planned for 2017, will cover 30km of the Ramganga from Haridwar to Rishikesh as well as some tributaries, and will be done in partnership with the Wildlife Institute of India.

The release of the mahseer atlas is planned for 2017 or 2018, depending on the outcomes of the tagging study: at least one year of tagging data is required, covering each of the three seasons. In addition to species occurrence (from the atlas research and the tagging), WWF-India will also seek to determine species abundance in order to estimate current mahseer populations; WWF-India is currently seeking official permission to undertake the catch-and-release portion of the study.

FOR MORE INFORMATION

Contact the WWF-India team

Resources

- ¹ WWF-India. 2013. *Mahseer conservation in India: Status, challenges and the way forward*. In: Proceedings of the Workshop, New Delhi, pp 1–36.
- ² WWF-India. N.D. [Golden mahseer web page](#).
- ³ Jha, B.R. & Rayamajhi, A. 2010. *Tor putitora*. The IUCN Red List of Threatened Species 2010: e.T166645A6254146. Downloaded on 07 November 2016.
- ⁴ Bhatt, J. and Pandit, M. 2016. Endangered golden mahseer *Tor putitora* Hamilton: a review of natural history. *Reviews in Fish Biology and Fisheries*, 26: 25-38.
- ⁵ WWF-India. 2013. *Conserving mahseer in India*. Panda newsletter special issue.
- ⁶ WWF-India. 2015. *Conservation assessment of Golden Mahseer Tor putitora along River Kosi, Ramnagar Forest Division; Uttarakhand*. 9pp.
- ⁷ Gupta, N., Sivakumar, K., Mathur, V. and Chadwick, M. 2014. The 'tiger of Indian rivers': stakeholders' perspectives on the golden mahseer as a flagship fish species. *Area*, 46.4: 389–397
- ⁸ Everard, M. and Kataria, G. 2011. Recreational angling markets to advance the conservation of a reach of the Western Ramganga River, India. *Aquatic conservation marine and freshwater ecosystems*, 21.1.



Why we are here
To stop the degradation of the planet's natural environment and
to build a future in which humans live in harmony with nature.

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