Policy Brief
June 2025

Introduction of Brown Trout Displaces Native Fish in Bhutan – Consequences and Actions

Why this matters

Bhutan's rivers are among the most pristine in the world, but they are facing a growing ecological threat. Brown trout (*Salmo trutta*), a non-native species introduced in the 1930s for sport fishing and aquaculture, has spread widely across the cold-water river systems in the country. Originally seen as a beneficial addition, this species has since become invasive, outcompeting and displacing native fish such as the snow trout (*Schizothorax* spp.*)*. Without intervention, Bhutan may lose its native cold-water fish species entirely, as brown trout continue to dominate key habitats. This shift not only threatens biodiversity but also undermines the ecological balance of river systems that support both wildlife and human livelihoods. Native fish species are crucial not only for maintaining ecosystem services but also for supporting local livelihoods and cultural heritage. They play a vital role in nutrient cycling, water purification, and providing food and income for communities.

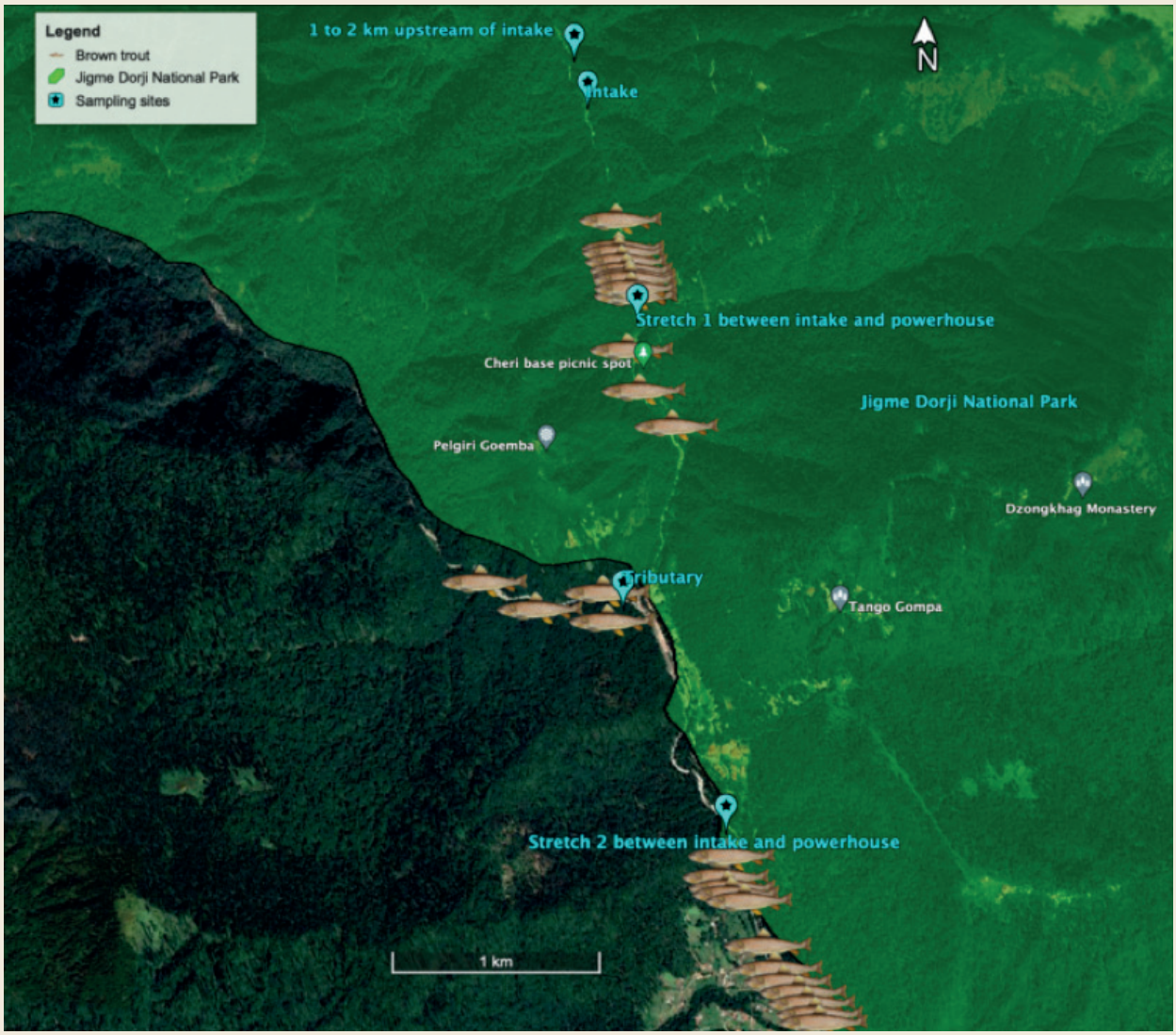
The challenge

Recent studies in rivers such as Thimphu Chhu and Paro Chhu (2024) have revealed that brown trout are the only fish species present in many stretches. This dominance is alarming, as it suggests that native species have been pushed out. The absence of native fish in these river systems strongly suggests that brown trout have outcompeted and possibly preyed upon native species. The continued introduction of non-native fish including the rainbow trout in fish farms, combined with religious release practices like *Tshethar* (release of captive animals into the wild), increases the risk of further spread. These fish can escape into rivers through mishandling or flooding, further threatening native biodiversity.

A Global Pattern of Displacement

Globally, the introduction of brown trout has led to the widespread displacement and even local extinction of native fish species. In New Zealand, native galaxiids have vanished from many streams due to predation and competition from brown trout.[5] *Similar patterns have been observed in the Andes of Patagonia, where native Aplochiton and Galaxias species now survive only in trout-free refuges.*[3] *In the western United States, brown trout have replaced native Cutthroat and Bull Trout in numerous rivers*[1]*, while in the Indian Himalayas, their presence has altered the life-history traits of native Snow Trout,* reducing their abundance and reproductive success.[4]

Brown trout in Natural Habitat. This non-native species threatens the survival of native cold-water fish.



Distribution of Brown Trout in Begana, Thimphu showing the widespread presence of Brown Trout across all surveyed river stretches in Begana. The species has fully colonized the area, with no native fish recorded during multi-seasonal assessments (Sampling year 2024).

What science tells us

Research shows that brown trout prefer deeper, faster-flowing waters during the monsoon and shallower pools in winter. They are highly adaptable and can thrive in a range of ecohydrological conditions. Their presence has been linked to changes in native fish behavior, reduced population sizes, and altered food webs. In some areas, even tributaries and high-altitude streams have been colonized by brown trout, indicating their rapid spread. Macroinvertebrate studies, which help assess water quality, also show shifts in aquatic communities where brown trout are dominant.

What is an invasive species?

An invasive species is a plant or animal that is not native to a specific location and tends to spread rapidly, often causing harm to the environment, economy, or human health. In the case of brown trout, their aggressive feeding habits, adaptability to seasonal river changes, and ability to reproduce in a wide range of habitats have made them a dominant force in Bhutan's rivers. These fish prey on native species, compete for food and space, and can even introduce diseases from fish farms into natural ecosystems.

Key findings

Fieldwork conducted across multiple river systems in Thimphu chhu and Parochhu in 2024 found that brown trout were the only fish species present in pre-monsoon, monsoon and post-monsoon seasons in many stretches. No native fish were recorded in several key habitats, and fingerlings and juveniles of brown trout were found even in remote tributaries.[2] The biological balance is shifting, which indicates that brown trout are not only surviving but thriving—and expanding their range.

Recommendations for policy action to protect native fish

To protect the native fish and river ecosystems, Department of Forests and Park Services, Ministry of Energy and Natural Resources should take the lead in implementing a coordinated set of actions:

- ***Prohibit further introductions of non-native trout into the natural river***
  Enact and enforce a nationwide ban on the introduction of Brown and Rainbow Trout into natural rivers. This includes halting stocking from hatcheries and preventing unauthorized releases to avoid further ecological disruption.

- ***Strengthen fish farm regulations***
  Implement and monitor strict biosecurity protocols in all trout farms to prevent accidental escapes into nearby rivers and streams.

- ***Discourage religious release of non-native fish***
  Collaborate with religious institutions to promote culturally respectful alternatives to *Tshethar* that do not involve releasing invasive species. Awareness campaigns can help shift practices toward more ecologically sound options.

- ***Manage existing brown trout populations***
  Develop strategies to manage the current populations of brown trout in natural rivers. This could include selective removal, relocation to protected farms, and reintroduction of native fish in their place to restore ecological balance.

- ***Restore native fish habitats and reintroduce native species***
  Relevant organizations such as Department of Forests and Park Services and Department of Livestock, Ministry of Agriculture and Livestock should identify and rehabilitate degraded habitats. These efforts should include pilot reintroduction programs for native species in rivers where they have disappeared.

- ***Adopt advanced monitoring tools***
  Establish an environmental DNA monitoring program and integrate citizen science platforms, such as angler reporting apps, to track fish populations and detect early signs of invasive spread. These platforms can empower local communities and anglers to contribute valuable data and observations.

Ichthyological survey in Punatsangchhu in 2024 caught brown trout (A) preying on native snow trout juvenile (B).

Call to action

Bhutan's rivers are more than just waterways—they are lifelines for biodiversity, culture, and communities. The spread of brown trout is a clear warning sign. By acting now, we can protect our native fish, preserve ecological balance, and ensure that future generations inherit rivers as rich and vibrant as those we know today.

- ***Develop a national invasive freshwater species policy***
  Draft and adopt a comprehensive policy to guide long-term prevention, control, and management of invasive freshwater species. The sooner this policy is implemented, the better it will be for Bhutan's ecosystems and biodiversity.

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Acknowledgements

The document was produced by the Centre for Rural Development Studies, under the College of Natural Resources with funding support from Department of Academic and Research Services (DeARS), Office of the Vice Chanceller RUB, B-KIND Tarayana Foundation, Royal Society for Protection of Nature (RSPN), and Asian Food and Agriculture Cooperation Initiative (AFACI). The aquatic survey in Thimphu Chhu and Parochhu were funded by Druk Green Power Corporation Limited and Gyaltshen Consultancy respectively. The contents are the sole responsibility of the authors and do not necessarily reflect the views of the supporting organizations.

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