

# Alaknanda

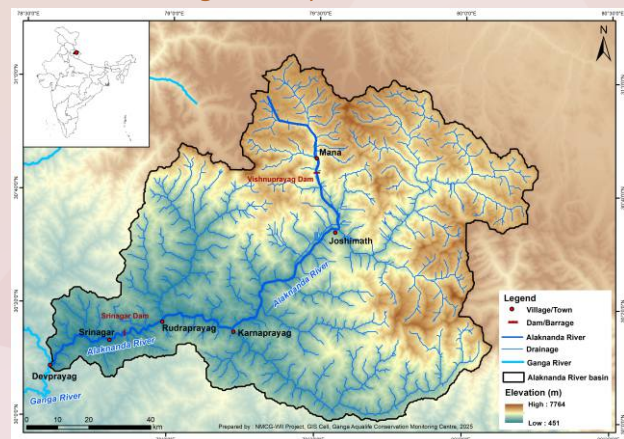
## GENERAL INFORMATION

- Alaknanda River, a major headwater tributary of the Ganga River, originates from the snouts of the Satopanth and Bhagirathi Kharak glaciers, descending from the Chaukhamba massif (approx. 3,800 m asl) in Chamoli district of Uttarakhand, and flows for about 195 km through Chamoli, Rudraprayag, Pauri Garhwal, and Tehri Garhwal districts in Uttarakhand.
- It meets the Bhagirathi River at Devprayag (Tehri Garhwal district), from whence the river is known as 'Ganga'.
- Alaknanda River basin spans an area of about 10,882 km<sup>2</sup> (Figure 1).
- The basin falls under the Trans-Himalaya (Tibetan plateau – 1B), Himalaya (West Himalaya – 2B) and Gangetic Plain (Upper Gangetic Plains – 7A) biogeographic zones.
- Climate of the basin ranges from subtropical in the lower reaches to alpine at higher altitudes, with marked variation driven by its large altitudinal span and rugged topography.
- The river exhibits a sinuous to meandering course through deep gorges, developing terraces, epigenetic gorges, and rock-cut benches between Joshimath and Devprayag.
- Major tributaries of Alaknanda are the Dhauliganga, Nandakini, Pindar, Mandakini and

Saraswati.

- The population density along the river is 102.19 persons/km<sup>2</sup>.
- Decadal LULC transitions in the Alaknanda basin (2008–09 to 2018–19) recorded increases in kharif crop by 1.08%, double/triple crop by 0.92%, grassland by 0.66%, and waterbodies by 0.02%, while rabi crop decreased by 0.02%, fallow land by 1.74%, evergreen forest by 0.07%, deciduous forest by 0.01%, degraded/scrub forest by 0.01%, wasteland by 0.63%, and snow cover by 0.20%, indicating a shift in land-use patterns (Figures 2a and 2b).

Figure 1: Map of Alakananda River basin



## BIODIVERSITY VALUE

- Alaknanda basin is dominated by non-forest areas (64.01%), followed by moderately dense forest (19.48%), open forest (10.06%), very dense forest (6%), and scrubland (0.45%) (Figure 3).
- At higher elevations, the basin supports alpine scrub and meadows with species like Himalayan birch (*Betula utilis*), *Rhododendron* spp., and alpine herbs, including the Endangered gandrayan (*Angelica glauca*). Mid-elevation temperate forests feature oaks (*Quercus* spp.), deodar (*Cedrus deodara*), spruce (*Picea smithiana*), and west Himalayan fir (*Abies pindrow*). The lower elevation subtropical and tropical forests are characterized by pine (*Pinus roxburghii*, *P. wallichiana*) and sal (*Shorea robusta*).
- In the upper Alaknanda basin, Vulnerable snow leopard (*Panthera uncia*) occurs with key prey species such as blue sheep (*Pseudois nayaur*) and Himalayan tahr (*Hemitragus jemlahicus*), alongside the Endangered Himalayan musk deer (*Moschus leucogaster*), and the Himalayan brown bear (*Ursus arctos isabellinus*). The Nanda Devi National Park and its surrounding areas, located within the basin, hosts 27 mammalian species (2 orders and 5 families).
- Khan et al. (2014; WWF) reported the presence of otters along the Alaknanda River downstream of Rudraprayag. Although these were hypothesized to be smooth-coated otters (*Lutrogale perspicillata*), they may represent Eurasian otters (*Lutra lutra*), given the latter's distribution in higher elevations (>750 m asl).
- 82 and 154 avifaunal species have been recorded from the Valley of Flowers National Park, and Nanda Devi National Park and its surrounding areas, respectively, including the Vulnerable cheer pheasant (*Catreus wallichii*), and Himalayan monal (*Lophophorus impejanus*), the state bird of Uttarakhand.
- 60 fish species (5 orders and 11 families) have been documented from the river, including the Endangered golden mahseer (*Tor putitora*) and *Glyptothorax madraspatanus*.



Figure 2a: LULC map of Alakananda River basin (2008-09)

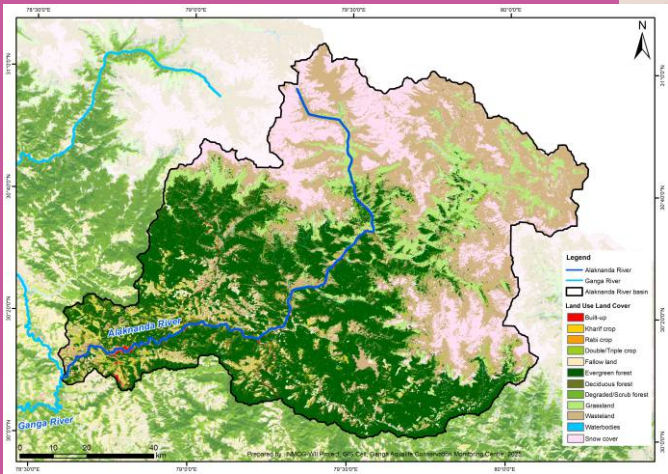


Figure 2b: LULC map of Alakananda River basin (2018-19)

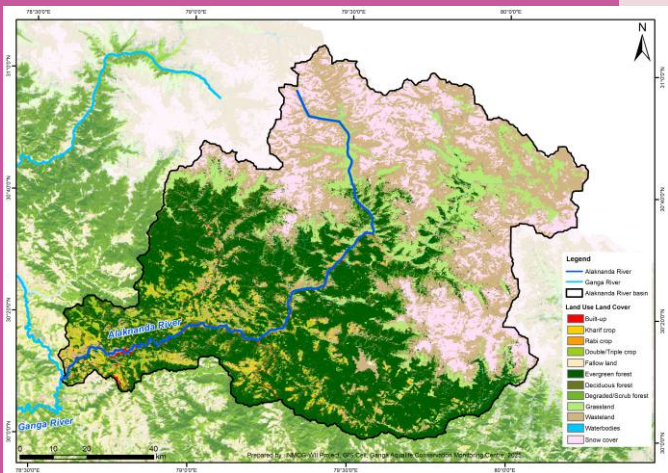
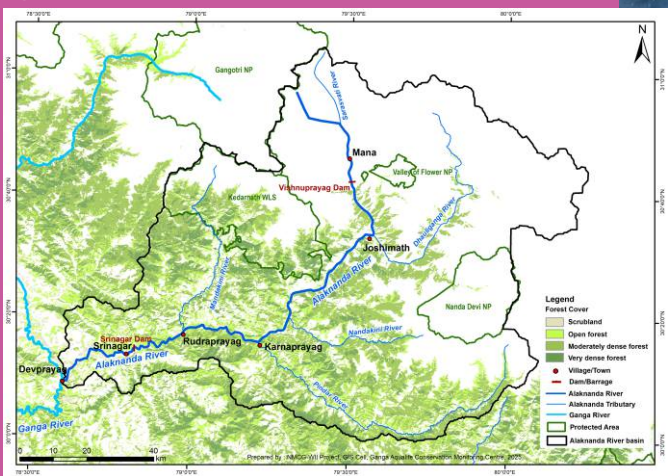


Figure 3: Forest cover of Alakananda River basin (2019)



## CONSERVATION SIGNIFICANCE

### ENDANGERED

#### Fish

Golden mahseer *Tor putitora* (Hamilton, 1822)  
*Glyptothorax madraspatanus* (Day, 1873)

### VULNERABLE

#### Fish

Gangetic loach *Botia rostrata* (Gunther, 1868)  
Dark mahseer *Naziritor chelynoides* (McClelland, 1839)  
Chirruh snow trout *Schizothorax esocinus* (Heckel, 1838)  
Hill trout *Schizothorax plagiostomus* (Heckel, 1838)  
Snowtrout *Schizothorax richardsonii* (Gray, 1832)  
Goonch *Bagarius bagarius* (Hamilton, 1822)

### KEY PROTECTED AREAS

Valley of Flowers National Park  
Nanda Devi National Park  
Kedarnath Wildlife Sanctuary

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## DRIVERS OF RIVERSCAPE CHANGE

- Alaknanda catchment lies in the seismically active Himalayan region, where tectonic movements cause crustal deformation, leading to high erosion, frequent landslides, and a heavy sediment load in the river.
- Tunneling for hydropower projects like Tapovan-Vishnugad HEP in the Alaknanda basin has been linked to land subsidence in Joshimath, with tunnel construction in fragile zones causing groundwater loss and destabilizing the town, resulting in cracks and damage to homes.
- Extreme and sudden weather events like cloudbursts and flash floods are key drivers of rapid change in the basin, causing major shifts in channel shape, increased sediment, and frequent course changes due to the region's fragile geology and geography.
- Glacial melt due to rising temperatures increases the risk of glacial lake outburst floods (GLOFs), which can suddenly and drastically alter the Alaknanda riverscape.
- There are 10 operational dams in Alaknanda basin, of which two are on the mainstem river, namely Srinagar HEP (330 MW) and Vishnuprayag HEP (400 MW), while Vishnugad Pipalkoti HEP (444 MW) is under construction. These structures modify flow regimes, sediment transport and downstream river dynamics.

## INTERESTING FACTS

- According to Hindu mythology, the river is considered one of the sacred streams that formed when the celestial Ganga descended to Earth, and was divided by Lord Shiva's (one of the three supreme Hindu deities) matted locks.
- 'Panch Prayag' are the five sacred confluences along the Alaknanda River, where it is joined by its major tributaries. In chronological order, these are Vishnuprayag (with the Dhauliganga), Nandaprayag (with the Nandakini), Karnaprayag (with the Pindar), Rudraprayag (with the Mandakini), and Devprayag (with the Bhagirathi, after which the river is known as the Ganga).
- Badrinath Dham, situated along the Alaknanda River, is one of the Char Dham pilgrimage sites established by Adi Shankaracharya and dedicated to Lord Vishnu (one of the three supreme Hindu deities). It premises houses a sacred thermal spring, *Tapt Kund*, which is believed to have healing properties.
- Sri Hemkund Sahib, located in the Alaknanda basin, is an important Sikh pilgrimage site associated with the 10<sup>th</sup> and last Guru in Sikhism.
- Valley of Flowers National Park and Nanda Devi National Park, both UNESCO World Heritage Sites situated in the Alaknanda River basin, constitute the core zones of the larger Nanda Devi Biosphere Reserve (designated under UNESCO's Man and the Biosphere Programme). These National Parks are notable for their endemic alpine flora, high biodiversity, and exceptional natural beauty, representing areas of significant ecological and cultural value.



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