



Firefly flashes and field observation.



World Firefly Day 2024

Illuminating India: The Nationwide Firefly Conservation Initiative

Introduction

Fireflies, or lightning bugs, hold a special position in a country where biodiversity is as rich and varied as its culture. These enchanting beetles from the family Lampyridae, known for their bioluminescence, play a crucial role in the ecosystem. They are not just a summer's delight but also excellent bio-indicators of a healthy environment. Their larvae contribute to natural pest control by feasting on garden pests like snails and slugs. The adults are

pollinators and a food source for other animals. Despite their ecological importance, researchers have largely neglected fireflies, resulting in a conservation status that remains data deficient.

Several key factors contribute to the decline of firefly populations. Urbanisation, deforestation, and agricultural expansion destroy or fragment their natural habitats. This alteration or diminution of wetlands, meadows and woodlands impacts their breeding and feeding grounds. Artificial light disrupts fireflies' mating rituals, as excessive lighting interferes with their bioluminescent signals. Chemical pollutants and pesticides harm fireflies directly or destroy the insects they feed on, reducing food availability and contaminating water sources where fireflies lay their eggs. In some areas, the collection of fireflies for the pet trade or scientific research causes local population declines if not managed sustainably.

Strategies for Firefly Conservation

Conservation efforts are essential to address these issues. Protecting natural habitats, reducing light pollution, and using fewer chemicals are steps that can help mitigate their decline. By raising awareness and supporting local conservation initiatives, we

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Communication of citizen science
through social media.



can ensure the future of firefly populations and maintain the ecological balance which they help sustain. There are over 2,200 species of firefly worldwide, but in India only about 50 have been documented so far. There is a significant gap in our understanding of their diversity and ecology. To help bridge this gap and to instil a valuable sense of responsibility, a citizen science initiative was launched across the country.

Citizen Science Initiative

Fireflies are magnificent creatures whose collective flashes create a mesmerising recreational environment. To highlight their significance, the organisation *Fireflyers International Network* designated the first weekend of July as *World Firefly Days*. We launched a nationwide firefly survey in July 2021 to support firefly conservation and raise awareness in India through a Rufford Foundation small grant for firefly study in Doon Valley. Thus, in 2021, a ground-breaking citizen science project was launched to document firefly occurrences across India. This is now an annual event.

To enhance survey participation, we designed an eye-catching cover page and prepared a questionnaire to collect essential information on fireflies. We generated a link to the questionnaire using ArcGIS Survey 123. We circulated this link through the official websites and Instagram handles of the Wildlife Institute of India and Graphic Era University. Additionally, we leveraged personal contacts to increase involvement. We guided participants to go out at around 8–9 pm, look for fireflies, make an approximate count and provide information on nearby anthropogenic pressures to identify potential drivers behind the decline of firefly populations.

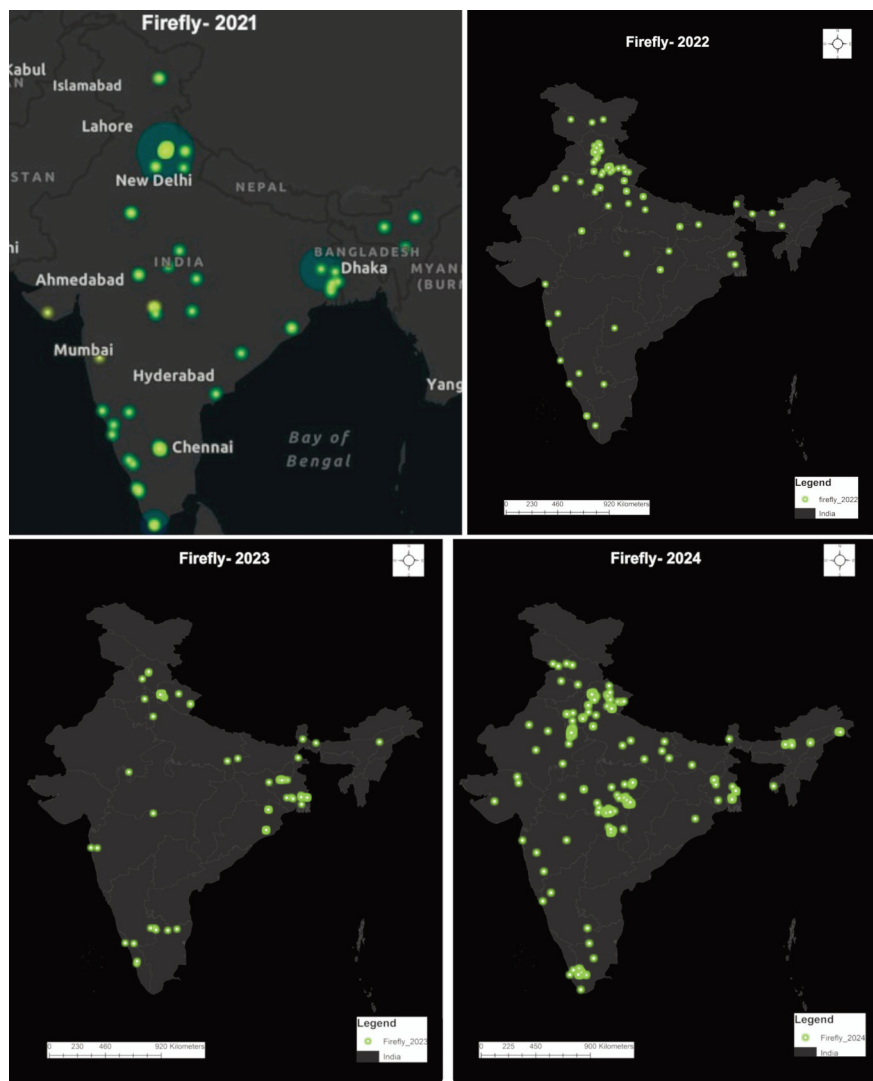
Over the past four years (2021–2024), public participation has grown steadily. We have provided educational programmes, workshops and community events, offering platforms for people to learn about fireflies and contribute to their preservation.

Highlights from Firefly Surveys

Firefly surveys have played a pivotal role in engaging



Abscondita perplexa.



Indian Firefly Survey Responses 2021–2024.



Firefly larva feeding on snail.

communities across the country, aiding in the documentation. The first survey in 2021 involved just 76 citizen scientists. In 2022, 170 from 19 states took part, and 93 participants from 14 states in 2023. The response grew remarkably in 2024 with 350 participants from 20 states. Over the years, approximately 26,000 firefly sightings have been

documented, revealing a significant participation from states including Uttarakhand, Madhya Pradesh, Maharashtra, Kerala, Rajasthan and West Bengal. This widespread involvement not only highlights the distribution of fireflies across diverse regions but also fosters a deeper appreciation and understanding of these luminous

insects. Such widespread involvement indicates a collective recognition of the ecological importance of fireflies. Their presence serves as a strong indicator of environmental health, making their conservation crucial. By involving citizens in these surveys, we not only gather valuable data but also promote a sense of stewardship towards the environment. The firefly survey has thus become more than just a data collection exercise; it is a movement that educates and inspires people.

Future Directions: Ensuring the Glow Continues

The success of the firefly survey sets the stage for future projects aimed at strengthening conservation planning for fireflies. By continuing to engage communities and expand research efforts, we can ensure that the glow of fireflies continues to illuminate our nights, signalling a healthy environment for generations to come.

The celebration of World Firefly Day in India exemplifies the power of collaborative efforts in biodiversity conservation. Through the combined efforts of various organisations and enthusiastic citizen scientists, we are not only safeguarding these magical beetles but also nurturing a culture of environmental stewardship.



Field visit.