AWARE

JAN/ FEB 2026

Kingfishers: Jewels of the Waterways

By Peter Hudson and Kaitlyn Baker

CONTENTS

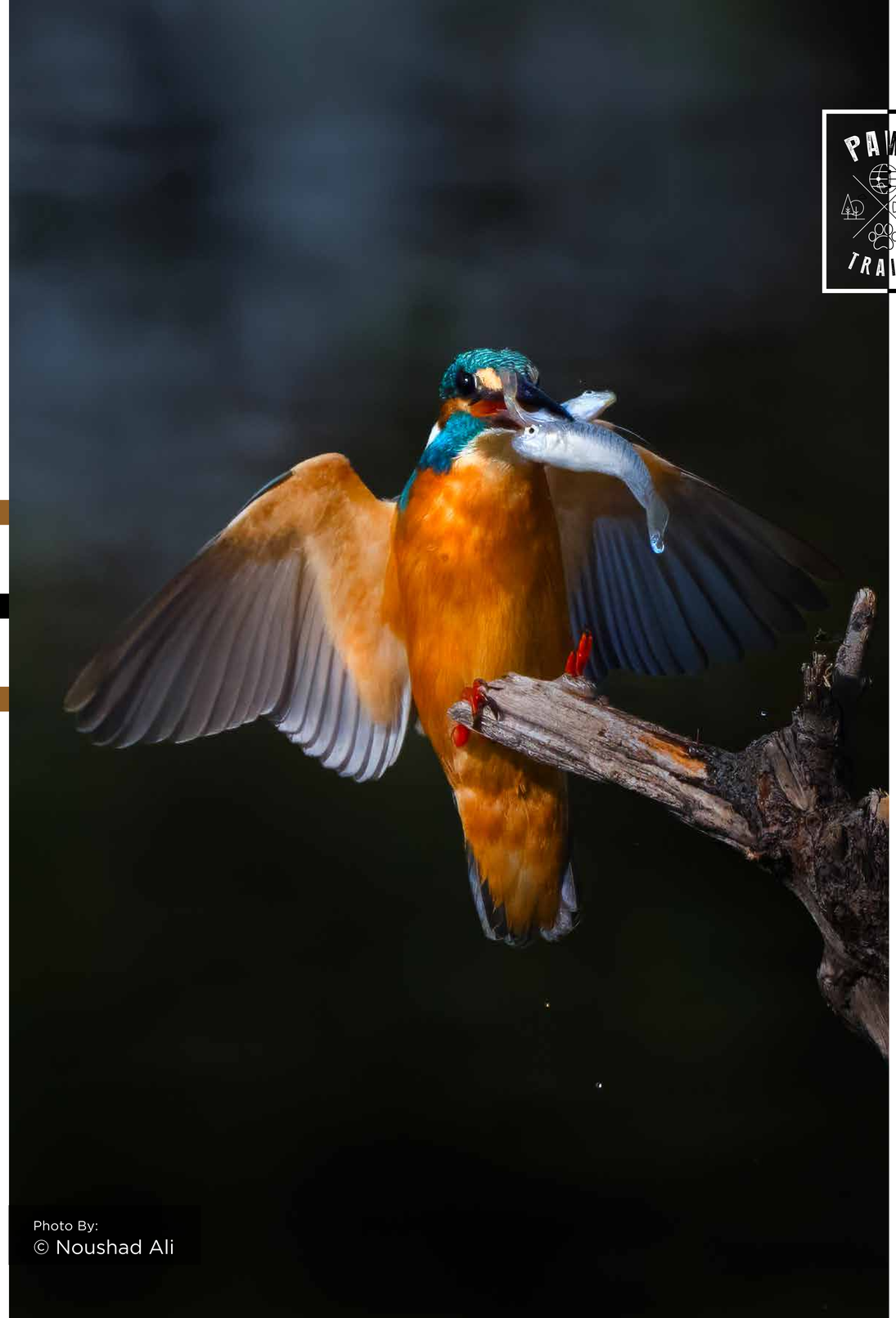
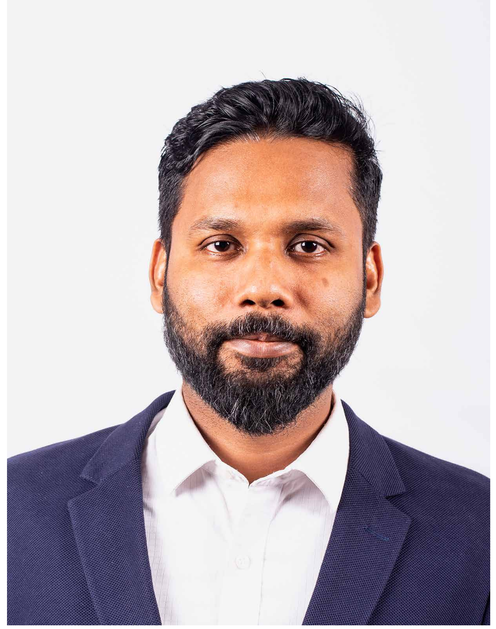


Photo By:
© Noushad Ali

Publisher: Paws Trails Explorers **Editorial Director**: Raghul Patteri **Conservation Director**: Peter Hudson
Content Director: Nisha Purushothaman, **Director Photography:** Hermis Haridas, **Design desk** : Nithya Purushothaman



Raghul Patteri
Editor

EDITOR'S DEN

In this edition, we step into the shimmering world of kingfishers birds whose brilliance is contrasted by the fragility of the habitats they depend on. The narrative by Dr. Peter Hudson and Kaitlyn Baker takes us far beyond their iconic blue flash and plunging dives, revealing a story shaped by extraordinary adaptations, quiet resilience, and mounting environmental pressures.

From the intricate physics behind their iridescent plumage to the precision engineering that enables their breathtaking hunting dives, this feature reminds us that nature's elegance is the product of millions of years of evolution. Yet every one of these marvels now faces increasing threats to survival. As waterways stagnate, banks harden, and climate extremes reshape the landscape, kingfishers stand as vivid indicators of ecological health and of the consequences when it falters.

At the same time, the narrative offers hope. Conservation efforts from riparian restoration to artificial nest banks show that when we give nature space, it rebounds with astonishing speed. Through the lens of dedicated photographers, we witness not only the beauty of these birds but also the broader story of our rivers and wetlands.

This feature is a call to admiration, but more importantly, a call to action: to protect the clean waters, living banks, and wild corridors that allow kingfishers and entire ecosystems to thrive.

Our thanks for the contributors of the brilliant photographs in this edition. The power of community photography never ceases to amaze us and we are proud of the Paws Trails community. Our next edition will feature the Cape Buffalo, please keep your images ready.

Photo by: © Nikhil Singh

FOUNDERS' NOTE

Welcome to the 38th edition of PT Aware, where each issue is dedicated to giving a voice to one wild species and the ecosystem it silently supports.

This bi-monthly magazine was born from a deep need to slow down, pay attention, and tell the stories that often go unheard. It remains completely free, because awareness shouldn't have a price tag. Our mission is simple but urgent: inform, inspire, and ignite action through storytelling rooted in science, photography, and compassion.

In this edition, we turn our focus to the Kingfisher, a bird as iconic as it is elusive. With its electric blues and lightning-fast dives, the kingfisher is often admired from afar. But how many of us know about its fragile habitats, or the human pressures threatening its survival?

This feature dives into the life of the kingfisher its behavior, breeding, feeding habits, and the delicate balance it depends on. From wetland degradation to pesticide use, the threats are many but so are the solutions.

If this small, brilliant bird has ever made you pause in wonder, we invite you now to pause with purpose.

Explore more editions at www.pawstrailsmagazine.com

Sincerely,

Hermis Haridas &
Nisha Purushothaman
Founders - Paws Trails

Peter Hudson is a scientist, photographer, and conservationist. He undertook his first scientific expedition to Africa at the age of 21 and has been a regular visitor ever since. Passionate about nature, he manages his own 36-hectare nature reserve in Pennsylvania which is home to bears, bobcats, and other animals.

In his professional career, Peter is the Willaman Professor of Biology at Penn State University. The focus of his research has been the infectious diseases of wildlife and in particular how new diseases emerge. For the past 11 years, he has been working on how and why viruses move from bats to humans in an attempt to predict when viral spillover occurs. He has also been studying the wolves in Yellowstone, tortoises in the Mojave Desert, and bighorn sheep in Idaho.

Peter is the Conservation Director at Paws Trails and uses his skills as a scientist and educator to increase awareness about conservation issues. He is supported by two interns at Paws Trails: Hayden Kissel and Shreya Menon. He is also heavily involved with the Random Good Foundation that undertakes storytelling for social change. He is an adjunct Professor at The Nelson Mandela African Institute of Science and Technology based in Arusha, Tanzania, and a Fellow of the Royal Society.

Kingfishers: Jewels of the Waterways

By Peter Hudson (Conservation Director, Paws Trails)
& Kaitlyn Baker

Images by: Peter Hudson, Amith Krish, Dr Noushad Ali, Hermis Haridas, Deepa Girish, Aminlal Ami, Nikhil Singh, Anidas, Aghil K K, and Nisha Purushothaman

Photo by: © Deepa Girish

An electric blue flash across a stream. A patient vigil on an overhanging branch. The explosive dive into crystalline water. These are the thrilling moments that make kingfishers some of the most spectacular subjects in the natural world. Yet, these stunning birds face mounting pressures that make documenting their lives increasingly urgent. For wildlife photographers, understanding kingfisher biology and the conservation challenges they face enriches both our images and our role as visual advocates for their protection.

The Kingfisher Family: Diversity and Distribution

Kingfishers belong to the Alcedinidae; a family closely related to rollers and bee-eaters that comprises about 90 species distributed across every continent of the world except Antarctica. While temperate regions like Europe may have just one or two species, the real biodiversity flourishes in the tropics.

The variety is remarkable. In Africa alone, kingfishers range from the diminutive African Pygmy Kingfisher, weighing just 10 grams, to the substantial Giant Kingfisher at 350 grams. Despite their name, many kingfishers have abandoned aquatic prey entirely. Australian kookaburras hunt terrestrial prey including snakes and lizards. Forest kingfishers of New Guinea specialize in insects. The African woodland kingfisher, with its memorable call, feeds mostly on large insects.

Photo by: © Aminlal Ami

Surely the most recognizable aspect of the kingfisher are their remarkable iridescent colours with many species being either blue or a rufous orange. The blue colour is not caused by a pigment but is almost entirely structural, produced by air sponges in the feather barbs that scatters the short wavelength light while underlying melanin absorbs the rest. These spongy nanostructures can generate a continuum of blue colours in the short wavelength end of the spectrum and can range from cyan to deep blue/blue green with simple small changes in spacing.

Since blue depends on physical architecture rather than a rare dietary pigment, it is easy to produce and maintain. In contrast the orange to rufous colours are classic pigmentary colors, produced by carotenoids and deposited in the feathers. These carotenoid-based colors can reflect the condition of the bird and carry information about individual quality, and in many species are thought to be used in female mate selection.

For photographers in temperate regions, the Common Kingfisher (*Alcedo atthis*) of Europe and Asia and the Belted Kingfisher (*Megaceryle alcyon*) of North America represent the most accessible subjects. Both species exhibit the classic kingfisher form: a relatively large head, dagger-like bill, short legs, and compact body built for the precision demands of plunge-diving.

Kingfisher Life History

The Belted Kingfisher, which is one of the most widespread species in North America, offers a window into the life history of these birds and is well illustrated in this edition. They raise a single brood each year in a burrow cavity that both parents excavate early in the season. The female lays about six glossy white eggs that both parents incubate for approximately 23 days. Then, both parents feed the nestlings until they fledge at 28 days of age. After fledging, the young remain with the adults for another three weeks, learning the critical skill of catching fish before dispersing to find their own territories.

Outside the breeding season, kingfishers are mostly solitary. In many parts of their range, they remain on established territories year-round, but when water sources freeze over, they undertake short-distance migrations to find open water, where they must interact with other kingfishers competing for the same resources. In July 2025, I had the privilege of photographing these birds in Colorado with the accomplished and superb bird photographer, Alan Murphy (Alan Murphy Photography). We encountered Belted Kingfishers that we believe had migrated down from higher altitudes as a group with several males and four females. Female Belted Kingfishers have a distinctive rusty-colored band across their belly, allowing us

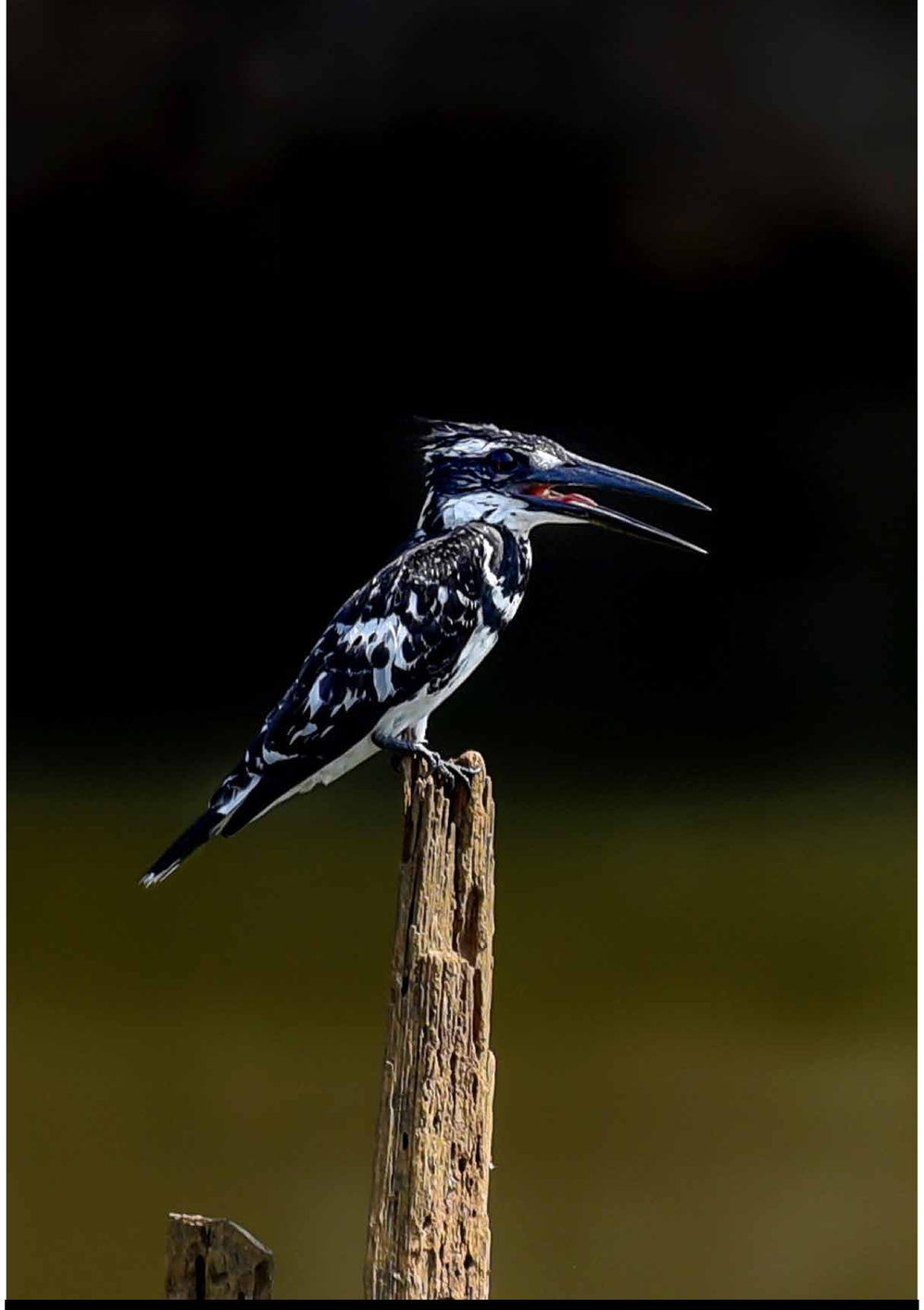


Photo by: © Aghil K. K

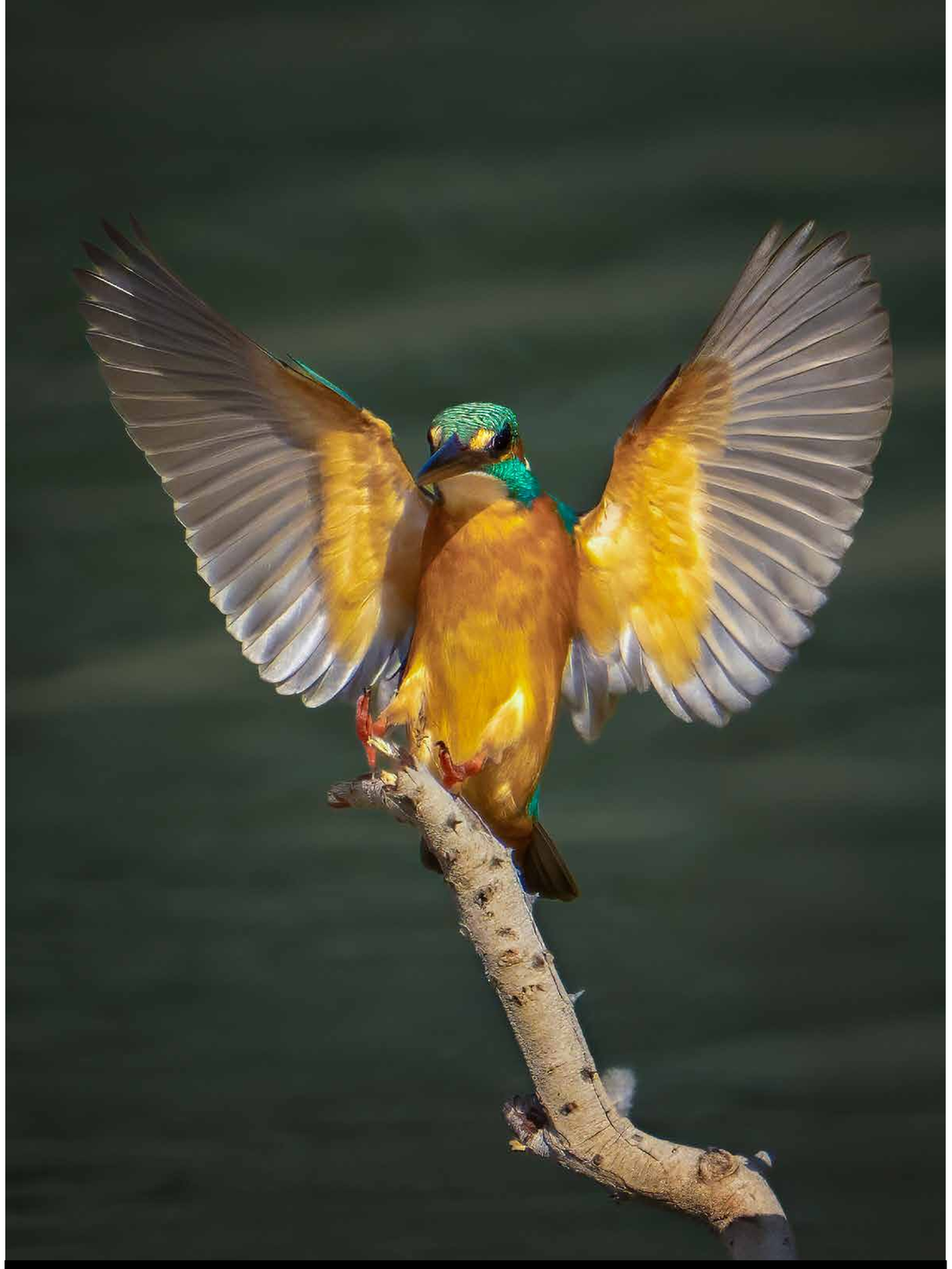


Photo by: © Noushad Ali

to identify their sexes, though we couldn't determine age or know the relationship between them. We watched as one male repeatedly chased the females from their feeding perches. Some of this aggression may have been the male encouraging his offspring to disperse and establish their own territories.

The Art of the Kingfisher Dive

While a portrait of a kingfisher waiting to dive makes a pleasing image, capturing them in flight or plunging into water to catch fish is far more compelling. Understanding the challenges kingfishers face helps us appreciate both their hunting strategy and our opportunities as photographers.

First, they must select a hunting perch that provides a clear view of potential prey while ensuring they won't collide with obstacles above or below the water's surface. As photographers, we can assist by providing good perches in strategic locations. Second, when they dive, they need space and conditions that allow them to adjust their angle mid-flight, to get the perfect entry point into the water to reach the fish and then power back above the water to fly again, without becoming waterlogged.

Third, catching fish underwater is not easy, since the birds must compensate for refraction, the bending of light as it passes from water to air. When we look at a fish underwater, what we see as a fish's location is an illusion, the fish is deeper and in a slightly different position than it appears from above and unless the kingfisher compensates for this they will miss every time. Yet kingfishers strike with extraordinary accuracy and have developed a series of specialized adaptations to solve this optical challenge. Their binocular vision provides an accurate perception of depth. Many species have a distinctive white spot or mark near their eye that they appear to use as a sighting reference, helping to correct for refraction much like a sighting bead on a rifle. While most vertebrates have a single fovea on the back of their retina (the area of sharpest vision in the eye), birds that hunt on the wing have two. Kingfishers can switch between these foveal regions as they transition from air to water, maintaining effective binocular vision underwater and improving distance judgment when refraction complicates matters. They also possess a transparent nictitating membrane, and you will see this in several of the photographs, this is a third eyelid that protects the eye while dealing with fish and still allowing for sight.

Fourth, watch closely a kingfisher before it dives, and you will notice behavioral adaptations as well. They often bob or sway their heads while keeping their body still, viewing the fish from slightly different angles to resolve its true position. This head-bobbing also serves as a valuable

cue for photographers so keep your hand on the shutter release when this starts.

Their streamlined, hydrodynamic head and bill shape minimize deflection as they pierce the water's surface, while stiff tail feathers help guide their entry angle. When taking photos, I aim for shutter speeds faster than 1/4000th of a second to capture the action while maintaining sharp focus. I often use apertures around f/6.3 to increase my depth of field while still creating an attractive blurred background.

The next challenge is capturing the kingfisher as it emerges, phoenix-like from the water, with a fish firmly grasped in its bill. This is never easy since you are never quite certain where the bird will surface, making proper focus partly guesswork. Everything happens so quickly and getting the focus right before the bird is on its perch is a challenge. Once there, they stun larger prey by beating it against the branch before swallowing it headfirst to prevent scales or spines from lodging in their throat. Sometimes, another kingfisher will attempt to steal the catch. Catching morning or last light with patience near an established hunting perch often rewards photographers with multiple hunting attempts within an hour.

Conservation Challenges: An Urgent Narrative

Despite their wide distribution, many kingfisher species face severe conservation threats. At least 42 kingfisher species (35%) are of conservation concern. Many of the endangered species have very small island ranges, and they are all vulnerable to habitat alteration and introduced predators. Intensive logging has also led to widespread destruction of habitat for forest kingfishers in Southeast Asia.

The primary challenge facing kingfishers is habitat degradation and destruction. They require clean, clear waterways with adequate prey populations and suitable nesting banks, conditions becoming increasingly rare in human-modified landscapes. Agricultural runoff, urbanization, and industrial pollution reduce water quality, directly impacting fish populations and the aquatic invertebrates that the fish depend on. Bank stabilization for flood control eliminates nesting habitat. Many rivers now flow between concrete channels or rock-reinforced banks unsuitable for burrow excavation. This forces populations to concentrate on the remaining suitable sites, increasing competition and making kingfishers vulnerable to localized disasters.

Climate change compounds these pressures through altered precipitation patterns affecting river flow. Severe floods can destroy nest burrows during

Photo by: © Ani das

Photo by: © Nisha Purushothaman

the breeding season, while droughts reduce prey availability and can eliminate breeding sites entirely. Warming waters also shift fish community composition, potentially reducing preferred prey species or eliminating fish of the size kingfishers need for a successful dive.

Some species face immediate extinction. The Tuamotu Kingfisher of French Polynesia has fewer than 125 individuals, confined to a single island. The Micronesian Kingfisher exists only in captivity and was wiped out in the wild, after Brown Tree Snakes were released onto their island and have essentially consumed every native bird they encounter. The Philippine Dwarf Kingfisher also faces severe pressure from deforestation, while several Indonesian species remain known from just a handful of museum specimens.

Conservation & How Photographers Can Help

Conservation initiatives for kingfishers operate at many scales. Riparian restoration programs recreate habitat through bank stabilization, allowing natural river meanders and creating suitable nesting substrate. These projects are often spectacularly successful and within two to three years, kingfishers can colonize newly restored rivers. Water quality improvements through pollution controls and vegetated buffer strips enhance prey populations.

Several European countries now install artificial nest banks earthen mounds positioned near suitable foraging habitat. These structures provide nesting opportunities where natural banks no longer exist, with success rates often exceeding 70% and multiple pairs nesting in well-designed installations.

Captive breeding programs for critically endangered species have yielded mixed results. The Micronesian Kingfisher breeding program maintains genetic diversity, though reintroduction awaits effective Brown Tree Snake removal in Guam. The Tuamotu Kingfisher program focuses on understanding basic biology while protecting remaining wild populations.

Wildlife photographers contribute meaningfully to these conservation efforts. High-quality images raise public awareness, generate funding for conservation programs, and stimulate people to document population trends. Behavioral documentation helps researchers understand habitat requirements and identify previously unknown threats. Photography at restoration sites demonstrates success, building support for additional projects.

The Path Forward

Kingfishers serve as indicator species their presence signals the health of aquatic ecosystems.

They are also flagship species whose beauty and charm help build local community support for conservation action. Many people experience pure joy when glimpsing the flash of a kingfisher flying along a stream. For photographers, each image tells part of a larger story about water quality, habitat integrity, and biodiversity conservation. As we document these remarkable birds, we simultaneously record the health of our waterways and celebrate the stunning beauty that makes kingfishers so captivating.

Photographing kingfishers is a privilege that comes with responsibility. Ethical photographers minimize disturbance and share their images thoughtfully, using them to inspire conservation rather than revealing sensitive locations that may attract crowds and disrupt both wildlife and local communities. Beyond capturing nature's beauty, we can contribute to science by documenting species presence or absence, sharing our observations with local stakeholders, and supporting efforts to advocate for clean water and intact riparian corridors.

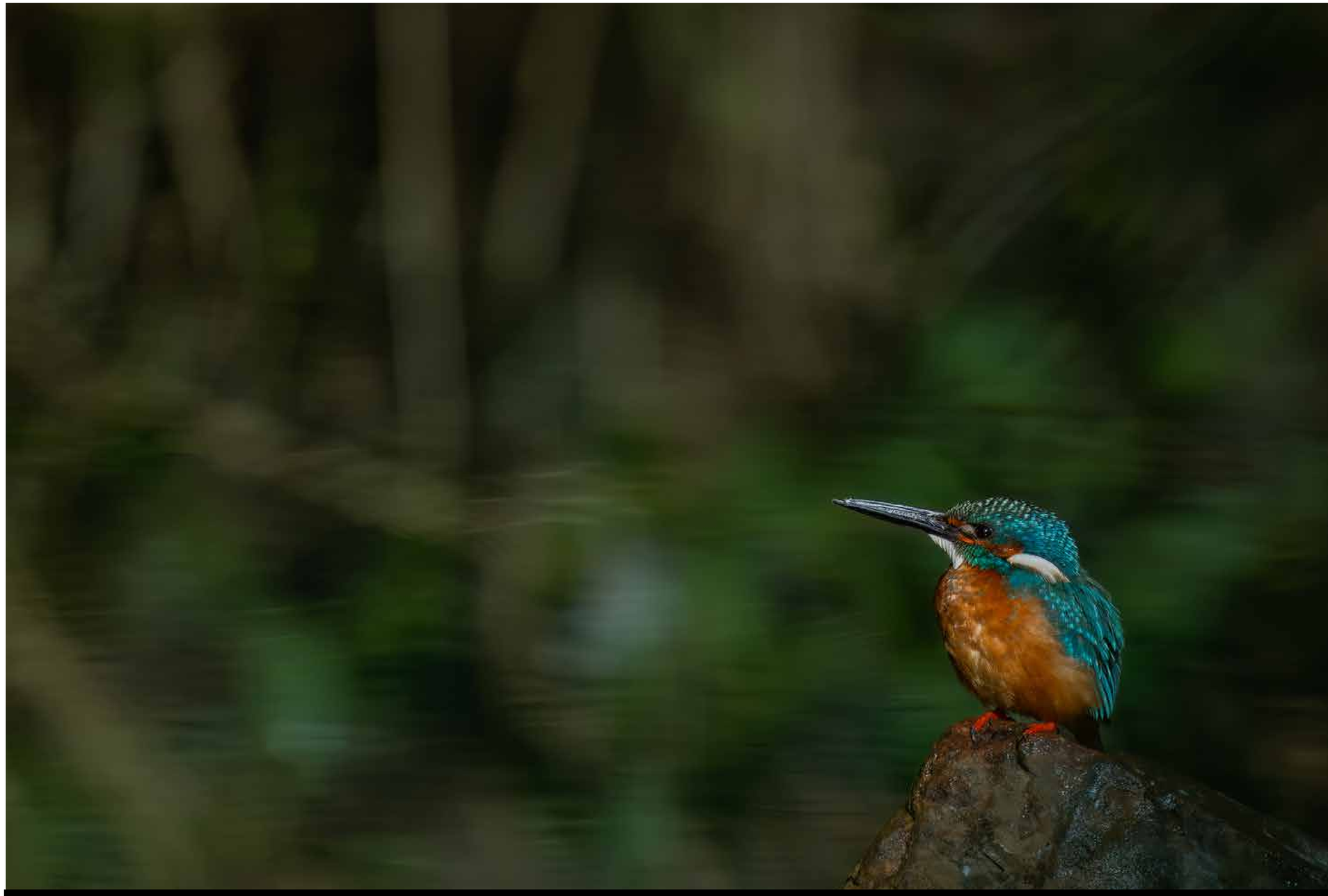


Photo by: © Hermis Haridas

Photo by: © Peter Hudson

Photo by: © Nikhil Singh

Photo by: © Amith Krish

Photo by: © Peter Hudson

Photo by: © Aminlal Ami

Photo by: © Peter Hudson

Photo by: © Nikhil Singh

Photo by: © Nisha Purushothaman

Photo by: © Amith Krish

Photo by: © Peter Hudson

Photo by: © Deepa Girish

Photo by: © Peter Hudson

Photo by: © Amith Krish

Photo by: © Deepa Girish

Photo by: © Nisha Purushothaman

Photo by: © Deepa Girish

Photo by: © Peter Hudson

Photo by: © Amith Krish

Photo by: © Deepa Girish

Photo by: © Nisha Purushothaman

Photo by: © Peter Hudson

Photo by: © Deepa Girish

Photo by: © Peter Hudson

Photo by: © Peter Hudson

Photo by: © Deepa Girish

Photo by: © Peter Hudson

Photo by: © Nisha Purushothaman

Photo by: © Peter Hudson

Photo by: © Deepa Girish

Photo by: © Nisha Purushothaman

Photo by: © Peter Hudson

Photo by: © Nisha Purushothaman

Photo by: © Peter Hudson

Photo by: © Nisha Purushothaman

PI AWARE

CONSERVATION & PHOTOGRAPHY

UPCOMING EDITION

CAPE BUFFALO