

INDIA'S CHAMBAL RIVER SANCTUARY **SAURIAN STRONGHOLD**

Exploring a rugged, remote wilderness
in Northern India in search of a near-
legendary, gigantic and severely endangered
crocodilian, the fish-eating gharial



A huge female gharial
Gavialis gangeticus basks on the
shores of the Chambal river, in the
National Chambal Gharial
Wildlife Sanctuary.

Rocky escarpments
along the Chambal river,
National Chambal Gharial
Wildlife Sanctuary, Dholpur.



Black-winged Stilt ■
Himantopus himantopus,
Chambal river.

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Most visitors to India - if interested at all in the wonderful wildlife of the subcontinent - hope to see a tiger in the wild. Some will also be happy with elephants, birds and the occasional cobra. But - gharials? Why, most people don't even know what a gharial actually is! In fact, gharials are pretty amazing creatures, and the stuff of legends - besides being highly endangered, major biological indicators of river water quality. Since briefly glimpsing one almost forty years ago in the swift waters on the Rapti river in Nepal, we had long dreamed to see them again in the wild. And to see gharials in the wild there is no better place in the whole world than the remote, romantic Chambal - a rugged, desolate, spectacular wilderness where nature, history and culture intermingle as only in India they can, and which we visited together with our dear friend and wildlife

photographer Yuwaraj Gurjar, with the help of local biologist Rajeev Tomar. The National Chambal Sanctuary, also called the National Chambal Gharial Wildlife Sanctuary, is a 5,400 square km (2,100 sq mi) tri-state protected area in northern India. Located on the Chambal River near the tripoint of Rajasthan, Madhya Pradesh and Uttar Pradesh, it was first declared in Madhya Pradesh in 1978 and now constitutes a long narrow eco-reserve co-administered by the three States. Within the sanctuary the wide, pristine Chambal River cuts through mazes of rugged ravines and hills, fringed by long, wide, deserted sandy beaches - the landscape itself is worth the trip. The critically endangered gharial and the red-crowned roof turtle live here, and together with the endangered Ganges river dolphin they are the keystone species of the sanctuary. Other large threatened inhabitants of

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Young gharial ■
Gavialis gangeticus basking on the
shores of the Chambal river
in the National Chambal Gharial
Wildlife Sanctuary.



A mighty river flowing across a rugged, parched land of craggy ravines



■ An unusual sight: Egyptian vulture *Neophron percnopterus* mating on top of a rocky escarpment along the Chambal river.

the sanctuary include the mugger crocodile, the smooth-coated otter, the striped hyena and the Indian wolf. The Chambal supports 8 of the 26 rare turtle species found in India, including the Indian narrow-headed softshell turtle, the three-striped roof turtle and the crowned river turtle. Other reptiles include the Indian flapshell turtle, the soft shell turtle, the Indian roofed turtle, the Indian tent turtle and the Bengal or land monitor lizard. Mammals include rhesus macaques, Hanuman langurs, golden jackals, Bengal foxes, common palm civets, Indian small mongooses, Indian grey mongooses, jungle cats, wild boars, sambar, nilgai, blackbuck, Indian gazelles (chinkara), northern palm squirrels, porcupines, Indian hares, Indian flying foxes and

hedgehogs. The Chambal Sanctuary is also listed as an important bird area and is a proposed Ramsar site - at least 320 species of resident and migratory birds inhabit the sanctuary. Migratory birds from Siberia form part of its rich avian fauna. Vulnerable bird species here include the Indian skimmer, sarus crane, Pallas's fish eagle and Indian courser; the pallid harrier and lesser flamingo are near threatened. Winter visitors include black-bellied terns, red-crested pochard, ferruginous pochard and bar-headed goose. Other species include the great thick-knee, the greater flamingo, the Indian darter and the brown hawk owl. But the real star of the show - and the main reason for visiting this stunning area - is of course the extraordinary gharial.

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■ Large Mugger
or Marsh
Crocodile
Crocodylus
palustris are
commonly
observed on the
sandy shores of
the Chambal
river.



Gavialis gangeticus, also known as the gharial, is a gigantic crocodilian member of the family *Gavialidae*, native to the Indian Subcontinent. Incredibly, the global gharial population is estimated at fewer than 235 individuals, which are threatened by loss of riverine habitat, depletion of fish resources and use of fishing nets. As the population has declined drastically in the past 70 years, the gharial is listed as Critically Endangered by the IUCN. Gharials once inhabited all the major river systems of the Indian Subcontinent, from the Irrawaddy River in the east to the Indus River in the west, but their distribution is now limited to only 2% of their former range. They inhabit foremost flowing rivers with high sand banks that they use for basking and building nests. They usually mate in the cold season, and the young hatch before the onset of the monsoon. The gharial is one of three crocodilians native to India, the other two being the mugger crocodile *Crocodylus palustris* and the saltwater crocodile *Crocodylus*

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Deccan sawback or
Indian Tent Terrapin
Kachuga tentoria.



■ Left, immature
Gharial Gavialis
gangeticus;
 top right,
Osprey
Pandion
haliaetus;
 bottom right,
Intermediate
egret
Mesophoyx
intermedia.



■ A very large
Mugger or Marsh
Crocodile *Crocodylus*
palustris takes to the
Chambal waters.



porosus. Gharials once thrived in all the major river systems of the Indian Subcontinent, spanning the rivers of its northern part from the Indus River in Pakistan across the Gangetic floodplain to the Irrawaddy River in Myanmar. Today, they are extinct in the Indus River, in the Brahmaputra of Bhutan and Bangladesh, and in the Irrawaddy River. In India, small populations are present and increasing in the rivers of the National Chambal Sanctuary, Katarniaghat Wildlife Sanctuary, Son River Sanctuary and the rainforest biome of Mahanadi in Satkosia Gorge Sanctuary, Odisha, where they apparently do not breed; in Nepal, small populations are present and slowly recovering in tributaries of the Ganges, such as the Narayani-Rapti river system in Chitwan National Park and the Karnali-Babai river system in Bardia National Park. They are sympatric with the mugger crocodile *Crocodylus palustris* and formerly with the saltwater crocodile *Crocodylus porosus* in the delta of Irrawaddy River.

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■ Large gharial
*Gavialis
gangeticus*
make an
extremely
impressive sight.



Left,
architectural
detail of the
splendid
Machkund
complex, in
Dholpur;
right,
Ruddy Shelduck
or Brahminy
Shelduck
*Tadorna
ferruginea*.



*Noisy flocks of waterbirds along
the cultivated riverbanks*



Knob-billed Duck ■
Sarkidiornis melanotos,
Chambal river.




Far left, a very young Rhesus macaque *Macaca mulatta*; left, the ubiquitous Rose-ringed Parakeet *Psittacula krameri*, here nesting in a wall of the Machkund complex in Dholpur.

In 1977, four nests were recorded in the Girwa River of Katarniaghat Wildlife Sanctuary, where 909 gharials were released until 2006. Twenty nests were recorded in 2006, so 16 nesting females resulted from 30 years of reintroductions, which is equivalent to 2% of the total pre-2006 releases. In 1978, twelve nests were recorded in the Chambal River in the National Chambal Sanctuary, where 3,776 gharials were released until 2006. By 2006, nesting had increased by over 500% to 68 nests, but the recruited mature, reproducing females constituted only about 2% of the total number released. The newly hatched young are especially prone to being flushed downstream out of the protected areas during the annual monsoonal flooding. The gharial is characterised by its extremely long, thin jaws, regarded as an adaptation to a predominantly fish diet. Males develop a hollow bulbous nasal protuberance at sexual maturity. The name gharial is derived from the resemblance of the nasal growth to an earthen pot known locally as "ghara". They use this growth to modify and amplify "hisses" snorted through the underlying nostrils. The resulting sound can be heard for nearly a kilometer on a still day. Gharials are

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Common but beautiful, 
the Indian Roller
Coracias benghalensis.

*Gentle
endangered
giants of India's
mighty rivers*



A gigantic gharial *Gavialis gangeticus* female basking on the shores of the Chambal river.



Top left, Knob-billed Duck *Sarkidiornis melanotos*;
top right, Red-wattled lapwing *Vanellus indicus*;
bottom left, White Browed Wagtail *Motacilla maderaspatensis*;
bottom right, River Lapwing *Vanellus duvaucelii*.





■ The lonely, hauntingly beautiful shores of the Chambal host multitudes of Bar-headed geese *Anser indicus*.

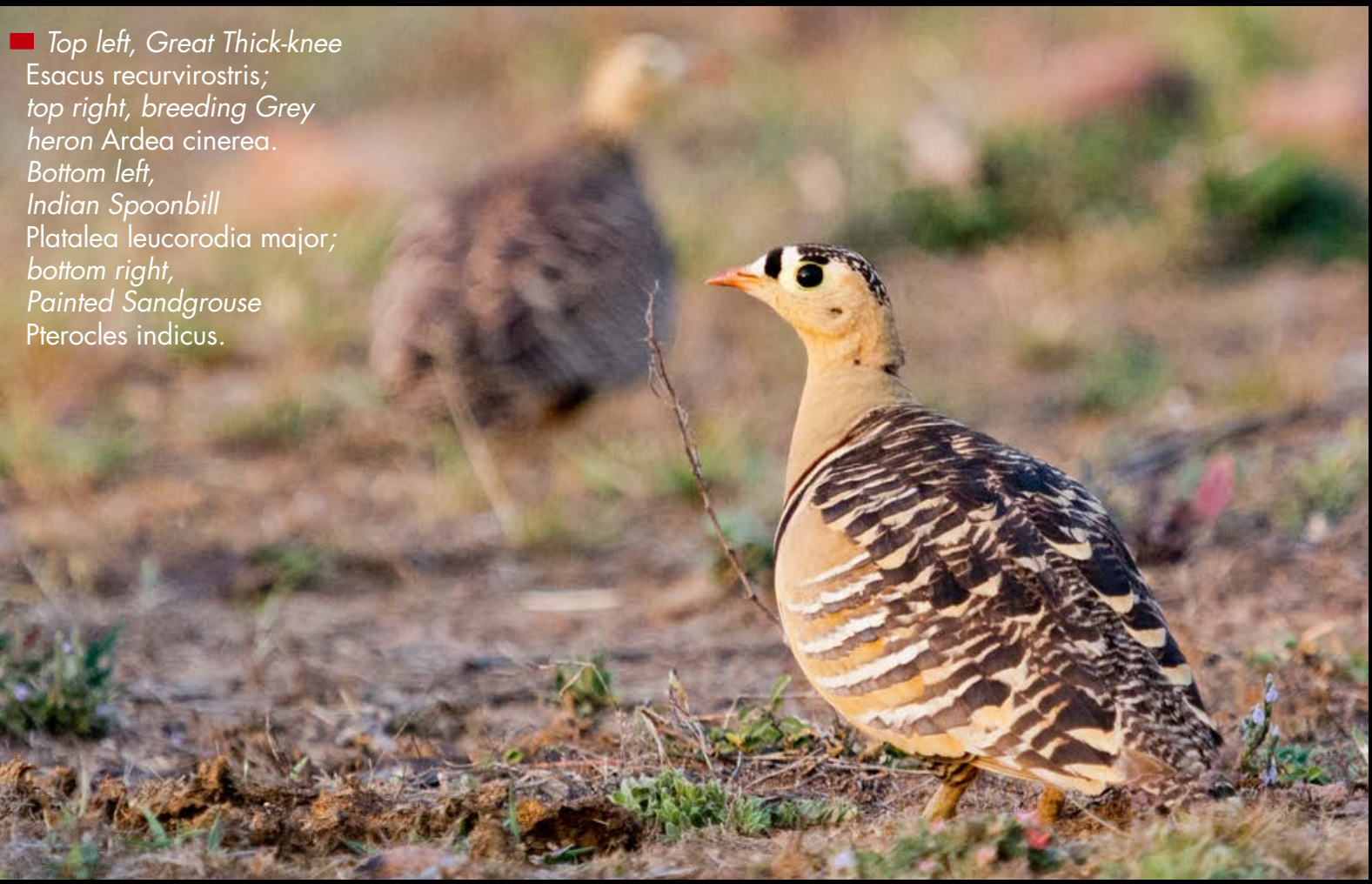
Indian skimmer or Indian
scissors-bill *Rynchops*
albicollis showing its typical
fishing technique - skimming
the water surface.



the only extant crocodilian with visible sexual dimorphism. Although the function of the nasal boss is not well understood, it is apparently used as a visual sex indicator, as a sound resonator, or for bubbling or other associated sexual behaviours.

The average size of mature gharials is 3.5 to 4.5 m (11 to 15 ft), with the largest recorded length is 6.25 m (20.5 ft), and a largest recorded weight of 977 kg (2,154 lb). Hatchlings approximate 37 cm (15 in) and can reach a length of 1 m (3.3 ft) in 18 months. The average body weight ranges from 159 to 250 kg (351 to 551 lb). Males commonly attain a total length of 3 to 5 m (9.8 to 16.4 ft), while females are smaller and reach a body length of up to 2.7 to 3.75 m (8.9 to 12.3 ft). The elongated, narrow snout is lined by 110 sharp interdigitated teeth, and becomes proportionally shorter and thicker as an animal ages. There are 27 to 29 upper and 25 or 26 lower teeth on each side. The nuchal and dorsal scutes form a single continuous shield composed of 21 or 22 transverse series. Gharials have an outer row of soft, smooth, or feebly keeled scutes in addition to the bony dorsal scutes, and they also have two small postoccipital scutes. The toes are partially webbed. They also have a very distinct crest on

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■ Top left, *Great Thick-knee*
Esacus recurvirostris;
 top right, *breeding Grey*
heron Ardea cinerea.
 Bottom left,
Indian Spoonbill
Platalea leucorodia major;
 bottom right,
Painted Sandgrouse
Pterocles indicus.

■ A worrying sight with a subadult Gharial *Gavialis gangeticus* basking among domestic buffalo and garbage on the shores of the Chambal river.

the outer edge of the fore arm, leg, and foot. Typically, adult gharials have a dark olive colour tone, while young ones are pale olive, with dark brown spots or cross-bands. The well-developed, laterally flattened tail and webbed rear feet provide tremendous manoeuvrability in deepwater habitat, and the laterally compressed tail serves both to propel the animal and as a base from which to strike at prey. On land, however, an adult gharial can only push itself forward and slide on its belly. The three largest examples reported were a 6.5-m gharial killed in the Gogra River of Faizabad in August 1920, a 6.3-m individual shot in the Cheko River of Jalpaiguri in 1934, and a giant of 7-m animal, which was shot in the Kosi River of northern Bihar in January 1924. Though specimens of over 6 m (20 ft) were not uncommon in the past, such large individuals are sadly not known to exist today. According to IUCN, a population

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A large group of adult Gharial 
Gavialis gangeticus, Chambal river.

■ A *Gharial Gavialis gangeticus* basking on the shores of the Chambal river is disturbed by illegal miners in the background. Human-related disturbances are a problem in the National Chambal Gharial Wildlife Sanctuary.





Large flocks of the beautiful Bar-headed geese *Anser indicus* are commonly seen along the Chambal river.



Left,  two Rhesus
macaque
Macaca mulatta
by a dilapidated
royal hunting
pavilion:
right,
Black-winged Stilt
Himantopus
himantopus,
Chambal river.



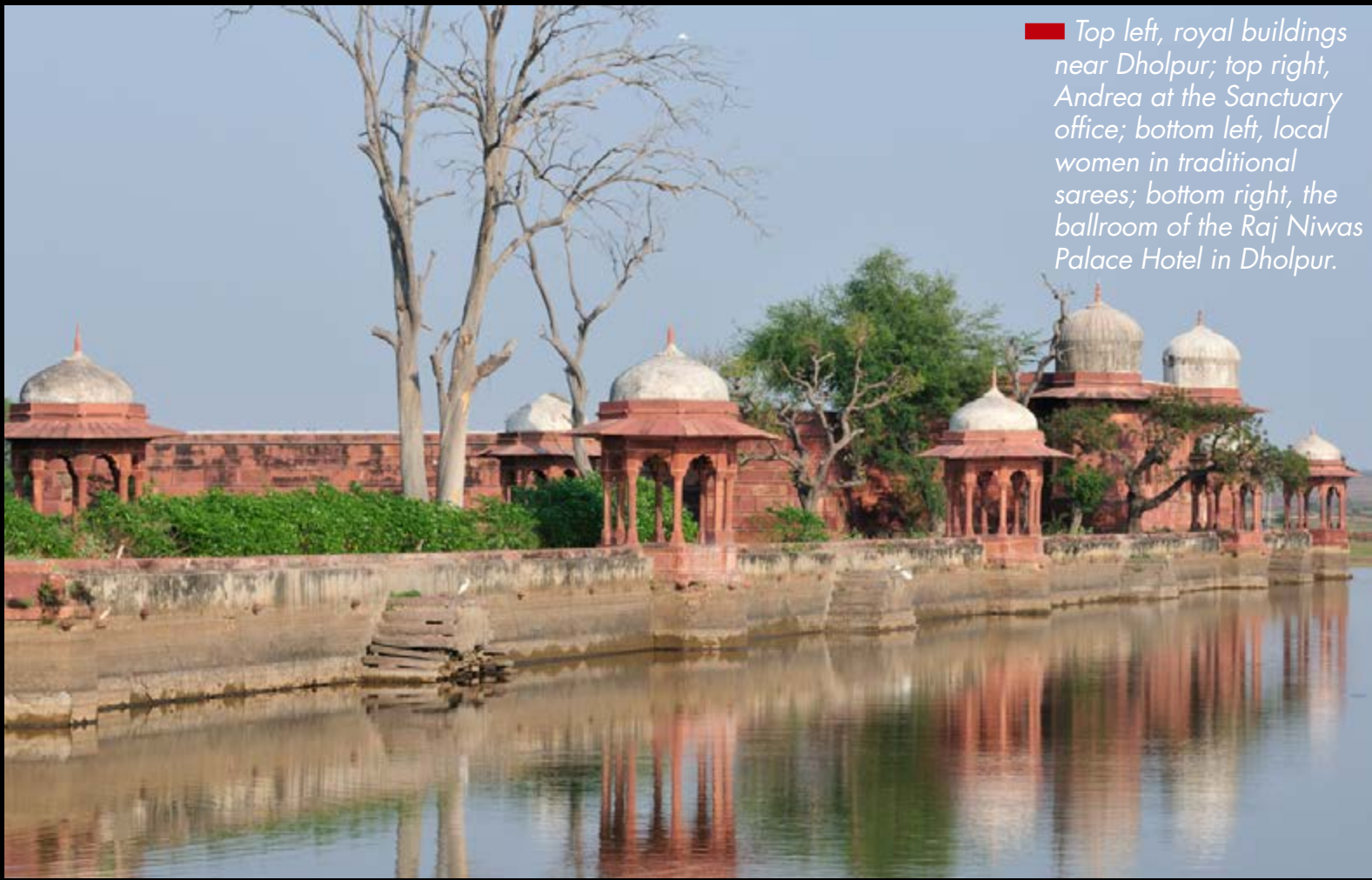
■ The distinctive Indian skimmer or Indian scissors-bill *Rynchops albicollis* is a common sight along the shores of the Chambal river.



decline of 96–98% has occurred over a three-generation period since 1946, and the once-widespread population of an estimated 5,000 to 10,000 individuals has been reduced to a very small number of widely spaced subpopulations of fewer than 235 individuals in 2006. The drastic decline in the gharial population can be attributed to a variety of causes, including overhunting for skins and trophies, egg collection for consumption, killing for indigenous medicine and killing by fishermen. Hunting is no longer considered to be a significant threat. However, the wild population of gharials has declined by about 58% between 1997 and 2006 because of the increasing intensity of fishing and the use of gill nets throughout most of the present gharial habitat, even in protected

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Top left, royal buildings near Dholpur; top right, Andrea at the Sanctuary office; bottom left, local women in traditional sarees; bottom right, the ballroom of the Raj Niwas Palace Hotel in Dholpur.



*Fascinating creatures
from a lost age still
surviving in today's world*

A very large
Mugger or Marsh
Crocodile *Crocodylus*
palustris on the shores
of the Chambal





Top left, River Lapwing *Vanellus duvaucelii*; top right, the Machkund complex at Dholpur; bottom right, a large Marsh Crocodile *Crocodylus palustris*; bottom left, the beautiful dining room of the Raj Niwas Palace Hotel in Dholpur.

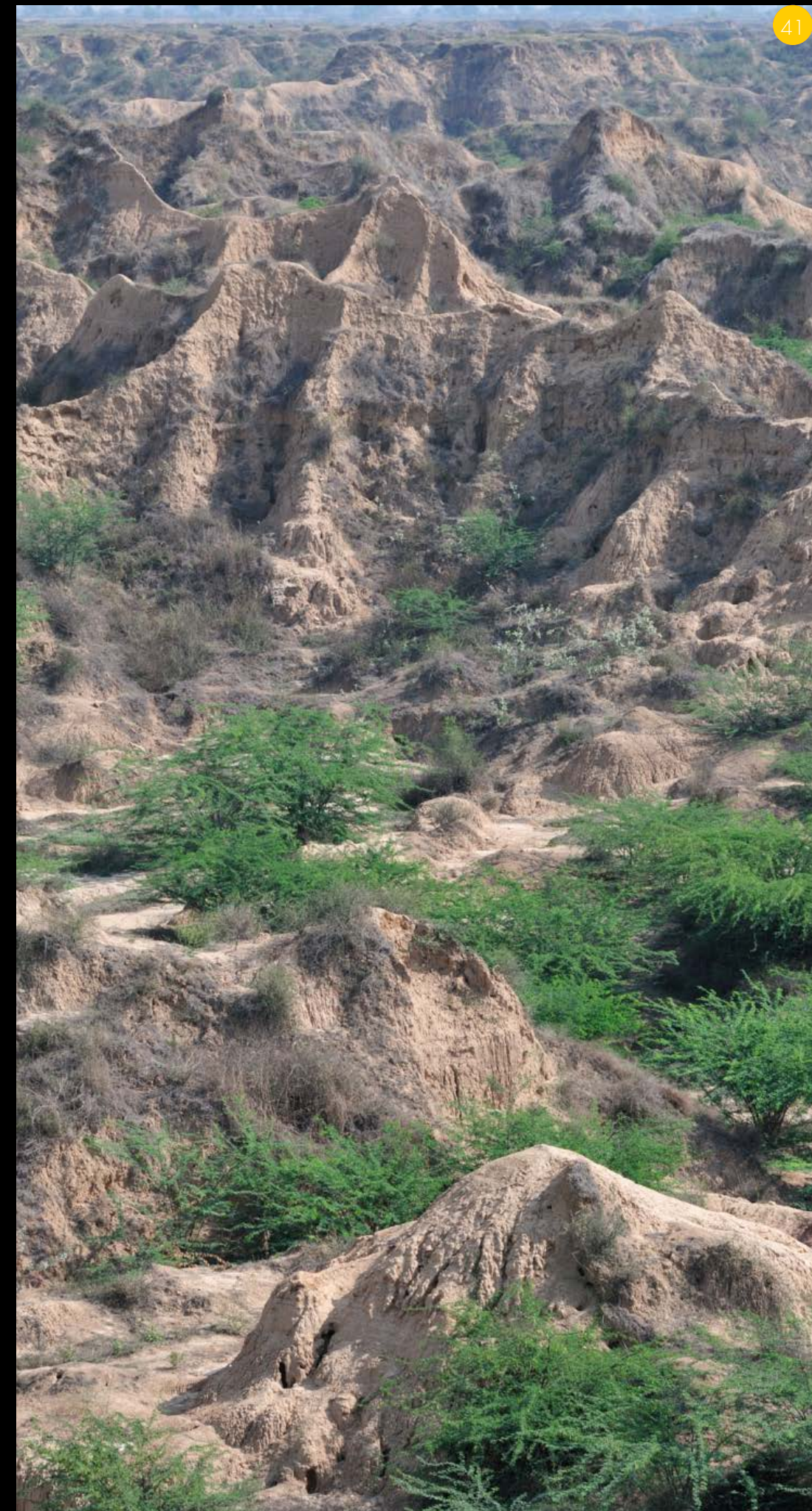


Large numbers of the Lesser whistling teal *Dendrocygna javanica* are commonly observed along the Chambal shores.



Two Gharial
Gavialis gangeticus
basking on the
shores of the
Chambal river;
at right, the deep
ravines alongside the
Chambal river,
which were the
unconquerable realm
of dacoits in a not
too distant past.

areas, and the loss of riverine habitat to dams, barrages, irrigation canals, siltation, changes in river course, artificial embankments, sand-mining, riparian agriculture, and domestic and feral livestock. Thanks to the efforts of several organizations and individuals - notably celebrated herpetologist Romulus Whitaker - conservation programs have been enthusiastically and successfully undertaken in India and Nepal, being based on the establishment of protected areas and restocking of these with animals born in captivity, but nowhere has restocking yet re-established viable populations. Gharials are being successfully bred in captivity in the National Chambal Sanctuary and in the Gharial Breeding Centre in Nepal's Chitwan National Park, where they are generally grown for two to three years until they average about one metre in length, when they are released. Reintroduction in their habitat however is fraught with difficulties - largely due to growing and uncontrolled anthropogenic pressures, including depletion of fish resources - and the future of the harmless, beautiful gharial is still, sadly, very much in doubt. ●



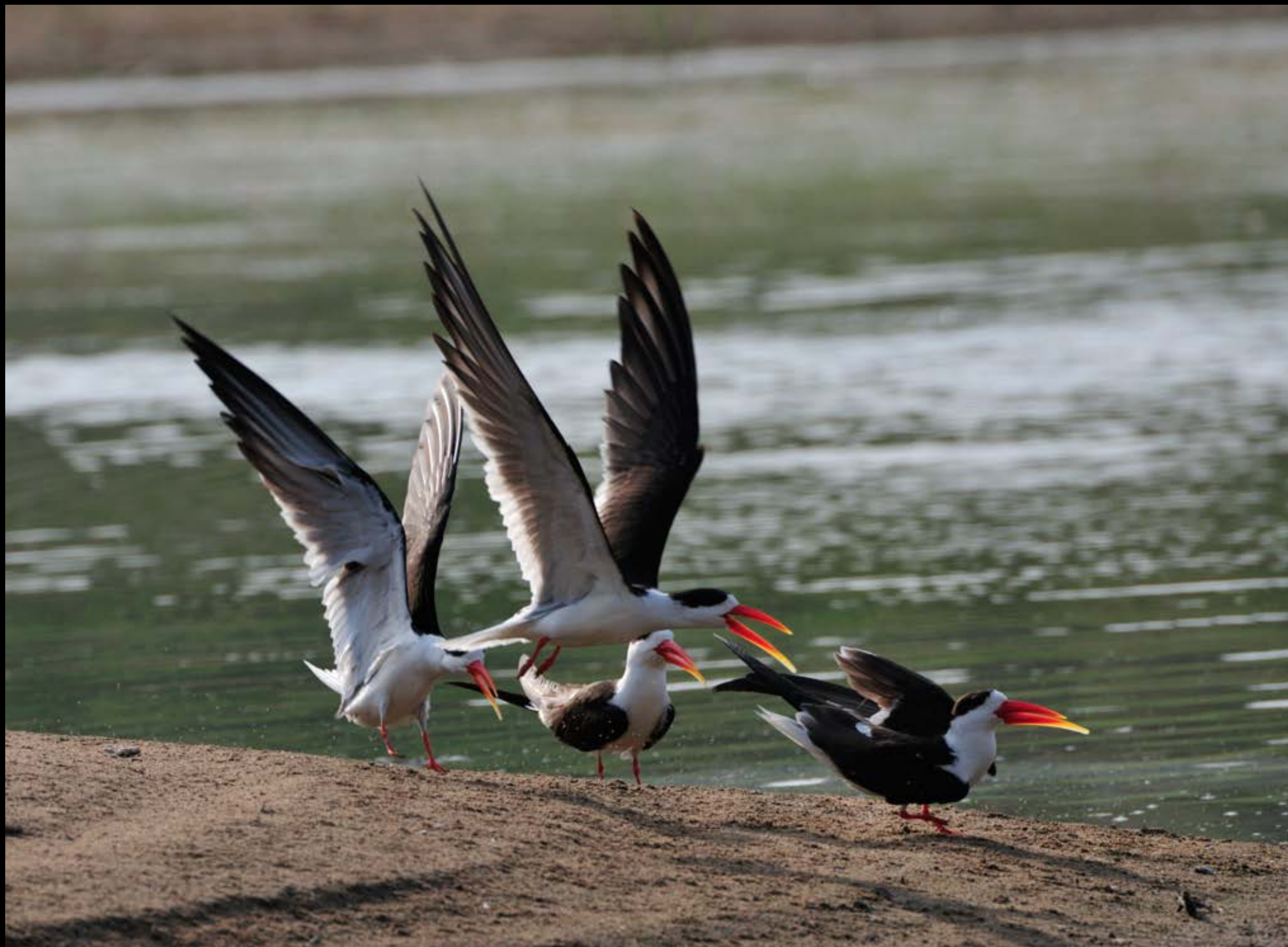
Closely approached by our boat, a huge Mugger or Marsh Crocodile *Crocodylus palustris* launches itself in the waters of the Chambal river at lightning speed.



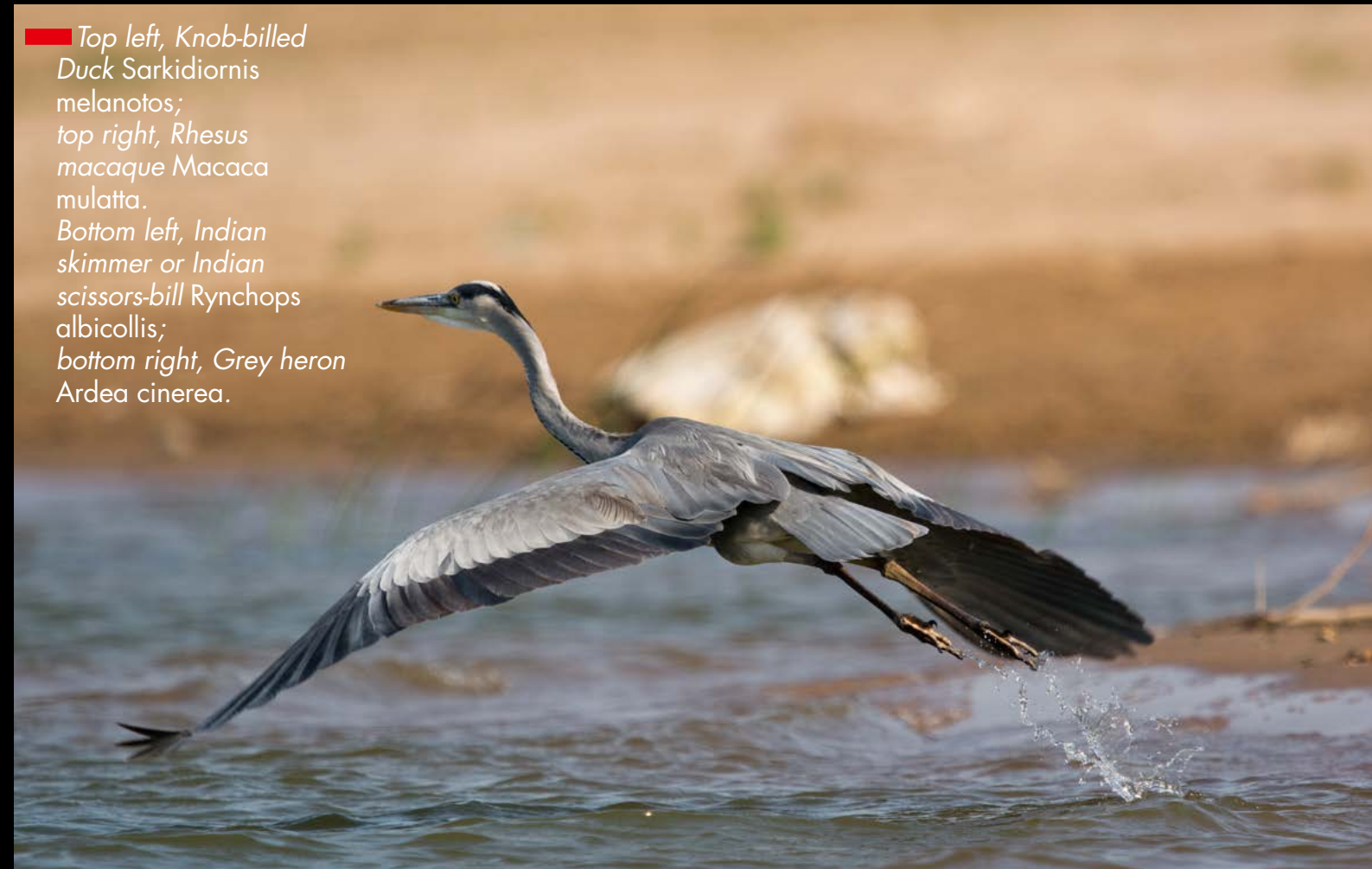
*A reptilian indicator
of Indian rivers'
water quality*



*Gharial Gavialis
gangeticus - notice
the numbered release tag
affixed on its tail.*



■ Slowly cruising along the Chambal river and its sandbanks offers great opportunities to watch and photograph the unmistakable Indian skimmer or Indian scissors-bill *Rynchops albicollis*.



Top left, Knob-billed Duck *Sarkidiornis melanotos*;
 top right, Rhesus macaque *Macaca mulatta*.
 Bottom left, Indian skimmer or Indian scissors-bill *Rynchops albicollis*;
 bottom right, Grey heron *Ardea cinerea*.

■ Female gharial *Gavialis gangeticus* basking on the shores of the Chambal river, National Chambal Gharial Wildlife Sanctuary. Notice the extremely elongated, thin snout, which is used to catch fish with a sudden sideways sweep.



A quartet of Deccan
sawback or Indian Tent
Terrapin *Kachuga tentoria*.





■ A specially arranged visit to the gharial hatching center in Dholpur offers the opportunity to examine closely captive-bred juveniles and other endangered species such as the Deccan sawback or Indian Tent Terrapin *Kachuga tentoria* (bottom right).



*An endless variety
of waterbirds lining up
along the river shores*



Lesser whistling teal ■
Dendrocygna javanica.



■ Left, water reflections at the Machkund architectural complex in Dholpur; right, a White-breasted kingfisher *Halcyon smyrnensis* hunting among the pens at the gharial hatching center.



A large female gharial ■
Gavialis gangeticus slides in the
waters of the Chambal river.
Notice the unmistakable dorsal
scutes and the thin, greatly
elongated snout, specially evolved
for a diet exclusively based on fish.

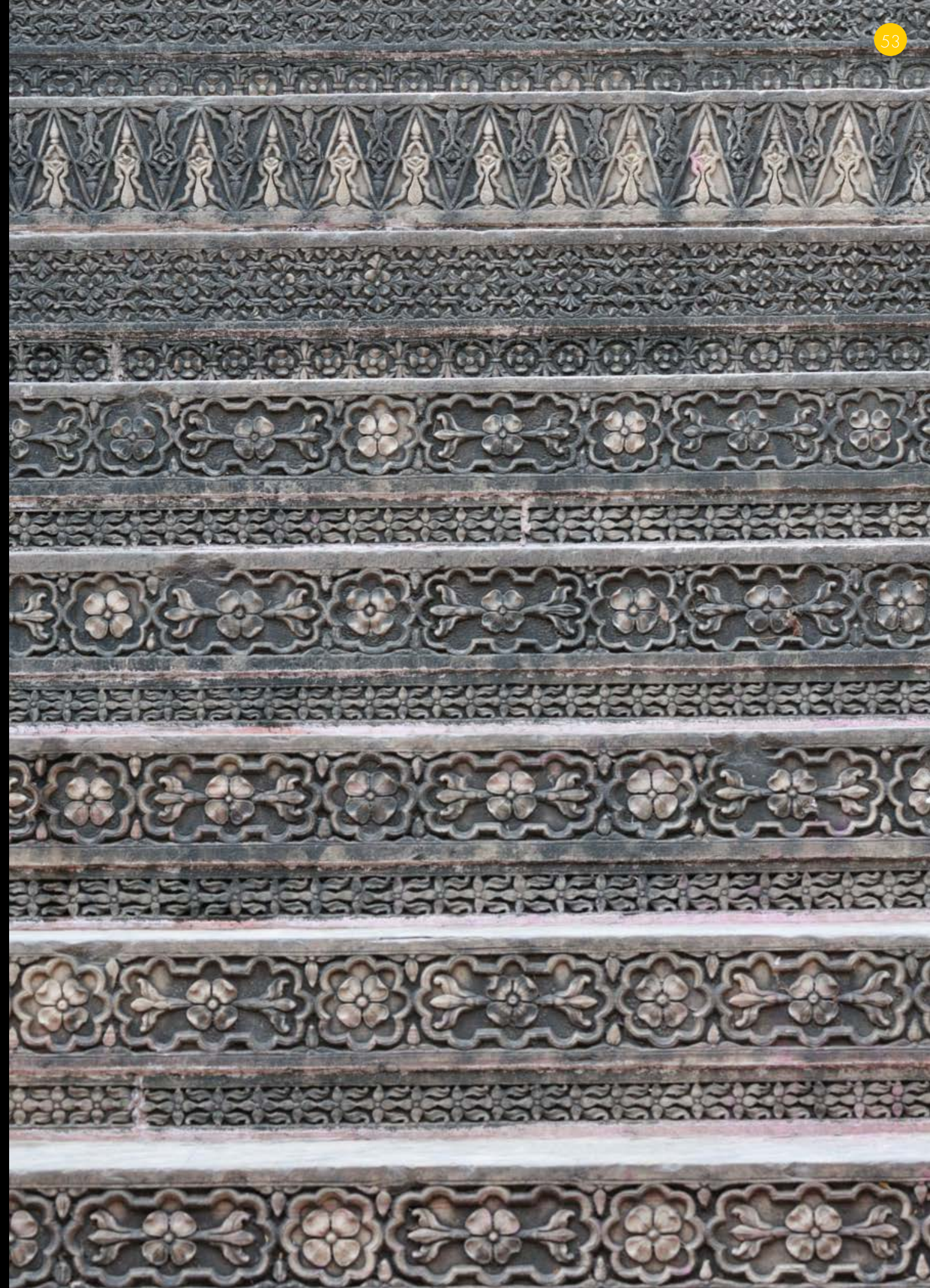




Bar-headed geese ■
Anser indicus in typical formation
as they fly over the shores
of the Chambal.



■ The Chambal river area in the vicinity of Dholpur is rich in historical and artistic evidence. Left, detail of the sculptures of the Chropra Mandir at the Shiva Temple, Dholpur; right, a detail of the intricately ornamented and sculpted staircase of the same.





■ A panoramic image of the deep ravines alongside the Chambal river, a barren and hostile environment of great ecological significance.



■ Adult female gharial *Gavialis gangeticus* basking on a shallow sandbank of the Chambal river. Despite their impressive size, gharials are very shy animals and are not easily approached.

■ Adult Marsh crocodiles *Crocodylus palustris* can reach truly massive proportions in the Chambal, and can be occasionally approached quite close during boat trips on the river.



*A fragile environment precariously
balanced between desert
and watercourse*



■ Knob-billed Duck
Sarkidiornis melanotos.
Slow boat trips along the
Chambal offer the
opportunity to observe many
waterbird species.

Peaceful, wary
fish-eaters, gharials
Gavialis gangeticus
are totally harmless to
humans and coexist
peacefully with many
different bird species
sharing their
environment.

