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COP15 FINAL CHANCE TO HALT BIODIVERSITY DECLINE

ZSL calls for ambitious and legally binding targets, underpinned by Living Planet Index, ahead of UN Convention on Biological Diversity

THIS year, the three-times-delayed 15th Conference of Parties (COP15) to the Convention on Biological Diversity (CBD) is due to take place. Postponed since October 2020, the task ahead of COP15 is urgent – to establish a new global framework that addresses biodiversity loss.

In many ways, COP15 represents a final opportunity to arrest biodiversity decline before the scale tips too far. The previous framework, agreed in 2010 at COP10 in Aichi, Japan has largely failed; we are still losing biodiversity. The 20 targets, agreed by 196 parties, ranged from addressing the causes of biodiversity loss and reducing pressure on ecosystems to building capacity for biodiversity conservation. And though progress has been made in some areas, by some countries – such as increasing protected area coverage – the overall status of biodiversity continues to decline.

Ambitious targets to meet the challenge

We need stronger targets, says Mike Hoffmann, ZSL's Head of Wildlife Recovery. "The UN's Framework Convention on Climate Change (UNFCCC) renegotiated new targets in 2015 and all the parties present were legally contracted to hit those targets – with consequences if they fail. The targets set by the CBD remain non-binding.

"The targets themselves must be strong, measurable and unambiguous," adds Mike. "This is the agenda that countries and companies across the world need to buy into, and there can be no doubt about the scale of effort needed.

"Crucially, we need to see ambition. ZSL doesn't want to just maintain the species we have left, or

slow their decline, nor do we expect that to be good enough for countries at the negotiating table. We want to restore populations to former levels of abundance and help recover species from the brink of extinction."

ZSL's monitoring work is crucial to measuring any impacts made against new targets and Mike is one of several conservation scientists at ZSL, along with Robin Freeman and Louise McRae, and partners like WWF, who are working to ensure that ZSL's Living Planet Index (LPI) is adopted as a key indicator for the new framework of targets set by the CBD. "If you want to understand how abundance of wildlife is changing, it is the only measure. And while abundance isn't the only metric we need, it is fundamental to ecosystem process.

"The LPI is highly sensitive, picking up local changes in abundance across the world. It's the perfect complement to the IUCN Red List Index [another key indicator that ZSL helps to produce], which tracks changes in extinction risk over time."

Putting nature at the heart of decision making

A major rethink is also needed if we are to tackle the biodiversity crisis, says Nathalie Pettorelli, Senior Research Fellow at ZSL's Institute of Zoology. "Biodiversity loss and climate change are interlinked, and must be addressed together. It is impossible to solve one without tackling the other," says Nathalie.

ZSL is calling for the CBD to work more closely with the UNFCCC. "There are a number of instruments and processes that could be put in place to support joined-up thinking and better coordination

between these two bodies," says Nathalie. "For example, the CBD and UNFCCC are currently funded separately, with a much larger pot allocated to climate change initiatives. We need mechanisms that prioritise projects that address both the biodiversity and climate change crisis."

Offering a vision of the future

Nathalie believes we can also look to the climate crisis for inspiration. "Leaders and technologists have provided a vision of our carbon-neutral future – the green economy, cleaner energy, electric cars, less pollution – that they are now offering to people across the world. That vision is getting slowly embedded in local and national institutions.

"For biodiversity, we haven't done that yet – we haven't shown people what making space for nature can actually look like. 'Nature' is still perceived as somewhere else, removed from our own environment."

It's possible that discussions around the concept of rewilding might help shape such a nature-rich vision for the future. "Scientifically, there is still work to do to define rewilding, but there is a willingness to engage and the concept has captured the imagination of many," says Nathalie. "Rewilding doesn't focus on what habitats used to look like before humans existed, but asks what is working, what isn't, and embraces the dynamism of nature – that's exciting!

"New rewilding projects have been announced across Europe and North America in recent years, and the UK is especially active. The UK Government recently announced a raft of environmental management reforms, and the potential for the UK to become nature-positive is high. The real question is how to we bring everyone on board, but the changes we're seeing give me hope for the future of biodiversity."

To learn more about how ZSL's work is used to monitor global agreements like the CBD, visit zsl.org/global-biodiversity-monitoring **TZ**



Guy Cowlshaw, Acting Director of Science, ZSL

DEAR FELLOWS

After the historical landmark of last year's 26th UN Climate Change Conference in Glasgow, this year ZSL is getting ready for another global event: the 15th Conference of the Parties to the Convention on Biological Diversity, or COP15, in Kunming, China. We are calling for nature to be put at the heart of all decision-making; you can read more about this in our cover story.

Across the Society, we have also been working hard to ensure that ZSL's ability to achieve lasting, real-world change continues to grow as the UK

emerges from the pandemic. Yet it's important to remember that Covid-19 still rages largely unchecked through impoverished communities and countries around the world. In addition to the human cost, this creates significant challenges to our science and conservation projects. In this issue we report on work in six countries across three continents which have been impacted in varying ways by the virus: Chile, China, India, Kenya, Mexico and Vietnam. It is a testament to the dedication of our teams, and our in-country collaborators, that their vital work has continued despite all the challenges of the last two years.

Change, of course, is the only constant. In February, Prof Sarah Durant stepped down from her role as Acting Director of Science. Sarah has led ZSL's science for the last two years, through some of the most difficult circumstances the Society has ever faced, and we are deeply grateful to her for guiding us safely through such stormy waters. Sarah is a global leader in the coexistence of people and wildlife, with a focus on local communities and large carnivores in Africa. You can read about her most recent work in this issue. Happily, as Sarah steps down, she will have more time to dedicate to her pioneering research and conservation activities, and we look forward to reporting on this in the future.

Finally, continuing on the theme of change, we are delighted to announce the arrival of ZSL's new Secretary, Prof Sir Jim Smith. Jim introduces himself in the Q&A on the back page of this issue. Please join me in welcoming him to the Society. **TZ**

DIARY DATES

12 April 6pm

Science talk Monsoon, umbrellas and gharials: What can conservation of the world's weirdest crocodile teach us about saving rivers?

Online event

27 April 2-day event

Symposium Changing the system: A new approach for ocean conservation

10 May 6pm

Science talk Bridging the gap: 25 years of capacity building for wildlife health professionals

Online event

27-31 May 10:30am and 1:30pm

The Royal Tour at London Zoo

Exclusive Fellows Walk

Find out more at zsl.org/science/whats-on or visit zsl.org/zsl-fellows-events for exclusive Fellow events

CHINA'S ELEPHANTS ON THE MARCH

Mammoth trip exposes complex situation facing China's elephants



China's population of Asian elephants (*Elephas maximus*) has doubled in the last 40 years

In August 2021, 15 endangered Asian elephants (*Elephas maximus*) completed a 1,300km round trip from Xishuangbanna National Park in the south of China's Yunnan province to provincial capital Kunming – a city with a human population of over eight million.

The elephants captivated international media, and the appearance of an apparently lost herd of elephants in the heavily urbanised environment around Kunming has been hailed as a symbol of just how badly we've damaged the natural environment. While the exact reason for the herd's journey is still unknown, many have speculated that it may have been caused by an extreme drought in 2020, or simply shrinking habitat and fewer food sources as land has been turned over to agriculture and rubber plantations. However, this could be only half the story.

"In the last 40 years, China's elephant population has doubled from 140 to 300," says Becky Shu Chen, ZSL's Technical Advisor for China. "In this sense, the story of the elephants' march also has its positive side – it is natural for elephant herds to splinter and seek a new range as their numbers grow."

Safeguarded by 25,000 personnel during their journey, often using drones to both monitor their progress and make emergency banana drops, the elephants' journey prompted the evacuation of 150,000 people from their path. The elephants themselves caused an estimated US\$1 million in damages. The commitment of the Chinese

Government to the protection of their elephants is clear.

The herd's journey also had a positive impact on people. "Analysis of Weibo, China's main social media platform, shows that sentiment towards the elephants was overwhelmingly positive, despite the destruction and upheaval," says Becky. "Prior to the event, the social media presence of elephants was tiny. Many people outside China didn't realise China has elephants, and their increased profile is an opportunity to educate the public."

"The sadder side of the elephants' story is the challenge of avoiding conflict between humans and elephants," adds Becky. "Asian elephant numbers might be growing, but with land outside the national park heavily urbanised, where can they go? Coexistence is at the heart of the struggle for our elephants, and increasing tolerance towards elephants will be key to that."

As part of the IUCN Asian Elephant Specialist Group, Becky also sits on a transport working group, which is striving to understand how underpasses and overpasses can help to reduce conflict and increase connectivity between protected areas.

The elephants' journey couldn't have come at a more important time. Kunming hosts the 15th Convention on Biological Diversity (COP15) later this year. The issue of coexistence, raised so poignantly by China's elephants, must sit front and centre if world leaders are to solve the issues facing biodiversity. **TZ**

LOKI LEAVES LEGACY FOR FUTURE OF SPECIES

Understanding seizures in Sumatran tiger cub could be key to preventing episodes for future tigers

IN February, London Zoo said a very sad goodbye to Loki the Sumatran tiger. The 10-week-old cub – adored by staff and visitors alike – experienced several seizures over the course of a week and, though all possible efforts were undertaken to alleviate the symptoms and understand the cause, veterinarians at London Zoo and the Royal Veterinary College (RVC) were unable to halt Loki's decline. After the fourth and most severe seizure, ZSL's Head of Wildlife Health Services and lead veterinarian Dr Amanda Guthrie made the difficult decision to put Loki to sleep.

Loki's loss has been felt keenly by staff and supporters, and ZSL's team of vets and vet nurses is now working to understand the underlying cause of the seizures; so that future tigers can be saved from Loki's heart-breaking and untimely end.

The race to diagnose

"After Loki's first seizure, our immediate priority was to rule out the big, most obvious, medical conditions that cause seizures," says Amanda. Through physical exams, blood tests and X-rays at the Zoo's veterinary hospital, Amanda and the team were able to systematically discount kidney or liver failure, a bacterial infection or major congenital abnormalities. "All of his organs appeared to be working well and his skeleton had developed correctly. If he had an infection, we would have seen an elevated white blood cell count in the blood."

With no visible signs or indications in the blood samples and X-rays, but the seizures continuing, Loki was taken to RVC in Potters Bar. "We often work closely with the RVC, sharing the teaching of veterinary students and often calling on their specialists for consultations on challenging cases. Their neurology, diagnostic imaging, and anaesthesia teams were invaluable," says Amanda.

Once at the RVC, Loki received an MRI, designed to identify changes in the brain like infection, structural abnormalities or hydrocephalus – a build up of liquid inside the brain. A CT scan was conducted to check for any issues in Loki's internal organs and fluid was taken from the brain and spinal cord to check for inflammation or infection in the brain. All of the tests came back negative or normal.

"We continued to rule out more causes, but still we were unable to determine a cause," says Amanda.

A sad day for London Zoo

Returning to London Zoo, the outlook for Loki's future was increasingly poor. With no underlying cause identified, the Zoo's veterinary team would only be able to alleviate the symptoms temporarily.

"The risk of seizures is that they damage the brain's neural networks, sometimes permanently," says Amanda. "In very rare cases, an animal can have a single seizure and never have one for the rest of their life. Having had three already, we knew that Loki's seizures would continue and get progressively worse. Every seizure would cause more damage, and the brain would take more time to recover each time."

On Thursday 24 February, Loki suffered a severe and prolonged seizure, confirming the veterinary team's worst fears and prompting the difficult decision that he would need to be euthanised. "It was

clear he would continue having seizures. And, for a 10-week-old tiger cub that hasn't yet been weaned, medicating him three times a day would present huge practical challenges – not least that each time we removed him from his mum Gaysha, it increased the risk she would reject him," says Amanda.

"His quality of life would be dramatically compromised. He would need to be given medication for life, would likely be unable to live with other tigers and would not be able to be part of the conservation breeding programme for Sumatran tigers. And there is no medication that would prevent seizures totally – there would be breakthrough seizures, and with them the risk that he could suffer brain damage or hurt himself as he grew into an adult tiger.

"At ZSL the wellbeing of animals is paramount and, ultimately, the choice was clear. We had to put Loki to sleep."

Understanding implications for the species

Following Loki's death, ZSL's veterinary team are now working to understand what could have caused the seizures. "The likely diagnosis is epilepsy, but we won't be able to confirm that until we've explored every possible option," says Amanda. The team have examined all of his organs visually, and the next step is histopathology – examining his

body tissues under microscope – and tests for rare infectious disease.

The information Amanda and the team are collecting could be vital for preventing the same issues in tigers in the future. "In dogs, epilepsy is well described – we know that it can be inherited, and scientists have identified the genes that cause it," explains Amanda. "We can use Loki's DNA to look for similar markers in tigers, potentially identifying the gene that causes it."

Understanding Loki's genetics will also be crucial for the future of Gaysha and Loki's father, Asim, who have successfully bred in the past, as well as other tigers in European zoos, says Amanda. "Sumatran tigers are Critically Endangered, and the population of them in zoos is very small. If we identify a genetic issue, we will need to decide if Asim and Gaysha breed again. But in such a small population, not breeding them also has ramifications for the future of the species."

The team are committed to fully investigating Loki's illness to inform tiger conservation and care in the future. "Ultimately, the reason our animals are here is to help us conserve their whole species," adds Amanda. "Everything we learn now about their diseases and genetics will help us care for tigers and conserve their species." **TZ**



Loki and mum Gaysha at London Zoo © George Cuevas

A TURTLE TALE: FROM LONDON TO VIETNAM

Hatching of three turtles marks latest success for ZSL's work with critically endangered species

IN November 2021, zookeepers at London Zoo celebrated the hatching of three big-headed turtles (*Platysternon megacephalum*). The hatchlings are the young of two of the four individuals that arrived at the Zoo in 2018 after being rescued from smugglers trying to import them into Canada in cereal boxes. As well as successfully breeding them in the Zoo, ZSL's herpetology team have also been involved in the rehabilitation and release of 300 big-headed turtles in Vietnam, seized from illegal traders.

"Knowing how rare these species are in the wild, it's been crucial that we translate any knowledge gained by caring for them at the Zoo into conservation impacts on the ground, and vice versa," explains Dr Ben Tapley, Curator of Reptiles and Amphibians at ZSL. "We already work closely with the Asian Turtle Programme, supporting turtle rescue centres that are often overwhelmed by the number of freshwater turtles confiscated from the illegal trade, but thanks in part to funding from Fondation Segré, we've been able to take that work a step further."

In 2019, ZSL began supporting Vietnamese conservationist Ha Hoang through the EDGE Fellowship programme, and made preparations for the release of big-headed turtles from the rescue centres. A disease risk analysis of Mycoplasma and chelonian herpes virus was completed, all individuals were assigned to a subspecies, interview surveys were conducted at release sites to understand the threat from hunters, and two field surveys were undertaken

to determine the presence of existing turtles at the release sites.

With these steps successfully completed, a total of 300 big-headed turtles – all from the rescue centres – have now been released into four of Vietnam's protected area. A further 318 turtles, including 85 critically endangered Bourret's box turtles (*Cuora bourreti*), 109 critically endangered Indochinese box turtles (*Cuora galbinifrons*) and 87 critically endangered Four-eyed turtles (*Sacalia quadriocellata*) have also been released at the same sites.

"It's an enormous boost for Vietnam's turtles, hit hard by the demand for their meat, and demonstrates perfectly how we can deploy the knowledge of our zookeepers and veterinarians to support our in-country partners," says Ben.

As part of the programme, post-release monitoring of 11 big-headed turtles was undertaken using radio trackers fixed to the backs of their shells. Monitoring showed that turtles can disperse much further than previously thought, indicated that the Mycoplasma and chelonian herpes virus pathogens are likely to be absent from the release sites, and even offered temperature data that has informed the husbandry of big-headed turtles at London Zoo and in Vietnam's rescue centres.

Next steps for the project include developing more cost-effective methods for identifying big-headed turtle sub species, and the publication of rescue and release guidelines for all freshwater turtles in Vietnam. **TZ**



One of three big-headed turtles (*Platysternon megacephalum*) hatched at London Zoo in 2021

ZSL SETS OUT PATH TO NET ZERO

New sustainability plan commits ZSL to halve emissions by 2030 and hit net zero by 2035

THIS year ZSL begins its journey towards net-zero, in commitments set out in a new sustainability plan. The plan will see the Society aim to halve emissions across its UK sites by 2030 and hit net zero by 2035. In addition, ZSL has also pledged to reduce mains water use by 30% by 2030 and increase recycling of visitor waste to 70% by 2026.

The next eight years will see the establishment of a solar farm at Whipsnade Zoo, the phasing out of fossil fuel vehicles and wholesale changes to infrastructure across ZSL. These will include heat-saving measures in buildings, prioritising low and zero-carbon energy sources and the planned development of an anaerobic digestion plant at Whipsnade that will allow waste treatment and biofuel production onsite.

"Our ambition is to be a leading organisation in the race for sustainability," says Olivia Preston, ZSL's Sustainability Manager. "To deliver these

ambitious commitments we will need to fundamentally look at what we do and how we do it – no business can simply continue as usual in the face of climate change."

With the plan agreed by ZSL's Executive Committee and Council, the hard work really begins, says Olivia. "We have already established our baseline and are working to forecast how we can reduce every area of energy use and emissions – and that includes our supply chain too. Buildings are being fitted with smart meters to identify exactly where we're wasting energy, and we're reviewing where we can upgrade our existing buildings to improved standards of energy efficiency.

"We have mapped our targets against the UN Sustainable Development Goals, to help show how this contributes to global goals as well as our own vision of a world where wildlife thrives. Our new sustainability plan complements our scientific

research, conservation fieldwork and the wider education and policy engagement work led by teams across the Society.

"Visitors will start to see changes across our Zoos too, from the introduction of reverse vending machines to aid recycling, and an even greater focus on sustainable materials in our exhibits, to improved messaging on our bins and the introduction of electric charging points in our Zoo car parks."

The priority will be to "reduce emissions as low as we can, as quickly as we can in line with climate science," explains Olivia, but ZSL will also explore how to credibly offset emissions we genuinely cannot avoid. "ZSL is already involved in habitat restoration projects that naturally help to sequester carbon – such as the restoration of mangrove forests, or oyster beds – so we may look to those to find ways to take us to fully net zero carbon." **TZ**

SHINING A LIGHT ON MEXICO'S NOCTURNAL SEABIRD

Conserving the endangered ashy storm-petrel

ON the offshore islands of California and northwest Mexico, lives the elusive and endangered ashy storm-petrel (*Hydrobates homochroa*). Charcoal grey, nocturnal and known to nest in deep rock crevices, the ashy storm-petrel is notoriously difficult to study and has received little conservation attention. EDGE Fellow Alejandra Fabila Blanco is working to change that.

Alejandra first began monitoring the seabirds of Mexico's Todos Santos Islands ('All Saints Islands') in 2013, and helped to prove the presence of ashy storm-petrels there in 2015 – making it the most southerly site at which they are known to breed. Now, supported by ZSL's EDGE Fellowship programme, Alejandra has been able to begin a project focussed solely on the ashy storm-petrel.

"One of the objectives of the EDGE project is to establish a population estimate for the ashy storm-petrel on Todos Santos Islands. It will contribute vital data for global population estimates and trends

for a species that is extremely difficult to track," explains Alejandra. According to the IUCN there are as few as 3,500 ashy storm-petrels remaining, while studies suggest that the species' already small population has declined dramatically over the last 48 years (three generations for the ashy storm-petrel). Alejandra's data will be crucial for understanding the extent of that decline.

Alejandra is also hoping to understand more about the species with artificial nest boxes. "We've installed 25 nest boxes so far," says Alejandra. "They offer additional nesting habitat and, at the same time, give us easier access to the birds for monitoring. Other species of storm-petrel have successfully bred inside artificial nest boxes elsewhere in Baja California, so the hope is we can give extra space to ashy storm-petrels while offering a window into their lives for researchers."

The next step for the project is to establish a biosecurity protocol. "Though the Todos Santos

The endangered ashy storm-petrel (*Hydrobates homochroa*) is notoriously difficult to study



Islands are uninhabited by humans and currently free of invasive mammals, other islands along the coast have invasive predators," explains Alejandra. "There is constant movement from the mainland to the islands for commercial, recreational and research activities, so our next step is to carry out a workshop with island users and install information signs at landing sites."

Alongside this, Alejandra is evaluating avian predation on the ashy storm-petrel, and she hopes to expand the project to investigate the threats of oil, organochlorine pollution and artificial light. "Their nocturnal habits and better night sight mean they are particularly in danger from artificial lighting from vessels and structures at sea, which can cause disorientation, collapse and vulnerability to other predators," explains Alejandra.

To find out more about Alejandra's work, other EDGE Fellows and the EDGE species lists, visit zsl.org/EDGE **TZ**

SAVING AFRICA'S CARNIVORES REQUIRES SYSTEM-WIDE CHANGE

New paper sets out the systematic shifts required to conserve Africa's top predators

ZSL'S researchers and collaborators have set out a 'theory of change' approach for conserving Africa's largest carnivores, including lions, leopards, cheetahs, spotted hyenas and African wild dogs. The paper highlights the challenge of conserving large predators alongside a growing human population, puts coexistence between communities and wildlife at the centre of the solution, and demands more support for people on the front line.

Africa currently faces several major challenges – including a human population set to double by 2050, acute pressures on natural resources and the intensifying impacts caused by climate change. Published in *Frontiers in Conservation Science* earlier this year and written by representatives from ZSL and 15 other organisations from nine countries, the paper sets out three pathways for transforming the future of carnivores on the African continent and the wellbeing of the people who live alongside them.

"The first pathway concerns governance," explains Sarah Durant, Prof at ZSL's Institute of Zoology and lead co-author of the paper. "Conserving large predators means working at national and transnational scales, but success on the ground requires the engagement of the many communities living in those landscapes – themselves often marginalised and economically vulnerable."

"To achieve success at both levels, national government must harmonise with local perspectives and needs, empowering communities in the sustainable management of their own natural resources and biodiversity, while supporting them

with the burden of living alongside large carnivores and dealing with climate shocks. These policies also need to be aligned across the portfolio of governance – not just in conservation and land management, but the economy and infrastructure.

"The second pathway addresses coexistence at the landscape level – emphasising the building and strengthening of local institutions to deliver the policies set out in the governance pathway, support local people in their management planning and deliver specific conservation interventions. Those interventions include creating community-led, sustainable natural resource management plans, livestock strategies to minimise predation, and planned approaches to hunting and water.



Empowering local communities is an integral part of protecting African carnivores

"And the final pathway is about raising the economic and cultural value of large carnivores, and reducing the risks and costs of living alongside them. This includes transforming the financing of conservation to increase sustainable benefits derived from large carnivores, and ensuring costs and benefits are distributed equitably at local, national and international scales. This also means addressing the alienation some communities have felt from conservation."

Eco-tourism is a useful tool for enhancing the beneficial relationship between people and carnivores, but it can't be the only solution, says Sarah. "The Covid-19 pandemic has shown us the risks of over-reliance on tourism, while many areas lack the capacity and infrastructure to support tourism. Instead, we need to rethink how we support coexistence, and this should be part of the global response to the climate change and biodiversity crises." The paper suggests that more integrated approaches to nature stewardship, such as schemes that offer financial benefits for the sustainable use and protection of natural resources, or carbon-based schemes, could be part of the solution.

"Coexistence is not an endpoint; rather, it is an ongoing process of negotiation and learning that recognises the diverse and changing relationships between large carnivores and people," says Sarah. "Our model represents the actions and structures that must be put in place to allow this negotiation to take place – without it, many of Africa's most iconic and charismatic species face a very uncertain future." **TZ**

FLAGSHIP FROG SECURES LOCAL SUPPORT

Iconic amphibian of Patagonia's forests unites Chile's landowners



Darwin's frogs, like this southern Darwin's frog (*Rhinoderma darwinii*), are the only known amphibians in which males brood their offspring within their vocal sacs

THIRTY-SIX landowners in Chile have committed to the protection of endangered southern Darwin's frogs (*Rhinoderma darwinii*), thanks to efforts by ZSL's Institute of Zoology and partner organisations in Chile. Their support ensures protection of over 16,000ha of the amphibian's habitat in the Valdivian temperate rainforest of southern Chile.

This success follows the launch of the Binational Conservation Strategy for Darwin's frogs in 2018: an initiative led by the IUCN, involving ZSL and a further 29 governmental, non-profit and private organisations from Chile, Argentina and across the world. The strategy,

which sets out 39 conservation actions for the protection of the Darwin's frog, proposed the amphibian as the flagship species for the conservation of temperate rainforests in Chile and Argentina.

Darwin's frogs were first described by ZSL Fellow Charles Darwin in 1834 and are the only known amphibians in which males brood their offspring within their vocal sacs. Darwin's frogs are in fact two species – *R. rufum* from northern Chile and *R. darwinii* from southern Chile and Argentina – although the former is thought to already be extinct, having not been seen since 1981. Sadly, populations of the latter are small,

isolated and threatened by habitat loss and the introduction of a deadly chytrid fungus.

"Securing habitat for the southern Darwin's frog, which relies on native flora and the damp and cool climate created by the Andes mountain range, will protect an iconic amphibian species and its wider ecosystem – one of the world's most biodiverse areas," says Prof Andrew Cunningham, Deputy Director of Science at ZSL's Institute of Zoology, and ZSL's project lead. "The Darwin's frog, and the buy-in of Chilean landowners, is proof that it isn't just charismatic mammals that can play the role of flagship species."

The project team will now monitor the habitat and amphibians at each of the land holdings, work with the landowners to set land management guidelines, and conduct interviews with them to understand more about their own practices and attitudes towards amphibians. As part of the project, the team will also establish an acoustic monitoring network using sound recorders to identify the southern Darwin's frog and other species.

Meanwhile, ZSL and partners at ONG Ranita de Darwin and Universidad Andres Bello continue to study the impact of chytrid on several populations of Darwin's frogs. In one study, metal fences have been erected around two Darwin's frog populations and other amphibians removed from the enclosed area, to test the hypothesis that it is other amphibians that spread the disease and enable the pathogen to persist. Recent research has also shown that some Darwin's frogs can respond differently to the disease, with males increasing the number of tadpoles they produce and reproducing more frequently – enabling the population to increase despite being infected.

To learn more about ZSL's work with amphibians, visit zsl.org/science/wildlife-health **TZ**

LESSONS FROM THE PAST

Archaeological evidence highlights complexity of bringing European bison to UK

A HUNDRED years after their disappearance from Europe, bison are on their way to the UK. A small herd of European bison (*Bison bonasus*) – one male and three females – are being released in Kent this year, as part of a number of rewilding plans across the UK.

Hunting drove the European bison to the edge of extinction in the 1920s but, thanks to breeding programmes and reintroductions, bison herds have returned to central and eastern Europe. They have made a remarkable recovery and, in 2020, they were downgraded from Vulnerable to Near Threatened by the IUCN. Now it's the turn of the UK to welcome them, though their arrival should be considered less reintroduction, more introduction, explains Prof Samuel Turvey from ZSL's Institute of Zoology.

"Thanks to research by archaeologists, palaeontologists and historians, we know that European bison never occurred here," explains Samuel. "A different, now-extinct species called the steppe bison lived in Britain, though the steppe bison occurred here during the late Pleistocene, when our climate was much colder. Warmer and more wooded postglacial British landscapes, which have existed for

over 10,000 years, never contained bison."

It's possible this might not matter, though. "Britain was once home to another bison-like mammal, the auroch, which disappeared during the Bronze Age," says Jennifer Crees, Postdoctoral Researcher at the Natural History Museum. "Research indicates that European bison might have evolved from hybridisation between steppe bison and aurochs. So our ecosystems do have a roughly bison-shaped hole in them. However, aurochs and bison seem to have had different ecologies, with aurochs feeding more on grass rather than browsing on mixed vegetation. So, what lost ecological function would European bison fulfil in British landscapes?"

'Rewilding' is a means to restore not just biodiversity but the ecological processes that underpin an ecosystem, such as seed dispersal and nutrient cycling. The reintroduction of previously extinct species is often a crucial part of a rewilding project, and large herbivores like bison play a central role in restoring ecological functions through grazing, browsing, trampling vegetation and depositing dung.

"European bison may simply be a tool to



European bison (*Bison bonasus*) are being released in the UK this year

manage the diverse mixed landscapes that we wish to see today, but they are not a native species – and could have unexpected impacts on the landscape, vegetation and other species," adds Samuel. "Rewilding is a hugely important approach to build a new future for biodiversity, but rewilding efforts must be based upon clear rationales and objectives, which ultimately depend upon an accurate understanding of the past." **TZ**

FOSTERING TRUST AND COEXISTENCE IN KENYA

A multi-pronged approach to human wildlife conflict on the edge of Kenya's national parks

WORK is underway in Kenya to support two communities experiencing human wildlife conflict, with help from ZSL's supporters and match funding through the UK Government's UK Aid Match scheme.

Using funds donated to ZSL during the *For People, For Wildlife* appeal in 2019, ZSL is working with the communities of Kamungi and Mang'elele, located in southern Kenya and bordered on three sides by three of the country's national parks – Tsavo East, Tsavo West and Chyulu Hills. The location of these communities means they come into regular conflict with wildlife, losing an estimated half of all crops and livestock annually to wildlife. Left unsupported, the conflict will likely lead to deteriorating attitudes to wildlife, further loss of property and livelihoods, and even loss of life.

"Leopards, lions and other carnivores pose a problem, but elephants are the most severe issue for the communities," explains Fridah Mutili, ZSL's Community Technical Manager for Kenya. "They threaten lives, property and crops. In the high season, between seven and 15 elephants need driving off the communities' land every day."

The problem is an ongoing one, but Fridah

believes the conflict is growing day by day. "It has been exacerbated by a growing human population and land use change. With the climate changing, and longer drought periods, we're also seeing increasing numbers of elephants moving outside of the protected areas in search of water. Often destroying tanks of water and threatening human life."

ZSL and its partners – including Kenya Wildlife Service (KWS) and Tsavo Trust – have taken a multi-pronged approach, seeking to mitigate the immediate situation and improve relationships for the future. Immediate solutions include fencing and predator-proof livestock enclosures, and research into the conflict 'hot-spots' that need the most attention. A human-wildlife conflict 'knowledge exchange' has also been set up, including ZSL's conservationists from countries like Nepal, India and China, human-wildlife conflict researchers from the Institute of Zoology, and Whipsnade Zoo's elephant keepers.

But just as important is repairing the relationship between people and their local wildlife, says Hannah Klair, ZSL's Conservation Programme Coordinator for Africa. "These communities face the brunt of negative impacts of the conflict, and we work together to help



African elephants (*Loxodonta africana*) are a severe issue for communities in southern Kenya

improve attitudes towards coexistence," says Hannah. "As part of our work, we have set up bus tours with KWS into the national parks for people from Kamungi and Mang'elele, with the aim of fostering positive attitudes towards conservation and their local wildlife."

Alongside the bus tours, quarterly meetings give community members an opportunity discuss wildlife issues and hear about work in the national parks. ZSL is also helping the communities set up community banks – saving schemes that provide essential access to self-managed financial services. The banks offer opportunities for members to invest in themselves, their community and conservation.

"This is just the beginning of the project. Our ultimate goal is to establish a local governance body, representative of the local community, that can give them the agency and the tools they need to work with KWS and manage wildlife conflict as efficiently as possible," adds Hannah. **TZ**

CAUGHT ON CAMERA

First sightings of fishing cat and crab-eating mongoose in Nandhaur

NEW records for the fishing cat (*Prionailurus viverrinus*) and crab-eating mongoose (*Urva urva*) are fresh evidence that India's Nandhaur Wildlife Sanctuary Reserve is a hotspot for Asia's carnivores.

The two species, of which the fishing cat is classified as Vulnerable by the IUCN, were recorded in Nandhaur for the first time by camera traps in a project led by Wildlife Institute of India, Uttarakhand Forest Department and ZSL.

"Proof of their presence in a new area of India is exciting for the species and but also indicates a healthy ecosystem," explains Harish Guleria, ZSL's Project Manager. "Fishing cats are specialist hunters and both species, as their names suggest, require access to wetlands, rivers and swamps to hunt their preferred aquatic prey. These are all criteria that also fit the need of Nandhaur's flagship species, the Bengal tiger."

Nandhaur, in northern India, represents an important stepping-stone for tigers, leopards and Asian elephants living in the Terai Arc landscape, a subtropical zone stretching across southern Nepal and India. With ZSL already working closely with Nepal's national parks, ZSL established a presence in Nandhaur alongside the Indian



A new record of the fishing cat (*Prionailurus viverrinus*) in Nandhaur may indicate a healthy wetland ecosystem

Government in 2017 to help secure a vital piece of this wider landscape.

The first stage of the project has involved camera traps to understand which species live in the reserve, and offering training and equipment to the reserve's rangers, as well as improving law enforcement against poachers. So far, 32 individual tigers have been recorded in Nandhaur, along with significant numbers of prey species like goral and sambar deer.

"An important part of the project has also been improving the wellbeing of communities living in the buffer zones," explains Harish. "Conflict with wildlife over resources and loss of livestock

to predators is a big issue, and we identified three hamlets in urgent need of support." These communities have been offered training in alternative livelihoods, such as eco-tourism and diversified food production, while fencing and early warning systems have also been installed to help villages manage wildlife conflict.

With the position of wildlife, rangers and local communities improving, the next phase of the programme will look at improving the landscape itself – from slowing or reversing ecological changes resulting from the extraction of water for agriculture, to removing invasive plant species that threaten the integrity of the grasslands. **TZ**



During his career, ZSL's Secretary Prof Sir Jim Smith has studied the development of species like the African claw-toed frog (*Xenopus laevis*)



Prof Sir Jim Smith, ZSL Secretary
Photo credit: Dave Guttridge, The Francis Crick Institute

SCIENTISTS' CORNER

Q&A with Prof Sir Jim Smith

In spite of the pandemic, ZSL's impact on the future of wildlife remains transformative. Help us continue our vital work at zsl.org/donate

PROF Sir Jim Smith was appointed ZSL's Secretary in September 2021. He joins ZSL with over 40 years' experience as a developmental biologist, and has served as Director of the Gurdon Institute and of the MRC National Institute for Medical Research (NIMR). Most recently he was Director of Research Programmes at Wellcome.

Why did you want to become a part of ZSL?

It goes back to the beginning of my career. I got a degree in zoology and went on to do a PhD in developmental biology. I was – and still am – fascinated by the question of how a single cell, the fertilised egg, can divide and divide and organise itself into a functioning organism! There are about 37 trillion cells in the human body, and each different kind of cell has to be in the right place doing the right thing at the right time. It's impossible to study developmental biology and not be intrigued by the way developmental mechanisms are conserved and the way in which this conservation informs our understanding of evolution. This is why, during my PhD, I became a Fellow of ZSL, and visited the Zoo frequently. During my career I have studied the development of the chicken, the African claw-toed frog, and the zebrafish, so zoology has remained central to my work. As some areas of my career have started to wind down, that fascination with zoology has only increased, and I'm proud to be a part of ZSL.

What do you hope to bring to the role of Secretary?

I hope I bring two things to ZSL. First, through my work at NIMR, helping to establish the Francis Crick Institute, and later through my work at Wellcome, I gained a good sense of governance and how to run organisations. ZSL's Council and Executive Committee (ExCo) already have a very good relationship, and I'm looking forward to helping that relationship yield fruit in every way I can. Second, I bring an understanding and love of science. Prof

Sarah Durant, ZSL's then Acting Director of Science, showed me around the labs at Regent's Park recently – I was blown away by the quality and importance of the research, and can't wait to help ZSL make the most of that work.

What do you see as the biggest challenges and opportunities facing ZSL?

The biggest challenge for any charity will always be money but, putting that to one side, the opportunities are huge. Not only because zoology and evolution are, intellectually, among the most fascinating things that humankind can seek to understand, but also because there has never been a more important time in our history for scientists to get up and tell the world what's important. We need the science being done at ZSL both to protect ourselves and to save species; without it we're on a path to disaster. And the important thing for ZSL is having the contacts needed to effect change. Our President, Prof Sir John Beddington, is well-connected in UK Government, and I hope that I may bring a different cast of characters from the biomedical community to help.

What are you looking forward to tackling, in your role as Secretary?

One of the things I feel most strongly about is helping my colleagues improve diversity at ZSL. The effects of climate change on conservation and biodiversity are a global problem and they require a global solution; indeed, many of the problems we are facing – not only in biodiversity but also in areas like zoonotic diseases – are being felt most keenly by people in the developing world. A career in conservation science should therefore be open to everyone, and we should empower those who are most affected to find the best solutions. Diversity is key to improving our impact on the world. I know ZSL already does some fantastic work alongside communities around the world, and I'm excited to be working with Council and ExCo to make things even better. **TZ**

There has never been a more important time in our history for scientists to get up and tell the world what's important. We need the science being done at ZSL both to protect ourselves and to save species; without it we're on a path to disaster.

ZSL | **LET'S WORK FOR WILDLIFE**

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