ZSL
LET'S WORK FOR WILDLIFE

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Atlantic Forest in urgent need
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Avocets ride tide of Thames recovery

Coral reefs may be the habitat in the most urgent need of our help in the face of climate change – and the benefits of taking action are clear

WE MUST PUT NATURE AT THE HEART OF GLOBAL DECISION-MAKING

ZSL calls for policymakers to turn rhetoric into action ahead of UN Climate Change COP26

by **Matt Lowton,** Policy Officer and **Andrew Terry,** Director of Conservation and Policy, ZSL

THE interactions between climate breakdown and biodiversity loss are becoming better understood, and there is growing consensus that both crises must be tackled together. However, for too long, strong unified rhetoric has not translated into the systemic changes needed. Failure to act is already having catastrophic consequences, and will continue to do so. Habitat degradation reduces the ability of natural systems to store carbon and for species to adapt to a rapidly changing environment, increasing their risk of extinction and further undermining the integrity of ecosystems.

And yet, existing global strategies have not halted the speed and scale at which these twin crises continue to develop. All governments have failed to meet any biodiversity targets set over the past two decades. G20 countries continue to subsidise fossil fuels and the upper-limit targets for greenhouse gas emissions, set under the Paris Climate Agreement, are likely to be surpassed within a few years.

This autumn, the delayed 'super year of action' will finally get underway with Glasgow hosting the 26th United Nations Climate Change Conference of Parties (COP26). Commitments and strong statements of intent for integrated responses to the climate and biodiversity crises are being made by national leaders, but they mean nothing without action. As co-hosts of COP26, the UK Government must implement its own national commitments if it is to truly advocate for global change.

Coming into the major biodiversity and climate policy events, ZSL is calling for the equitable protection and recovery of natural systems to be integrated into all global decision-making, either as a key response strategy or to fully account for the impacts of decisions on nature. The recovery of nature must be made a priority commitment at COP26, alongside the many financial, technological and industrial solutions that will be agreed.

At ZSL, a key area of our work is the development of nature-based solutions that adapt to and mitigate the impacts of climate change. These approaches, including habitat protection and restoration, are a relatively low-cost yet impactful approach that provide multiple benefits to people and wildlife. Our role is to ensure that the recovery of biodiversity sits at the heart of any nature-based solutions.

At COP26, our focus will be on making sure that the benefits biodiversity offer – from carbon capture to coastal protection – sit front and centre. Tracking these benefits is challenging but it could be done by creating a standardised monitoring framework that compares biodiversity benefits across different nature-based solutions. Developing a risk assessment process for nature-based solutions, clearly identifying the direct and indirect ecological risks to land and aquascapes, would also help identify the suitability of different options in various environments.

The situation where action is perhaps most urgently needed, and where the benefits of action are very clear, is coral reefs – and we will be pushing for more effective protection and management of aquatic ecosystems. Coral reef systems are under intense pressure from multiple threats, including over-exploitation, deoxygenation and climate driven pressures of acidification and sea-surface temperature increases. Coral reefs are the world's most biodiverse ecosystem, occupying less than 1% of the ocean floor but supporting 25% of marine life. More than 500 million people worldwide depend on them for food, income, coastal protection and more. But a third of coral reefs have already been lost, with a further third under threat of extinction,with the greatest threat coming from climate breakdown.

It is not possible to solve the climate and biodiversity crises without recognising that they are interconnected. Commitment to, and implementation of, science-based solutions that address the interconnectivity between ocean, aquascapes, climate and biodiversity is essential. This must start now. Our conservationists will be at COP26 showcasing the role of biodiversity conservation in climate change mitigation, focussing mainly on coral reefs and ocean protection and restoration. We will join NGO colleagues pushing for definitive and bold commitments to be made.

An active member of the Climate Coalition, we will also support efforts to increase participation from young people, who will most keenly feel the impacts of climate change. We are hosting teacher training events at both London and Whipsnade Zoos to support the uptake of education resources that highlight the importance of COP26, of engaging with the summit and the immediacy of action required to combat the climate crisis.

Success will be defined by the commitments made, their adoption by political leaders and the private sector, the financing established to enable them, and the monitoring put in place to track actual implementation. Our role is to provide the evidence, showcase solutions, support direct action to restore wildlife on the ground and join unified voices to hold decision-makers to account. TZ

Andrew Terry, Director of Conservation and Policy, ZSL

DEAR FELLOWS

IN spring 2020, ZSL was making plans for a much anticipated, vital year for biodiversity. With a packed agenda of global conferences setting future policy direction, there was momentum ahead of 2020 as the 'super year' for biodiversity. We all know what happened next, but we are now finally able to start the much-needed period of major global biodiversity and climate decision-making.

One of the very few silver linings to this horrendous period has been the ramping up of ambition to tackle climate change and biodiversity loss. With a strong evidence base informing our work at ZSL, we are poised for the massive commitments that need to be made. But, while the research is in place, we are yet to see rhetoric translate into action. It is vital that the UK Government, as hosts of COP26, shows leadership in domestic and international policy.

ZSL's position, discussed in more depth on the cover of this issue, is that we want to see the integration of biodiversity into all decision-making; whether that is through full consideration of biodiversity conservation to tackle the climate emergency or the integration of biodiversity into sectoral decision-making to avoid the continuation of perverse and contradictory policies that promote environmental destruction. We will highlight our work in marine ecosystems, the world's largest carbon sink, and the impacts of climate change on coral reefs in particular. Alongside these commitments, we also need to see the necessary financing put in place to support delivery, particularly in high biodiversity and low-income countries.

Despite the challenges that our colleagues have faced, changes to funding or restrictions to their movement, this issue of *The Zoologist* highlights the continued delivery of high-impact results. Our approach of putting science into practice on the ground to impact species, build capacity and guide policy development is highlighted in research into the impacts of climate change on wild dog populations, ecological thresholds associated with forest cover and the development of the Green Status of Species. The Green Status, which now sits alongside the Red List of Threatened Species, will have a major impact on priority setting for species recovery and will become an important tool for ZSL. We also showcase field initiatives where we are applying our technical knowledge to drive positive change for species, including work on the impacts of rat removal on islands to help restore seabird populations, the use of technology to help rangers protect native forest in Cameroon or tracking the growth of greater one-horned rhino populations in Nepal. I hope you find this packed issue as motivating as I do. TZ

DIARY DATES

9 November 6pm
Science talk Remote sensing for savannah species conservation
Online event

11 January 2022 6pm
Science talk CSI of the Sea: What have we learnt from 30 years of investigating cetacean strandings?
Online event

8 February 6pm
Science talk Can understanding animal personalities help us to improve conservation?
Online event

8 March 6pm
Science talk The IUCN Green Status of Species: How to thrive not just survive
Online event

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

21-22 April 2-day event
Symposium Changing the system: A new approach for ocean conservation
Online event

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

GREEN STANDARD OF SPECIES RECOVERY

New species status criteria benchmarks species recovery

SINCE 1964, conservationists have tracked species decline and extinction risk through the IUCN's (International Union for Conservation of Nature) Red List of Threatened Species. In a landmark move, the IUCN's newly launched Green Status of Species will offer conservationists the opportunity to track species recovery and celebrate conservation successes as well.

"The Red List has been used for decades to draw attention to species in dire need of conservation attention," says Mike Hoffmann, ZSL's Head of Global Programmes and technical lead on ZSL's contribution to the Green Status of Species. "The challenge is that we've lacked something to do the reverse, until now. The Green Status is a means of rigorously quantifying and communicating the recovery of species in the wild."

The new Green Status will integrate into the existing Red List and record a score between zero and 100 to indicate the recovery of the species – zero being extinct and 100 meaning fully recovered. The Green Status will also offer a vision of species' status and potential trajectory using a variety of scenarios, such as if conservation activity were to immediately cease.

"This second part is hugely important, because it makes clear the legacy of conservation work – 'without us, where would that species be?' – and indicates whether continued conservation is important to the continued recovery of the species," explains Mike.

"When we downgrade a species, from Critically Endangered to Endangered for example, there is a risk that some policymakers and funders may interpret that the species no longer requires attention – which is often not the case. With the Green Status, we can be clear about the gains we've made, but also what we stand to lose if we were to suddenly stop."

ZSL has played a key role in developing and testing the standard, bringing together the Society's experts in species like sharks, eels, invertebrates and reptiles, where there is often less monitoring data to draw upon. Now the Green Status has been launched, ZSL and the IUCN's other partners will be working to produce the first Green Status species assessments. ZSL will also use the system to help inform and measure its species recovery work.

Visit **iucnredlist.org/about/green-status-species** to find out more. TZ

TURNING UP THE HEAT ON AFRICAN WILD DOGS

New study links climate change to higher mortality of Endangered carnivore

Daniella Rabaiotti, Postdoctoral Researcher, ZSL's Institute of Zoology

RESTRICTED to just seven percent of their historic range and reduced to an estimated 1,400 breeding adults, new research indicates that high temperatures could be putting even greater pressure on the Endangered African wild dog (*Lycaon pictus*).

Research led by ZSL's Institute of Zoology has found that higher ambient temperatures in Kenya are associated with an increase in wild dog deaths at the hands of humans and through disease by domestic dogs. This suggests higher temperatures drive a change in either wild dog or human behaviour which brings them into greater conflict.

"African wild dogs are known to hunt goats and sheep, so it's understandable that some farmers retaliate to protect their livestock," says Daniella Rabaiotti, Postdoctoral Researcher at ZSL's Institute of Zoology and lead author on the paper. "On top of this, their susceptibility to domestic dog diseases means any interaction with humans comes with the risk of contracting diseases like rabies and canine distemper."

The study, which took place at sites in Kenya, Botswana and Zimbabwe, found that intentional and unintentional killing by humans, as well as disease spread by domestic dogs, accounted for 44% of African wild dog deaths at the study sites between 2002 and 2017.

The study also points to larger pack size as improving African wild dogs' chances of survival, suggesting that larger packs are better at defending themselves, caring for individuals and avoiding predators, competitors and people. However, African wild dog packs are at risk from intentional and unintentional killings by humans and the spread of disease by domestic dogs.

"We've already reported in 2017 on the negative impact higher ambient temperature can have on pup survival rates. This research shows that that heat can impact adult survival too, and African wild dogs face twin impacts from climate change," says Daniella.

"With higher temperatures limiting the wild dogs' opportunity to hunt, this is also likely to leave individuals malnourished and immune systems compromised – making them more susceptible to the diseases carried by domestic dogs. Disease often wipes out whole packs, with large population implications that could see the African wild dog spiral towards extinction."

There is hope though, says Daniella. "Our findings suggest that the impact of climate change on African wild dogs could be mitigated both locally and globally: resolving human-wildlife conflict and reducing disease transmission from domestic dogs could help to make African wild dog populations more robust in the face of climate change, while by lowering our individual carbon footprints we can all contribute to the survival of these incredible animals."

The next step for the project will be to publish a population model that brings together these impacts with future climate change scenarios. Daniella and the team of researchers involved are also working on attaching more advanced monitoring collars to individual dogs so that they can monitor their movements closely and see how high temperatures impact their behaviour in detail. Ultimately, this will help ZSL and its partners put forward the best conservation interventions for the survival of the species. TZ

Rising temperatures have been linked to a higher mortality rate of African wild dogs *(Lycaon pictus)*

BRAZIL'S ATLANTIC FOREST FAR BELOW OPTIMUM FOREST COVER

Study of ecological thresholds shows Atlantic Forest in urgent need of restoration

WHEN tropical forest cover falls below 35%, it can lead to a dramatic drop in biodiversity, according to new research into ecological thresholds. The study points to Brazil's Atlantic Forest, with around 15% of its original forest cover remaining, as one area in urgent need of restoration.

PhD Researcher Yara Shennan-Farpón of ZSL's Institute of Zoology reviewed research from across the tropics to identify minimum levels of forest cover for the preservation and restoration of biodiversity.

"Any lower than 35% forest cover, and we see a drastic drop in biodiversity – though this only applies to Brazil, there is too little research to identify similar thresholds for Africa and Southeast Asia," explains Yara. "Thresholds can also depend on the study species. While small mammals, birds and amphibians may only require a third of forest cover within a landscape, larger forest species are likely to need more. One study of tapirs, for example, found that they were only present in landscapes with at least 45% forest cover."

Brazil's Atlantic Forest biome, an area covering approximately 1.5 million kilometres square on the eastern coast of Brazil, is kept drier than most inland rainforests by Atlantic trade winds – meaning many unique species of plant and animal have evolved to thrive in the unusual conditions. However, the area is also home to four-fifths of Brazil's human population and much of the land has been converted for urban and agricultural use.

The golden-headed lion tamarin (*Leontopithecus chrysomelas*) is one of the species endemic to the Atlantic Forest

"Species like the Endangered golden-headed lion tamarin, one we have at London Zoo, are only found in a small area of the Atlantic Forest, and their survival is under threat from the fragmentation of land for agriculture," says Yara. "Meanwhile, around 85% of jaguar habitat has been lost, and the big cat only survives in less than 3% of the Atlantic Forest."

As part of her work, Yara is engaging with smallholders and family-run farms to understand their receptiveness towards and ability to undertake habitat restoration projects. "Brazil has made a number of national and international commitments, including the restoration of 12 million hectares of forest – that they are being encouraged to uphold by the UN and EU trade partners.

"A large proportion of the fruit and vegetables consumed in Brazil are produced by smallholder farmers. Including them in restoration plans – for example, through agroforestry – can benefit rural livelihoods and safeguard food security, as well as biodiversity."

The next step for Yara's research is to use land-use change models to test how different policies and approaches might lead to greater levels of restoration in the Atlantic Forest over the next decades. TZ

ZSL FORGES RANGER PARTNERSHIP

Launch of Universal Ranger Support Alliance to aid rangers in protecting biodiversity

RANGERS are the frontline in the fight to conserve biodiversity, and the launch of the Universal Ranger Support Alliance (URSA) represents the next step in offering this diverse workforce better support and training.

Launched in 2020, URSA was established by the International Ranger Federation, ZSL and six other conservation NGOs. The parties involved have now published an action plan which sets out their vision for the ranger workforce, including better pay, working conditions and training.

"The rangers we work alongside operate in a high-risk working environment, often in very remote and difficult situations, and too often they do so without the support offered by other professions," says Mike Hoffmann, ZSL's Head of Global Programmes. "We see first-hand the challenges they face and yet, if we want to achieve our goals for the preservation of biodiversity, rangers are fundamental.

"URSA will underpin the ranger workforce with a structure of support – from codes of conduct and training, to promoting better pay and health insurance, to ensuring fairer opportunities and conditions. And ZSL is well placed to support that – we have a strong track record of training and building capacity in developing countries."

ZSL already works closely with rangers in Kenya, Cameroon, Benin, Nepal, Mongolia and Thailand, offering support that varies from funding vital equipment, providing training in monitoring and anti-poaching techniques, to working directly with rangers to collect data on wildlife and illegal wildlife trade activities.

"Through URSA, ZSL has helped establish a global code of conduct that ranger agencies can sign up to," explains Mike. "We're also working on a minimum set of welfare standards for rangers – something many other professions already have."

ZSL is also part of a working group producing a report on gender diversity and the barriers to entry in the ranger profession. "It is a vital piece of work which we hope will kickstart a transformative approach within the ranger workforce globally," says Helen Karki Chettri, Monitoring and Evaluation Officer at ZSL.

ZSL already works alongside rangers in several countries, including Mongolia (pictured)

"Despite women playing a key role as rangers, they are vastly underrepresented and literature on rangers is largely gender blind. The report highlights the barriers to gender equity, identifies opportunities for change and shows the value of investing in female and male recruits."

"We want to make the world a safer place for both rangers and wildlife – that means giving rangers the security they need, and the tools and training they require to do their jobs," adds Mike.

For more on URSA, and to access the global Action Plan and Ranger Code of Conduct, see **www.ursa4rangers.org** TZ

PCBS LINKED TO LOWER FERTILITY IN MALE HARBOUR PORPOISES

New study is first indication that banned chemicals may impact male porpoise fertility

BANNED industrial chemicals could be impacting the fertility of male harbour porpoises (*Phocoena phocoena*), according to new research. Higher concentrations of polychlorinated biphenyls (PCBs) in the blubber of male porpoises have been linked with smaller testes weights in adults with otherwise good body condition.

"We understand their impacts on embryonic loss and calf mortality, but this is the first study to investigate the impact of PCBs on male fertility in marine mammals," says Rosie Williams, Postdoctoral Researcher at ZSL's Institute of Zoology. "While we are yet to understand the mechanism causing the reduced testes weights, lower weights have already been proven to correlate with markers of fertility, such as sperm production."

Harbour porpoises employ a mating strategy of promiscuity, competing with other males to breed with as many females as possible. During the summer breeding season, the testes of harbour porpoises can grow 15 times in size, from 200g to 3kg, to meet the needs of frequent copulations.

"By impacting the testes weights of otherwise healthy individuals that are, arguably, the most likely to reproduce, PCBs could be impacting the fitness of the porpoise population," adds Rosie.

"While harbour porpoises are the UK's most abundant cetacean, we know very little about their population trends. What we do know, sadly, is that they face a multitude of stressors: bycatch, overfishing, acoustic disturbance, the impacts of PCBs on their immune system and female reproduction. With the addition of male fertility to the list, it may be time to look again at our risk assessments for the species."

Developed for use in manufacturing, PCBs were banned across Europe in the 1980s but have persisted in the environment, often due to inaction or lack of adequate disposal. At the 2001 Stockholm Convention 152 countries agreed to remove all PCBs from use by 2025 and ensure elimination by 2028. "The UK and several other countries are likely to miss that target at their current trajectory," says Rosie. "Defra are currently in the process of rewriting the UK's strategy on chemicals so this presents a great opportunity for the UK Government to ramp up efforts to reduce the concentrations of PCBs in the environment."

Harbour porpoises (*Phocoena phocoena*) are the UK's most abundant cetacean, but they face a range of stressors

PCBs pose a huge risk to larger marine predators higher up the food chain, like bottlenose dolphins and killer whales, who can accumulate far higher levels of the chemicals in their blubber. But it may not be just marine mammals at risk. "There is a growing consensus that exposure to contaminants could be partially responsible for the global decline of male human fertility," adds Rosie. "It is in all of our interests that we deal with these pollutants sooner rather than later." TZ

THE THAMES MAKES A COMEBACK

New report sets benchmark for recovery of Tidal Thames

DECLARED biologically dead in 1957, the Tidal section of the River Thames has come a long way in the last 60 years, according to ZSL's coming *State of the Thames* report. However, the estuary's recovery remains finely balanced as emerging external factors like climate change and plastic waste could play a greater role.

Being published later this autumn, with support from Royal Bank of Canada, the report will be the first to bring together data from the Environment Agency and a number of organisations monitoring water quality, wildlife numbers, industrial activity and recreation along the Tidal Thames. The biggest improvements have come in water quality – reduction of phosphates, improving levels of dissolved oxygen – both of which are vital for fish to survive.

"Significant investment in sewage treatment works in 1990s and 2000s has led to a reduction of phosphates in the water – a nutrient found in sewage and some agricultural fertilisers that, when it gets into rivers, can kill off fish by causing massive blooms of algae that block out sunlight and starve the water of oxygen," explains Alison Debney, ZSL's Programme Manager for Estuaries and Wetlands. "Pre-2011, the Thames experienced massive drops in dissolved oxygen, again likely killing off fish. Since 2011, those drops have started to level off.

The pied avocet (*Recurvirostra avosetta*) has made a spectacular recovery in the Thames

"This improvement of water quality is reflected in the diversity of fish species now found in the Thames. In 1957 no fish at all were recorded but now over 115 species of fish are found in the Tidal Thames."

Other animal groups are also improving. Numbers of harbour and grey seals are steadily increasing in the Thames Estuary. Wading birds across the Tidal Thames have also doubled since 1993, with avocets (*Recurvirostra avosetta*) making a spectacular return – recovering from locally extinct as a breeding species in the early 1900s to now over 600 individuals. However, it's thought that the rise of wading birds may be an indication of climate change as well as ecosystem recovery.

"The wider UK has seen a general decline in wading birds, so what we may actually be seeing is more overwintering birds settling in the estuary as the UK's east coast warms up," explains Alison.

"Water levels in the Tidal Thames have risen by an average of almost half a centimetre a year for the last 30 years, and we've seen average summer water temperature rise by two degrees since 2007 – which lowers the amount of dissolved oxygen the water can hold."

Another growing issue highlighted in the report is the overwhelming presence of microplastics in the water column. London has the highest density of microplastics compared to five other temperate estuary cities, with over five million microplastics flowing through Greenwich per minute – though very little is known about the ecological impacts of microplastics.

The next step for ZSL's Marine and Freshwater team will be mapping out habitat restoration opportunities in the Thames, with a focus on seagrasses – which provide vital nursery habitats for growing fish. "The return of fish species, and the avocet, are proof that conservation can work," says Alison. "It's time to build on that success and turn our Thames Estuary into a truly thriving ecosystem for both wildlife and Londoners to enjoy." TZ

ICONIC EUROPEAN SPECIES MAKING A COMEBACK

ZSL conservationists support the camera-trap monitoring of returning European species

FROM bison and brown bears to wolves and beaver, some of Europe's most iconic mammals have been making a comeback in recent years – with the help of rewilding and reintroductions programmes, better legal protections, conflict mitigation and wildlife tourism. A long-time collaborator with Rewilding Europe, ZSL is now helping efforts to survey these returning species, by contributing its technical expertise in using motion-activated camera traps to assess wildlife populations.

"Camera traps are an incredible tool for monitoring the kind of large-scale, rugged terrains that Rewilding Europe is working in," says Kate Moses, Project Manager on ZSL's conservation monitoring and technology team. "They provide a fantastic opportunity to see what's happening on the ground in these habitats without disturbing wildlife, and collect data that will allow us to estimate the population densities of species and get a clearer idea of their numbers."

The cameras have recently been deployed in Rewilding Europe project areas in Bulgaria and Croatia. "In the Croatian sites, the primary aim is to obtain the baseline density and abundance of species that are hunted locally, such as brown bears, red deer and roe deer," explains Kate. "In Bulgaria, the focus will be on reintroduced red deer and fallow deer, to see how those are doing, as well as gathering data on other local species such as bison, wolves and golden jackals."

The ZSL team originally planned to help install the camera monitoring networks in the field – but due to pandemic travel restrictions, they instead trained local conservation teams online in how to use and deploy the tech. "The next stage will be sending one of our conservation scientists over this autumn to check the cameras are collecting data as they should."

The team are hoping to roll out the technology in further locations, increasing local monitoring capacity across the Rewilding Europe sites. They also plan to get the public involved in identifying the species caught on camera, by bringing wildlife images from the project sites to ZSL's Instant Wild citizen science app. The resulting data will help inform a new report on how recovering species are faring in Europe, to be co-authored by ZSL conservation scientists. TZ

Red deer (*Cervus elaphus*) are one of a several species recovering across Europe, and a focal species for ZSL's work in Croatia

NEPAL'S RHINOS ON THE RISE

Latest count finds greater one-horned rhino numbers increasing in Nepal

Nepal's greater one-horned rhino (*Rhinoceros unicornis*) population continues to grow

A COUNT of Nepal's greater one-horned rhinos (*Rhinoceros unicornis*) earlier this year recorded a 17% rise in rhino numbers, taking the population from 645 to 752 individuals. The increase signals the continued recovery of a species that had previously dropped to around 200 individuals globally as a result of hunting and habitat loss.

Conducted every five years, the count involved 250 staff from four of Nepal's national parks and is key to measuring the country's efforts to reverse the decline of Asia's rhinos. "In the 1950s, the government at the time instigated a malaria eradication programme in the country's southern lowlands and encouraged people to settle in the area. This led to a rise in hunting and much of the greater one-horned rhino's habitat being cleared for agriculture," explains Hem Baral, ZSL's Country Director in Nepal. "The population of rhinos dropped to less than 100 by the mid-60s, and it was only in 1973 – when Chitwan National Park was established – that we saw the rhinos begin to recover."

Since then, Nepal has undertaken a programme of protection and translocation, ensuring the continued recovery of the rhinos in Chitwan and re-establishing small populations in Shuklaphanta and Bardia National Parks. For much of that time, ZSL has worked closely with Nepal's Department of National Parks and Wildlife Conservation and other partners that include Nepal's National Trust for Nature Conservation.

"We have been involved for over two decades," says Hem, "from the funding of patrols and equipment to deter poaching, improving habitat management, offering training to rangers in evidence collection and animal identification, to introducing the monitoring system Nepal uses to keep track of its rhinos.

"Indigenous communities play an integral role and ZSL has established close relationships with local people living in the buffer zones of national parks. We offer training to develop skills and provide seed funds through community banks to help people set up sustainable businesses and harness growing tourism – work that ultimately helps to discourage poaching."

It all appears to be working too, with populations of rhinos and tigers climbing in Nepal. However, work isn't over for the preservation of greater one-horned rhino; rising numbers of rhino creates new challenges for conservationists.

"The future is definitely brighter for the greater one-horned rhino," says Hem. "However, while poaching may have been reduced, a growing rhino population means our efforts to reduce human-wildlife conflict in the communities we work with are all the more important. And with the impacts of climate change being felt in Nepal, habitat management will also be crucial to their long-term survival."

Visit ZSL Whipsnade Zoo to meet our family of four greater one-horned rhinos or visit **zsl.org/conservation/species** to learn more about our work with Nepal's threatened species. TZ

BRINGING BACK SEABIRDS IN THE CHAGOS ARCHIPELAGO

Banishing invasive rats and rewilding abandoned coconut plantations boosts biodiversity in remote Indian Ocean islands

SEABIRDS are the fastest declining group of birds worldwide – due to a combination of threats, including habitat loss and degradation, and the introduction of invasive predators. But recent research by ZSL's Institute of Zoology, supported by the Bertarelli Foundation, has indicated an effective dual approach for restoring seabird numbers in the Chagos Archipelago.

Even in these remote, uninhabited islands in the Indian Ocean, over 300 miles south of the Maldives, former human occupation continues to impact wildlife populations. "Whenever human settlers have introduced invasive species such as rats to oceanic islands, seabirds – particularly burrow-nesting species – have been decimated," says Pete Carr, PhD Researcher at ZSL's Institute of Zoology and the lead author of the study.

Pete, a former Royal Marine Commando turned conservationist, and the team found that merely removing rats from an island was unlikely to fully restore seabird numbers. A far more effective strategy was to combine this with converting abandoned coconut plantations back to native habitat.

"The Chagos Archipelago used to be known as the 'Oil Islands' because they produced so much coconut kernel for oil production," says Pete. "Native vegetation was cut down to make way for coconut plantations. Unfortunately, when coconut farming ended in the 1970s, it left behind what I call 'coconut chaos'. Few species thrive in the former plantations, as the coconut palms outgrow and outcompete native trees and plants."

Ground-nesting seabirds such as sooty terns (*Onychoprion fuscatus*) won't breed in the dense vegetation of the plantations. And coconut palms – with their palm fronds rather than branches – also make poor nesting sites for birds like red-footed boobies (*Sula sula*): "In 30-odd years, I've only seen three red-footed booby nests in coconut palms," notes Pete.

The study assessed the densities of breeding seabirds in different types of habitat on rat-free islands. "We found the greatest diversity and abundance of species occurred in native forest and savannah," says Pete. "Taking the island of Coin as an example; converting one square kilometre of former coconut plantation to half a square kilometre each of those two native habitats could theoretically support over 319,000 breeding seabird pairs. That's more than can currently be found in the entire archipelago!"

Based on the findings, once rats have been removed, at least 55% of an island should revert to native forest and savannah (and ideally the latter should make up at least 15%) in order to see seabird-driven ecosystems fully recover.

And that's good news for more than just birdlife. "Seabird islands have a massive impact on the coral reefs and marine habitats around them, improving reef resilience to other pressures," explains Pete. "Our research underlines that a 'whole ecosystem' approach to island recovery is likely to be more successful than simply removing rats. And it's a method that could be useful far beyond the Chagos Archipelago, on many other islands too." TZ

Red-footed boobies (*Sula sula*) are one of the species that could benefit from de-ratting and rewilding in the Chagos Archipelago

LISTENING OUT FOR POACHERS

Acoustic monitoring could help protect endangered species by pinpointing wildlife crime hotspots in protected areas worldwide

NEW technology developed by ZSL and road-tested in Cameroon could help in the global fight against wildlife crime by detecting the sound of gunshots in key habitats at risk from poaching.

"We tested the technology last year by placing acoustic recording devices in an area of Cameroon's Dja Faunal Reserve," says Anthony Dancer, Conservation Monitoring and Technology Lead at ZSL. "The recordings are then collected and analysed using artificial intelligence to isolate and identify gunshots from the background noise."

Unlike motion-activated surveillance tools such as camera traps, the acoustic sensors don't rely on close proximity, but can detect gunfire up to a kilometre away.

Working with Google Cloud, ZSL's conservation technology team used stock recordings of gunshots to develop machine-learning tools that would recognise tell-tale sounds of gunfire, and used Google's cloud technology to help analyse data collected from the trials.

The Dja is one of Africa's biggest intact expanses of rainforest, and a crucial habitat for Critically Endangered western lowland gorillas (*Gorilla gorilla gorilla*) and forest elephants (*Loxodonta cyclotis*). But this vast terrain is challenging for rangers to protect, and not only sees subsistence hunting for bushmeat by local people, but also more organised wildlife crime, such as ivory poaching by well-armed groups who have crossed into Cameroon specifically to hunt elephants.

In habitats like this, acoustic data could not only provide reserve managers with real-time alerts about poachers in action, but also help build up a picture of poaching activity and hotspots that could inform future security. "Our goal is to help those in charge of wildlife reserves identify areas of threat, so they can act on that information – whether that means planning their wildlife patrols accordingly, or involving local and national law enforcement," explains Anthony. "We have already found that, while most poaching takes place at night, as you might expect, there were a couple of instances of gunshots in the day, underlining the need to continue their current daytime patrols. Poaching really is going on around the clock," he says.

Now that the technology has been successfully trialled in Dja, the team are looking for funding opportunities to roll it out more widely. And as Anthony notes, it's a technology that could potentially be deployed in any wildlife habitat, if adjusted to fit the local acoustics. "There are other sites in Cameroon which could really benefit, as could the regions where we work in the Western Forest Conservation Complex in Thailand," he says. "The approach could be incredibly valuable for many of the protected areas we are working in worldwide." TZ

Acoustic technology could help Cameroon's rangers identify hotspots of illegal activity

The Ethiopian mountain viper (*Bitis parviocula*) is one of several new species that will be on show at London Zoo's new Reptile and Amphibian House, opening in 2022

Ben Tapley, Curator of Reptiles and Amphibians, ZSL

SCIENTISTS' CORNER

Q&A with Ben Tapley

BEN Tapley is Curator of Reptiles and Amphibians at ZSL. He joins *The Zoologist* to discuss the new Reptile and Amphibian House opening at London Zoo in 2022.

TZ: Why is London Zoo building a new Reptile and Amphibian House?

BT: London Zoo is lucky to have such a rich history, and along with that, beautiful historic buildings. However, as we deepen our knowledge of the animals we care for and increase our ambition for the conservation work we do here at the Zoo, the need for new facilities grows too. Integrated with new technology for managing climates, the new facility will mean we can do more to replicate wild conditions and changing seasons. It will also mean we can show new species like the Ethiopian mountain viper (*Bitis parviocula*), a beautiful animal that, as the name suggests, prefers the cooler and more changeable temperatures of higher altitude. We're actually the first Zoo in Europe to successfully breed them, and the new building will allow us to mimic their habitat and show them to the public.

TZ: How will the move affect your team's conservation work?

BT: Conservation research is an integral part of the role of zookeepers, and the new House will give our reptile and amphibian keepers an opportunity to deliver more than ever before. With so little known about many species of reptile and amphibian, and our ability to recreate natural conditions in our Zoos so precisely, we are in a unique position to fill in the gaps of knowledge and contribute meaningful research in the fight to preserve these animals. For example, we are the only Zoo in the world to both care for and successfully breed the Lake Oku frog (*Xenopus longipes*), a species found in just a single volcanic lake in Cameroon. Our research into their reproductive biology, tadpoles and how to identify individual frogs is already helping to inform monitoring and conservation management decisions in Cameroon, as well as helping us manage the breeding Zoo population of this Critically Endangered EDGE species.

TZ: What will the new Reptile and Amphibian House mean for the species at London Zoo?

BT: This attention on conservation research, and our ability to care for the unique needs of poorly understood species, will mean we can turn our focus to animals that really need our help. For example, building on our success with the Lake Oku frog, I'd like us work with more amphibians from Cameroon. Many of Cameroon's amphibians are both poorly known and highly threatened, and Cameroon's forests are disappearing at a frightening rate. All the evidence points to amphibians disappearing too, so it's a group that desperately needs more conservation attention.

TZ: What can visitors look forward to in the new Reptile and Amphibian House?

BT: It will be a much more interactive experience for visitors and will have greater diversity of habitats and plant life. But the most important thing is that visitors see the link between our Zoos and conservation, and understand the benefit of what we do at ZSL. Visitors will be able to experience what it's like working in the field and learn about our research with species like the mountain chicken frog (*Leptodactylus fallax*), a Critically Endangered species that we are working with in both our Zoos and in the Caribbean. Like many amphibians, mountain chicken frogs are threatened by chytrid fungus, but we are part of a team trialling different methods of making the environment on Montserrat less favourable for the fungus. This includes using heated pools, in semi-wild enclosures, that kill the pathogen but don't harm the frog. Chytrid is driving the global decline of amphibians but, if our work on Montserrat is successful, it could mark the turning point in amphibian conservation – and we want our visitors to know about it! TZ

To find our more about our work with mountain chicken frogs, as well as other species, visit ***zsl.org/conservation/species/reptiles-and-amphibians***

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

"Conservation research is an integral part of the role of zookeepers, and the new House will give our reptile and amphibian keepers an opportunity to deliver more than ever before."