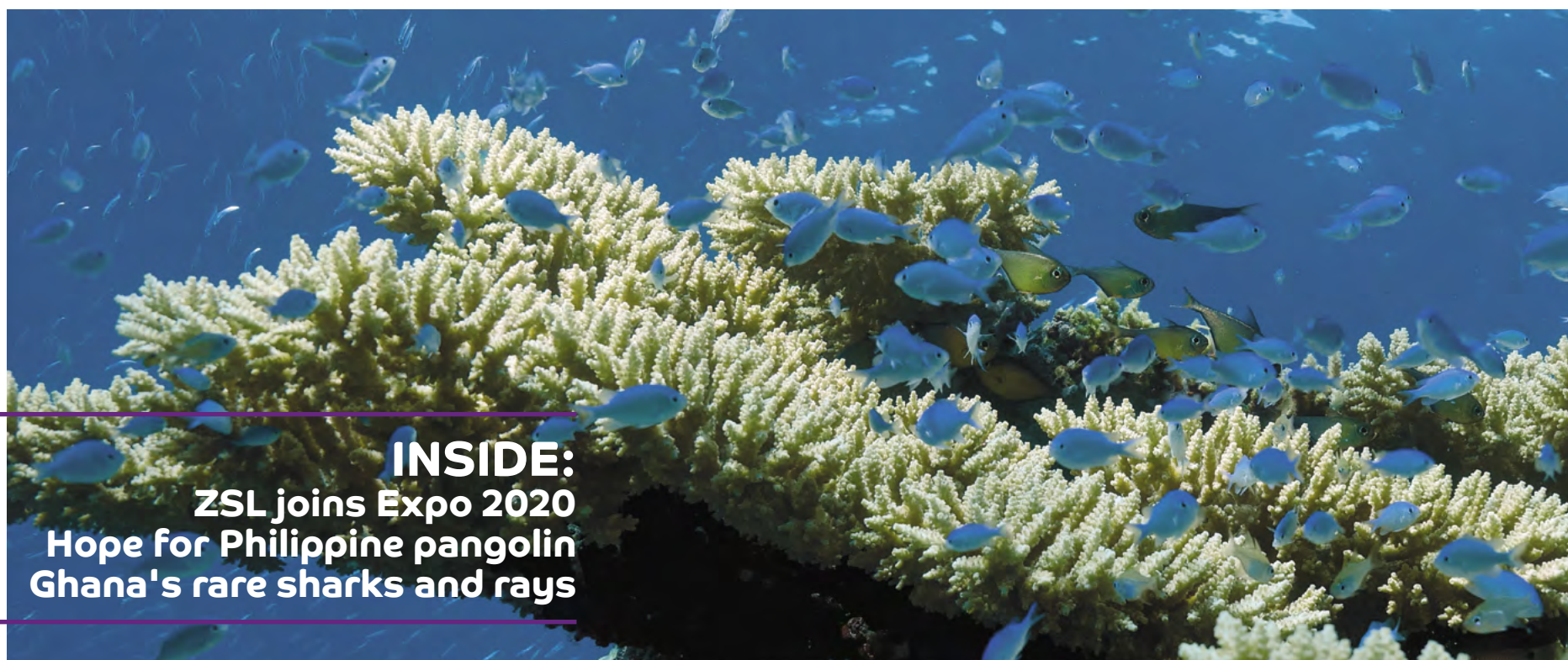


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Exclusively
for ZSL Fellows

THE ZOOLOGIST



INSIDE:
ZSL joins Expo 2020
Hope for Philippine pangolin
Ghana's rare sharks and rays

The new coral exhibit at ZSL London Zoo will highlight work in the Chagos Archipelago, part of the British Indian Ocean Territory (BIOT), where ZSL is leading a programme to study and conserve coral reefs and their inhabitants Credit: Salomon Courts Knoll, BIOT. Rob Dunbar.



Paul Pearce-Kelly, Senior Curator of Invertebrates and Fish, ZSL

CORAL EXHIBIT TO SUPPORT GLOBAL CORAL CONSERVATION

**Aquarists, curators and
researchers at ZSL part of
IUCN's response to coral crisis**

OPENING later this spring, ZSL London Zoo's new coral reef will put conservation at its heart. With over 100 species of corals, reef invertebrates and fish, the new home will raise awareness of the importance of coral reef biodiversity and directly support global coral conservation initiatives.

"We have a dedicated coral and reef fish culture room, where we will be able to induce coral spawning and rear young," explains Paul Pearce-Kelly, ZSL's Senior Curator of Invertebrates and Fish. "Alongside ZSL's Institute of Zoology and international colleagues, we'll be advancing coral identification capability through genetic and image analysis, while also helping to bring more coral species into cryopreservation banks to safeguard genetic material at very low temperatures in the event of species extinction."

It is estimated that up to 50% of the world's coral reef has already been lost or severely damaged, and unprecedented back-to-back mass bleaching events in the last few years have shown that even the best managed reefs have little defence against such heat stress and other climate change impacts. In this light, ZSL is working with the IUCN Coral Specialist Group to implement a two-pronged approach to the coral crisis.

"The situation facing corals is very stark and our response is becoming increasingly urgent," says Paul. "Our work is twofold – we help to ensure effective policy action for protecting them in the wild, while establishing populations in aquariums and cryopreservation banks of as many species as

possible. This will help us develop climate resilient strains and ensure the survival of vulnerable species.

"We're part of the global effort to bring all reef-forming corals into Zoo care and we will be holding as many of these rescue species as possible. Advancing breeding capability for reef fish will be an increasingly vital conservation requirement too, and we are supporting this effort in parallel with our coral culture work."

ZSL currently leads a research programme of over 100 scientists from 26 institutions in the British Indian Ocean Territory (BIOT), a marine protected area containing the Chagos Archipelago, one of the world's most important reef systems. "Our new coral facility will help raise awareness of the Chagos Archipelago and directly contribute to its conservation," adds Paul. "For example, we are part of an initiative to provide urgent assistance to the Critically Endangered Chagos brain coral (*Ctenella chagius*) which, due to climate change, is facing extinction."

Long term, Paul believes the survival of corals will come down to our collective efforts to influence policymakers to take effective action against climate change. And if successful, it will have dramatic results for wider biodiversity. "Because coral reefs are so sensitive to climate change, if we can ensure their future we'll also have given ourselves the best chance of saving most other major ecosystems, along with our coastal cities and socioeconomic wellbeing. There's every incentive to do our collective best while there's still time." **TZ**



Sarah Durant, Acting Director of Science,
ZSL's Institute of Zoology

DEAR FELLOWS

THIS has been a difficult year for ZSL. There is not an area of our work that has escaped the impacts of the Covid-19 pandemic. Our Zoos have had to close three times during the last year, but the pandemic has also impacted on science at ZSL. We have managed to keep our laboratories open since the first lockdown but many of our scientists have transferred their offices to their studies, bedrooms, dining tables and kitchens across the country.

Despite this upheaval, the past year has been a busy time for ZSL's Institute of Zoology. In consultation with Research England (whose funding underpins the Institute's research), we have developed and put in place an exciting new business plan. This plan will see us continue to develop our multidisciplinary science around three key themes that map onto the pillars of ZSL 200: biology

and recovery of small populations; coexistence between people and wildlife; and wildlife health. An additional two research themes on adapting to climate change and global biodiversity monitoring will provide cross-cutting scientific and methodological support in these areas.

In this issue of *The Zoologist* you can read about some of the science that has continued, despite the disruptions. David Redding re-joined ZSL this year, after being awarded a prestigious Wellcome Fellowship, and his work on zoonotic disease risk in the face of environmental change could not be more timely. I recommend you read his interview on the back page. The pioneering work of Lewis Rowden, Fiona Sach and Alasdair Davies on new technology using elephant thermal imaging shows how practitioners in zoos, science and conservation can work together to develop new approaches to address long-standing issues. And in the marine world, Rosie Williams's work has shown the damage of chemicals that, despite having been banned in the UK since the 1980s, still exert their destructive impacts on marine mammals in UK waters.

Later this year, the global leadership will come together at the Conference of the Parties on Climate Change in the UK, and on Biological Diversity in China, to make decisions that will decide our future. With this in mind, our front page highlights the existential crisis facing many marine ecosystems, where climate change threatens to destroy corals critical for marine ecosystems. ZSL leads an extensive program of work on these fragile and complex ecosystems in the British Indian Ocean Territory (BIOT) and the new exhibit at ZSL will highlight this work and showcase the importance of corals to our marine biodiversity.

I hope you find this issue a fascinating read, and thank you for your support of ZSL at this difficult time. **TZ**

DIARY DATES

May

Opening Tiny Giants:
From Minibeasts to Corals
ZSL London Zoo

11 May 6-7:30pm

Science talk Why do eggs fail?
Experts discuss female reproductive failure in birds
Online event

13 May 1pm

Talk Future Zoo: An update from our senior team about our Zoo plans
Exclusive online event

8 June 6-7:30pm

Science talk Life in the cold:
Celebrating a decade of research in Greenland
Online event

Summer tbc

Opening Giants of the Galapagos
ZSL London Zoo

10 November 5pm

Annual General Meeting
Online event

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

ZSL TAKES CONSERVATION TO WORLD STAGE AT EXPO 2020

Society joins Expo 2020 Dubai and DP World to highlight value of biodiversity and drive action for overlooked species

THIS year, ZSL will be partnering with Expo 2020, the first World Expo to be held in the Middle East since the events launched in 1851 with London's Great Exhibition.

Partnered with Expo 2020 organisers and the global ports company DP World, ZSL will be supporting the development of the Expo's Climate Change and Biodiversity Week (3-9 October 2021) and Water Week (March 2022), while also helping to shape the wider conversation around biodiversity at the six-month exhibition.

"The event brings together representatives from over 190 nations, as well as high level corporate policy makers," says Andrew Terry, ZSL's Director of Conservation and Policy. "In terms of putting ZSL in a position to build new partnerships and influence global change, this is absolutely enormous.

"This year is promising to be a significant year for conservation and the environment; with the G7 summit hosted by the UK in Cornwall, the UN Convention on Biological Diversity summit

taking place in China, and the UN Climate Change Conference in Glasgow all having a major focus on the environment and future recovery strategies. Expo 2020 represents an important touchpoint for the decision makers involved in those conferences."

ZSL will be working closely with DP World, a major logistics company that runs ports in several ZSL field conservation regions – including the UK, Mozambique and the Philippines – to build a programme of events and exhibitions that bring together ZSL's expertise in four key areas: wildlife trade, ocean health, integrating biodiversity into corporate decision making and using big data to support conservation.

"We are keen to showcase overlooked species, particularly those impacted by both illegal and legal trade. On the corporate side, we want to engage companies to take a pioneering role in adopting pro-wildlife investment strategies that will not only reduce impacts from supply chains, but also contribute towards net gains.

"Fundamentally, saving wildlife and addressing our climate crisis requires the integration of the natural world into our global financial models. Food lies at the heart of most of this, as food production is the leading driver of change to habitats and wildlife," adds Andrew. "The evidence is in place from an economic, social, scientific and health perspective. So now, as we approach the major summits taking place this year, we need to see the translation of this evidence into action both at a national policy level and a corporate level.

"At ZSL we are focussed on putting our world class science into practice to drive the recovery of wildlife. We are really looking forward to engaging with our partners at Expo 2020 and bringing different perspectives from our scientists, our field collaborators and the communities who are reliant on wildlife. I hope we can affect change and inspire the pioneers that can make a difference." **TZ**



Thermal imaging system developed by ZSL can spot Asian elephants (*Elephas maximus*) with 90% accuracy at 30 metres away

RISING human population and agricultural intensification is forcing elephants globally into smaller, fragmented habitats – and often into conflict with humans for resources. These clashes between humans and elephants can cause a loss of income, or risk injury and even death to both humans and elephants. Some early warning systems are already in place to alert villages of approaching elephants, but new technology developed with ZSL Whipsnade Zoo’s Asian elephant herd could help to drastically improve them.

THERMAL IMAGING LIGHTS THE WAY FOR ELEPHANTS

Whipsnade’s elephant herd contributes to detection system that could reduce human-wildlife conflict

Using low cost, open-access thermal cameras and machine-learning technology, a team of conservationists and zookeepers at ZSL have developed software that can automatically identify thermal images of Asian elephants – with 90% accuracy at 30 metres. Three years in the making, the project has involved collecting over 30,000 thermal images of Whipsnade’s Asian elephants.

“This technology can automatically detect elephants in complete darkness, with a high level of confidence, and alert rural communities where conflict with elephants is an issue,” says Fiona Sach, Proposal Development Manager. “The confidence level is absolutely key – too many false positives will render the technology useless as local communities become disengaged.”

“The cost of thermal technology has become more accessible in recent years,” explains Arribada Initiative’s Alasdair Davies, ZSL’s technology partner on the project. “We saw that change, and realised it offered an opportunity to utilise thermal imaging for conservation.”

As well as warning community leaders of approaching elephants via text or WhatsApp, giving them time to divert the elephants from crops or property, or move to safer areas, the

thermal detection system could provide vital information to conservationists about overall elephant movement. Identifying routes of migration will help policymakers establish protected areas for the elephants and pinpoint hotspots of conflict with humans.

“This kind of research would not be possible without Whipsnade’s elephants and the expertise of our elephant keepers,” says Lewis Rowden, ZSL’s Zoo Research Officer. “To teach the software to recognise elephants we had to take into account every single angle and movement an elephant can make at a range of distances. The zookeepers’ understanding of elephant movement and behaviour allowed us to plan the shots we needed around the elephants normal daily routine.

“We are also collaborating with other UK Zoos, such as Colchester Zoo, whose herd of African elephants are helping us to challenge the model with both species of elephant, so that it can have wider applications in the field.”

The next step for the programme is to trial it in the wild. The team hope to run a prototype in Nepal, where ZSL is already working closely with communities affected by conflict with elephants. **TZ**

REMEMBERING DR TREVOR COOTE, PARTULA CONSERVATION BIOLOGIST

By Paul Pearce-Kelly, Senior Curator of Invertebrates and Fish, ZSL and Prof Mike Bruford, Cardiff University

WE are very sorry to share the news that our dear colleague Dr Trevor Coote, Conservation Field Biologist on the International Partulid Programme, passed away in February this year.

Having graduated from Nottingham as a mature student in 1991, Trevor joined ZSL in 1992; first as a volunteer and then as a technician in the Institute of Zoology. He was instrumental in developing and applying human microsatellite DNA markers in apes and Old World monkeys, and it was then that he embarked on his PhD at the Institute: examining genetic diversity in *Partula* snails. It was a subject he had first been introduced to by Prof Bryan Clarke during his undergraduate degree, then based at the Institute, and he worked in collaboration with Prof Richard Nichols at Queen Mary University in London.

His scientific ethos included a granite-hard commitment to his personal codes and to openness. This integrity was central to his PhD, for which he eschewed many intriguing and plausible results because he insisted on checking and rechecking them. He is fondly remembered by his colleagues as smart, hard-working, humble and extremely funny. A North Londoner born and bred,

with a varied and interesting life outside of science, and the published author of several novels.

Trevor went on to spend almost 20 years advancing conservation efforts for French Polynesian *Partula* snails – a group of molluscs plunged into crisis by the introduction of invasive, carnivorous snails – and was instrumental in enabling the reintroduction phase of the Partula Programme. From his base in Tahiti, and with the support of ZSL, a consortium of international zoos and the French Polynesian Government, Trevor was responsible for the reintroduction of over 15,000 individual snails from 14 species and sub species since 2015.

Tragically, having only recently retired and returned to the UK, Trevor contracted Covid-19 and passed away. Colleagues across the mollusc conservation community, and far beyond, have expressed their sadness and testified to Trevor’s outstanding knowledge, experience and achievements – as well as his kind and helpful nature. In addition to a wealth of fond memories, Trevor’s conservation impact is a truly outstanding legacy for which we are all grateful and inspired to carry forward. **TZ**



Dr Trevor Coote was responsible for the reintroduction of 15,000 *Partula* snails in his role of field biologist

LANDING SURVEYS OFFER INSIGHT INTO RARE SHARKS AND RAYS

Seven species of EDGE sharks and rays identified in survey of fishing catches on Western Ghana coast

WESTERN Ghana's coastline could be a hotspot for extremely rare sharks and rays, according to the first ever detailed study of elasmobranchs in the region. Working closely with local fishing communities, EDGE Fellow Issah Seidu has identified seven species of EDGE sharks and rays in the catches of fishers making a living on the country's coastline.

"Many Ghanaian fishers noticed a decline in stocks of tuna and other bony fish in the 1990s, and some communities turned to fishing for sharks and rays," explains Issah, who has been conducting interviews with fishers. "They have developed strategies for catching large sharks in their canoes – keeping the meat for their families and selling on the fins to buyers who likely sell them on to Asia."

The species Issah has recorded in his landing surveys include the Endangered scalloped hammerhead (*Sphyrna lewini*), Endangered blackchin guitarfish (*Glaucostegus cemiculus*) and Vulnerable sand tiger shark (*Carcharias taurus*) – all in the top 30 list of EDGE sharks and rays requiring urgent conservation attention.

ZSL's EDGE of Existence initiative identifies evolutionarily distinct and globally endangered species in need of urgent support. The programme launched its list of 50 EDGE shark and ray species in 2018 and supports Issah and 50 other in-country conservationists around the world through its Fellowship programme.



EDGE Fellow Issah Seidu has recorded several species of rare sharks and ray in landing surveys in Western Ghana, including the scalloped hammerhead (*Sphyrna lewini*)

Once Issah has collected enough data, he hopes to leverage ZSL's experience in locally-managed marine conservation and work with the communities to establish ways of reducing their fishing of such rare species. "Through a series of meetings with the communities involved, and quite a bit of persistence, we've established a promising relationship," says Issah. "Some fishers even call me when they catch certain species. But no amount of words will stop them catching the sharks and rays that help them provide for their families.

"Instead, we need to work with them to find alternative livelihoods, and then they may begin

to buy into conservation models and protected areas." Through his interviews, Issah has already identified several members of the fishing community who are keen to explore setting up their own businesses. Culturally too, there are encouraging signs for fostering a more sustainable relationship with sharks; some communities in Ghana revere whales as sea gods, and refuse to catch whale sharks because they mistakenly believe them to be whales.

Issah's surveys will continue into 2022, at which point he hopes to have enough data to leverage local and government support for the EDGE species in the area. **TZ**

NEW FROG SPECIES FOUND ON VIETNAM'S THIRD HIGHEST PEAK

Vietnamese amphibian is fourth described by ZSL's international team in five years

A NEW species of frog, the Mount Ky Quan San horned frog (*Megophrys frigida*), has been discovered 2,700m above sea level in Vietnam's mountains.

The research, led by ZSL's Curator of Herpetology Ben Tapley and ZSL EDGE Fellow Luan Thanh Nguyen, in collaboration with the Australian Museum, Hoang Lien National Park and the Natural History Museum, found the new species on Vietnam's third highest peak, Mount Ky Quan San, north-west Vietnam. This newly described amphibian is the fourth species discovered by the team since 2017, demonstrating just how little is known about this fascinating region of Vietnam.

"With nearly half of the world's amphibian species threatened with extinction, the discovery of a new species is cause for celebration," says Ben Tapley, ZSL's Curator of Herpetology. "It was

by no means easy finding them, especially when they are as small as 3.3cm, around the size of a £2 coin, and the new species closely resembles many other horned frogs."

"At first glance, the frog looked very similar to other species in the area," explains Luan Thanh Nguyen, ZSL EDGE Fellow. "It wasn't until we examined their call and analysed their DNA that the pieces of the puzzle came together, and we could rejoice the discovery of a new species."

"We were only able to find this particular species at two locations high in Vietnam's Hoang Lien Range, meaning its range is very restricted," continues Ben. "From our assessment, we can already speculate that this species is Endangered due to its small range and the ongoing habitat loss we saw in both areas where the new species was found.



Newly described Mount Ky Quan San horned frog (*Megophrys frigida*)

"This is the fourth species of horned frog discovered by our team in the Hoang Lien Range since 2017, which stresses the significance of this area for Vietnam's amphibian diversity. We are still identifying new species so there is an urgent need for additional amphibian surveys, particularly at high elevation sites in Vietnam where other undiscovered and potentially highly threatened amphibian species could occur. However, the important thing is that, now the species is named, we can take the important next steps in conserving it." **TZ**

A NEW SOLUTION TO CLIMATE CHANGE FOR MARINE BIRDS

Research project offers insight into effective climate change adaptation practices

THE challenges posed by climate change are numerous, diverse and often difficult to ascertain. Our changing planet presents each species with a set of obstacles (or benefits) that are unique to their biology and environment, ranging from the direct impacts of rising temperature on that species to the indirect impacts of changing climatic conditions on predators, prey, competitors, diseases, vegetation and the landscape itself.

Making decisions in the face of these changes, at the speed required to prevent extinctions, presents conservationists with their own challenge – which response will be the most effective? ZSL has begun a new project, alongside Cambridge University, to assess Western Europe's marine birds and existing climate change adaptation practices to address this knowledge gap in the conservationist's toolkit.

"Marine birds are dependent on both the land and the sea, making them an exciting pilot study group," explains Nathalie Pettoirelli, Senior Research Fellow at ZSL's Institute of Zoology. "They face a huge number of climate-related challenges,

from the direct effects of changing climatic conditions on their ability to survive and breed, to the indirect effects of rising sea levels and changing sea temperatures on nesting sites and fish stock distribution. We're also seeing predators like the red fox and racoon dog expanding their range as our climate changes, presenting risks to nesting seabirds who would normally be beyond their range.

"There is an equally large range of management responses we can consider, some more effective than others – from the local eradication of invasive predators or the building of protective fences, to establishing new colonies or improving existing habitats in a way that mitigate the impacts of climate change on the survival and reproduction of sea birds."

Over the next 18 months, the project aims to assess the threats posed by climate change to Western Europe's marine birds, develop an evidence base that assesses the effectiveness of climate change mitigation techniques already in use and establish a network of climate change conservationists across Western Europe so that information can be shared and action coordinated.



The Atlantic puffin (*Fratercula arctica*), listed as Vulnerable, is one of 75 pelagic and coastal marine birds included in the study

"Our immediate aim is to improve marine bird conservation by bringing together the best science on climate change vulnerability and the best evidence on management effectiveness," explains Nathalie. "Once we have a framework in place, we can look to expand – not just to other marine birds, but to all birds and even other animal groups.

"For any conservation manager, success begins with choosing the most effective route available. Our hope is that this project will help conservation managers make the decisions that optimise the chances of survival for the species that require help." **TZ**

CANTOR'S GIANT SOFTSHELL TURTLE ENDURES IN KERALA

EDGE Fellow works with local communities to unearth evidence of large freshwater turtle in south-west Indian state



The Cantor's giant softshell turtle (*Pelochelys cantorii*) has been recorded in Kerala, India

EVIDENCE collected with the support of local communities in the Indian state of Kerala suggests the Cantor's giant softshell turtle (*Pelochelys cantorii*) persists in the region. The discovery is welcome news for the Endangered species, which is illegally hunted for its meat and eggs, and impacted by the building of dams and sand mining across Asia.

Last recorded in Kerala in 2010, and without any prior population studies in the region, EDGE Fellow Ayushi Jain embarked on a project to prove the existence of the turtle in Chandragiri river. Through surveys of local fishing communities, she was able to build a record of sightings and an alert network of local fishers – since leading to the safe rescue and release of several Cantor's giant softshell turtle.

"Despite being incredibly unique, and one of the largest freshwater turtles in the world, there was almost no attention given to the species," says Ayushi Jain. "What little research is being done for the conservation of freshwater turtles in India is focussed

on the Ganga-Brahmaputra regions – I knew it was time for someone to change that.

"Their secretive nature and tendency to stay buried in the sandy river bottom for long periods makes them very difficult to study. What little we know of them is often from their interactions with humans – caught in nets or on fishhooks – so the focus of my project has been to involve and empower the local communities in the protection of the species."

Working with local communities and Kerala State Forest Department, Ayushi conducted a survey of local knowledge, recording sightings in 13 locations from people in various villages, before using those contacts to build an alert network of fishers for future sightings. This has led to the successful rescue of three juvenile and two adult Cantor's giant softshell turtles – mistakenly caught as bycatch by local fishers – and the identification of three nesting sites.

Nesting sites and juveniles are a good sign for the turtle, indicating the population is still functioning in the area. "The next stage of the project is about bringing the State Department and local communities together to build an action plan for the species," says Ayushi.

"We are hoping to protect the nesting sites from the immediate threats through various management activities, like the regulated use of dams, as well as monitoring for illegal activities like sand mining and poaching. If this is applied systematically, with the buy-in from everyone, we can increase the chances of survival for turtle hatchlings." **TZ**

OUR SEA, OUR LIFE

Developing a guide for establishing locally managed marine protected areas

SINCE 2013, ZSL has been working with fishing communities in Mozambique, alongside local and international partners, to implement a series of locally managed marine protected areas. Having helped establish protected areas totalling 60km² across northern Mozambique, the team behind the project has developed a toolkit that they hope will help other NGOs and fishing communities set up protected areas across Mozambique and the western Indian Ocean.

Mozambique is a hotspot for marine diversity in the Indian Ocean, but the coastline is under threat from increasingly unsustainable fishing and the discovery of underwater gas reserves in the mid-2000s, says ZSL's Project Manager Jeremy Huet. "The aim of the project *Our Sea, Our Life* is to protect the rights of local fishers by securing access to the marine resources they depend on and protect marine biodiversity and the coastal habitat from more damage.

"We took the learnings from ZSL's work in the Philippines, where this approach of locally managed marine areas has been successful, and applied them to our work in Mozambique."

'No-take zones' were agreed with participating communities, allowing octopus and fish the opportunity to grow and breed. Once their populations have recovered, the fish quickly move into unprotected areas, where they can then be caught – a tactic that is proven to improve the resilience of marine biodiversity and, crucially for the villages involved, secure the future health of their fish stocks.

The programme has also involved establishing community banks that allow participants to make regular savings on a weekly basis. Savings and loans can then be used to improve their home and wellbeing, set up alternative sustainable businesses, or enable families to send their children to school. So far, over five community banks have been set up, with savings of around US\$1,000 per group, supporting over 1,000 people throughout Mozambique.

The lessons learned from the programme, templates for surveys, and the suggested steps for establishing relationships with fishing communities have all been captured in a toolkit. "The toolkit is based on inclusivity," explains Ana Pinto, Project Coordinator. "The programme has been designed to empower the communities we work with to take control of managing their coastal resources.

"The success of the project is down to their willingness to engage with the programme and embrace more sustainable fishing practices, to establish fisheries councils and to work together as communities."

The toolkit is now available on the ZSL website for other NGOs to apply to similar projects in Mozambique and across the East African coast. Visit www.zsl.org/ourseaourlife to find out more. **TZ**

SAVING THE GUAM KINGFISHER FROM EXTINCTION

Supporting the reintroduction of sihek



ZSL is part of a programme hoping to reintroduce Guam kingfishers (*Todiramphus cinnamominus*), also known as *sihek*, to the wild

LAST spotted in the wild in 1988, the Guam kingfisher (*Todiramphus cinnamominus*) – called a *sihek* in the native language of CHamoru – is a small but striking species of bird endemic to the island of Guam in the Western Pacific Ocean.

Weighing just 50 to 70g, sihek have a golden-brown body with jade-coloured wings and tails. The birds were wiped out in the wild after brown tree snakes were accidentally released onto their tropical island home in the 1940s.

Thankfully, a small number – just 29 – of the birds had been moved to zoos in the United States with the aim of starting a conservation breeding programme. Those birds were the founders of a population that now stands at 135 individuals.

Researchers from zoos and conservation groups including ZSL, Calgary Zoo, US Fish & Wildlife Service, Guam Division of Aquatic and Wildlife Resources, and the American Association of Zoos and Aquariums, are working together on a sihek recovery programme – with one key aim being to reintroduce them to the wild.

ZSL's scientists are leading research to support the release of these birds, including assessing if the population is genetically healthy enough to support removing individuals for release to the wild. "Due to the incredibly small size of the founding group of the Guam kingfishers that have been bred in zoos, some inbreeding was considered inevitable," explains Amanda Trask from ZSL's Institute of Zoology. "What we needed to investigate was the extent of this and the impact on the population's viability."

This research was published in *Scientific Reports* in January this year and flagged an urgent need to increase both breeding rates and the population of sihek in zoos in the US and Guam, so that it can better support a wild reintroduction programme.

"While our research demonstrated that inbreeding has impacted the species' reproductive success, it also showed that we could overcome the issues it poses by increasing breeding rates," says Amanda. "If we can achieve this, then the population is capable of supporting a successful reintroduction programme – which is exciting news for the future of the species."

Due to the ongoing presence of the brown tree snakes in their original habitat, the sihek would first be released to remote islands which have been carefully identified as an ideal environment and where the released birds can be closely monitored, but with the ultimate aim of reintroduction to Guam.

"If this is successful, it'll not only see the sihek living in the wild again for the first time in more than 30 years, which will be a huge achievement in itself, but will also help us to create a blueprint for doing the same for other Extinct in the Wild species," adds Amanda.

To hear more from Amanda about her work with the sihek, alongside other reintroduction experts, watch ZSL's *Return to the Wild: How can we recover Extinct in the Wild species?* science talk: youtu.be/VWTbrJe1Zl **TZ**

LOCAL KNOWLEDGE OFFERS HOPE FOR SURVIVAL OF PHILIPPINE PANGOLIN

Critically Endangered pangolin may still persist across much of their range, according to new study

IN the first study to attempt to understand the Philippine pangolin's distribution across its range, a survey of local ecological knowledge indicates the species could still survive throughout Palawan Province – though in small numbers.

“In interviews with over 1,000 people from 72 villages, recognition of the Philippine pangolin was very high,” says Lucy Archer, PhD Researcher at ZSL's Institute of Zoology and lead author of the paper. “Over two-thirds reported pangolin sightings, with 19% of interviewees reporting sightings in the last two years.

“It's heartening, given that studies of other pangolin species have shown them to have completely disappeared from whole areas,” adds Lucy. “However, there is a flip side. Sadly, most of the people we interviewed considered the pangolin to be ‘rare’ or ‘very rare’, and the majority felt their numbers to be declining.

“The research offers hope for the species – they're still holding on across a lot of their historic range. But what's clear is that action needs to be taken now if we are to protect them.”

Philippine pangolins (*Manis culionensis*) are elusive, nocturnal and semi-arboreal, making them extremely hard to study. In such cases, local ecological knowledge is an important tool for identifying the presence of wildlife before employing more expensive and time-consuming monitoring and protection techniques. Working with ZSL's Philippine pangolin team, Lucy was able to build a picture of the Philippine pangolin's distribution from interviews with members of each village.



The Philippine pangolin (*Manis culionensis*) is one of the rarest mammal species in the world

The research also highlighted that consumption of pangolin products is common at a local level. “In all but one village, interviewees confirmed that they were aware of pangolins being consumed locally,” explains Lucy. “More research needs to be done on consumption levels, but the interviews indicate the practice is widespread. And it may not be solely international trade driving the species' decline.”

Working with stakeholders from across the province, an initial ZSL research site has been established at Lake Manguao, Taytay municipality. It is soon to be designated as one of the first local pangolin conservation area in the Philippines,

and camera trap surveys are underway to gain a better understanding of the species. The project also works closely with the local community, both as part of the surveys and on ways to change behaviour around the use of pangolin products.

Ultimately, Lucy hopes that the study will kickstart a series of locally led conservation projects across Palawan. “Our study has shown just how important local ecological knowledge can be – preserving the Philippine pangolin would not be possible without it. Local people are the ones who hold the knowledge of the landscape, the forests and their wildlife, and they must be the ones to drive conservation. With their support, there is hope for the pangolin.” **TZ**

LESSER NIGHT GECKO MAKES GIANT LEAP FOR REPTILE CONSERVATION

Reintroduction of tiny gecko could pave way for more reptile restoration projects

FIRST discovered in 1982, the lesser night gecko (*Nactus coindemirensis*) is a tiny lizard – just 6cm from head to tail – unique to Mauritius. Classified as Vulnerable by the IUCN, they survive on four small offshore islands, but it is thought they once existed on the main island of Mauritius until the introduction of non-native species, including the larger Asian house gecko.

“The devastation of Mauritian wildlife by invasive mammals like rats, cats and rabbits is well known,” explains Katie Bickerton, PhD Researcher at ZSL's Institute of Zoology. “What is less understood is the damage done by invasive lizards like the Asian house gecko, an adaptive species that has been shown to have out-competed smaller native lizards.”

Katie is studying the effectiveness of previous efforts to safeguard the lesser night gecko, including the translocation of the species onto

the fourth island, Île Marianne. Eight years of data from Île Marianne and survey data from the other populations will inform the next stage of the project: reintroducing the lesser night gecko to Round Island.

“In most restoration projects, prey species are reintroduced first and allowed to establish before the predators are added, but in this case we will be reintroducing the lesser night gecko onto an island with native predators, which are also threatened” says Katie. “We are using the data gathered so far to identify a suitable release site on Round Island, as well as investigating the best method to reduce predation, allowing the population to establish. This could include the use of soft release enclosures, artificial refuges and anti-predator fencing.”

Round Island is monitored daily by rangers and completely closed to tourists, making it the

safest possible place for the lesser night gecko, as invasive species are more likely to be detected and removed. The geckos for translocation will be sourced from the largest population on the neighbouring Gunner's Quoin. There are an estimated 15,000 lesser night geckos on Gunner's Quoin, meaning they are relatively abundant compared to other gecko species in Mauritius, and the project will enable Katie to develop a protocol for translocating other more threatened reptile species.

“Key to this project, will be predicting the likely outcomes prior to taking action, through population models, then adaptively managing the population based upon how accurate our predictions are. By demonstrating the use of modelling in this context, we hope to improve the success of future reptile translocations, making them more cost effective.” **TZ**



Land-use change may impact the risk of disease spill over from wildlife to humans, according to research co-authored by ZSL's David Redding



David Redding, Research Fellow, ZSL's Institute of Zoology

SCIENTISTS' CORNER

Q&A with David Redding

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DAVID Redding is a Research Fellow at ZSL's Institute of Zoology and UCL's Centre for Biodiversity & Environment Research. He uses large-scale analysis of ecological and epidemiological data to predict trends and risk in the spread of zoonotic diseases, including Lassa Fever, Ebola and Rift Valley Fever.

TZ: You began as an ecologist, what led you to the study of epidemiology?

DR: I became interested in the tangible impacts of biodiversity loss on humans. As land use and climate change alter the way species behave, this changing behaviour presents different opportunities for the spillover of zoonotic disease to humans. And that's a really important area of research, because it reframes biodiversity loss in terms of a quantifiable risk to us. Unlike much of zoonotic disease research, that tends to have a narrow geographical scope, my work focuses on a general understanding of how zoonotic diseases emerge and spread globally. Zoonotic disease is not random – it spreads from certain places, at certain times – and ecology is a crucial link in understanding that interface between humans and wildlife and, ultimately, reducing the risk of disease.

TZ: In a recent paper you co-authored, you found that land-use change may increase the risk of disease outbreaks.

DR: Generally speaking, the majority of species decline as you degrade the landscape – whether that's for urbanisation or agriculture, for instance. However, in our research, we found that there are certain groups of animals known to carry many diseases dangerous to humans – certain rodents, passerine birds and bats, for example – who appear to adapt better to land use change than others. So degrading natural habitat acts as a filtering process: we lose megafauna, large predators, primates, while giving certain disease-carriers room to expand, and we end up with a landscape primed for the spillover of disease.

TZ: Your research couldn't be more timely. What can we learn from the Covid-19 outbreak?

DR: What's clear is that we can't have unlimited globalisation and economic expansion without increasing our risk of disease outbreaks. And we can't wait to act. Our use of land must be more efficient if we are to reduce the opportunities for disease spillover, and everyone should take some responsibility for making that happen – it is often demand for products like soy and palm oil driving land degradation. But it's also worth remembering that, as well as outbreaks of novel viruses like SARS-CoV-2, endemic zoonotic disease already places a huge burden on communities around the world. For example, Lassa Fever, one of the diseases that forms part of my research, impacts around 200,000 people per year in West Africa. If we take into account rabies, anthrax, brucellosis and echinococcus, you're looking at annual disease spillovers in the millions. So the impacts of zoonotic disease might be new to many of us in the UK, but their impact has been felt regularly throughout many communities for generations, and investing in the research of endemic zoonotic disease is crucial.

TZ: What does the future hold for zoonotic disease research?

DR: Interdisciplinary research is crucial to preventing future zoonotic outbreaks. Covid-19 couldn't have come to pass without bats living in a particular way, in a particular place, and without humans behaving in a specific way. Understanding all these complex behaviours requires different skill sets: from ecologists, to anthropologists, to virologists. Beyond epidemiology, it's also important we invest in people's lives – the communities living on the cutting edge of biodiversity loss. If we invest in the people who live in areas of primary habitat, then we can bypass this hugely inefficient destruction of habitats and help to protect ourselves from further outbreaks. **TZ**

We can't wait to act. Our use of land must be more efficient if we are to reduce the opportunities for disease spillover, and everyone should take some responsibility for making that happen.

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