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ZOOQUARIA

AUTUMN 2020

ISSUE 109

TEAM DRAGON

WORKING TOGETHER TO
SAVE THE KOMODO



A BIRD IN THE HAND

A LONG-TERM PLAN FOR THE VIETNAM PHEASANT

FISH FOOD

SUSTAINABLE DIETS FOR OUR PISCIVOROUS ANIMALS





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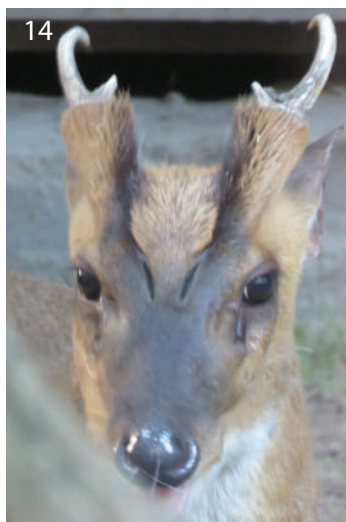


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Zooquaria

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FROM THE DIRECTOR'S CHAIR

I am delighted to share this issue of *Zooquaria* with you. In what continues to be a challenging world, I find my spirits lifted by the evidence of much good work that is continuing and would like to thank all our authors for their submissions. During the period since our last issue we have seen many of our Members reopen and welcome visitors back to be inspired and engaged by nature. More recently we have sadly seen some countries re-enter periods of tighter restrictions and seen zoos and aquariums close again. What is in no doubt is the continued support offered by our community and the opportunities that being part of it offer in terms of sharing best practice and staying strong together in the face of adversity.

Our animals may have noticed that it was quieter than usual over the spring/summer period, but this did not stop them behaving normally, as the successes shared on the Births and Hatchings pages show. When we consider breeding success and population management, it is also great to read how both the Deer Taxon Advisory Group (TAG) and Old World monkey TAG experienced the new-style Regional Collection Plan (RCP) process and are putting those plans into action. Not to be left out of the scope of taxa, it is also good to read about progress with the Vietnam pheasant Long-term Management Plan (LTMP) and development of the Best Practice Guidelines that were published in July. Of course, we cannot talk about population management without mentioning the transition of our studbooks into ZIMS for Studbooks – please read the article on page 21 to find out about developments and the variety of support that is available to you.

Within this issue we also see good progress on diverse conservation-related activities. The article on pages 8–9 shares information about the EU Biodiversity Strategy for 2030 and the call from EAZA to make sure that ambitious and achievable targets are set so that real progress can be made. EAZA stands ready to assist with achieving these targets and has, along with many of our National Associations, already signed up to the EU's Global Coalition for Biodiversity. If you are interested in joining, then please read the article to find out more. The excellent articles on conservation of Komodo dragon and rhino further demonstrate my comments in the first paragraph about the strength of our community, especially when it comes to collaborating. Being part of the Which Fish? campaign and sharing the experiences of Wildlife Reserves Singapore moving to sustainable fish adds to the examples of when we work together and share best practice, we can achieve so much more than we do alone.

I also want to mention the people aspect of our work and community. The article from Dr Severin Dressen nicely shares how Zoo Zürich has linked its Lewa Savannah

development to their *in situ* conservation and immersive education of visitors, and Victoria Melfi challenges us to think about the evolution of visitor-animal interactions and how we can better structure our research to understand visitor effect, which in turn links to the article about the educational impact of visitor-animal interactions. Whilst concentrating on people, I would like to add my acknowledgement of the passing of Petr Čolas. I was fortunate to meet him on a number of occasions and he was always a thoughtful and strong advocate of progressive zoos and EAZA. My thoughts are with his family, friends and colleagues at Ostrava Zoo.

Lastly, I cannot finish without making mention of our first ever virtual Annual Conference. A fuller summary will be given in the next issue of *Zooquaria* but I want to share some numbers now: over the course of five days we had at least 1,158 delegates (and many more last-minute registrations) from 573 institutions in 80 countries! The programme included 12 Committee meetings, nine Member plenaries, six live-streamed plenaries, six workshops, one poster session and one icebreaker! Moving to a totally new format involved a steep learning curve with ongoing adaptations; however, we were able to build on the experiences gained from needing to switch the Animal Welfare Forum and Conservation Forum to webinars earlier in the year. It was also pleasing to see that the virtual format enabled us to expand our audience and reach many people who had never attended before. This is definitely something we want to retain in the future. I received many compliments about how engaging and well run the sessions were and extend my personal thanks to everyone involved in organising and running sessions and all our amazing speakers. I could not be prouder of #TeamEAZA and the 'can do' attitude of our community. I truly believe that this shared attitude is what will enable us to succeed together, whatever the future holds.

Myfanwy Griffith
Executive Director, EAZA

NOTICEBOARD

EAZA COUNCIL

During the EAZA Council meetings on 1 and 2 October 2020, the following membership decisions were made:

MAINTAIN FULL MEMBERSHIP AND ACCREDITATION

- Szeged Zoo, Hungary
- The Scientific Centre, Kuwait
- Zoo Hluboká nad Vltavou, Czechia
- Koninklijke Burgers' Zoo, the Netherlands
- Oceanogràfic, Spain
- Zoo Frankfurt, Germany
- Wildnispark Zürich, Switzerland
- Zoologischer Garten Basel, Switzerland
- Aquazoo Düsseldorf, Germany
- Tiergarten der Stadt Nürnberg, Germany
- Cotswold Wildlife Park, UK
- Ménagerie du Jardin des Plantes, France
- Thüringer Zoopark Erfurt, Germany
- Océanopolis, France

TEMPORARY MEMBERSHIP (FROM FULL)

- Poznań Zoo, Poland
- Zoo Duisburg, Germany

TERMINATION (FROM CANDIDATE FOR MEMBERSHIP)

- Rostov-on-Don Zoo, Russia

REINSTATED TO FULL STATUS (FROM EXCLUSION)

- Magdeburg Zoo, Germany

Membership Summary following these decisions:

• Full Members	301
• Temporary Members	17
• Candidates for Membership	24
• Associate Members	36
• Corporate Members	45
• Honorary Members	4

GRAND TOTAL: 427

FURTHER DECISIONS OF COUNCIL

- Renewing the Memorandum of Understanding (MoU) with ALPZA (2020–2025)
- Renewing the MoU with EUAC (2020–2024)
- A proposal to add a new membership fee category to Members with

<50,000 visitors. The next step will be to bring the proposal to AGM for discussion in April 2021.

- A name change for the Education Committee to Conservation Education Committee

DECISIONS FROM THE AGM

The Extraordinary Annual General Meeting held on 2 October 2020 approved the following:

- Updates to the EAZA Standards for the Accommodation and Care of Animals in Zoos and Aquaria – specifically new sections 1.5 on elephant management and 3.1.2 whereby Members must not engage in intentional breeding practices for the expression of rare recessive alleles
- Updates to chapter 3.12 in the Population Management Manual to clarify the procedure on Ownership, Use and Access of Studbook Data (the updated Manual will be available soon)
- Terms of Reference for all Committees and Council

A thank you was given to Arne Lawrenz who is stepping down as Chair of the Veterinary Committee. Mads Frost-Bertelsen (Copenhagen) was approved as the new Chair.

LIFETIME ACHIEVEMENT AWARD

At the recent EAZA online Annual Conference, EAZA awarded its highest honours to Dr Miklós Persányi, recently retired Director of Budapest Zoo. Miklós received not only the Lifetime Achievement Award, but also Honorary Membership of the Association, an honour granted previously to four previous Chairs of EAZA.

Miklós was not only Director of Budapest Zoo for nearly 30 years, but also Chair of EAZA and, in the early 2000s, Hungarian Minister for the

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Zooprofs

Environment and Water. Miklós received the award in the final session of the EAZA Conference on 2 October. On behalf of the whole community, we wish Miklós a long and happy retirement.



NEW ARRIVALS

PINK-BACKED PELICAN CHICKS HATCH AT DUISBURG ZOO

IN MID-JULY THIS YEAR, Pelican Island at Duisburg Zoo in Germany saw the arrival of two healthy pelican chicks writes *Christian Schreiner, PR officer*. The parents took very good care of the chicks, which were the first to hatch; some birds are still sitting on their nests, so the zoo is hoping for more offspring.

In the wild, pink-backed pelicans (*Pelecanus rufescens*) breed in colonies of between 20 and 500 pairs of animals. Nests are built using twigs and branches, and between one and three eggs are laid per nest. Incubating the eggs is a task for both the female and the male pelican, who take turns for 30 days, after which the young hatch.

Pink-backed pelicans are rarely kept in zoos and even more rarely breed successfully. 'It is due to the harmony within the pelican colony,' says Head of Zoology Johannes Pfeleiderer. The group harmony is clearly working well, as the colony has successfully bred since 2007, and in each of the past eight years has raised at least one chick to adulthood. 'The offspring have then been sent to eight other zoos in five countries to



G. SICKMANN

contribute to the *ex situ* population of this elegant waterfowl,' adds Pfeleiderer. Pink-backed pelicans are managed as a European Studbook (ESB), and once DNA results are in from the offspring, several collections have expressed an interest in the birds to balance the sex ratio within their colony.

Pink-backed pelicans originate from

tropical and subtropical regions in Africa and south-western Arabia. It is listed as Least Concern on the IUCN Red List. Despite this, the global wild population suffers from habitat destruction and pollution that disrupts colonies. In Madagascar, the pink-backed pelican population has been eradicated.

THE DOMAIN OF THE CAVES OF HAN WILDLIFE PARK CELEBRATES THE ARRIVAL OF TWO

The Domain of the Caves of Han Wildlife Park in Belgium stretches out over 250 hectares of unspoilt nature and is home to around 650 animals from 35 different European species, including a pair of wolverines (*Gulo gulo*) writes *Anthony Kohler, Réserve d'Animaux Sauvages*.

The wolverines, a rare species even in zoological parks, are part of a European breeding programme led by Eva Andersson of Nordens Ark, Sweden. In 2020, the EEP numbered 144 animals spread out over 59 zoological parks.

Currently, it is assumed that Europe is home to approximately 1,300 wolverines in the wild. The Domain of the Caves of Han is the only Belgian park exhibiting this particular species.

In 2015, the Park joined the EEP and welcomed two wolverines: a male called Valle, from Borås in Sweden, and a female called Skally, who came from Novosibirsk in Russia. Because of the



pair's genetic diversity, the green light was given; the wolverines could reproduce!

On 6 February 2017, a small female wolverine was born, named Grahma.

Unfortunately, she developed meningitis and died of cardiorespiratory arrest at the age of six months.

We had to wait until 7 February 2020 before the female retreated into her den

SCHÖNBRUNN ZOO CONTINUES ITS UNIQUE BREEDING SUCCESS AS TEN MORE ROCKHOPPER PENGUINS JOIN THE COLONY

NORTHERN ROCKHOPPER PENGUINS (*Eudyptes moseleyi*) are found in the South Atlantic and Indian Oceans writes Sabine Frühwirth, Schönbrunn Zoo (Vienna) and Coordinator of the Northern & southern rockhopper penguin EEP. The global population is estimated to be around 240,300 breeding pairs, the majority being found on Gough Island and in the Tristan da Cunha group. The northern rockhopper penguin is classified as Endangered (IUCN Red List) owing to very rapid population decreases over the last three generations thanks to climate change, pollution, increasing disturbance, harvesting, introduced predators and disease outbreaks.

At present, 111 northern rockhopper penguins are kept in five EAZA zoos, 64 of which hatched at the Schönbrunn Zoo, the only zoo in the world to breed rockhopper penguins every year – this year, 10 rockhopper penguins hatched from Schönbrunn eggs.

The Polarium, which opened at the zoo in 2005, offers the best conditions for this



species, with its cooled air and water systems, rock structures and freshwater and saltwater pools. The breeding area is covered with ice in January, a trick that enabled the penguins' keepers to synchronise the courtship behaviour and breeding time. Dried grass is made available to the penguins for nest-building. The young birds from previous years are separated from the breeding pairs during this time, since the unpaired birds have repeatedly disrupted the breeding process, damaging eggs and injuring the chicks.

The rearing of the chicks is monitored by video cameras, and if a chick is not fed enough by its parents, it is taken out of the nest and given a mixture of puréed fish and krill. When it becomes strong enough, it is returned to the nest.

Breeding the northern rockhopper penguin is a challenge, but with the right plan, sensitivity and personal commitment from the penguin keepers and the exact simulation of seasonal light and climate conditions, you can succeed – although of course a bit of luck is part of every success.

BABY WOLVERINES

to give birth again. This was not entirely a surprise to the animal team; they had witnessed the wolverines mating last year and had hoped that the wolverine family would soon welcome a new member. The den was not accessible to the keepers, but their patience was rewarded in March 2020 when they finally caught sight of the two baby wolverines.

The staff decided not to interfere and let the mother take care of her kits. Mother and young were given their first check-up in April, when it was discovered that Skally had given birth to a male and a female. Both baby wolverines are the picture of health and already display the notoriously tenacious temper typical to their species. In 2020, a total of eight baby wolverines were born in zoological parks that are members of the EEP, and we are delighted to have contributed to this success.



DANIEL ZUPANC

Raising the stakes

EAZA'S RESPONSE TO THE EUROPEAN UNION BIODIVERSITY STRATEGY FOR 2030 WILL CALL FOR AMBITIOUS BUT ACHIEVABLE TARGETS TO ENSURE THAT REAL PROGRESS IS MADE

David Williams-Mitchell, EAZA Director of Communications and Membership

The EU's new Biodiversity Strategy for 2030 was launched in June of this year, at a time when the UN Convention on Biological Diversity (CBD) is closing one decade-long strategic period and working towards a new framework, which appears to be taking a long view of biodiversity conservation and protection. The EU response to the direction that the CBD discussions are taking is summarised in the new Biodiversity Strategy for 2030, which recognises that for actions to take place to fulfil this long view, a medium-term objective is more valuable locally.

The strategy is seen as a central part of the EU Green Deal transformational plan, and as such has wide areas to cover in terms of addressing the protection of biodiversity, such as the inclusion of relevant targets as obligations for business. It is therefore essential, as champions of animal species conservation in Europe, that EAZA puts forward a response that will help give specific shape to the more general language that such a mandate implies, and ensure that Member States and Union bodies can call on our expertise in fulfilling the strategy.

Shortly after the publication of the Biodiversity Strategy, EAZA therefore published and distributed a full statement responding to the document and calling for a number of areas we believe should receive serious consideration.

DELIVER ON THE AMBITION

There is no doubt that a unified biodiversity strategy for such a large geographical area and range of cultural and political landscapes is an extraordinary achievement in its own right. That said, there is also little doubt that the UN Decade of Biodiversity, which shaped the previous EU Biodiversity Strategy, has failed to provide a secure future for wild animal species at home and abroad.



THE EU BIODIVERSITY STRATEGY FOR 2030

Response
of the European Association of Zoos & Aquaria (EAZA)



June 2020

The new Strategy aims to overcome some of the implementation difficulties by establishing a governance framework, but EAZA would also like to see the engagement of the widest possible stakeholder base to achieve a lasting transformation of our relationship with nature – an engagement based on the expression of clear, ambitious, achievable and measurable targets that all citizens and groups can play a role in meeting.

MAKE FULL USE OF OUR POTENTIAL

The Strategy is explicit in pointing out that zoos and aquariums are central to the effort to raise public awareness of biodiversity and its loss, and EAZA is clear that it wishes to fulfil this function scientifically and as

effectively as possible. We also point out, though, that this is only one of the roles of a modern progressive zoo or aquarium network. A state-of-the-art population management structure aimed at providing taxon-specific support for wild animal species in conservation provides the means to assist materially with the strategy's conservation goals; scientific collaborations and research that help us to understand not only how animals live, but also in many cases the means to help protect them in the future; reintroduction programmes that can help to restore lost biodiversity; training and capacity building for conservationists worldwide – all these can be added to the power of a zoo or aquarium in providing education to the public.

EAZA goes further, however. We ask that every zoo and aquarium should be held to the principle that they can and must contribute to their communities and the wider region in all of these fields, and must be able to provide secure, welfare-positive environments for the animals in their care. To that end, we call on the EU to push Member States to improve their implementation of the Zoos Directive. To allow us to do our jobs more effectively, we have also called on the EU to recognise that some environmental regulations, such as those covering invasive alien species, may provide obstacles to conservation and other roles played by good zoos. If the implementation of the Directive can guarantee that animals can be kept well and safely in human care, then zoos should be trusted to care for species that the Member States wish to eradicate from their European habitats.

Finally, in recognising that zoos and aquariums are key parts of their local communities and are able to provide expert advice, EAZA calls on local authorities to use its expertise in the environmental initiatives such as Urban Greening Plans referred to in the Strategy.

EMPHASISE SPECIES CONSERVATION

The EU Biodiversity Strategy for 2030 represents a move forward from previous international frameworks, which looked at habitat and ecosystem protection but took less notice of conservation tailored to the needs of individual threatened species. Indeed, the Strategy specifically talks about protection of species and planning measures to ensure corridors for nature between areas of the Trans-European Nature Network. It looks also at correcting the oversight of previous strategies, which did not adequately address the negative effects on biodiversity of other areas of EU strategy, such as international trade. Nonetheless, EAZA feels strongly that these good intentions need to be codified with strong targets on species conservation, legal governance, genetic diversity of wild populations and an emergency response to prevent extinctions and generate recovery.

EAZA recognises that the EU is highly influential in the UN environmental forums, including

the CBD, and we have called on the Union to take the lead in pushing for urgency on species conservation measures globally. To support this at a local level, and to ensure links between that local level and the regional and global frameworks, EAZA also calls for National Biodiversity Strategies and Action Plans (NBSAP) that can provide adjustable scaling for species protection and the pooling of resources and knowledge, as well as targeted interventions for local populations at imminent risk.

APPLY AN INTEGRATED ONE PLAN APPROACH TO CONSERVATION

EAZA recognises, through the planning and implementation of the new EEP structure among other measures, that species conservation needs to be approached holistically and in good time to prevent vulnerability to extinction. EAZA therefore calls on the EU to push for full implementation of the CBD's Article 9 and to fully integrate *ex situ* conservation into planning for the avoidance of extinctions. Given that the IUCN SSC Guidelines on the use of Ex Situ Management for Conservation is a key document for EAZA, we recommend to the EU the rigorous application of the One Plan approach. EAZA Members are able to support this through planning and management of *ex situ* populations, bolstered by robust genetic analysis of all populations and sample collection at the EAZA Biobank for further research. The One Plan approach also requires the convocation of a wide stakeholder base for each species' conservation, and we urge the

EU to follow this model and include experts in *ex situ* conservation and support in all discussions and strategies for species recovery.

ENSURE THAT BIODIVERSITY IS ONLY USED SUSTAINABLY AND LEGALLY

EAZA applauds the EU Biodiversity Strategy for 2030's commitment to continue the fight to eradicate the illegal trade in animals and animal parts. We call for greater coordination between the various UN agencies related to different conventions including the CBD, CITES and Convention of Migratory Species (CMS), and recognise that the EU can drive efforts to fully enforce legal measures that arise from them. On top of this, we recognise that the new strategy specifically addresses the potential for other areas of EU activity, such as trade agreements, to damage biodiversity (and in some instances encourage the trade in animals) and commits to eradicating them as far as possible. Finally, EAZA commends the EU on its recognition that the health of all organisms is related (the One Health approach) and that the illegal and/or unsustainable use of wildlife resources is a direct contributor to the diminution of public health and a sustainable economy.

In summary, EAZA intends to hold the EU to its ambitions and support their fulfilment via all the means at our disposal. The coming decade may represent a last chance for many species, but we believe that sincere and holistic collaboration can make all the difference.

GLOBAL COALITION UNITED FOR #BIODIVERSITY

Under the aegis of DG Environment of the European Commission, a new global coalition for biodiversity has been established, and EAZA, along with individual Members and National Associations, has signed up to be an active member. The aim is to coordinate all efforts to raise awareness of the CBD Conference of the Parties early next year, and to inspire the public to call for the highest possible level of ambition in the post-2020 CBD framework from their representatives.

The coalition currently features not only the zoo and aquarium community, but also groups such as Ecsite and Botanic Gardens Conservation International (BGCI, our former partners in the Let It Grow campaign), the Consortium of European Taxonomic Facilities (CETAF), TRAFFIC and many other international groups and local institutions.

If your institution is interested in taking part, please contact the EAZA Office (info@eaza.net) and we will put you in touch with the coalition's leader at the Commission.

Access all areas

APRIL ADAMS, EAZA'S ACCREDITATION AND MEMBERSHIP MANAGER, TRACKS THE EVOLUTION OF THE OPEN-ACCESS JOURNAL OF ZOO AND AQUARIUM RESEARCH

The work of any modern zoo and aquarium is driven by research and data collection at every level. From a keeper comparing whether an orangutan responds better to strawberries or blueberries as reinforcement for blood-draw training to a vet sending biopsy samples to a pathology lab as part of a study on liver function in saki monkeys, at all levels research drives the decision-making and work of our Members. And it was the depth of commitment to research from case studies to rigorous science that led to the development of JZAR – the uniquely open-access *Journal of Zoo and Aquarium Research*.

The journey to publishing JZAR was a long one. Talks about strengthening EAZA's scientific standing began in the late 2000s, and crystallised during the 2009 Research Committee meeting held in Poznan, Poland.

'The first talks about having an open-access journal on zoo research were a direct result of the EAZA Research Strategy,' says Zjef Pereboom (Antwerp Zoo Society), Chair of the EAZA Research Committee and Chair of JZAR's editorial board. 'We recognised that quite a lot of research activities were ongoing in zoos, but most studies were never published, and getting scientific work published is key to being able to use that information in practical day-to-day zoo management.'

Thus, in 2010 at the Research Committee's meeting in Antwerp, Belgium, a decision was taken to create an electronic journal to encourage and amplify the research happening at zoos and aquariums around the world. 'An electronic journal enabled easy accessibility and allowed zoo researchers to publish relatively quickly,' says Pereboom.

At the same time, the British and Irish Association of Zoos and Aquariums (BIAZA) Research Committee was coming to similar conclusions on the

JZAR WAS LAUNCHED AT THE 2013 EDINBURGH CONFERENCE BY THEN EAZA CHAIR SIMON TONGE



need to boost the existing good research of BIAZA members. 'We had been discussing the need for a new journal at BIAZA Research Committee meetings, mainly because there was no real avenue for publishing small-scale studies or case studies,' explained Geoff Hosey (University of Bolton), BIAZA Research Committee member. 'Zoo Biology was great, but didn't really accept small studies, and they had more submissions than they could deal with anyway. We also thought a more European focus would be worthwhile.'

Real progress was made when the EAZA and BIAZA research committees joined forces and, in 2011, developed a small task force that became the first editorial board. The task force approached established publishers with the prospective journal, but the financial commitment expected by these organisations was too great, especially when the intention was to make the journal freely available, a key aspect of JZAR from the very beginning. But then Pereboom found publishing software that would allow the team to do it themselves – so that's what they did.

'With hindsight I suppose 2011 was the tipping-point year that made it all possible,' reflects Pereboom. 'It was at the 2011 EAZA Annual Conference in Montpellier that EAZA's Executive Committee endorsed JZAR and pledged an annual budget line from the EAZA Executive Office, and later that week EAZA Council approved that budget.'

Once the funding and the method of self-publishing was set, many other important decisions fell into place: the need for a committed editor, author guidelines, the call for initial submissions, and the scope of research that would be accepted. An important difference of JZAR is its willingness to publish evidence-based research, case

studies and other scientific activities that can provide insight into practical animal management but that might not be accepted by hard science journals.

'JZAR promotes research that supports the vision of EAZA Members and other zoos globally, and supports zoo professionals with publishing scientific studies – including an evidence-based section where systematically collected data is published from opportunistic events that could support future housing and husbandry,' says Vicky Melfi (Hartpury University), JZAR's Managing Editor. The journal's scope of research supports the implementation of evidence-based operations.

After many years of hard work, the first issue of JZAR (the only hard-copy issue) was presented at the 2013 EAZA Annual Conference in Edinburgh.

'Just getting started was a big achievement,' says Melfi, 'And the original Managing Editor, Eluned Price, set up processes that made possible all that has followed. We are now publishing quarterly while still growing and improving, with a largely volunteer workforce – a great accolade to our supporters, who give their time freely.'

JZAR remains the only double open-access journal of its kind, which means that articles can be published and read freely, allowing zoos and aquariums to share their excellent and varied research to encourage data-driven husbandry, population management and veterinary care globally. Its continued success exhibits EAZA's commitment to research as one of its primary missions.

If you would be interested in submitting to JZAR, the website (www.jzar.org) has detailed submission guidelines, including editorial rights, types of manuscript accepted, preparation guidelines and contact information for any questions.

Petr Čolas (1965–2020): in memoriam

A TRIBUTE TO THE DIRECTOR OF OSTRAVA ZOO, WHO TRANSFORMED THE ZOO WITH HIS VISION AND PASSION FOR ANIMAL WELFARE AND CONSERVATION

Vladislav Jiroušek, Director Emeritus, Jihlava Zoo, Czechia

Petr and I first met many years ago; he began visiting me at Jihlava Zoo during the first year of his studies at the University of Agriculture. After a number of short-term positions as a zoo technician at state farms, he dedicated 30 years of his life to Ostrava Zoo, which he joined in 1990, first working in the zoo kitchen, then as a keeper, curator and, finally, as the director, a role he held for 16 years.

Petr's appointment to the top job meant huge changes for the zoo. He built a team of highly qualified and committed staff, began tearing down outdated animal facilities, some dating back to the 1950s, and launched the construction of newer, more modern buildings and exhibits. Personally, I was the most impressed by Chitwan: a one-hectare exhibit for Asiatic black bears (*Ursus thibetanus*) and the world's largest group of Northern Plains grey langurs (*Semnopithecus entellus*) in human care. It is a state-of-the-art facility, set in a lush forest with a lake.

Chitwan perfectly represents Petr's feel for good animal husbandry and for the aesthetics of a modern animal exhibit. However, it is by no means the only part of the zoo that represents his legacy. I could think of the House of Evolution, with more than 200 animals in residence, or La Pampa – a recently opened walk-through aviary housing American black vultures (*Coragyps atratus*). Other new exhibits are being finalised and several others are scheduled to be built.

Along with setting up new facilities, Petr expanded the zoo's species variety, with most of the species breeding successfully. His main focus was on Old World primates and Asian fauna. That's also why Ostrava Zoo manages, among others, the global studbook and the EEP for the Vietnamese sika deer (*Cervus nippon pseudaxis*). Always seeing nature holistically, Petr also paid a lot of attention to the botany of the zoo and created several beautiful educational trails with amazing plant richness.



Petr was an active member of the Council of the Union of Czech and Slovak Zoos (UCSZOO) and coordinated its Old World primate expert group. In EAZA, he kept close ties to the Old World monkey and Prosimian TAGs and sat on four lemur species committees. These activities reflected his true passion as a primatologist.

He found it very important to support conservation projects, both within and outside EAZA campaigns. He shared funds and expertise, employed field zoologists and visited the project sites; he needed to know the projects first-hand. Petr and his team found various creative ways to acquire funds; one example is the annual fundraiser run at the zoo. Its subsequent editions have supported the conservation of the silvery gibbon (*Hylobates moloch*), the Sclater's lemur (*Eulemur flavifrons*) or the Tonkin snub-nosed monkey (*Rhinopithecus avunculus*).

The total overhaul that Ostrava Zoo went through under Petr's leadership wouldn't have been possible without his managerial skills. He built good relations with the authorities in the city and region, securing funds for his initiatives. The zoo flourished and attendance grew. Petr and his partner Jana, also a zoo staff member, simply lived for their zoo.

I had the honour to know Petr not only as a colleague, but also as a close friend and travel companion. Wherever we went, he had unlimited patience for observing animals and just taking in the natural surroundings. Often we hardly said a word for the whole day, but then in the evenings we'd engage in passionate recounts of the species we saw, how the animals behaved and what we could learn from it for our zoo work.

We were close – sometimes too close! On a trip to the Falklands we shared a tiny tent in which we could barely move. The small plane that got us there didn't have space for large luggage, and we both gave priority to the photo gear – all the rest was of secondary importance. Petr shared his food with me, saying he couldn't eat it alone. That was typical of his selflessness.

I vividly remember another situation from Patagonia. Seeing that we were the only two foreigners on the bus, the local guide got it into her head that she must turn us into experts in the history of the region. After a packed day, we were totally exhausted and I was already falling asleep. Petr was just as tired as I was, but he was too polite to ignore the guide's lecture and continued listening and nodding for many more hours.

Petr was indeed a rare breed of gentleman, modest, intelligent and empathetic. His patience, politeness and composure were genuine, but while he never cursed and always stayed calm, he was also very frank and honest. Born to a Czech mother and a Greek father, I guess he inherited some of the best traits from these two cultures.

Petr's untimely death is a blow for the whole zoological community and a deep personal loss for those of us who knew him as a friend. We will remember him with a sense of gratitude for all the shared experiences and memories of the time we spent together.

A sustainable solution



ZOOQUARIA TALKS TO THE WILDLIFE NUTRITION TEAM AT WILDLIFE RESERVES SINGAPORE ABOUT MAKING THE SWITCH TO SUSTAINABLY SOURCED SEAFOOD FOR ANIMALS

Laura Myers, EAZA Academy Manager

LM: Could you introduce the team and tell us about your work?

WRS: Wildlife Reserves Singapore (WRS) is the operator of Singapore's wildlife parks – Jurong Bird Park, River Safari, Night Safari and Singapore Zoo. These four zoological parks are home to nearly 15,000 animals and there is one team responsible for the nutrition of all these animals, consisting of Dr Francis Cabana, Chou Po Han and Shaun Wee.

The wildlife nutrition team at WRS is responsible for buying all the animal food, and this includes sourcing for quality ingredients sustainably.

LM: Can you tell us why WRS committed to offering sustainably sourced seafood options for animals?

WRS: We think that zoos have a voice and that it's important to walk the talk. Especially in this part of the world (Southeast Asia), sustainable seafood is very novel. We need to show that we are doing everything we can to protect wild animals and the habitats from which our animals came.

As an institution that prides itself on wildlife conservation, it is important that we play our part to ensure the sustainability of such food sources, especially when large quantities of them pass through our parks daily. This also ensures that the food from this source is always available to our animals.

We also need to show the local fish suppliers that there is demand for sustainable seafood so that more options become available. We have a bigger budget for animal food than for human food and beverage (F&B), and we have the potential to act as a role model for other industries and the public so we can really help to change the market.

LM: Can you tell us a bit about what sustainable seafood options you have available at the moment to feed animals?

WRS: The vast majority of our sustainable seafood comes from overseas. Items we currently purchase are certified by either the Marine Stewardship Council (MSC) or Aquamarine Stewardship Council (ASC). We are now at just above 65% sustainably sourced seafood for our animals (and 100% for our F&B).

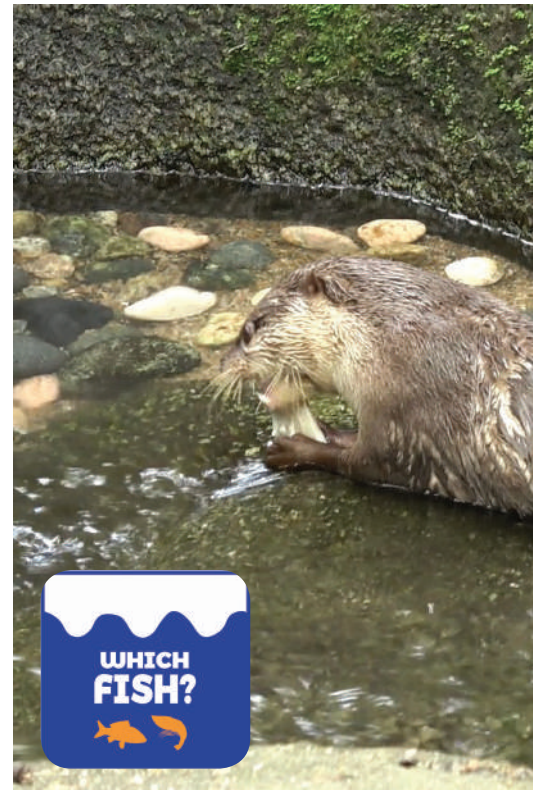
LM: It's great to hear that you now source the majority of your seafood sustainably. What's behind the difference between the animal food and F&B percentages?

WRS: Generally, there are more sustainable options for fish for human consumption. For our animals we buy the whole fish, and currently not all fisheries can provide certified whole fish, which reduces the options. We also need to be able to provide fish with different levels of fat content, and different sizes – finding certified small fish to feed to our birds is the biggest challenge.

LM: How did you make the switch to using sustainable seafood products at your institution?

WRS: We started to assess sustainability four years ago. It turns out that our fish sustainability was around 24% and we didn't even know it! We tried to understand what sustainable options were available in our market and how to maximise their usage. Once we reached a plateau where animal diets would need to be significantly changed or we would have to significantly increase our budget to purchase sustainably, we had to get creative.

We created our WRS Sustainable



Fish policy to help us define what we mean by sustainable, and, more importantly, to avoid fish that were actively being exploited, so we avoid using any red-listed species. If we stick to only MSC and ASC certified species, we could never achieve 100% sustainability in Singapore, so we had to use other guides and focus on the green-listed fish. Obtaining fish from local and regional sources can also reduce our carbon footprint. These may not have the obvious certifications, but knowing the source, fishing methods used and the species background can be a first step towards achieving 100% sustainably sourced seafood.

LM: Were there any major challenges with switching to sustainable seafood products? Do you have any tips for zoos and aquariums who are just getting started with the process?

WRS: The challenge is being limited by our available options. Naturally you'd want to sit down with all the suppliers in your region and have a face-to-face chat with them and make them understand what you are going for, then they can come back to you with options. Having a flow chart and clear specifications helped the suppliers understand our needs. Once you have all these options, then do a bit of



research (or if you are lucky the supplier will have this information) and separate all the fish into low, medium and higher fat content. This will help you choose a variety of fish suitable for the different animals in your collection. We have a lot of tropical species that don't do well on high-fat fish, so historically they would be getting lots of local fish from Malaysia or Indonesia. Sustainable certification for those species doesn't exist, so we had to make transitions to other species.

We believe zoos and aquariums should have a basic understanding of where, what and how their seafood is being obtained, regardless of whether the necessary certifications are provided. This would be the best way to start the process.

We have shared our flow chart to the Which Fish? campaign resources page, and you can also find a more general one produced by WWF.

LM: Those are some great tips, and really illustrate one of the key ideas of the Which Fish? campaign – it's about asking the right questions and getting as much information as you can to make the best possible choices. Were there any unexpected impacts (positive or negative) from making the change?

WRS: The animals themselves don't

really have much of an issue as long as the size is right. Sustainable fish tends to be much better quality, so the animals love them. We haven't noticed any nutritional impacts from switching. We can also tell the visitors our animals' diets are made from sustainable fish; this has a strong impact on them and especially their kids. This was a huge positive impact!

Financially, the costs are higher in our region, mainly because sustainable seafood is not commonly consumed. Therefore, it is crucial that more customers purchase sustainable seafood so that prices will begin to change.

LM: How else do you inform visitors about your sustainable seafood policy to help drive that wider change?

WRS: We have campaigns and messaging through displays and signage, and public interactions on sustainable seafood. We also include it in the messaging on our website, social media and with local news.

LM: Are there species that are commonly fed on fish where a different diet would be more appropriate?

WRS: Great question. Some aren't

getting enough, some get too much. Fishing cats fed on a traditional cat diet are prone to getting a specific type of cancer. We don't see this as much in the cats that are fed fish. Asian short-clawed otters (*Aonyx cinereus*) do really well on a diet high in (sustainable) crustaceans, but fish isn't necessarily bad for them. Fish-eating species eat fish for a reason, and completely substituting their diet may risk the welfare and nutritional needs of the animal. In some cases a balance can be obtained, providing the animals with more options and variety and reducing any reliance on seafood products.

LM: What about using alternative food sources for species that currently feed on fish/marine products? Is this something you are pursuing at WRS?

WRS: We strongly believe in feeding wholesome diets – less processed and as close to wild diets as possible. There are gels that mimic the nutrients found in fish, but when you look at nutritional welfare, giving variety, choice and masticatory pleasures are essential components. The gel may be incorporated into the diet to reduce the amount of fish used, but we wouldn't recommend using only that, although it can be very useful for sick or injured animals.

Commercial products and alternative diets can supplement but not completely replace seafood products. We think that if you cannot provide sustainable seafood options for piscivorous animals, they should not be prioritised for your collection.

LM: So is it fair to say that in your opinion it's important to provide minimally processed seafoods to piscivorous animals, but there's room to be creative with the species chosen if you can find sustainable options with comparable macronutrients, size and palatability?

WRS: Yes, you can experiment. Providing variety and choice is also very important for welfare; in our experience, if the size is right and the quality is good then piscivorous animals will eat most species. We don't see much leftover fish.

Join our space programme

THE DEER TAG SPACE PROGRAMME IS DESIGNED TO HELP EAZA MEMBERS IMPROVE AND EXPAND THEIR DEER COLLECTIONS BY ENCOURAGING UPTAKE OF THE MOST IMPORTANT TAXA

Noam Werner, Tisch Family Zoological Gardens, Jerusalem, and EAZA Deer Tag Chair

A recurrent theme in many TAG meetings is the need for new holders and the shortage of space for their animals. The Deer TAG is probably among the lucky few that are happy with the space allocated for deer (chevrotains and musk-deer included). According to ZIMS data, there are well over 6,000 deer in EAZA Member institutions, occupying hundreds of enclosures. Unfortunately, however, too often those are the wrong deer. Nearly 4,000 of the EAZA Members' deer belong to common taxa that do not have conservation value, such as red deer (*Cervus elaphus*), semi-domesticated reindeer (*Rangifer tarandus*), sika deer (*Cervus nippon*) or axis deer (*Axis axis*). These could be replaced by more important taxa, which would still provide the same experience or fit the same theme. These could be specific subspecies of the above-mentioned species or similar species from the same regions or of the same size.

The big challenge for the Deer TAG is how to 'market' species that are, in some cases, common in Europe and sometimes even perceived as pests in some regions, have been hunted for millennia and even domesticated to some degree (e.g. reindeer). In addition, some species that do not come from Europe often look like those that do.

Many people who visit EAZA Members do not consider deer to be exotic animals and, as a result, they often do not think of them as species that might be threatened. Unfortunately, this could not be further from the truth. About half of all deer (including chevrotains and musk-deer) species are threatened

with extinction, as are many more ecologically important subspecies. As the important herbivores in much of their distribution areas, the decrease in deer populations also threatens the carnivores that depend on them, the indigenous societies for which deer are central, culturally and economically, and habitats and ecosystems of which deer are a vital part. Sadly, these facts are often not known, even within our zoo community, so we are very happy that we have been able to produce the TAG's new-style Regional Collection Plan (RCP) – which ignites the TAG's 'Space Programme'!

The RCP workshop took place at Tierpark Berlin, Germany in early June 2019, and was attended by 20 people who represented various stakeholders, including the EAZA Executive Office, current and past TAG members (programme coordinators), IUCN Species Survival Committee (SSC) Deer Specialist Group members (including the Co-Chair, Susana González), representatives from the research community, and private/non-EAZA Member deer holders, who all contributed to lively (often heated) discussions. During the workshop, out of 73 species that fall under the remit of the Deer TAG (56 true deer, seven musk-deer and 10 chevrotains), 38 species and subspecies – which are already kept by EAZA Members or expected to have conservation roles – were discussed in detail; other species were discussed only briefly. When the discussions ended, the TAG's new RCP included 19 recommended EEPs, which include all 12 taxa that were managed before the RCP revision, four species that



thus far had been monitored and three more that had not been managed or monitored before. Out of the 19 taxa, all but two are either globally threatened or Near Threatened, one is threatened (Vulnerable) locally in its native country and the last species is considered Data Deficient/Least Concern. Nearly all need an insurance population and in several cases also a source population that will provide animals for reintroduction.

One unique case among the 19 recommended EEPs is that of the Critically Endangered large-antlered muntjac (*Muntiacus vuquangensis*). While other EEPs are recommended for species that are already being kept by EAZA zoos and that will be managed in the standard way, the large-antlered muntjac is not kept by any EAZA Members or by any other zoo around the world. Nevertheless, the situation of the species in the wild is dire and the establishment of an *ex situ* population is recommended by the IUCN/SSC Red List as an urgent conservation need for the species. Therefore, the TAG decided to create an EEP that will focus on communicating with stakeholders in the range countries and trying to fulfil their needs: for example, providing technical support or funding.

The RCP has already been approved by the EEP Committee and has been uploaded to the TAG's workspace for you to read. We hope that it will provide ideas on how to better use the



Top left: The southern pudu (*Pudu puda*) is, and will continue to be, an EEP species. Pudu is the smallest cervid and the southern pudu is the only American species that has an EAZA population management programme. Like many other deer species, the pudu could be kept in mixed exhibits, as here in Belfast Zoo with howler monkeys and screamers.

Above: For many years the Reeve's muntjac (*Muntiacus reevesi*) has been a popular species in European zoos due to its smaller size and tolerance to cold, and recently had even been included in the EU's list of invasive alien species. However, in its natural distribution area it has been declining and is considered VU by Chinese conservation authorities. This decline was one of the reasons that the new Deer TAG RCP recommends that the species will be managed as an EEP.

Left: Kept for many years in European zoos and parks, the barasingha is now threatened in the wild and its populations are declining; so an EEP has been created for it following the recommendation of the new Deer TAG RCP. A first studbook had already been published, as the species was monitored prior to the publication of the RCP.

space that is already allocated for deer and assist in finding alternatives to all those not-so-important species that fill hundreds of deer exhibits in many EAZA Member zoos. For example, if you keep axis deer, you could replace them with other spotted deer species, such as the Visayan spotted deer (*Rusa alfredi*) or the Indochinese sika deer (*Cervus nippon pseudaxis*), or you can go for other Indian species, such as hog deer (*Hyelaphus porcinus*) or barasingha (*Rucervus duvaucelii*); if you keep semi-domesticated reindeer, you can change them for forest ones; and if your red deer are only there for show, why not switch to the similar-looking Bactrian deer (*Cervus elaphus*

bactrianus) and immediately add conservation value to the exhibit? And there are more options of course: for example, a species that is threatened by global warming, another with a fascinating conservation story that highlights the role of zoos, and one that fawns in midwinter when not much else is happening. There really is something for everyone.

Like all other space programmes around the world, ours would also be a long-term one. We do not expect all EAZA Members to replace less important deer species with the more important ones immediately, and we understand that some of you might want to keep the less important

species because, for whatever reason, they fit your zoological plan. However, we ask and urge you (and beg as well, if it will help) to have a look at the new Deer TAG RCP and see if and how you can help these magnificent, important animals. Haven't you always wanted to be part of a space programme? Well, now is your chance! We will support you as much as we can, so do not hesitate to contact us. Rest assured that we will also be extremely happy if you build a new deer exhibit or add deer to a mixed-species exhibit. Our RCP is now in virtual space; help us to implement it and put the all-important deer species in real space.

New plans for Old World monkeys

ZOOQUARIA TALKS TO TJERK TER MEULEN, PLANT AND ANIMAL COLLECTION MANAGER, ARTIS ZOO, THE NETHERLANDS, AND CHAIR OF THE OLD WORLD MONKEY TAG, ABOUT ITS NEW-STYLE REGIONAL COLLECTION PROGRAMMES AND SIX RECENTLY FINISHED LONG-TERM MANAGEMENT PROGRAMMES

David Williams-Mitchell, EAZA Director of Communications and Membership

DWM: To begin, could you briefly explain your role in the Old World monkey (OWM) TAG?

TM: I have been active in the OWM TAG since 2008; for the first two years I was the coordinator for the black crested mangabey (*Lophocebus aterrimus*) and in 2010 I became the Vice-Chair. When Neil Bemment resigned three years ago, I took over the role as TAG Chair.

DWM: The OWM TAG has recently finished its new-style Regional Collection Plan (RCP). Can you tell us something about the workshop?

TM: It was a very nice but intensive process. We had great help from the office with the crucial preparation, and they guided us as a TAG through the meetings at GaiaZOO Kerkrade in the Netherlands, which were full of in-depth discussions about the species and their roles. The TAG really enjoyed focusing on the process and the species we represent for almost three days, and the TAG came out much stronger, not only with a written plan, but also as a team.

DWM: What are the main challenges that the OWM TAG, and Old World monkeys in general, are facing, and how can the new RCP help in this?

TM: The main challenge is the lack of space; for example, in the past a certain zoo kept three or four species of OWM, but due to the increasing need to make bigger and better enclosures (a positive development), you simply cannot keep three or four species in the same number of square metres any more. So we have to be creative and inventive to keep enough space to house a good number of OWM in the modern zoos – such as in mixed exhibits. The RCP helps us to make the decision to focus on the right species, so if you do need to make that choice, the RCP will guide you. This does not mean that the non-recommended species do not exist any more, but we are looking for

ways to manage them as well.

DWM: During the RCP, the OWM TAG has identified key OWM species that are prioritised not only because of their IUCN status, but also due to other significant attributes (e.g. model species, flagship species, space issues). Can you tell us more about these – which species are they and why are they important?

TM: We do indeed have some key species of this kind, namely white-naped mangabeys (*cercocebus atys lunulatus*), rolaway monkeys (*Cercopithecus rolaway*), Sulawesi crested macaques (*macaca nigra*) and Barbary macaques (*Macaca sylvanus*). The management of these species touches on many attributes that we would like highlighted in our RCP species; they act more or less as a guidance for the other species. They all have links to direct conservation of the species and active management *in situ* and *ex situ*.

DWM: In the RCP report, it can be read that the OWM TAG is involved in various conservation and field projects. Can you give some examples and tell us how the TAG supports these initiatives?

TM: We have some nice conservation initiatives that we support with the TAG; all initiatives are discussed by the conservation advisors or the TAG before we decide whether or not to support them. We are currently involved in projects with Barbary Macaque Awareness & Conservation (BMAC), West African Primate Conservation Action (WAPCA) and the Selamatkan Yaki NGO. These projects all focus on, of course, the conservation of the species, but they also work on research and education and work in close contact with local people.

DWM: The RCP report encourages OWM holders to contribute to conservation education activities

and fundraising to fulfil the roles and goals of the plan. How would you like to see this happening?

TM: We would like to reach out to the holders to help them in their choice of conservation projects; for example, WAPCA is focused on white-naped mangabeys, but we encourage all mangabey holders – so this applies if they keep cherry-crowned mangabeys (*Cercocebus torquatus*), black crested mangabeys or golden-bellied mangabeys (*Cercocebus chrysogaster*) – to support this project as long as there is no species-specific approved project.

DWM: The RCP also describes various *in situ* and *ex situ* research roles for (some) OWM species. Can you give some examples of currently needed research?

TM: The Barbary macaque is probably the species that has the most trafficking victims, and one of the responsibilities of keeping this species in our European zoos is to make our visitors aware of the fact that this is happening. Research *in situ* can help us understand more about trafficking, and *ex situ* research should inform the messaging we use to raise awareness most effectively.

DWM: In its day-to-day work, the OWM TAG collaborates with various programmes, organisations and NGOs. Can you give us some examples and explain why such cooperation is important?

TM: We do indeed work with several partners, and one that we work with closely is the Pan African Sanctuary Alliance (PASA). The director was present during our RCP meeting and helped us to address certain risks or possible roles.

DWM: The RCP encourages mixed-species exhibits. Can you tell us about that, and what the benefits are for institutions taking this approach?



ROLOWAY MONKEY

RCP WORKSHOP SUMMARY

As a result of the RCP workshop, the following Old World monkey species were selected to be managed within an EAZA Ex situ Programme (EEP):

- Barbary macaque (*Macaca sylvanus*)
- White-naped mangabey (*Cercocebus lunulatus*)
- Cherry-crowned mangabey (*Cercocebus torquatus*)
- Black crested mangabey (*Lophocebus aterrimus*)
- Western black-and-white colobus (*Colobus polykomos*)
- Eastern black-and-white colobus (*Colobus guereza*) and Angolan black-and-white colobus (*Colobus angolensis*)
- Patas monkey (*Erythrocebus patas*)
- Diana monkey (*Cercopithecus diana*)
- Rowlay monkey (*Cercopithecus rolwayi*)
- De Brazza's monkey (*Cercopithecus neglectus*)
- Owl-faced monkey (*Cercopithecus hamlyni*)
- L'Hoest's monkey (*Allochrocebus lhoesti*)
- Northern talapoin monkey (*Miopithecus ogouensis*)
- Gelada baboon (*Theropithecus gelada*)
- Drill (*Mandrillus leucophaeus*)
- Mandrill (*Mandrillus sphinx*)
- Guinea baboon (*Papio papio*), olive baboon (*Papio anubis*), and yellow baboon (*Papio cynocephalus*)
- Hamadryas baboon (*Papio hamadryas*)
- Lion-tailed macaque (*Macaca silenus*)
- Sulawesi crested macaque (*Macaca nigra*)
- Crab-eating macaque (*Macaca fascicularis*)
- Japanese macaque (*Macaca fuscata*)
- Rhesus macaque (*Macaca mulatta*)
- Southern pig-tailed macaque (*Macaca nemestrina*)
- Francois' langur (*Trachypithecus francoisi*)
- Javan langur (*Trachypithecus auratus*)
- Hanuman langur (*Semnopithecus entellus*)

For more details, please see the RCP report on the EAZA Member Area.

TM: If it is well done and the risks and possibilities of all species involved are thought through, it can be enormously enriching and lead to better welfare for all the individuals. In addition, it makes it possible to keep more species within the scarce space that a zoo can offer.

DWM: The RCP includes a statement on the importation of new OWM species into the EAZA region, which specifies that the OWM TAG presently does not support the importation of non-recommended species into the EAZA region. Can you elaborate on this?

TM: At present we have 28 managed species, some with enormous numbers of individuals, and to keep genetically and demographically healthy populations of all these species we already need more space than is available right now, so we discourage every zoo that would like to bring in a new species. If we are dealing with extremely rare species of which the transfer to an European zoo has a direct benefit to the species in general, we are of course open to discussing the options; but this means that you need more than one zoo to carry this initiative and, theoretically, 20 founders of that species to build up a future-proof population.

DWM: The OWM TAG has also produced six Long-term Management Plans (LTMP) so far, and the newest one on mangabeys has just been published in June. Can you tell us something about these?

TM: These LTMPs are very useful tools for managing the population in more detail; the process of working together for a day or two on one or a small group of species is a very good way to guide the coordinator and help the species.

DWM: Now that you have completed the new-style RCP and various LTMPs, do you have any advice for TAGs or EEPs that still need to do this?

TM: Hurry up! It is worth all the effort and is a very useful tool to have. Also be grateful for the people behind the scenes in the office; without them you would get lost very quickly, so let them guide you.



Planning for a pheasant's future

THOUGHT TO BE EXTINCT IN THE WILD, THE SURVIVAL OF THE VIETNAM PHEASANT NOW DEPENDS UPON THE CONTINUED SUCCESS OF EAZA'S LONG-TERM MANAGEMENT PLAN

Jan Dams, EAZA Galliformes TAG chair, Antwerp Zoo, Belgium; Kristin Leus, EAZA Population Biologist/CPSG Europe, and William van Lint, Manager Animal Programmes and Conservation, EAZA Executive Office

The Vietnam pheasant (*Lophura edwardsi*), previously known as Edwards's pheasant, is endemic to central Vietnam. While currently listed as Critically Endangered on the IUCN Red List of Threatened Species, the last confirmed record of the species dates from 2000 and it may already be extinct in the wild. Ongoing dedicated camera-trap surveys conducted by Viet Nature since 2011 have failed to record the species.

In 2015, a stakeholder workshop in Vietnam produced an overall 'Edwards's Pheasant Action Plan (2015–2020)', which contains strategies and actions to ensure that once again a viable population of the species will exist in the wild. Together with site protection and management, research, and coordination and resource mobilisation, conservation breeding was highlighted as one of the four priority programmes. While other partners are working on the protection and management of known key sites (including cessation of hunting at these sites), conducting field surveys to locate any remaining wild populations, studying basic ecology and identifying and preparing areas for reinforcements or reintroductions, we focused on developing the *ex situ* components of the action plan. During the Vietnam pheasant Long-term

Management Plan (LTMP), we defined the roles, goals, management strategies and actions for the global *ex situ* conservation programme, ensuring that these are integrated within the species' overall conservation strategy. The LTMP involved Viet Nature, the EEP, the European Conservation Breeding Group (ECBG) of the World Pheasant Association (WPA), the International Studbook (ISB) under the World Association of Zoos and Aquariums (WAZA) and BirdLife International, and was supported by the IUCN Species Survival Committee (SSC) Galliformes Specialist Group.

During the workshop it was agreed that what was previously referred to as two different species, the Edwards's pheasant *Lophura edwardsi* (with blue central tail feathers in the male) and the Vietnamese pheasant *Lophura hatinhensis* (with white central tail feathers in the male and asymmetric white tail feathers in some females) will henceforth be treated as a single species named Vietnam pheasant *Lophura edwardsi*. The Vietnam pheasant type *hatinhensis* was found at the northern and southern end of, and within the known range of, type *edwardsi* and is now considered to be an inbred morph of the latter. *Lophura hatinhensis* is thus an invalid taxon (Hennache *et*

al., 2012). Going forward, the global *ex situ* conservation population will be composed of individuals of both types, as well as descendants from pairings between the two. Individuals of Vietnam pheasant type *hatinhensis* will be gradually inserted in the current Vietnam pheasant type *edwardsi* population for breeding, solely at the direction of the EEP/ECBG coordinators, when an opportunity for a genetically good pair formation presents itself, without compromising the welfare of the birds involved.

In addition, due to the absence of suitable breeding stock at times, some breeders have in the past produced hybrids with Swinhoe pheasant (*Lophura swinhoii*) and silver pheasant (*Lophura nycthemera*). For these reasons, and given the importance of the *ex situ* population for the restoration of the wild population, various molecular genetic studies have and are being conducted to investigate the purity and genetic variability of the captive population and guide future genetic management. Detected hybrids were excluded from the managed population.

As of 11 December 2018, the global living population of the Vietnam pheasant type *edwardsi* registered in the International Studbook counted 786 living individuals in 235 institutions,

derived from a maximum of 29 wild origin individuals. The living population is largely distributed over the EEP (including Hanoi Zoo) (155), the WPA ECBG (470), the Species Survival Plan (SSP) of the Association of Zoos and Aquariums (AZA) (N. America) (51) and the Japanese Association of Zoos and Aquariums (JAZA) (35). With attentive management, the *ex situ* community can confidently breed this species up to required or desired numbers.

At the end of 2018 there were 260 known living individuals of the Vietnam pheasant type *hatinhensis* in the *ex situ* population, distributed over Vietnam (26), other countries in Southeast Asia (22), EAZA (49) and the ECBG (163). They derived from 10 founders.

Using the IUCN Guidelines on the Use of Ex situ Management for Species Conservation (IUCN SSC 2014, integrated in the new population management structure of EAZA), the global *ex situ* conservation programme for the Vietnam pheasant was assigned the direct conservation roles of 'Ark population' (maintaining a long-term *ex situ* population after likely extinction in the wild), 'Source for population restoration' (reintroduction and/or reinforcement), and 'Research' (into the species' biology and ecology).

Indirectly, the *ex situ* population will contribute to conservation as a flagship species (with the potential to become the National Bird of Vietnam) through conservation education and through fundraising to support *ex situ* and *in situ* conservation actions.

Moving forward, the intensively managed global *ex situ* conservation population (which is a subset of the total captive population) currently aims to maintain at least 400–500 individuals. The bulk of these will eventually be kept at specialised breeding centres in Vietnam. The non-Vietnamese population is intended to be predominantly formed by the EEP (180 individuals) and the SSP (100 individuals); these numbers may increase following the needs within the overall conservation programme. The EEP is composed of EAZA Member institutions, Hanoi Zoo (as an officially approved non-EAZA EEP participant) and those ECBG/WPA private holders that formally declare their wish to participate and their willingness to



THE LTMP WAS DRAWN UP BY MEMBERS OF THE GALLIFORMES TAG AND RELATED STAKEHOLDERS



Vietnam pheasant Best Practice Guidelines

In July 2020 these guidelines were made publicly available on the EAZA website at www.eaza.net/conservation/programmes/#BPG. While there is hardly any information available on the species' natural history in the wild, years of experience with keeping and breeding Vietnam pheasants in human care has resulted in highly valuable guidelines with a wealth of information about the husbandry of this highly threatened bird. This is valuable information also for the colleagues in Vietnam who have to start working with this species.

follow the stipulations for governance and participation as mutually agreed between EAZA and WPA. The EEP and SSP will at timely intervals exchange individuals with smaller satellite populations in Asia such as Singapore and Japan. The EEP and SSP can gradually grow to their target population sizes, which are not far above their current holding numbers. Institutions that participate in the *ex situ* conservation population should only parent-rear their chicks in order to ensure that the birds are behaviourally competent.

The LTMP contains a general strategy for the development of the population at the Vietnamese breeding centres, which will be the source for birds for release. 'Foundation birds' transferred from the rest of the *ex situ* population will form the basis for the *ex situ* programme in Vietnam. The eventual design of the release component will determine how many birds are needed annually for reintroduction.

In addition, the LTMP presents a series of strategies and detailed actions to coordinate studbook data management, continue molecular genetic work to complement pedigree-

based genetic management, coordinate between the different people and organisations involved, produce up-to-date Best Practice Guidelines (BPG), build capacity in the breeding centre in Vietnam, increase education and awareness-raising activities in Vietnam and in Europe, stimulate priority research and ensure continued integration of the *ex situ* component within the overall conservation strategy for the species.

REFERENCES:

- Hennache, A., Mahood, S. P., Eames, J.C., Randi, E. (2012). *Lophura hatinhensis* is an invalid taxon. *Forktail* 28: 129–135.
- IUCN SSC (2014). Guidelines on the Use of *Ex situ* Management for Species Conservation. Version 2.0. IUCN Species Survival Commission: Gland, Switzerland.
- Kapic, T., Rahde, T., Pinceel, L., Jacken, H., Roels, I., Pham Tuan Anh, Corder, J., Leus, K., van Lint, W., Hausen, N. (2020). Long-term management plan for the Vietnam pheasant (*Lophura edwardsi*) Global *Ex situ* Programme. European Association of Zoos and Aquaria: Amsterdam.
- Pham Tuan Anh and Le Trong Trai (compilers) (2015). Action Plan for the Conservation of the Edwards's Pheasant *Lophura edwardsi* for the period 2015–2020 with vision to 2030. Viet Nature Conservation Centre: Hanoi, Vietnam.

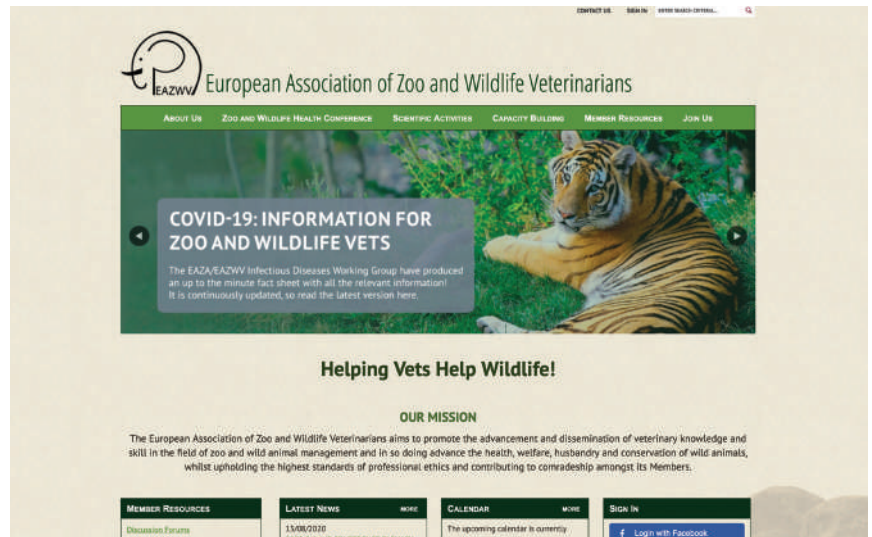
Virtual vets

ALLAN MUIR, EAZA EU POLICY COORDINATOR, REPORTS FROM THE ANNUAL 2020 ZOO AND WILDLIFE HEALTH CONFERENCE

Covid-19 unfortunately put a stop to even the best-made plans this year, including many of the face-to-face conferences and events that our community would normally attend. The annual Zoo and Wildlife Health Conference, organised by the European Association of Zoo and Wildlife Veterinarians (EAZWV), was one such event, which, although originally scheduled to take place at Wildlands (Emmen), was moved online with great success.

Marked in the calendars of zoo and wildlife veterinarians and researchers across the globe, this annual conference gives attendees the opportunity to update their knowledge on the latest research in the fields of wildlife health and medicine. The 2020 online conference was held for approximately half a day per week over a four-week period to give delegates the flexibility to fit conference sessions and poster presentations around their working schedules. Live Q&A sessions allowed for questions to be sent in from delegates across the globe, providing an opportunity for many interesting and engaging discussions.

Following an opening introduction from EAZWV president Hugo Fernández-Bellon (Barcelona Zoo), the presentations were kicked off by a plenary provided by Chris Walzer (Wildlife Conservation Society) entitled 'Covid-19 and the end of the Anthropocene', in which he discussed the huge number of opportunities that have been unveiled by the current pandemic for us to change our engrained capitalist socioeconomic concepts, which have so far served only to further climate change and the biodiversity crisis. The plenary provided a thought-provoking



backdrop to the subsequent session concerning reintroduction projects, with Sara Shopland (Bristol Zoo) presenting on her and her colleagues' work on undertaking population health screening and disease risk assessments for the translocation of EEP pink pigeons (*Nesoenas mayeri*) back to their island home of Mauritius.

Day two of the conference began with Franz Schwarzenberger (University of Vienna) presenting the latest recommendations for reproductive monitoring in the okapi (*Okapia johnstoni*), which should help this species in the future, given its relatively high incidence of abortion. Marcus Clauss (University of Zürich) spoke on his recent research concerning foot health in the Asian elephant (*Elephas maximus*) EEP, providing a fascinating population level insight into these conditions and how statistical analysis can be applied for differing outcomes and conclusions. This transition towards addressing zoo population health challenges while maintaining optimal welfare at the individual level was furthered through a dedicated day of talks concerning elephant endotheliotropic herpes virus (EEHV) on the following day.

The haemorrhagic disease caused by EEHV infection remains the largest cause of death within the Asian elephant EEP; however, new research insights and ongoing cross-disciplinary collaboration is improving our understanding and success in these cases. A presentation from Lauren Howard (San Diego Zoo) discussed the knowledge gaps that exist when it comes to African elephants (*Loxodonta*

africana) and EEHV, following a series of cases in 2019 in the USA, and the establishment of new projects with African colleagues to research these infections in free-living populations. Additional insights into immunology as well as new diagnostics and treatment options were provided by many colleagues from across the EAZA community, including Chester Zoo, Zoological Society of London (ZSL), Rotterdam Zoo and Kolmården Zoo with collaborative work with academics from the universities of Utrecht and Surrey.

The final day session began with Leigh Clayton (New England Aquarium) giving an introductory plenary into fish medicine and welfare. Understanding the varying needs of each individual species remains key to providing for and measuring welfare outcomes in a highly diverse group of animals that comprise half of all living vertebrate species.

Away from the presentations and posters, delegates could catch up socially with old and new friends and colleagues via the online platform. We now look forward to the 2021 Zoo and Wildlife Health Conference, jointly held with North American zoo vet colleagues in Toronto, Canada. Keep an eye on the EAZWV (www.eazwv.org) website for upcoming information and dates.

Finally, huge congratulations are due to the Organising Committee; the logistics of putting on such an event are not to be underestimated! Many thanks are due also to the Scientific Committee for providing us with a fascinating array of talks and posters.

Studbook-keeping in a digital age



ZIMS FOR STUBBOOKS IS A CONSTANTLY EVOLVING SOFTWARE SYSTEM THAT HELPS EAZA MEMBERS TO SHARE THEIR KNOWLEDGE AND EXPERIENCE QUICKLY AND EFFICIENTLY

Maaïke Voorham, EAZA Assistant Population Biologist

When SPARKS was released over 30 years ago, it took some time to get used to this new studbook-keeping software, but it soon earned a place in our hearts. During its years of service, it saw our EEPs develop from scratch to where they are today. Now ZIMS for Studbooks will see them develop further into the future.

As we write this, nearly all EAZA studbooks are kept in ZIMS for Studbooks. The gradual migration of more than 450 data sets over the past three years has been a huge amount of work for Species360, the EAZA Executive Office, and in particular the studbook keepers. We want to sincerely thank everyone who has joined us in the adventure of changing to this new software!

Working in ZIMS, studbook keepers have online access to their studbook everywhere and the studbook is immediately backed up in the cloud. It is also possible to work together with multiple people in the studbook at the same time. By entering complete data directly in ZIMS for Husbandry, an institution no longer needs to email basic individual animal data to the studbook keeper. The studbook keeper will receive updates to records by the institutions immediately and can also easily import new animals into the studbook. In turn, studbook numbers

given to animals by the studbook keeper will automatically be added to Husbandry records. Studbook keepers can now continuously update their studbook with the latest information from Husbandry. Therefore, accurate and timely data entry by holding institutions has become more important than ever.

ONLY CONNECT

In this new automated world, it nevertheless remains very important for institutions and studbook keepers to continue to work closely together and communicate. For example, a studbook keeper will still be interested to hear how you finally manage to breed with a pair. For studbook keepers it is still important to actively ask for this type of information, in addition to communicating recommendations to EEP participants in context for the roles and goals of the population.

ZIMS for Studbooks has already seen many developments and improvements since its release. One of the more recent additions is the census graph. This allows you to see not only population growth and births and deaths, but also transfers in and out of your programme.

The priorities for development are determined together by Species360,

EAZA and the other regional associations. One of EAZA's main priorities is to make sure that every studbook has the basic functionality it needs to manage its population. Therefore, two of the priorities are developing the option to track Social Groups, and improving the user interaction and speed, especially for larger studbooks. We will update all studbook keepers when these new features become available, as well as any other developments of ZIMS for Studbooks.

HELP WITH YOUR STUBBOOK

New software always takes some getting used to. The EAZA Population Management Centre has developed several documents and tools to support you and help you to take full advantage of ZIMS for Studbooks. These can be found on the EAZA Member Area under Population Management. Here you can find Species360's training library on the functionalities of ZIMS for Studbooks, which is useful if you are a new user. You can also find the EAZA guidelines on Linking and Updating, which are important to read once you have become more familiar with the software. To find out how to export to PMx, see the Population Management Tutorial, which you can also find on this area of the website.

If you have used ZIMS for Studbooks for a while and would like us to have a look at your studbook and discuss any questions, you can also sign up for the EAZA ZIMS webinars via the link on the EAZA Member Area.

And finally, if you have any questions about using ZIMS or analysing your studbook, please do not hesitate to contact the EAZA Population Management Centre. We are always happy to talk to you.

Category	Value	Priority
Living Animals In Studbook	132	High Priority
All Animals In Studbook	1258	Medium Priority
Suggested Animals	11	Low Priority
Pending Updates	40	Low Priority
High Priority	153	High Priority
Medium Priority	76	Medium Priority
Low Priority	1	Low Priority

Enter the dragon



A MULTIFACETED APPROACH HAS BEEN THE KEY TO SUCCESSFUL CONSERVATION OF THE KOMODO DRAGON

Gerardo García, Curator Lower Vertebrates and Invertebrates, Chester Zoo, UK

Multidisciplinary conservation initiatives are increasingly advocated as best practice to address both stochastic and deterministic (i.e. human-mediated) processes that pose a threat to the survival of species and to ecosystems in general. Over the past two decades, grassroot projects championed and implemented by NGOs have striven to integrate wildlife protection and sustainable development initiatives in order to attain long-term conservation in tropical countries where natural habitats are disappearing at an alarming rate. Indonesia and Komodo dragons (*Varanus komodoensis*) in particular are a vivid example of a quite successful multifaceted approach to the world's largest lizard conservation in both protected and non-protected areas championed by the Komodo Survival Program (KSP), a relatively young (established in 2007) but effective Indonesian NGO.

Indonesia's Komodo dragon is arguably the world's most iconic lizard, of prominent conservation value as both a keystone and an umbrella species for protection of monsoon forest ecosystems. Despite being

one of the first reptile recipients of conservation and management efforts, natural and anthropogenic threats continue to affect the abundance and distribution of this species. Komodo dragons are found in southeast Indonesia on five islands that are all part of Komodo National Park, and on the island of Flores where the most recent survey conducted by KSP in collaboration with the Indonesian Department of Forestry reports a highly fragmented distribution confined to three coastal areas along the southwest and northwest regions of Flores. Threats include ongoing and unsustainable poaching of key prey species such as the Timor deer (*Rusa timorensis*), habitat loss to agriculture and an expanding human population, habitat degradation (grazing of livestock and altered fire regimes) and mass tourism, as well as conflicts with local communities, particularly in northwestern Flores.

Since its inception, and thanks to continued support from EAZA, KSP has devised a multidisciplinary approach for the conservation of Komodo dragons on the island of Flores, whereby wildlife population

monitoring, direct protection measures, community awareness and capacity-building initiatives are integrated and implemented in collaboration with government authorities and the local community. In December 2018, KSP completed the first comprehensive survey ever conducted along the entire coastline of Flores in order to map once and for all the distribution of extant Komodo dragon populations. Such endeavour was largely facilitated by the deployment of passive infra-red cameras at 330 sites covering over 1,400km of coastal habitats. This survey provided updated information on the species distribution, recording a significant range area contraction of almost 50% in the last 50 years, but also captured images of Komodo dragons on the island of Longos, in northwestern Flores. This was the first record of a Komodo dragon island population so far unknown to the international community and national authorities.

WILDLIFE POPULATION MONITORING

Extant populations on the west and north coast of Flores are regularly monitored by KSP to assess crucial

demographic parameters such as population growth or decline, abundance and density, individual survival and recruitment. Nesting sites are also monitored to estimate reproductive activity in key populations. Changes in the abundance of main prey species (deer, water buffaloes, wild pigs) are also assessed by faecal and pellet group counts as an additional, important indicator of the status and viability of Komodo dragon populations. Monitoring activities are conducted with staff from the Indonesian Department of Forestry. The strong training component of this initiative is part of a long-term capacity-building programme where KSP has been formally appointed as the organisation providing designated trainers to develop local expertise in wildlife monitoring techniques.

INCREASED PROTECTION OF FLORES NATURE RESERVES

On Flores, Komodo dragons are formally protected in the Wae Wuul nature reserve (part of the southwestern distribution) and along the northern coast in the three contiguous reserves of Tujuh Belas Pulau, Wolo Tadho and Riung. Resource and infrastructure limitations have until recently hindered security and law enforcement to prevent poaching of prey, livestock grazing, timber harvesting and altered fire regimes in the reserves. In response, KSP funded and coordinated the restoration of a sentry post which now provides the operational base for wildlife monitoring, security and enforcement. Billboards, banners and signposts were deployed to identify the borders between protected areas and villagers' lands. Moreover, KSP designed and coordinated patrolling and surveillance programmes by involving government staff and members of the local community. The establishment of a *Masyarakat Penduli Api*, a local fire-fighting group, considered for the first time the involvement of people living close to nature reserves in the protection of natural habitats. Additionally, KSP promoted a monitoring programme to tag stray and feral dogs which enter the reserves to hunt deer. A collaborative plan with local authorities will help to decide the best course of action to limit uncontrolled dog breeding and possibly to cull feral dogs, which pose a serious threat to local wildlife.

COMMUNITY AWARENESS

Parallel to habitat protection activities, KSP conducts community-awareness initiatives in several villages close to reserve boundaries. The programme here advocates sustainable use of natural habitats and the adverse effect of deer poaching, which in turn drives Komodo dragon to prey upon livestock. Awareness sessions involve chiefs and religious leaders of communities as well as villagers, and promote alternative livelihoods. Awareness activities are collaboratively run by KSP and local authorities and consist of movie screenings, presentations and campaigns using posters and reading material. In the last five years, awareness sessions have been focused particularly on teachers and primary-school classes. Anthropomorphic storybooks and factual information from presentations and movie screenings were appreciated as a way to understand local biodiversity, and allowed KSP to record an increase in students' knowledge and positive attitudes towards Komodo dragon conservation efforts. In 2019, KSP also funded the construction of a community-awareness and education centre in northern Flores. This facility is now being used by local government authorities to conduct training workshops in ecotourism and conservation.

SUSTAINABLE LIVELIHOODS

The accomplishment of community-awareness activities is inextricably connected to the provision of alternative livelihoods, as the conservation of biodiversity often exacerbates tensions with local communities seeking poverty abatement rather than such things as enhanced land-use restrictions. In collaboration with the regional tourist board, KSP held training sessions on ecotourism in northern Flores and established trekking paths to promote important areas for conservation as additional sites for observing Komodo dragons. Sustainable development efforts also include workshops held by experienced woodcarvers from Komodo Island (where the practice is well established) which trained local community members in the carving of wooden souvenirs resembling Komodo dragons and other wildlife that they can sell to generate income. Art and craft events

are also organised to sponsor the making of woven robes, necklaces, bracelets and other accessories to address the demand for touristic merchandise from the central Flores Regency.

MITIGATION OF HUMAN-KOMODO DRAGON CONFLICTS

In northern Flores, habitat encroachment and occasional illegal hunting on Komodo dragon preys have recently resulted in Komodo dragons getting closer to the forest edge adjacent to human settlements, increasing the frequency of human-wildlife conflict events. KSP initiated a programme in which people were encouraged to change livestock management practices by limiting free-range grazing. Alternative revenues were introduced, such as the production of fertilisers and biogases from the accumulation of livestock dung. In-depth interviews with local people following the implementation of community-awareness programmes and the introduction of alternative livelihoods and mitigation measures recorded a significant overall shift in people's perception of wildlife, and an increase in the willingness to coexist with monitor lizards. In turn, this has led to a 70% decrease in livestock predation by Komodo dragons and a subsequent remarkable decline in the retaliatory killing of Komodo dragons associated with livestock death.

All conservation programmes, community awareness, sustainable livelihood and mitigation initiatives rely, of course, on close collaboration and official agreements with national and regional authorities. KSP holds regular meetings with government officials from the Indonesian Ministry of Forestry and Environment, and thanks to this so far successful liaison KSP is now working with the Indonesian government to develop a National Strategic Action Plan for the conservation of Komodo dragons. In 2019, senior members of KSP received an award from the Director General of Nature Resource and Ecosystem for their dedication to research and conservation of Komodo dragons, and soon after they were awarded the prestigious prize from the Minister of Environment and Forestry for an NGO's outstanding contribution to wildlife and natural habitats conservation.



HOW EAZA MEMBERS HAVE MADE A SUBSTANTIAL DIFFERENCE TO SAVE THE RHINO'S GLOBAL CONSERVATION WORK

Jack Bedford, Fundraising Officer, Save the Rhino International; Merel Zimmermann, EAZA Coordinator Animal Programmes and Conservation; and Wouter van der Ven, EAZA Conservation Communication Officer

Rhinos in zoos play a very important role as ambassadors, raising awareness about the threats facing all five species and raising funds for vital conservation efforts for their wild cousins. In 2019, rhino conservation received the most taxa-specific support, according to the EAZA Conservation Database. In this same year, EAZA Members partnered with Save the Rhino International specifically to raise an incredible €205,000.

The rhino is undoubtedly one of the most iconic animals on our planet. Seeing these charismatic creatures in the wild is at the top of safari-goers' wish lists, and, closer to home, they are a huge draw for visitors to zoos.

When it comes to the conservation of endangered species, zoos play an incredibly powerful role, both in *ex situ* settings and for *in situ* populations. With Members in the EAZA network welcoming 140 million visitors a year, zoos and aquariums have a prominent platform from which to share conservation messages with the public and, through close encounters with wildlife, to inspire visitors to become active supporters of conservation efforts.

Save the Rhino International and EAZA have had a long and successful

collaboration since the 2005–2006 'Save the Rhinos' campaign, which raised more than €660,000 for projects ranging from South Africa to Indonesia. Ever since, we have worked closely with many EAZA Members to continue delivering crucial rhino conservation activities across Africa and Asia.

In our new report, *Zoos and Save the Rhino International: Working together to save rhinos*, we share the fantastic news that our zoo partners across Europe raised a phenomenal €205,000 for conservation programmes between April 2019 and March 2020. Almost doubling the contributions received in the previous year, this incredible outcome shows that zoos are rising to the challenge of increasing their contribution to, and impact on, saving species in the wild.

This amazing sum has supported a diverse range of conservation work, from rhino protection and law-enforcement efforts to reducing the demand for illegal rhino horn. On the opposite page are just some of the ways in which EAZA Members have made a difference for rhinos in the wild in the last year, from strengthening canine units to closing down illegal markets.

In total, thanks to our partnerships with 34 EAZA Members, we directed grants to eight programmes working to conserve rhinos in seven countries across Africa and Asia. These funds have made a massive difference to our programme partners, and, through our long-term partnerships with zoos, we are helping to provide a reliable source of funding to ensure programmes can continue their rhino conservation efforts. While the Covid-19 pandemic has greatly affected our zoo and programme partners alike, we look forward to continuing our successful partnerships as we emerge from lockdown to maintain our crucial support for the world's rhinos, when they need it more than ever.

Finally, we would like to say a massive thank you to all EAZA Members, their staff, boards and visitors, who have so generously contributed to support our rhino conservation efforts. Together we are achieving the vision of all five species of rhino thriving in the wild for future generations.

To find out more about how zoos and Save the Rhino have been saving rhinos in the wild, visit our website at www.savetherhino.org to read the report.

Webinar: Finding a Partner in Conservation

A key part of delivering conservation impact is building strong relationships with trusted partners to achieve positive outcomes for wildlife. Since Save the Rhino was established in 1994, we have gained a wealth of experience in developing successful partnerships with field conservation partners and organisations such as zoos who support their work. With the EAZA Executive Office, Save the Rhino hosted a webinar to share our knowledge and experiences of choosing and working with conservation partners. A recording of this event is available on the EAZA Member Area and the EAZA YouTube channel and will help zoos and aquariums to identify the programmes they want to work with to make a difference for threatened wildlife around the world. Featuring examples from our work with rhinos, the lessons will be applicable to supporting the conservation of all species of wildlife.



Stopping illegal markets in Vietnam

Vietnam is one of the countries with the highest demand for illegal rhino horn. To tackle this pervasive threat, our partners, including Zoo de La Barben (France), have been supporting the work of Education for Nature Vietnam (ENV). ENV educates people about the threat that illegal wildlife trade brings to species such as rhinos in an effort to reduce consumption. Thanks to generous funding from our partners, ENV produces Public Service Announcements (PSAs); videos aiming to change attitudes and behaviours around illegal wildlife products. Their most recent PSA, 'Children know the score on rhino poaching' has been shown on TV channels across Vietnam, and has been viewed more than 1.6 million times on YouTube – a fantastic result, helping to spread the message that using illegal wildlife products is wrong.

Strengthening canine units in Kenya

Keeping rhinos safe from poachers is key to maintaining healthy, thriving populations and reducing the illegal trade in rhino horn. In Kenya, Ol Jogi was one of the first conservancies in the Laikipia region to add a canine unit to its anti-poaching and law enforcement efforts. However, courts often did not recognise the importance or credibility of evidence collected by canine units in criminal cases. Our partners at Zoo Berlin and Tierpark Berlin in Germany provided generous funds to enable Ol Jogi's Canine Unit to undergo certification by the Kenya Police. Now successfully certified, evidence collected by the Conservancy's canine team is considered 'admissible' in court cases, an important step to ensuring successful convictions.



Securing a future for the Critically Endangered Sumatran rhino

Alongside protecting rhinos from poaching, managing their populations is important to ensure their future prosperity. In Indonesia, Save the Rhino and our partner Wilhelma Zoological and Botanical Garden (Germany), became Strategic Partners in Sumatran Rhino Rescue – a groundbreaking, international collaboration to save the Critically Endangered Sumatran rhino (*Dicerorhinus sumatrensis*) from extinction through managed conservation breeding and care. Fewer than 80 individuals remain, scattered across 10 small subpopulations; without action, the species could become extinct in a matter of decades.

As part of this exciting project, we're supporting the Sumatran Rhino Sanctuary (SRS) – home to the only viable captive population of Sumatran rhinos in the world. Thanks to crucial funding from Wilhelma Zoo (Germany) and other partners including West Midland Safari Park (UK), a second ring of rhino enclosures was built at the SRS in 2019, along with improvements to its veterinary and staff facilities. This has doubled the space available for rhinos in the breeding programme and increased the capacity of the team to provide the highest standards of care, helping to grow the population of this unique species.



SUMATRAN RHINO CALF © D. CANDRA

Supporting rangers' needs in South Africa

Sometimes, wildlife reserves' greatest needs are not high-tech solutions or large infrastructure projects. At Hluhluwe-Imfolozi Park in South Africa, a number of our zoo partners are supporting rangers to continue tackling the high rate of illegal incursions into the park. Funding from our partners bought 130 extended camping kits for the park's rangers. These kits allow rangers to spend longer periods in the park's 'hotspots' so that they can intercept any incursions before rhinos are poached, increasing the effectiveness of their anti-poaching operations.



Life in the savannah

IN 1993, ZOO ZÜRICH'S CEO ALEX RÜBEL ENVISIONED AN AFRICAN SAVANNAH TO BE BUILT AND INAUGURATED IN 2020 AS PART OF HIS MASTERPLAN. TWENTY-SEVEN YEARS LATER, HIS VISION HAS BECOME REAL IN A STUNNING NEW EXHIBIT

Severin Dressen, CEO, Zoo Zürich, Switzerland

Almost 30 years ago, Zoo Zürich's then freshly elected former CEO Alex Rübel conceived his vision of the zoo in 2020. An important part of it was the zoo's new slogan – 'People who know animals will protect them' – which is still used today and acknowledges that only the personal commitment of our guests will make a difference in the struggle against loss of biodiversity and global change. Contributing to this huge societal task lies at the heart of all of Zoo Zürich's actions. Only excellent animal husbandry combined with an aesthetically pleasing presentation can make people fully sensitive to the beauty and processes of nature. Optimal animal husbandry therefore is a prerequisite not only for the animal, but also to make the visitor feel comfortable, willing to absorb knowledge about the animal world and to experience joy for each animal, seeing them as a wonder of nature.

THE VISION FOR AN AFRICAN SAVANNAH

Zoo Zürich is structured according to a geographical concept. The Africa section consists of different habitats, based on a direct contribution to the conservation of endangered species in the wild. In the African section, these are the savannah, the Central African rainforest (the next area to be built) and the Ethiopian mountains, for which the topography of Zoo Zürich is well suited.

The aim of the Lewa Savannah

was to create a mostly mixed-species exhibit with optimal animal husbandry conditions, especially for the flagship species Grevy's zebra (*Equus grevyi*), reticulated giraffe (*Giraffa reticulata*) and white rhinoceros (*Ceratotherium simum simum*). Small-scale facilities for individual species were largely avoided, which would have allowed for a higher number of species but would have contributed little to the goals of the zoo. As part of Zoo Zürich's environmental education, the intention is for the visitors to be immersed in the African savannah and mesmerised by its beauty, as a result of which they are willing to contribute to the protection of this habitat.

THE LEWA-ZÜRICH CONNECTION

At Zoo Zürich, all larger exhibits are linked to an *in situ* conservation project. In the case of the Lewa Savannah, the *in situ* cooperation dates back much longer than the actual exhibit. Connections between Zoo Zürich and the Lewa Wildlife Conservancy in Kenya have existed since the mid-1980s, after the spouse of one of Lewa's co-founders visited Switzerland for a health spa treatment and, in a very fortunate coincidence, shared a room with a Zoo Zürich keeper.

The Lewa Wildlife Conservancy, a UNESCO World Heritage Site and Man and Biosphere reserve in Kenya, is home to several threatened species, including white rhinos, African elephants

(*Loxodonta africana*) and one of the largest remaining populations of black rhinos (*Diceros bicornis*) and Grevy's zebras.

Since the late 1990s, Zoo Zürich has officially been involved with Lewa. In 2012, Zoo Zürich rated all its then numerous conservation engagements with an evaluation scheme from the Conservation Planning Specialist Group (CPSG). Lewa rated as one of the top projects and was chosen to become one of Zoo Zürich's new focus conservation projects for long-term and close cooperation. Over the last decades, the zoo has made substantial contributions to Lewa to combat poaching and protect threatened and endangered wildlife. Furthermore, the zoo funds research and other projects at the conservancy that aim to reduce human-wildlife conflict. The establishment of a 15km elephant corridor, as well as the resettlement of black rhinos to new sanctuaries, was financed through Zoo Zürich with endowments from foundations. In addition to its commitment to wildlife, the zoo also supports community development initiatives in the areas surrounding the conservancy. The total amount of direct contributions from Zoo Zürich to Lewa currently stands at CHF 2.6 million (€2.42 million)

EDUCATIONAL CONCEPT

In addition to its conservation link, Zoo Zürich connects all larger exhibits to a specific educational message –

stretching beyond pure biological facts. With the Lewa exhibit, this message concerns the positive and negative effects of tourism at the Lewa Wildlife Conservancy. The aim is to highlight the benefits of sustainable tourism for local communities and what can thereby be achieved for nature conservation, while not hiding the negative effects of (unsustainable) tourism. This is covered by a variety of educational elements, ranging from traditional posters to scenographic infrastructure (e.g. a village school, an airport and an airstrip), to staff-visitor and animal-visitor interactions. At different points across the Lewa exhibit, volunteers provide additional information and touch tables, allowing visitors – especially children – to use all their senses when learning about animals and conservation. For three species – giraffes (*Giraffa*), meerkats (*Suricata suricatta*) and crested porcupines (*Hystrix cristata*) – visitors can enjoy a guided experience, during which they receive additional information on the animals and our conservation efforts. By using such a variety of educational elements, Zoo Zürich aims to reach most of its visitors, regardless of their age or background.

A VISITOR'S WALK THROUGH LEWA

The visitors enter the Lewa Savannah after leaving the Kaeng Krachan elephant park. Walking through a descending valley, whose slopes effectively hide the indoor exhibits of Lewa, the visitors enter a 400m² aviary for grey parrots (*Psittacus erithacus*). From there, our guests reach the main indoor facility for white rhinos and reticulated giraffes, who live here mainly during the winter period. Visitors can observe the giraffes and rhinos on two different levels and experience their fascinating behaviour from different angles. The secret attraction of this part of the savannah is a colony of naked mole-rats (*Heterocephalus glaber*) that inhabit an underground system of corridors that have been made visible to the visitors.

Leaving the Lewa giraffe house, a long path meanders along the main part of the Lewa Savannah. In a mixed-species outdoor exhibit of over 20,000m² white rhinos and reticulated giraffes share the space with Grevy's zebras, impalas (*Aepyceros melampus*), scimitar-horned oryx (*Oryx dammah*), South

The Lewa Savannah at Zoo Zürich – facts and figures

Planning & construction: 5 years

Start of construction: 2 May 2017

Opening: 6 June 2020

Cost: CHF 56 million, fully funded through donations

Numbers of companies involved: around 100

Total area: 5.6 hectares

Size of Lewa giraffe/rhino house: 2,400m²

Soil material moved: approx. 90,000m³

Number of plants: over 90,000 (78 species)

Surface area of artificial rock work: 11,900m²

Volume of watering hole: ca. 180m³

Height of largest baobab: 19m

Circumference of large baobab: 23m

Highest kopje rock: 13m

African ostriches (*Struthio camelus*) and helmeted guineafowls (*Numida meleagris*). Four artificial baobabs are scattered across the savannah and serve as feeding trees. Together with numerous other automatic feeding stations, they provide randomised and species-specific access to food, motivating the animals to constantly move across the savannah in search of food.

A fifth large baobab marks the access to the central viewing platform of the savannah, with a panoramic view over the whole exhibit, including the large kopje rocks in the background. A water-hole, sandbaths and mud wallows provide amenities for the inhabitants, while the quality and density of the turf still seems promising. The health of the scrub patches, visually structuring the exhibit, are subject to the never-ending struggle between the keepers' creativity in the use of hot wire and the giraffes' blissful ignorance that they are supposed to be scared off by electricity. Meanwhile, the local acacia-like shaped trees are doing well and, in a few years, will improve the illusion of the African savannah in Zürich.

After leaving the viewing platform, the visitors pass the meerkat enclosure that marks the entry to the local village, including the village school as a key educational component, the Ubele kiosk and the Lewa airstrip, with Dahomey cattle (*Bos taurus f. dom.*) grazing around a prop plane. Next to the airstrip, a safari camp with 10 family-

sized tents marks the end of the village. The tents are part of our overnight-stay events, allowing guests to experience the savannah and its inhabitants by night.

Finally, the visitors enter the last part of the Lewa Savannah, the kopje section. Large artificial rockwork provides the setting, through which our guests can walk and experience a completely different habitat. Located in the centre of the rock formation, visitors can look out on the main savannah exhibit from different angles, and on additional exhibits can observe spotted hyenas (*Crocuta crocuta*) and crested porcupines, as well as visit a terrarium with giant plated lizards (*Gerrhosaurus validus*) and pancake tortoises (*Malacochersus tornieri*).

FIRST IMPRESSIONS AND NEXT STEPS

As Zoo Zürich's largest exhibit and third milestone project, the opening ceremony was scheduled for 9 April 2020 but had to be cancelled due to the coronavirus pandemic. While this allowed more time for animal management to work on the mixed-species exhibit, including introducing new species to each other and improving training management, it also meant that the Lewa Savannah was opened to the public only when Zoo Zürich was allowed to reopen after the lockdown on 6 June 2020. The public reception has been very favourable, with positive feedback particularly on species selection and design of the exhibits, namely landscaping and the artificial rockwork. To support our guests' efforts to adhere to the hygiene and social-distancing measures imposed by the Swiss government as part of Covid-19 prevention, all educational presentations are currently suspended. On a positive note, a scimitar-horned oryx and a white rhino successfully gave birth in the Lewa Savannah. Over the next few years, males will be added to the currently predominantly female groups of our large mammal species.

After Lewa, the next milestone project in our African section is the Central African rainforest, featuring lowland gorillas (*Gorilla g. gorilla*) as one of our flagship species. We hope that it will be just as successful as the Lewa Savannah in immersing our visitors in the wonders of the natural world.

The human effect

AS ZOO PROFESSIONALS WE PAY A GREAT DEAL OF ATTENTION TO OUR ANIMALS' WELFARE IN TERMS OF HABITAT, DIET AND OTHER FACTORS, BUT SHOULD WE BE PAYING MORE ATTENTION TO THE HUMAN ELEMENT?

Victoria Melfi, Head of Animal & Agriculture Research Centre, Hartpury University, UK

For some decades now, zoo animal welfare scientists have identified the importance of housing, husbandry, nutrition and other factors for ensuring good welfare for zoo animals. Yet it is only relatively recently that the role humans play in the lives of zoo animals has been recognised and that research in this valuable area has been initiated.

Formerly a Principal Lecturer (now Honorary Professor) at the University of Bolton, UK, and a member of the research committee for the British and Irish Association of Zoos and Aquariums (BIAZA), Professor Geoff Hosey is a pioneer in zoo biology, and actively promotes the study of human-animal interactions in zoos. Professor Hosey identified that one of three defining characteristics in the lives of zoo animals was the constant presence of people, both familiar and unfamiliar. Zoo professionals are classified as 'familiar' people, and studies of keeper-animal interactions have developed along lines similar to those of stockpeople in agriculture and pet owners in companion animal science. By contrast, zoo visitors are 'unfamiliar' people, and after a series of studies, Professor Hosey coined the term 'visitor effect', which describes situations where zoo visitors led to behavioural changes in animals.

Slowly but surely a body of research has accumulated which has the explicit aim of exploring the impact of zoo visitors on the health, welfare and behaviour of animals, and it was recently determined that there was a sufficient number of these studies to allow them to be reviewed in order to

find patterns and indicators that might help us understand the phenomenon. These reviews looked for patterns across taxonomical groups: we like taxonomic comparisons in biology and zoos!

Primates largely seem to be negatively impacted by visitors, and felids seem to be mostly unaffected. Unfortunately, like so much zoo biology, there have been too few studies on many other taxa to draw even loose conclusions, and even these patterns were not particularly robust, as various studies contradicted them. Some primates focused on maintaining their social interactions with one another and were seemingly unaffected by visitors, whereas negative behaviours displayed by some felids were associated with high visitor attendance.

These studies of the visitor effect do not seem to fit with Professor Hosey's prediction that we should expect zoo visitors to have either positive, neutral or negative impacts on animals. Instead, published studies seem largely skewed to observations of negative visitor effect. This could simply be because there are more instances of negative visitor effect than of neutral or positive visitor effect. Alternatively, as I suspect, there might be a bias in the focus of studies published on the zoo visitor effect. From my experience of studying and collaborating with other academics and zoo professionals over the years, I have seen that those interested in the zoo visitor effect want to promote animal welfare and consider that visitors might be a negative stressor. Therefore the first step to studying the zoo visitor effect is to seek out situations where

animals appear to display the negative consequences of being observed by visitors, and these situations and/or animals become the focus of the study. By contrast, well-adjusted groups of animals, which don't appear to be impacted by visitors, would be unlikely to feature as study subjects.

Science publication has been orientated towards the promulgation of significant results. Successfully publishing studies in this area, which have found no visitor effect, would, I suspect, be interpreted as a 'non-result' and be considered underwhelming. Consequently, I'd suggest that studies have been sought, undertaken and published which have created and maintained a bias towards finding a negative visitor effect. I'm not suggesting that those of us working in zoo biology have intentionally set up research to undermine the good work of zoos. Instead, the desire to help zoos mitigate situations where visitors negatively impact zoo animals has created a data set with a disproportionate number of instances where the visitor effect is negative. Zoo visitors can, of course, compromise animal welfare, but I'm suggesting not in all instances. The upside – and there is always a silver lining – of these studies is that many have triggered interventions or changes to current housing and husbandry to ameliorate the negative zoo visitor effect: a win for animal welfare.

Interventions have included placing visual barriers between visitors and animals, lowering the noise level created by visitors and providing animals with

opportunities to increase flight distances from visitors; all of these measures have successfully reduced negative consequences associated with visitor presence.

However, the downside of this negative bias is that we don't understand the true nature of the visitor effect. It also fuels a tendency to over-interpret data with caveats that although data don't support a negative visitor effect, there might be negative ramifications somewhere that haven't been identified yet. This is, of course, true. But equally it might be true that if the study considered positive outcomes from the visitor effect, these might be found. With all research it is important that we avoid confirmation bias as we seek to prove our pre-existing assumptions. It would serve us well to understand how and why certain situations lead to animals being either positively or neutrally impacted by visitors, and working to replicate these conditions.

The evolution of zoo visitor-animal interactions is now further muddying our understanding of the visitor effect. Traditionally, zoos mostly offered the opportunity for visitors to see animals within their enclosures, described as stand'n'stare opportunities. In a very short period of time there has been an explosion in the type of zoo visitor-animal interactions possible: the number of species included is ever-expanding, as are the number of zoos offering these opportunities. Once considered revolutionary, walk-through enclosures, which bring zoo visitors and animals into close proximity with one another, are now ubiquitous, and the complexity required to make them successful for both parties is somewhat overlooked. Once a defining moment, now everyone can pay for the opportunity to get close to and maybe touch, feed, clean or be behind the scenes with various zoo animals. These developments have meant that there are more and different factors that we need to consider when exploring the zoo visitor effect and that not all interactions are the same.

As zoo biologists we are taught that when several factors change at the same time, it is really hard to determine the cause of the change we observe. When we consider the visitor effect, it is likely that different

interactions are being compared with each other. Sometimes visitors are on the outside of the enclosure, sometimes on the inside; sometimes animals are in their enclosure, sometimes outside their enclosure; sometimes visitors are in zoos outside of opening hours; sometimes visitors provide food or perform similar duties to their familiar keepers at close proximity in keeper-only areas. The variation in these visitor factors is growing and thus we need a clearer framework to appreciate the complexities inherent in zoo visitor-animal interactions.

What is needed is a greater appreciation of the complexity of this issue, to enable us to explore like with like. We also need to be more inclusive of the situations where data are collected and how we pose our research question; to reduce bias and promote an understanding of the zoo visitor effect, by not targeting only those situations where we suspect there might be a problem. Then we can hope to determine what it is about visitors that impacts upon animals and/or situations, and manage zoos accordingly.

A final issue that we have not yet addressed is that the animals we care for are not homogenous; just as we are not. Zoo animals have different rearing

histories, personalities, behavioural needs and more. It is likely that within any given group, some individuals perceive and react to visitors differently to others they live alongside. So, with a final nod to Professor Hosey, who is a big influence in this field and my own research and practice, we need to recognise that both humans and animals will bring past experiences, attitudes and perceptions to each visitor-animal interaction.

So what is the visitor effect? Should we be worried about it if we can ameliorate it? In summary, yes; we should be exploring the impact of visitors, as they are a defining feature of zoos and exert a considerable presence in the lives of the animals in our care. Certainly, zoo visitors stimulate animals and we should expect this to be positive, neutral and negative. There is an unbelievably long list of factors that contribute to the outcome of the visitor effect. And as zoo visitor-animal interactions expand, it is crucial that we empirically understand the impact of this changing landscape on our animals. Evidence collected through research could usefully offer lessons on best practice and where interventions might be necessary to ameliorate negative impacts.



CLOSE ENCOUNTERS

THE EDUCATIONAL IMPACT OF VISITOR-ANIMAL INTERACTIONS IN ZOOS AND AQUARIUMS

Laura Myers, EAZA Academy Manager and Education Committee Liaison

Many zoos and aquariums have increasingly been focused on providing a richly interactive experience that enables visitors to have an up close and personal experience with animals. This can be achieved through design, such as allowing visitors to share space with animals in walk-through exhibits or creating the illusion of shared space through immersive theming. It's also common for more direct interactions to take place, mediated by staff or volunteers, which allow visitors to closely observe and sometimes touch or feed animals.

Often the idea is that this will help us reach our common goal of supporting visitors to become conservation activists and advocates by creating an emotional connection to the natural world, in addition to the opportunity to learn about this world and the threats it faces. But can we be confident that visitor-animal interactions really help us to achieve this goal?

Anecdotally, most educators will have a long list of moments where they've observed visitors making close connections with animals during an interaction – fear turning into curiosity once they feel the smooth, dry scales of a snake, or wonder at seeing the true length and colour of a giraffe's tongue as it wraps around leaves and strips them from tree branches. These moments seem obvious taken in isolation, but can we be confident that visitors are experiencing what we think they are during an animal encounter? In the same way as a visitor-animal interaction can be defined as having a positive, neutral or negative outcome for the animal's welfare, we can consider that the same interaction could have a positive, neutral, or negative outcome in terms of education.

A study by Eric Jensen in 2011 found evidence of mixed outcomes related to live animal encounters; although there were positive impacts, his study also found negative changes, too, such as an increased desire to keep the animals used in the interaction as pets, and a focus on



unnatural behaviours exhibited by the animals (such as a parrot talking) and unnatural items used in the encounters (such as carry crates used to transport animals to an outreach session).

Zoos and aquariums may feel drawn to focus on live animal encounters, as they provide a unique selling point that separates them from a school classroom or other science learning institutions. However, a recent study by Kleespies *et al.* (2020) found that while animal encounters could enhance a connection to nature in high-school students, other unique experiences, such as a talk with a zookeeper or a behind-the-scenes visit, could also enhance this connection.

The Kleespies *et al.* study also highlighted the potential for variable effects on different types of audience, as the impact of the different interventions used varied depending on the pre-existing connection to nature. The biggest positive changes were found in students with the lowest levels of connection to nature prior to the zoo visit and interaction. For the students who were already highly connected, the impacts seemed to be more neutral or in some cases slightly (but not significantly) negative. This shows the need to carefully consider the intended audience for planned visitor-animal interactions.

How can we ensure that visitor-animal interactions have the educational impact we want them to, if we choose to include them in the education offer? The first step is to be clear about the learning outcomes for

the encounter and identify precisely what the encounter is supposed to achieve. The next step is robustly to evaluate these interactions to test whether the learning outcomes have been achieved, and adjust accordingly. As a last step, we can all support each other by sharing our findings with other educators, for example by presenting at the EAZA Education Conference or publishing in the *Journal of Zoo and Aquarium Research* (JZAR).

Finally, it is of paramount importance to note that animal welfare should always take top priority when considering visitor-animal interactions, regardless of any possible education benefits. Where education staff and volunteers are tasked with delivering these experiences, it is important that their training includes the general principles of animal welfare as well as the practical knowledge to deliver a safe and positive experience for both animals and visitors.

REFERENCES

- Jensen, E. (2011). *Learning about Animals, Science and Conservation: Large-scale survey-based evaluation of the educational impact of the ZSL London Zoo Formal Learning programme*. London: Greater London Authority. (www.academia.edu/423053)
- Kleespies, M. W., Guebert, J., Popp, A., Hartmann, N., Dietz, C., Spengler, T., Becker, M., Dierkes, P. W. (2020). *Connecting High School Students With Nature – How Different Guided Tours in the Zoo Influence the Success of Extracurricular Educational Programs*. *Frontiers in Psychology*, 11: 1804. (DOI:10.3389/fpsyg.2020.01804)



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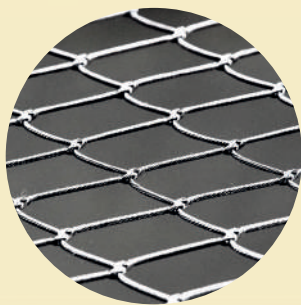
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