WAZA
World Association of Zoos and Aquariums

2022
03

NEWS

The 77th WAZA Annual Conference

EAZA's Collaborative Banking of Samples

The New WAZA Carbon Guide

JAZA's Effort on *Ex Situ* Conservation of the Amami Spiny Rat

WAZA

World Association of Zoos and Aquariums

WAZA Executive Office Staff

Chief Executive Officer	**Martín Zordan** ceo@waza.org
Director of Membership	**Janet Ho** membership@waza.org
Animal Welfare and Conservation Coordinator	**Paula Cerdán** conservation@waza.org animalwelfare@waza.org
Communications Coordinator	**Tania Kahlon** communications@waza.org
Administrative Assistant	**Emma Burke** administration@waza.org
Communications Assistant	**Linde de Nijs** communications@waza.org

Imprint

Editor:
Tania Kahlon

Reviewers:
Paula Cerdán and Linde de Nijs

Proofreader:
Laurie Clinton

Layout and design:
smithandbrown.eu

This edition of WAZA News is also available at: www.waza.org

Printed on FSC-certified paper

WAZA Executive Office

Postal Address	**WAZA Executive Office** Carrer de Roger de Llúria 2, 2-2 08010 Barcelona Spain
Phone	+34 936638811
Email	secretariat@waza.org
Website	www.waza.org
Facebook	@officialWAZA
Instagram	@wazaglobal
Linkedin	@World Association Zoos & Aquariums
Twitter	@waza

WAZA Membership

WAZA Members as of 28 November 2022

Affiliates	9
Associations	22
Corporates	27
Institutions	288
Life	100
Honorary	36

Future WAZA Conference

2023: San Diego Zoo Global, San Diego, United States, 8-12 October
www.waza2023.org

Cover Photo: Stone's sheep *(Ovis dalli stonei)*
© Assiniboine Park Zoo

Contents

President's Letter

Dear WAZA Members,

Welcome to the last edition of the WAZA News Magazine of 2022. I am excited by the insightful discussions we had at the 77th WAZA Annual Conference and thankful to everyone who joined us. It was wonderful to meet the members of our community, network and share knowledge on the topics that matter most to us. During the WAZA conference, we welcomed 186 members, and 32 non-members, representing 41 regions and countries from all over the world who shared their inputs on a wide variety of themes.

Over the course of the conference, we presented our members with a plan to revise the membership fee which was positively received. This restructuring is vital for WAZA to grow and be relevant in an ever-changing world. As we embark upon the adoption of a new strategy for the organisation, the support of our members is immensely valuable. During the strategic planning workshop we presented our members with the work that the WAZA Council, Committees and Executive Office had contributed towards developing and defining what WAZA could look like in the future. The feedback we received was heartening and we will continue working on the development of this process over the next few months.

I thank our gracious host, Loro Parque and the WAZA Executive Office for making the conference a success and look forward to the 78th WAZA Annual Conference in San Diego.

Apart from the conference, I am also looking forward to the shape that Reverse the Red will take as we prepare to celebrate the first Reverse the Red Day on 7 February, 2023. The movement is critical to ensure our members make a lasting impact in reversing the decline of endangered species.

As we head to the end of this year, I want to thank the WAZA community for its excellent and valuable work, and I look forward to collaborating with all of you to create more impact and continue our meaningful work in 2023.

I invite you all to get in touch with the WAZA Executive Office to share your news and stories with us, so that we can disseminate them to our wider community.

Yours sincerely,

Dr Clément Lanthier
WAZA President

CEO's Letter

Martín Zordan

WAZA Chief Executive Officer

Dear WAZA members and friends,

I have the pleasure of writing this letter almost three weeks after the 77th WAZA Annual Conference.

After two years of holding WAZA conferences virtually, we were finally able to reconnect in person, meet new colleagues, and engage in stimulating conversations. I want to thank the fantastic team at Loro Parque, the speakers, the WAZA office, our council, all our committees' chairs and members, and all of our members for making our gathering possible and enjoyable.

My deep gratitude goes to all of those who invest their energies, skills, and passion into our Association.

I congratulate the winner of the 2022 WAZA Heini Hediger Award, Radosław Ratajszczak. His work in our global zoo and aquarium community has been impactful and has inspired many of us. I also want to congratulate Saint Louis Zoo and Marwell Wildlife for being recipients of the 2022 WAZA Conservation and Environmental Sustainability Awards respectively.

For me personally, the conference had additional meaning. We discussed our proposal for WAZA's internal strategy and received valuable feedback, both virtually and in person, from our stakeholders including our council, committees, members, partners, and even former and potential members. We aim to share a final proposal in the coming months which we hope will be well received by our current members and will be successful in attracting new members. Our intention is for WAZA to become more equitable, providing members with tangible, meaningful benefits with further opportunities to participate.

Following the WAZA Conference, I had the opportunity to join several meetings (Species360 Board of Trustees, the International Aquarium Congress hosted by Nausicaa, and the 19th Conference of the Parties of CITES). At these events, I was able to reflect on the discussions around our upcoming WAZA strategy and how effectively it is addressing some of the needs of our global community. While it does not come as a surprise, some of the issues we are facing are old and others new. This makes me think about the legacy we are leaving for future colleagues who will inherit the enormous responsibility of ensuring that zoos and aquariums remain impactful in the eyes of the scientific community and meet social expectations.

I sincerely hope that our proposal for WAZA's strategy will strengthen our offering, resulting in an enhanced united conservation approach which will benefit outcomes for wildlife.

As the solar year is coming to an end, I share my best wishes for the end of 2022 and look forward to achieving more together with you in the upcoming year.

Sincerely,

Dr Martín Zordan
WAZA CEO

Highlights From the 77th WAZA Annual Conference

Linde de Nijs, Tania Kahlon and Paula Cerdán
WAZA Executive Office

The 77th WAZA Annual Conference was held from 23-27 October 2022, hosted by Loro Parque in Tenerife, Spain. After two years of holding virtual conferences, the attendees were finally able to meet in person to discuss seminal issues for the zoo and aquarium community. We welcomed 186 members, and 32 non-members, representing 41 regions and countries from all over the world, highlighting WAZA's global membership and reach.

On the first day of the conference, the President of the Canary Islands Mr Ángel Torres Pérez, the President of the Parliament of the Canary Islands Mr Gustavo Matos, the President of Loro Parque Mr Wolfgang Kiessling and WAZA President Dr Clément Lanthier shared their introductory remarks. The opening was followed by the first keynote speaker, Mr Hugo Morán, the Secretary of State for the Environment, Spain. He made an inspiring speech about the urgent need to reconcile the environment with economic and social challenges, so as to restore the balance between nature and civilisation.

The second day of the WAZA conference saw the keynote address by Franc Carreras, the Digital Marketing Professor at ESADE Business School and the Co-Founder of MamisDigitales.org, who provided engaging insights into the importance of communicating effectively and reputation management. Carreras also spoke about the importance of branding and how you can use different kinds of media as promotional tools.

On day three keynote speaker Trang Nguyen, the Founder and Executive Director of Vietnamese based NGO conservation organisation WildAct shared her incredible work in combating illegal wildlife trade between Africa and Asia. She also spoke about the three main programmes in WildAct: education, creating a better and safer work environment for women and gender minorities, and empowering local communities.

On the final day of the conference, David Ainsworth, the Head of Communications of the Secretariat of the Convention of Biological Diversity, shared his keynote address. He discussed the Post-2020 Global Biodiversity Framework and the role of zoos and aquariums in supporting the implementation of the Framework, touching on how zoos and aquariums can raise awareness and contribute to pro-conservation behaviour and social change.

↑ Dr Dalia Conde, Species360 Director of Science, during the Species on the Spotlight session at the WAZA Annual Conference © WAZA

→ Denise Verret, Zoo Director and CEO of Los Angeles Zoo and Botanical Gardens, and Dr Jo-Elle Morgerman Director of Saint Louis Zoo WildCare Park, during the Diversity and Inclusion session during WAZA Conference © WAZA

Over the course of the conference, there were several insightful presentations on diverse topics. The key work on environmental sustainability being undertaken by WAZA Members was highlighted with the launch of the WAZA Carbon Guide on Reducing, Measuring, and Offsetting Carbon in zoos and aquariums. The Guide was presented by the task force leaders and members of the Conservation and Environmental Sustainability Committee, Karen Fifield MNZM and Elaine Bensted. It was developed to assist members in measuring and reducing their greenhouse gas emissions and outlines various steps which zoos and aquariums can take across their operations. More information about the guide can be found page 12 of this issue.

After its official launch on 19 August 2022, the WAZA PalmOil Scan App was also introduced to the attendees. This mobile app allows users to scan a product's barcode and learn if the company that makes the product is committed to sourcing Certified Sustainable Palm Oil (CSPO). Please go to page 37 of this issue to learn more about PalmOil Scan.

Diversity and inclusion in zoos and aquariums was also discussed, with organisations sharing their key initiatives in promoting diversity and being more inclusive: Saint Louis Zoo WildCare Park discussed the importance of people equality for conservation, Wellington Zoo spoke about the Rainbow Tick Certification, and the South African Association for Marine Biological Research provided insights into the accessibility of zoo and aquarium facilities for visitors with additional needs.

At the conference, attendees also heard from several Reverse the Red panels as part of the Reverse the Red in Evolution session which was moderated by Prof Theo Pagel, WAZA Reverse the Red Committee Chair. Reverse the Red Executive Committee members and guest panellists from a variety of zoos and aquariums discussed the Plus One approach, the growing Centres for Species Survival and National Networks, and gave examples of empowering communities and amplifying success. A session on the importance of population management was conducted by David Field, Chair of the WAZA Committee for Population Management. The session initiated a dialogue on bridging the gap between professional population management and the potential role for zoo and aquarium directors to support it at an institutional and regional level to ensure the sustainability of our animal populations.

Other items raised during the conference included updates on the development of a new WAZA Code of Ethics and on the proposed membership fee model due for introduction in 2024, where a more equitable fee structure will be introduced next year. Also, a presentation was given on the progress of the 2023 Animal Welfare Goal, followed by a panel discussion concerning the potential meaning of the goal outside of the zoo and aquarium community.

In 2022, WAZA undertook a strategic planning process to re-evaluate its role in the global zoo and aquarium community, including its vision and core principles. The progress made so far was presented to the conference attendees, with opportunities to workshop on the process provided. More information about this can be found on page 9 of this issue.

The WAZA Awards ceremony was held during the conference to celebrate the achievements of WAZA members in conservation and environmental sustainability. Radosław Ratajszczak received the highest honour that WAZA can offer, the Heini Hediger Award. More details about the awards ceremony can be found on page 8 of the magazine.

At the Annual General Meeting (AGM), members voted to pass Resolution 77.1 Changing Outcomes for Biodiversity, as well as Resolution 77.2 WAZA in Support of Certified Sustainable Palm Oil.

↑ President of Loro Parque Mr Wolfgang Kiessling and WAZA President Dr Clément Lanthier © WAZA

We would like to thank everyone who contributed to the success of the conference – the host, Loro Parque and all attendees, and we look forward to the 78th WAZA Annual Conference in San Diego. This will be the second time that a WAZA Annual Conference will be held in San Diego.

We would also like to extend our gratitude to the Conference Gold, Silver, and Bronze Sponsors: American Humane, Wild Republic, ELSS Group, and Saint Laurent and to the exhibitors: Attractions.io, Carl Stahl ARC Cable Mesh Design + Build, Donchamp Acrylic Group, Parlevliet & Van der Plas, Schuran Seawater Equipment, and Zigong Lantern Group.

Gold Sponsor
AMERICAN·HUMANE
FIRST TO SERVE

Silver Sponsor
WILD REPUBLIC

Bronze Sponsor
elss Group
St Laurent

Attractions.io
Carl Stahl ARCHITECTURE
DONCHAMP
PP
SCHURAN SEAWATER EQUIPMENT
ZIGONG LANTERN GROUP

↓ Group photo during WAZA Conference at Loro Parque © WAZA

El "must" de Canarias
LORO PARQUE
ANIMAL EMBASSY
1972 50 2022 ANNIVERSARY

LORO PARQUE
FUNDACIÓN
WE CARE

WAZA Awards

WAZA Conservation Award

Saint Louis Zoo's WildCare Institute Center for Avian Health in the Galapagos Islands was awarded the Conservation Award for their work on the conservation of habitat and disease management, the integrated One Health approach, and the use of training and legislative and policy actions with the local conservation agencies.

The WAZA Conservation Award celebrates an outstanding and comprehensive conservation programme with clear objectives and excellent conservation outcomes.

The two other finalists for this prestigious award were North Carolina Zoo's UNITE project and Saint Louis Zoo's WildCare Institute Ron and Karen Goellner Center for Hellbender Conservation, both from the United States of America.

WAZA Environmental Sustainablity Award

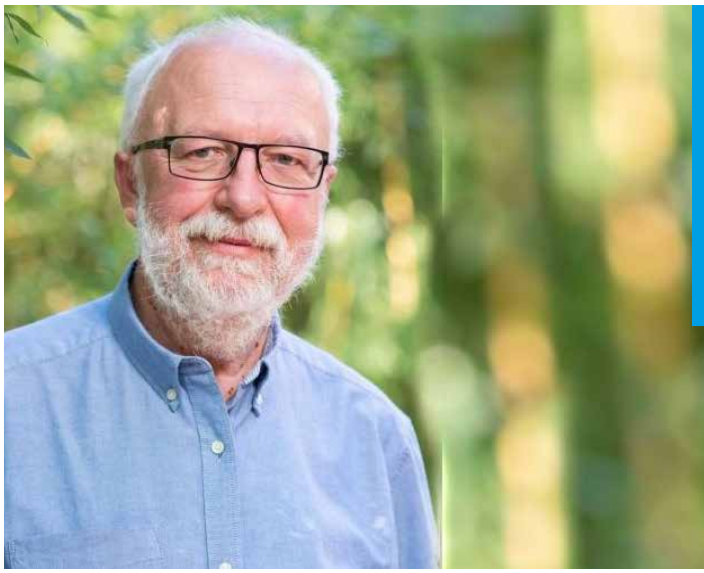
Marwell Wildlife, United Kingdom, was awarded the Environmental Sustainability Award for their innovative and consistent approach towards sustainability management, having clear long-term targets and commitments in reducing their use of carbon and water, and waste management. Their vision is clearly aligned with the United Nations Sustainable Development Goals.

The two other finalists for the Environmental Sustainability Award were Loro Parque, Spain, and Toronto Zoo, Canada. This award is granted to an institution for outstanding, comprehensive environmental sustainability initiatives that advances its commitment and efforts towards environmental sustainability.

Heini Hediger Award

Radosław Ratajszcak, Director Emeritus of Zoo Wrocław, Poland, was awarded the Heini Hediger Award celebrating his tremendous contributions to WAZA, to Polish zoos, and to the global zoo and aquarium community. His work in modernising and improving the standards of zoos has helped shape current zoos, and his influence goes beyond the zoo world, as his involvement in *in situ* conservation in regions such as Vietnam, Indonesia, and the Philippines has promoted local conservation of critically endangered species.

This award is the highest award for professional excellence, named in honour of Heini Hediger, the Swiss biologist known as the father of zoo biology. It represents the pioneering success of an individual who is strongly committed to animal welfare, conservation, environmental sustainability, education, and actively involved in furthering these causes within their zoo or aquarium.



↑ ↑ ↑ Dr Judy Mann-Lang handing out the 2022 WAZA Conservation Award to Saint Louis Zoo's WildCare Institute Center for Avian Health © WAZA

↑ ↑ Dr Judy Mann-Lang awarding Marwell Wildlife the 2022 WAZA Environmental Sustainability Award © WAZA

↑ Winner of the Heini Hediger Award, Radosław Ratasjzcak

Towards a New Strategy for WAZA

An Update on WAZA's Strategic Planning Process

Tania Kahlon and Paula Cerdán
WAZA Executive Office

Earlier in 2022, the WAZA Council and Executive Office, together with strategic planning consultant EcoLeaders, embarked on a journey toward a new strategy for WAZA. WAZA's strategy will guide the steps we take by setting criteria for how we will make decisions.

Those criteria included:

- Guiding principles and approaches
- The unique role that we play
- An aspirational vision for the future
- Clear priority areas for the next few years

Over the past six months, the WAZA Council and Executive Office met several times, both virtually and in-person to develop the strategic plan, including at ZooParc de Beauval (France) in March 2022 and at the Denver Zoo in the United States (US) in July 2022. To ground our strategy discussions in a solid understanding of stakeholder perspectives, we gathered data on beliefs, values, and aspirations for WAZA through the annual member survey. Additionally, a process of consultation with various focus groups including non-members, former members, association members, and institutional members further informed our conversations. As we began to get clear on the enduring parts of WAZA - who we are, what we stand for, and the change we want to make in the world – we invited members of the WAZA committees and subcommittees to share their feedback on our initial progress.

Prior to the 77th WAZA Annual Meeting in Tenerife, the WAZA Council and Executive Office met again to further progress the new strategy for WAZA, based on feedback received from the different focus groups and the WAZA Executive Office. This then culminated in the strategic planning workshop during the WAZA Annual Conference. Attendees were presented with a draft of WAZA's conceptual framework, which includes a purpose, guiding principles, and niche. This is the long-term part of our strategy that helps us understand what we will and won't do.

The purpose is the heart of why we do what we do. It is the overarching statement that expresses why we (WAZA) exist.

WAZA's guiding principles represent how we show up to the work. These present what we believe, what we stand for, and what we expect our members to adhere to.

WAZA's niche is the unique space that we occupy from which we can demonstrate our global voice, leverage our scale, and provide distinct services to WAZA members, partners, and stakeholders to achieve our purpose. This is the space that we play in that differentiates how we deliver on our purpose from other organisations.

WAZA's vision is our aspiration for who we want to become and what we want to achieve together; it's our chosen future. A great vision should stretch us and inspire us to achieve more than we thought possible. It should be transformational, for ourselves and our shared purpose.

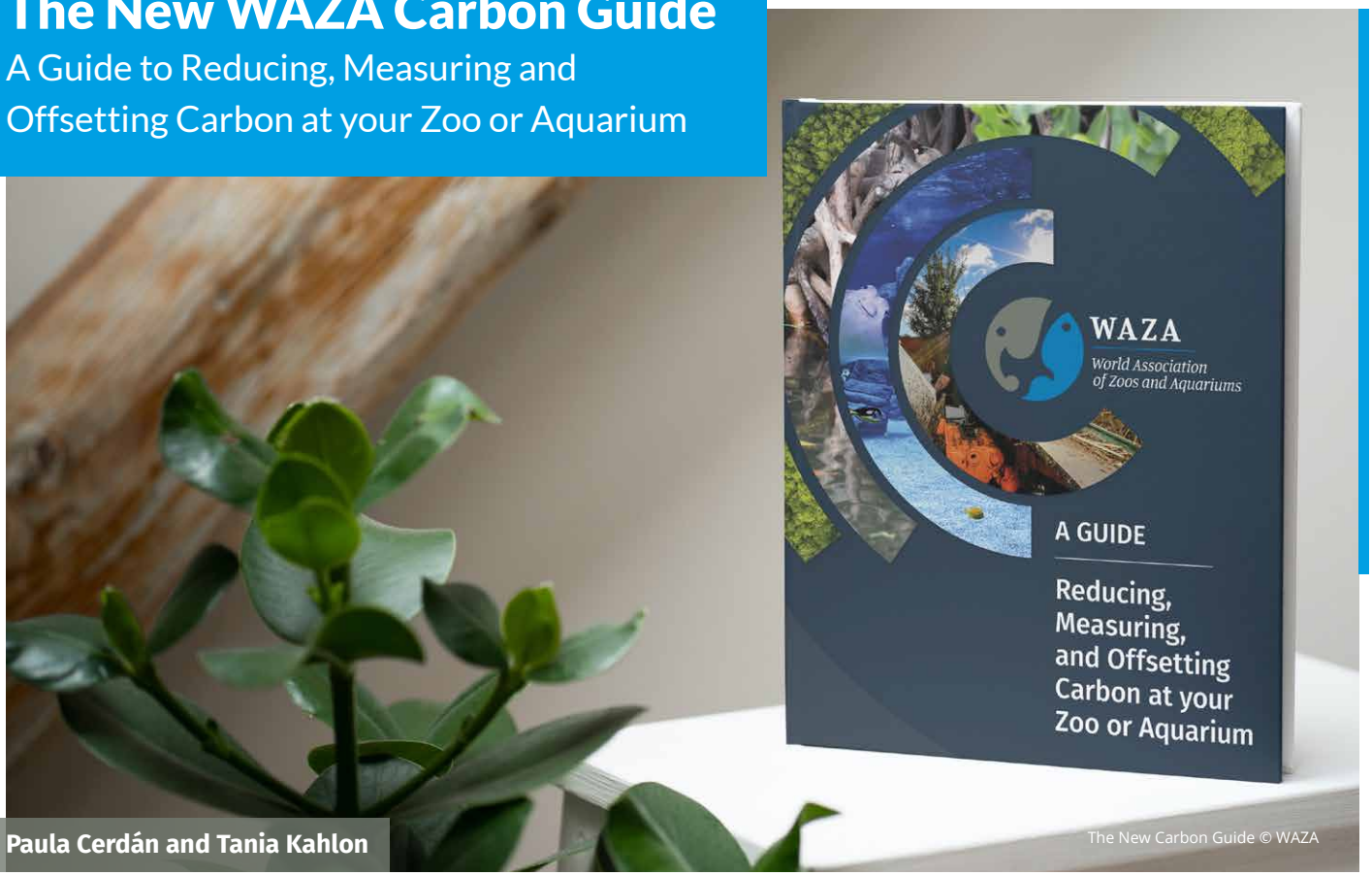
WAZA attendees were then invited to divide into breakout groups to share their feedback on the conceptual framework, including any changes they would like to see reflected in it. As a demonstration of commitment to WAZA's guiding principle of Global Diversity, and Inclusion, Council members hosted breakout groups in a variety of languages, including Spanish, German, French, Japanese and Mandarin.

The ongoing process of strategic planning is expected to be completed by early 2023, but the real work begins after approval, where all of us will be required to breathe life into this new vision for WAZA so that our collective hopes become a shared reality.

↑ André Stadler, WAZA Council Member, and Robin Keith from EcoLeaders during the Strategic Planning Session at the WAZA Conference © WAZA

The New WAZA Carbon Guide

A Guide to Reducing, Measuring and Offsetting Carbon at your Zoo or Aquarium



The New Carbon Guide © WAZA

Paula Cerdán and Tania Kahlon

WAZA Executive Office

In August 2021 the United Nations Intergovernmental Panel on Climate Change (IPCC) released a report from Working Group 1 titled "Climate Change 2021: The Physical Science Basis". This is the first section of the IPCC's Sixth Assessment Report (AR6), completed in 2022. Labelled "a code red for humanity", the Report notes unprecedented changes in climate in every part of the globe and unequivocally places the cause of these changes on human activities. The Report states that, unless there are urgent, large-scale, and rapid reductions in greenhouse gas emissions, including carbon, the global temperature will rise over 1.5 degrees Celsius (°C) or even 2°C. Exceeding temperatures by 2°C will have dramatic and deadly consequences for all life on Earth.

Zoos and aquariums around the world are visited by more than 700 million people annually. We are perfectly positioned to influence our visitors to make positive behaviour changes in their daily lives. However, the credibility of our messages and even the legitimacy of our existence is at stake if we do not reduce our own emissions.

"Now, more than ever, we need to lead by example and provide a showcase to individuals and other organisations of what needs to be done to cut emissions."

Thus, the WAZA Carbon Guide has been developed through a subgroup of the WAZA Conservation and Environmental Sustainability Committee (CESC) and global leaders in sustainability from WAZA – member zoos and aquariums, to assist WAZA members in measuring, reducing, and offsetting their greenhouse gas emissions. The new guide, launched during the 77th WAZA Annual Conference in Tenerife, outlines various steps which zoos and aquariums can follow to reduce the carbon footprint of their operations.

This Guide is the latest effort of the CESC, adding to an existing library of sustainability resources and publications for zoos and aquariums. Previous topics have included the reduction of single use plastic, the use of sustainable forest products and the sourcing of sustainable certified palm oil, all of which fall under the umbrella of Protecting our Planet – The WAZA Sustainability Strategy 2020-2030.

Over the course of this Guide, readers will be taken through a step-by-step process for reducing their zoo or aquarium's carbon footprint. The guide also includes a checklist which provides an overview of how to start your carbon reduction journey.

Different sections of the guide will be relevant to different stakeholders, depending on where your zoo or aquarium is on the carbon reduction journey. Some sections may be more relevant for executives while others are more appropriate for sustainability officers who want to implement the steps recommended by the guide. Case studies provided throughout the Guide will also help in operationalising the recommendations.

Regardless of the size of your zoo or aquarium, there are many steps you can take to get you started on reducing your carbon footprint.

Find the new WAZA Guide on Reducing, Measuring and Offsetting your carbon footprint on the WAZA Website.

If you or your organisation are interesting in assisting in translating the Carbon Guide into your own language, please email Paula Cerdán at conservation@waza.org

Shaping Reverse the Red

Megan Joyce
Communications Officer, Reverse the Red

↑ Reverse the Red session during WAZA conference © WAZA

WAZA Hosts a Roundtable Meeting for Members

In August, the World Association of Zoos and Aquariums (WAZA) held a Roundtable meeting for its members to shape their involvement in the vital Reverse the Red movement. Members of the Reverse the Red Executive Committee participated in the meeting including Prof Theo B. Pagel, Dr Jenny Gray, Dr Kira Mileham, Dr Judy Mann-Lang and Jared Lipworth.

The discussion focused on the Plus One plan, the Assess-Plan-Act methodology, National Networks and Centres for Species Survival, the proposed 'Year of Action', and a Reverse the Red Resolution for WAZA.

Each presentation was followed by facilitated breakout sessions to encourage discussion from participants. The discussions were recorded and shared with the participants following the Roundtable. Some of the inputs received over the course of the two-hour Roundtable included: better ways to communicate the Reverse the Red successes as well as the need for setting realistic and achievable goals, which enable the tracking of progress.

Reverse the Red at the WAZA Conference

Following feedback from the Roundtable participants, the WAZA Reverse the Red Committee updated a resolution that was shared with the wider membership at the Annual Conference in October and approved in the 77th WAZA Annual General Meeting as Resolution 77.2 Changing Outcomes for Biodiversity. This will leverage the work of leading zoos and aquariums, support the post-2020 Global Biodiversity Framework, and encourage action within the Reverse the Red initiative, in furthering the partnership established by WAZA and the IUCN Species Survival Commission (SSC).

At the conference, attendees heard from several Reverse the Red panels as part of a session on Reverse the Red in Evolution. Reverse the Red Executive Committee members and guest panellists from a variety of zoos and aquariums discussed utilising the Plus One approach, the growing Centres for Species Survival and National Networks, and gave examples of empowering communities and amplifying success.

↑ Prof Theo B Pagel, Chair of the WAZA Reverse the Red Committee © WAZA

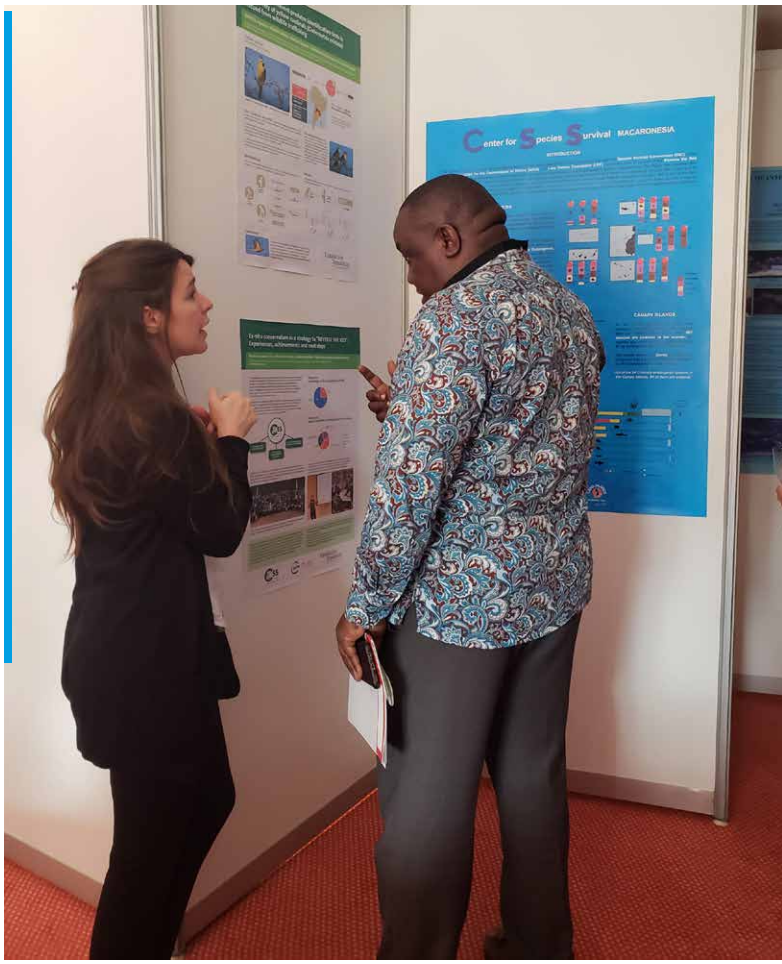
Many Centres for Species Survival also brought posters to showcase their collaborative efforts, integrative approaches, use of the Assess-Plan-Act Cycle, *ex-situ* conservation strategies, training resources, and other examples of boosting species conservation and Reverse the Red.

Mark Your Calendars for Reverse the Red Day on 7 February 2023

Reverse the Red is excited to announce the first annual Reverse the Red Day on 7 February 2023. Please join us in celebrating Reverse the Red Day at your zoos and aquariums all week long! There will be guidance for online and in person engagement, but also make this day your own by highlighting the work that you are doing, demonstrating the impact you are having for species. We encourage you to share actions and success in improving the status of threatened species and stories of how you collaborate with government, communities, supporters, partners, and visitors to make positive change for biodiversity.

Follow and engage with Reverse the Red on social media. We would like to share your stories of hope and conservation successes and continue to grow this movement as we approach our 2023 Year of Action.

REVERSE THE RED



↑ Poster session during WAZA Conference © WAZA

↓ Reverse the Red session during WAZA conference © WAZA

Cologne Zoo Aquarium's 50-year Anniversary

The Road to a Conservation Centre

Prof Dr Thomas Ziegler

Curator Aquarium and Coordinator Biodiversity and Nature Conservation Projects Vietnam and Laos, Cologne Zoo

In 2021, Cologne Zoo's Aquarium had been in existence for 50 years. The structural concept has been sustained; however, its philosophy has substantially changed. The concept of an exclusive animal exhibit has been replaced by the ark principle which has come to the fore.

During the global biodiversity crisis this is more important than ever: Space is created for threatened species and expertise provided for breeding projects and species conservation in compliance with International Union for Conservation of Nature (IUCN) One Plan Approach, which refers to the interaction of *in situ* and *ex situ* measures involving various expertise and thus enables optimised, contemporary species conservation.

With the construction of the Aquarium in 1971 the plan was pursued to extend the federal horticultural show from the Rhine Park on the right of the River Rhine to Cologne Zoo at the left bank.

The thematic division in the Aquarium, Terrarium and Insectarium sections is still valid today. The Aquarium and Terrarium sections including the entrance hall are located on the ground floor with capacious technique and breeding rooms situated in the basement. The Insectarium section with the tropical hall, is located on the upper floor and can be accessed by a broad staircase or by elevator.

The open panorama enclosures containing fish and reptiles as well as the river Rhine panorama with porthole views from the source of the river to the estuary render Cologne Zoo's Aquarium unique to this day. In 1975 it was awarded an architecture prize. In the past years, diverse extensions and combinations of aquaria and terraria were constructed, to provide held species with an enhanced living environment and to improve the visitor experience.

↑ Philippine crocodile (*Crocodylus mindorensis*) training © A. Rauhaus

Period	Head of the Aquarium of the Cologne Zoo
1971 to 1994	Harald Jes
1994 to 2002	Dr Hans-Werner Herrmann
July to December 2002 (temporary direction)	Prof Theo B. Pagel
Since January 2003	Prof. Dr. Thomas Ziegler

↑ **Table 1.** Direction of Cologne Zoo's Aquarium.

The Aquarium as Species Conservation Centre

The Aquarium's conservation commitment ranges from the keeping and breeding of threatened species and the exploration of poorly known taxa, to providing support to authorities in the identification, care and placement of confiscated animals. Ideally confiscation cases are converted into conservation breeding projects, suitable for subsequent repatriations. For this purpose, molecular identification is conducted for allocation to genetic lineages of different geographical provenances.

In recent years many of the former store rooms in the basement of the Aquarium were converted into modern breeding rooms for threatened taxa. This has allowed the zoo to provide additional space for species conservation projects. Such as a facility which was created for the Endangered Vietnamese Crocodile Lizard (*Shinisaurus crocodilurus vietnamensis*), the tiny natural population of which is in severe decline. Our parental group has already reproduced successfully to the F2 generation at the Cologne Zoo's Terrarium section. It was derived from European animal holdings and confiscations, which were genetically analysed and identified.

The Terrarium Section - Long Term Commitment for Threatened Southeast Asian Species

In the past two decades a focus on threatened species was established in the Terrarium section, closely connected with our projects in South East Asia, in particular Vietnam.

More than 60 species of reptiles are kept in the Terrarium section, with more than 40 of them being threatened (six Critically Endangered, nine Endangered). More than two thirds of the threatened reptile species were already successfully bred in Cologne Zoo's Terrarium section. Twenty reptile species derived from governmental confiscations, more than three quarters of them listed as Critically Endangered, Endangered or Vulnerable on the IUCN Red List.

Moreover 33 amphibian species are kept in the Terrarium section, around half of which have already been successfully reproduced. Ten of the amphibian species kept at the Terrarium section are threatened, two thirds of them were already bred. During the global amphibian crisis, it is important that zoos make a stronger plea for threatened species. For instance, both the first breeding worldwide and the first F2 breeding of the Endangered Vietnamese Crocodile Newt (*Tylototriton vietnamensis*) succeeded at the Terrarium section. Of the more than 300 Vietnamese Crocodile Newts which completed metamorphosis at the Cologne Zoo's Terrarium section, a considerable number were already provided to other zoos in Europe and also to a Citizen Conservation Programme, to extend the conservation breeding network. 2019 saw the first repatriation of the Vietnamese Crocodile Newt take place based on offspring from Cologne Zoo.

Another success story is that of the Green Toad (*Bufotes viridis*) in Cologne, which we inform visitors about at the Green Toad exhibit and rearing station on the upper floor of the Aquarium. For the conservation of this locally threatened amphibian, research is performed, new biotopes are created as step stone habitats and larvae are reared in the rearing station. At the end of the year, the young toads are finally released in Cologne Zoo to stabilise and restock declining natural subpopulations, of which there have been more than 1,500 individuals in the last year. The flagship One Plan Approach project was awarded in 2019, with partners from Cologne Zoo (together with the Cologne Drainage Utility, "StEB Köln"), NABU Nature Conservation Station Leverkusen-Köln and the University of Technology at Brunswick as an official project of the UN Decade on Biodiversity (CBD, Convention on Biological Diversity).

The Philippine Crocodile – Back Home

After the Nile Crocodiles were moved from the Terrarium section to Cologne Zoo's Africa house 'Hippodom' in 2010, their former enclosure was extended and modernised for the Critically Endangered Philippine Crocodile (*Crocodylus mindorensis*). The Philippine Crocodile show exhibit was opened in 2011 and the first European breeding succeeded there in 2013. Target training is also performed here, which enables us to separate the couple and provide behavioural enrichment. Behavioural research has already been performed by a number of student theses dealing with spatial use, thermoregulation, and reproductive behaviour.

The European Conservation breeding programme is coordinated from Cologne Zoo, the participants of which financially support the Mabuwaya Foundation in performing Philippine crocodile conservation in the north of the country. Because hybridisation with the Saltwater Crocodile has been reported from captive facilities in the Philippines, the European breeding programme has become particularly valuable, as genetic screening had already been performed. In 2015, the first natural breeding success of the Philippine crocodile in Europe took place at Cologne Zoo's Terrarium section. The two male juveniles, Dodong and Hulky, perfectly socialised and purebred, were selected for repatriation, which took place in 2020. This One Plan Approach project was recently highlighted as a success story on the Reverse the Red website.

Another natural breeding was successful in 2021 at Cologne Zoo. The repatriation of the three young females, to continue restocking of diminished natural populations in the Philippines, is currently under preparation. With the support of the Zoological Society for the Conservation of Species and Populations (ZGAP) and the Zoo species of the year 2021 campaign a semi-wild enclosure and education centre is currently being built by our partners Crocodylus Porosus Philippines Inc. (CPPI) in the South of the Philippines. The centre, located in Paghungawan Marsh, Siargao Island Protected Landscape and Seascape (SIPLAS), will be used to house purebred offspring from the European studbook for subsequent restocking measures.

↑ At the terrarium section of Cologne Zoo, the natural breeding of the Philippine crocodile could be documented and studied. © T. Ziegler

↑ Offspring of the Endangered Vietnamese Tiger Gecko (*Goniurosaurus araneus*) at the Terrarium section of Cologne Zoo; based on our field work and threat analyses, Vietnamese and Chinese Tiger Geckos only recently were included in the CITES Appendices. © A. Rauhaus

↑ This year we had the first breeding success of the Critically Endangered Mitchells Monitor Lizard (*Varanus mitchelli*), the parents of which derived from a confiscation and were provided to us in 2021 © A. Rauhaus

The Aquarium Section - Focus on Threatened Malagasy Freshwater Fish

Also, in the Aquarium section a focus on threatened taxa was built-up in the last few years with sustainability and protection of the environment highlighted. In the context of a waste campaign, we focused on the problem of water pollution. It is important to note that we do not purchase animals caught from the wild, instead we rely on captive bred offspring. We currently keep 25 threatened fish species in the Aquarium section, one of them is already extinct in the wild, four Critically Endangered and 11 Endangered. Also protected corals are reproduced in the Aquarium section and subsequently provided to other institutions.

Currently we are extending our commitment to micro-endemic species, specifically to the threatened Malagasy freshwater fish species. Madagascar has a unique biodiversity. In particular freshwater organisms are threatened through deforestation, invasive species and overfishing. In 2003 internationally renowned experts reinforced the fact that *in situ* measures would not be sufficient and thus highlighted and stressed the necessity of conservation breeding of threatened Malagasy freshwater fish in zoos. Thus, in the Aquarium section of the Cologne Zoo we currently keep 10 threatened freshwater fish species from Madagascar, one of them is Critically Endangered and seven are Endangered. They have been genetically analysed and so far, offspring of the seven species have been successfully bred in Cologne thus available for potential repatriation, once it is required. Another focus is the distribution of offspring to other zoos in Europe to establish a stable conservation breeding network. Also, Citizen Conservation programmes for threatened Malagasy fish species have been built-up recently based on our breeding successes. As a basis for establishing an improved conservation breeding network, a Masters of Education thesis was conducted at Cologne University analysing zoo holdings of threatened Malagasy freshwater fish worldwide. The results, recently published in the US journal Zoo Biology, can now be used for filling the gaps in *ex situ* conservation, for optimised conservation breeding and network development measures.

Insectarium Section – Together with Bristol Zoo for the Desertas Wolf Spider

In recent years diverse projects for threatened invertebrates came into being. Several Island endemic species from Madagascar, the Philippines, Sri Lanka and the Seychelles, such as the Giant Millipede (*Sechelleptus seychellarum*) and Fregate Enid snail (*Pachnodus fregatensis*), both listed as Endangered, were added to the collection of the Insectarium section. Furthermore, a number of protected tarantula taxa are kept and bred, among them several ornamental tarantula species (genus *Poecilotheria*). Also, recently, the Critically Endangered Vietnamese Giant Magnolia Snail (*Bertia cambojiensis*) reached us through ZSL to extend the conservation breeding network.

The Desertas Wolf Spider (*Hogna ingens*), which is listed as Critically Endangered, is among the most threatened spiders in the world.

The species is endemic to an island restricted to a small valley on Deserta Grande, an uninhabited island off the coast of Madeira. The natural habitat covers barely three kilometre in length and only several hundred kilometres in width.

The Desertas Wolf Spider is in serious decline due to invasion by a fast spreading, non-native grass that overgrows formerly open, non-vegetated soil and rocks. Because the natural population is declining and to prevent extinction, Bristol Zoo has launched a conservation breeding programme. Early in 2019, Cologne Zoo was the first German zoo to accept these spiders, receiving 40 from Bristol Zoo. After successful breeding at the Insectarium section sufficient offspring were generated (ca. 2,000 spiders up to now) to be provided to other zoos to extend the conservation breeding network – so far, we have supplied our offspring to nine European zoos. This is a promising example of a successful *ex situ* species conservation mission, which conveys the effectiveness of using storytelling as the rescue operation was well communicated to the zoo community and to the general public.

↑ Backstage view of the 20,000 litres show tank for threatened Malagasy freshwater fishes during TV shooting. © T. Ziegler

↗ Show exhibit for the Desertas Wolf Spider (*Hogna ingens*) with modern signposting and insight into the backstage rearing facilities for threatened invertebrates. © T. Ziegler

↑ Vietnamese-Laotian-German cooperation team in the newly created Ban Soc Crocodile Conservation Area, where the Siamese crocodile (*Crocodylus siamensis*) was previously re-discovered based on the team's research. © T. Ziegler

Finally – Together for the One Plan Approach

Lately, our activities in the Aquarium have been closely connected with in situ projects. The central theme of Cologne Zoo's Aquarium house, which has recently developed into a species conservation centre, is the IUCN's One Plan Approach.

In particular, with our cooperation partners in Vietnam, Laos and the Philippines, we have developed strong collaborations. In the field we have helped our partners to discover and document more than 130 new vertebrate species. It is only possible to protect the species that are known and officially documented. By means of modern scientific methods, such as eDNA analyses or species distribution models (SDM's), we help our partners to uncover previously unknown populations of threatened taxa. Together with local partners and students we investigate the population status and by doing so assess the threat potential of threatened taxa, perform animal trade analyses and help to create basics for improved conservation. For a number of species, we have already made an impact on their official or increased conservation status (IUCN Red List, CITES) and discoveries have been made from our field work where groundwork for protected areas led to the establishment or extensions of the protected areas, or to status upgrades. Additionally, we support the conservation authorities by providing administrative assistance in confiscation cases of threatened animals both in Europe and in Southeast Asia, and turn them into conservation breeding programmes, or restocking.

Even during the covid pandemic, based on the stable networks with our cooperation partners, we continued to advance conservation and research projects on site. Without these strong alliances, and the investment in repatriation and restocking projects, this would not have been possible. For many of the species we study and preserve *in situ*, in Southeast Asia's last remaining forests (e.g., Crocodile Lizards, Crocodile Newts, Tiger Geckos, Warty Newts), we also run *ex situ* conservation breeding programmes in Cologne Zoo's Aquarium. The species are ready for repatriation, if required in the event that local protection measures are insufficient or cannot be implemented in time.

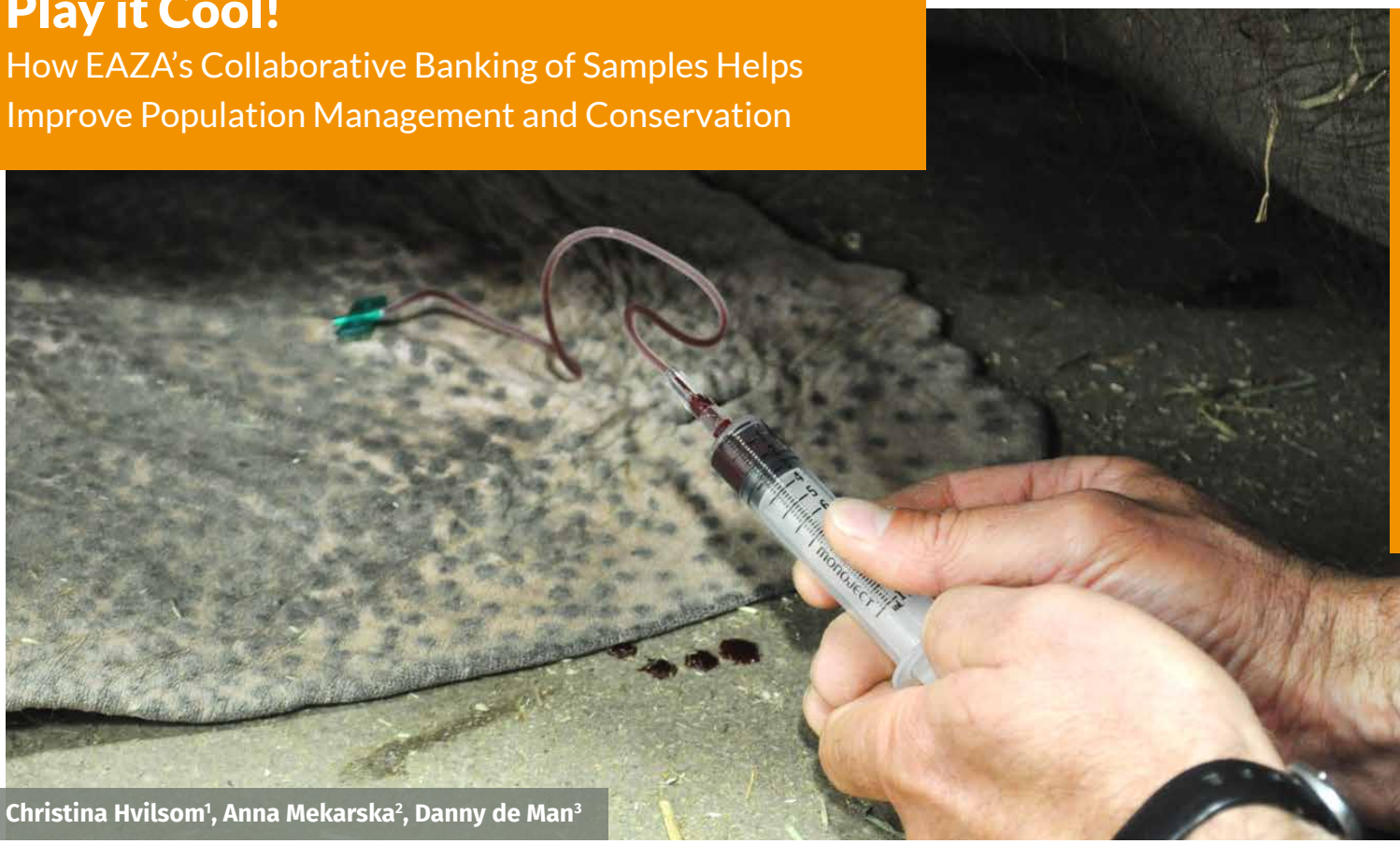
Students in our working group carry out analyses in order to be able to promote improved species conservation in an even more targeted manner, for example by evaluating zoo databases as a basis for improved *ex situ* measures. Furthermore, endemism analyses are carried out and protected area coverage is examined to show the gaps in conservation and thus use as a basis for further conservation measures, e.g., inclusion of species in the IUCN Red List, suggestion of the designation of new protected areas, or the establishment of conservation breeding programmes. Our most recent threat analysis, based on a bachelor thesis conducted at the University of Cologne, was published in Nature Conservation "Assessment of the threat status of the amphibians in Vietnam - Implementation of the One Plan Approach".

Our course of action is another successful example of the One Plan Approach, which is supported by the IUCN and aims to develop integrative strategies to combine *in situ* and *ex situ* measures with groups of experts for the purpose of improved species conservation.

By following this approach, Cologne Zoo's Aquarium with its dedicated team and partners plays a prominent role in international species conservation, which in the present day is more important than ever. We wish Cologne Zoo's Aquarium as modern Ark and its connected conservation projects with their strong potential all the best for the future and hope that many others will jointly head to the "Conservation Zoo".

Play it Cool!

How EAZA's Collaborative Banking of Samples Helps Improve Population Management and Conservation



Christina Hvilsom[1], Anna Mekarska[2], Danny de Man[3]

[1]Chair of the EAZA Biobank Working Group, [2]EAZA Biobank Coordinator, [3]EAZA Deputy Executive Director and Director Conservation and Population Management

The EAZA Biobank, has made a transformative journey from a vision formed back in 2016, to being a well-established resource supporting population management and conservation research created by the European and Western Asian zoo and aquarium community. The success of EAZA *Ex situ* Programmes (EEPs) relies on intensive demographic and genetic management of animal populations. Currently, the majority of population management undertaken in zoos is individual and pedigree-based. Whilst this method works well for some populations, for other populations pedigree records might be incomplete or not available at all. Management can be further complicated by relatedness among founders which often builds upon assumptions and taxonomic uncertainties as well as for some species, their natural history does not lend itself to individual pedigree-based management (e.g., species living in groups). Given the expanding needs and possibilities for the use of molecular tools in population management it is necessary to ensure optimal and long-term storage of high-quality material that will have a significant impact on future population management and conservation research. The EAZA Biobank meets these requirements and is a unique international initiative collecting and storing samples from 400 Member institutions located in 48 countries!

Since its inception, four dedicated institutions have provided employment of qualified staff and allocation of funds for infrastructure and equipment to serve as the long-term, high-quality storage facilities (Hubs), where the physical samples are kept. These Hubs are located at Copenhagen Zoo, Antwerp Zoo (KMDA - Royal Zoological Society of Antwerp), Edinburgh Zoo (Royal Zoological Society of Scotland) and IZW in Berlin (Leibniz Institute for Zoo and Wildlife Research) and are the cornerstones of the EAZA Biobank. These four Hubs provide the daily sample handling, facilitate the transfer of samples from zoos and aquariums to the nearest dedicated Hub, and from the Hubs out to researchers, and serve as sample backup facilities.

Because of the strong support and cooperation of EAZA zoos and aquariums, the Biobank is expanding and growing. The EAZA Biobank has already stored tens of thousands of samples, including historical and legacy collections, from more than 800 species, contributed by more than 250 zoological institutions. As the number of samples grows, so does the number of scientific studies conducted using collected samples. The EAZA Biobank Working Group has approved the release of samples for 27 research projects, with new applications coming in every month. The vast majority of projects are induced or related to EEP programmes. Genetic studies using EAZA Biobank samples cover, among other fields, the problem of hybridization (African penguins) or genetic assessments of EEP populations (Chimpanzee, Orangutan, Red panda, Great green macaws, Malayan tapir, Roti Island snake-necked turtle, Tufted deer). Genetic studies of EEP populations are often linked to understanding their potential to fulfill *ex situ* conservation roles including insurance, source, and other roles as recognised in the IUCN SSC *Ex situ* Guidelines, for example for the Amur leopard, European wildcat, Blue-throated macaw, Asian elephant and Vietnam pheasant. This demonstrates the direct impact of zoos providing samples to the Biobank on biodiversity conservation.

↑ Blood draw in a trained Asian Elephant (*Elephas maximus*) during lay down
© Imke Luders

The EAZA Biobank is also a source of samples from zoo animals for veterinary projects, such as the analyses of vitamin D levels in captive chimpanzees, the role of endogenous retroviruses in the development of the primate placenta or research on the markers of host resistance/susceptibility of suid species to African swine fever. Developments in research techniques and the increasing species extinction crisis are making samples from zoo animals essential.

Advantages for Zoos, EEPs and Researchers

Collecting and storing samples from animals kept in EAZA zoos and aquariums in one centralised Biobank make samples become available to researchers in a much more timely and efficient manner than contacting individual institutions, facilitating much more robust research in a more immediate timeline, of benefit to the species.

Daily routine of opportunistic sample collection by veterinarians is a key to the success of genetic and veterinary research development in modern zoos and aquariums. To facilitate sample collection and contribution the EAZA Biobank has developed tailored protocols for sample collection, (e.g. aquatic species), guidance and templates for ownership and use of the samples. These standard documents are used by zoos and aquariums sending samples to a dedicated Hub. Samples transferred to the Biobank are linked to the animal information held in the Zoological Information Management System (ZIMS). The EAZA Biobank together with Species360 and with financial support from Beauval Nature and KMDA (Royal Zoological Society of Antwerp) have built the EAZA Biobank Institution in ZIMS, allowing members to utilise the existing 'sample storage module' to share sample records and data with the Biobank electronically with the push of a button. This information-rich database offers transparency in allowing contributing members to view their donations via this sample storage module which gives an oversight of what they have already shared.

The EEP Coordinators have a significant role in the process of research project approval, sample collection and use. They often initiate the collection of samples, which is managed by the permanent Biobank Coordinator, rooted at the EAZA Executive Office. The Coordinator position has been instrumental to the success of the Biobank, allowing daily management to run smoothly and ensuring the EAZA Memberships treasure trove of samples are safeguarded so they can be used for multiple research projects, now and in the future.

For researchers, the EAZA Biobank facilitates a fast and systematic process from research review, and if approved, to sample release and use, enabling more population management and conservation research.

↑ Sample legacy collection transfer from CERZA @CERZA

↑ EAZA Biobank Hub Antwerp Zoo ©Antwerp Zoo

Cryopreservation Network

The EAZA Biobank does not have capacity for cryopreservation services at this time, but the EAZA community recognises the importance of cryopreservation of reproductive material and cell lines as additional tools to manage selected species within EAZA member institutions or in the wild. The EAZA Biobank, Reproductive Management Group, Population Management Advisory Group and EAZA Population Management Centre have created a Cryopreservation Network connecting EAZA EEPs and Members with cryopreservation needs to specialised storage facilities and researchers who already have these capabilities and can fulfil these needs. In order to guide the EAZA Membership on this complex and multifaceted issue, guidance and templates for Memorandum of Understanding (MoU) and material transfer agreements on ownership and use of these samples are available.

EAZA is growing its network of cryopreservation facilities and has already signed an MoU with an NGO – Nature's SAFE in the UK. So far, Nature's SAFE has enabled the cryopreservation of 280 different samples submitted by EAZA members. The samples span a variety of tissue types gametes (eggs and sperm), muscle, skin and gonad tissues (ovaries and testes) representing 108 species, including mountain chicken frogs, a jaguar, Owston's palm civets, Javan green magpies, an African wild dog and Boelen's pythons.

By working with additional cryopreservation facility partners and connecting with researchers to help develop species specific protocols EAZA will strive to further build and strengthen this network in the future.

At a time where there is already an urgency to save species under threat before they are permanently lost, it is critical that conservation professionals put on a unified front and coordinated effort. Only by bringing together experts from many fields, the world over, can we make immediate, impactful strides forward. While the EAZA Biobank is the primary resource for genetically supporting population management and conservation research, created by the EAZA Membership, we are dedicated to supporting emerging wildlife biobanks worldwide and facilitating knowledge and data sharing between initiatives and researchers to create a global collaborative network of biobanks, with the ultimate aim of benefitting the conservation of all biodiversity, by any means possible.

More information about the EAZA Biobank can be found at: www.eaza.net/conservation/research/eaza-biobank/

EAZA Biobank Coordinator contact: biobank@eaza.net

Thorntail Stingray Pups in the Open Ocean Exhibit at uShaka Sea World

Simon Chater

uShaka Sea World Curator Aquarium

↑ Stingray (*Myliobatoidei*) Release © Don Hunter Wildlife Photography

The South African Association for Marine Biological Research (SAAMBR) operates the uShaka Sea World Aquarium in Durban, South Africa which is home to more than 7,500 animals of 514 species, including three adult thorntail stingrays (*Dasyatis thetidis*). Since 2012 the male, aptly named Casanova, and two females, Dippy and Miss Cape Town, have produced more than 70 pups. Thorntail stingrays are found off southern Africa, New Zealand and Australia and are among the largest stingrays in the world.

Casanova is often seen pursuing the females and mating behaviour is also commonly observed. Gestation can take up to nine months, with the females carrying the developing embryos through aplacental viviparity. The pups are usually born in the early hours of the morning after which they are removed from the 2.2 million litre exhibit. The beautiful pups are miniature replicates of the adults except for a small, white fleshy round end to their barb which prevents the mother from being injured during the birthing process. These little rays fend for themselves from birth and after a veterinary check-up and health clearance they are released off the beach near the aquarium into the warm water of the West Indian Ocean. Releasing the rays always bring great excitement and serves as a wonderful opportunity to communicate ocean conservation to the greater public.

Thorntail rays are often caught by commercial and recreational fishers especially as bycatch by inshore trawlers and demersal longliners, and this species is listed as Data Deficient by The International Union for Conservation of Nature (IUCN). There are approximately 25 species of rays along the South African coastline with limited knowledge of their coastal movements and migrations.

The South African Institute for Aquatic Biodiversity (SAIAB) initiated a study using acoustic telemetry to study the movement of four ray species and gained many insights which are assisting scientists with conservation planning initiatives. SAAMBR works closely with SAIAB investigating the spatial ecology of various elasmobranch species (sharks, skates, rays and sawfishes) while contributing to conservation science.

Stories of animals being released into the wild enhances the human connection with the ocean which encourages and inspires people to become more environmentally mindful. Inspired people participate in beach clean-ups, make more sustainable seafood choices and contribute positively to society and the environment. Casanova and his two dames continue to give us reason to celebrate and to inspire. Nothing quite beats a 'day at the office' releasing beautiful and healthy little stingray pups into the wild.

↓ Stingray (*Myliobatoidei*) Release © Don Hunter Wildlife Photography

A Cow is Not Just a Cow

A German Project Supports Zoos in Consering Livestock Breeds

Dr Julia Kögler[1], Sinje Büttner[2]

[1]Deputy Executive Director, Association of Zoological Gardens (VdZ), [2]Project Coordinator, Arche Warder Zoo, Germany

Most zoological gardens keep livestock breeds as well as wild animal species in their collections. This allows them to display livestock animals' genetic diversity, promote cultural and social heritage while at the same time educating the public. Zoos preserve wild animal species and livestock breeds for non-economic reasons and because of their mandate to protect animal genetic diversity. In addition, zoos have the potential to sensitise millions of visitors from various backgrounds on the topic of livestock. However, the potential role that zoos could play in conserving endangered livestock breeds and in educating and communicating about this topic, so far remained at an institutional engagement level rather than following a coordinated, strategic, and cross-institutional approach.

Therefore, the Association of Zoological Gardens ("Verband der Zoologischen Gärten" - VdZ), based in Berlin, and Arche Warder Zoo, Germany, initiated a three-year model and demonstration project in 2020 in order to increase the overall contribution of zoos to the conservation of endangered livestock breeds. VdZ is a regional zoo association and currently represents 71 members in Germany, Austria and Switzerland as well as one member in Spain. Arche Warder Zoo is a member of VdZ and Europe's largest center for endangered livestock breeds, with about 1,200 individuals in 87 breeds. The joint project is supported by substantial funds from the German Federal Ministry of Food and Agriculture.

The project aims are to:

(a) Implement scientific conservation breeding programmes and cross-institutional population management for endangered livestock breeds.

(b) Educate on the topic of livestock.

(c) Network and increase internal and external communication.

Dr Julia Kögler from VdZ and Sinje Büttner from Arche Warder Zoo outline the project implementation and the results so far.

As a scientific base for the project, we adopted the Ministry's list of 140 livestock breeds which are specifically monitored and managed in and by Germany (BLE 2019). Furthermore, in 2020 we carried out a survey amongst our 56 German members to evaluate their livestock collection (Kögler 2021). We found that 45 VdZ zoos kept a total of 1,070 individuals of 74 regional livestock breeds. Amongst those, 27 VdZ zoos had 569 individuals of 29 different large animal breeds, i.e. horses, cattle, pigs, sheep and goats. Thus, as a first result we showed that our members have 38% of Germany's 77 large livestock breeds on display for visitors. The large breeds kept in zoos represent 54% of Germany's 14 breeds with an urgent status for conservation measures and 56% of Germany's 36 breeds with a medium status for conservation measures. Secondly, we found that only 12 out of the 27 zoos with large regional livestock breeds held a total of 263 individuals of 24 breeds that were registered in studbooks.

This result made it clear that within the framework of the project, studbook breeding had to receive special attention by means of entering more zoo born animals in the respective studbooks and by purchasing additional breeding animals from studbook holders. So far, 27 individuals of the five project focus breeds ("Deutsches Schwarzbuntes Niederungsrind", "Hinterwälder Rind", "Coburger Fuchsschaf", "Rauhwolliges Pommersches Landschaf", "Bunte Deutsche Edelziege") have been funded by project means and added to zoo collections. In 2021/2022, 17 offspring of the focus breeds were born and have been or will be entered in studbooks. It would not have been possible to coordinate the active and cross-institutional management of populations and maintain the fruitful engagement with the regional breeders' associations if the project funding had not enabled the recruitment of a project coordinator.

↑ Child and piglets at Arche Warder Zoo © Ferienpass Lauenburg

↑ The VdZ livestock suitcase in use © Sinje Büttner

In addition to optimising conservation breeding, another project focus is on public education. Zoos have great opportunities to sensitize and inform visitors about the unique animal genetic diversity of livestock breeds, their history and usage and about the threats and challenges these breeds currently face. We use internal communication to raise awareness on the topic within the zoo and educators' community. Furthermore, we encourage our members to maintain or develop high quality signage in their livestock areas. The presence of livestock animals in zoos provides educational value in that they allow visitors to have a 'hands-on experience' where the animals' behaviour can be observed up close and they can be fed and petted.

In order to embed the topic of livestock firmly into the educational programmes of zoos on a long-term basis it was the project's goal to invent and produce the first-ever, so-called "VdZ livestock suitcase". By means of this, we wanted to provide dedicated zoos with a free-of-charge collection of innovative educational materials to be used in zoo schools or in front of livestock enclosures. The suitcase was developed throughout the course of the project and in cooperation with the Association of German-speaking zoo educators (VZP). The content of the suitcase is made up of high-quality items, such as realistic animal toy figures of livestock and of the wild animal species they derived from respectively. There are also specifically designed memory and quartet card games portraying different endangered breeds, posters displaying the remarkable diversity of livestock breeds, carbon footprints in different sizes for sustainability games and an extensive instruction booklet with background information on livestock issues and suggestions on how to utilise the material collection. We were cheering in spring 2022, when after an extensive planning and evaluation phase 50 "VdZ livestock suitcases" were produced and sent to German, Austrian and Swiss zoos. On this occasion, we also published a press release which received extensive media attention.

Last but not least, the project also wants to increase the internal and external communication about livestock breeds in general and the role zoos can play to conserve them. The project has already been presented at numerous conferences, congresses and in online sessions to draw attention to the topic and to increase our networks. A future event highlight will be the "Interdisciplinary VdZ symposium on the preservation of old livestock breeds" which will be held in November 2022 at Nordhorn Zoo, Germany. Here, zoos, breeding and zoo associations, authorities, educators, scientists, and private breeders will come together to discuss how to best incorporate zoos in the conservation of endangered livestock. It is planned to install this symposium as a bi-annual event, even after the project has ended. We also noted during the project's lifespan that partnering zoos are increasingly drawing attention to livestock breeds by incorporating them in events, carrying out "livestock days" together with regional breeding associations and by regularly highlighting livestock stories in press releases and via social media channels. Usually, this results in increased public interest and generates media coverage.

In summary, it can be stated that our project has already successfully promoted and supported the potential of zoos for the conservation of endangered livestock breeds within the zoo community and across various, old, and newly gained external stakeholder groups. We look forward to working together with our many supporting members and partners on further achievements for the sake of endangered livestock breeds!

Note: This project is supported by funds from the Federal Ministry of Food and Agriculture (BMEL) based on a decision of the Parliament of the Federal Republic of Germany via the Federal Office for Agriculture and Food (BLE), grant number 2818BM030 and 2818BM031.

Bibliography:

Bundesanstalt für Landwirtschaft und Ernährung (2019): Einheimische Nutztierrassen in Deutschland und Rote Liste gefährdeter Nutztierrassen 2019. Available at: https://www.genres.de/fileadmin/SITE_MASTER/content/Publikationen/TGR/TGR_buch_roteliste_2021_web.pdf

Kögler (2021): Bestandsmonitoring einheimischer Nutztierrassen in Zoologischen Gärten als Basis für eine ex-situ in-vivo Erhaltungsstrategie (Monitoring regional livestock breeds in zoological gardens as basis for an ex-situ in-vivo conservation strategy). Zool. Garten N.F. 89 (2021) 57-66. Available at: https://www.vdz-zoos.org/fileadmin/Materialien/Nutztierrassenreport_2021.pdf

JAZA's Effort on *Ex Situ* Conservation of the Amami Spiny Rat in Collaboration With the Ministry of the Environment

Dr Yoshiko Takaki

Saitama Children's Zoo Park, Species Coordinator of the Amami Spiny Rats on the Biodiversity Committee of JAZA

In 2021, the Amami Islands in Japan, specifically the Northern part of Okinawa Main Island, and Iriomote Island, were registered as World Heritage sites by UNESCO as the island has rich biodiversity value with a very high percentage of endemic species, many of them globally threatened.

Tokudaia spp. consist of three species: the Okinawa spiny rat (*T. muenninki)*, the Tokunoshima spiny rat (*T. tokunoshimensis*), and the Amami spiny rat (*T. osimensis*). They are one such endemic genus at Amami Islands, and endangered or critically endangered because of deforestation, land development, invasive alien species such as the Small Indian mongoose (*Herpestes auropunctatus*) or feral cats, and other threats. Therefore, maintaining and improving their habitat is very important from the aspect of *in situ* conservation. In addition, the implementation of *ex situ* conservation is also required at some special breeding facilities. The Japanese Association of Zoos and Aquariums (JAZA) and the Ministry of the Environment (MOE) decided to initiate captive breeding of Tokudaia spp. at zoos based on the Basic Agreement on Promotion of Biodiversity Conservation in May 2014.

Prior to this collaboration a few researchers had previously attempted to breed spiny rats but despite keeping them for years they failed to breed. So, we zoo specialists began to establish a breeding technique for Tokudaia species and to research their breeding ecology and reproductive physiology such as gestation period, breeding season, etc.

We targeted the Amami spiny rat first because the status of the wild population is comparatively stable. Even if we capture founders from the wild, it will not have a serious impact on the wild population compared with the other two species.

We captured a total of 36 founder individuals from 2017 to 2019, and three institutions initially participated in this *ex situ* conservation programme.

At the beginning of September 2018, Miyazaki city Phoenix Zoo bred the spiny rat for the first time, but the offspring only survived two months. On 16 November the same female gave birth once again and this time the offspring were fully grown. This was the first breeding record for the Tokudaia species in captivity. Following this, Saitama Children's Park Zoo also introduced a breeding programme in December 2018.

In 2019, Tokyo Inokashira Park Zoo and the Kobe Animal Kingdom joined this programme and now Yokohama Kanazawa Zoo, Kagoshima Hirakawa Zoo, and Adachi Park of Living Things are all participating. The seven zoos currently keep about 90 individuals, of which Miyazaki, Saitama, Kanazawa, and the Kobe Animal Kingdom have succeeded in captive breeding. At the beginning of October 2022, we reached the third generation in captivity, and this milestone meant that we had achieved the implementation of the husbandry and breeding technique for these species.

The recent situation of wild Amami spiny rats is rapidly recovering as almost all introduced mongooses were wiped out and the feral cats captured programme is continuing at Amami Islands. As a result, it is unnecessary to translocate *ex situ* individuals to the wild, but we believe the captive population is very important to use for conservation education for the public, not only for zoo visitors but also for the local people living on Amami Islands. We are also collaborating with the Amami museum to spread the knowledge of the Amami spiny rat to islanders.

The breeding programmes have allowed us to obtain adequate knowledge and techniques for the breeding and maintenance of the population of Amami spiny rats. We will apply this technique and knowledge to *ex situ* conservation for more endangered Tokunoshima spiny rats and Okinawa spiny rats in the future.

↑ Amami Spiny rat (*Tokudaia osimensis*) © JAZA

Zoos and Aquariums Under 30

The Perspectives of Future Leaders

Frankie Lawrence-Thompson

Projects, Diversity and Inclusion Officer at the British and Irish Association of Zoos and Aquariums (BIAZA)

One truly interesting aspect about modern zoos and aquariums is that they exist, fundamentally in the same framework, all over the world. Whether it's in London, Perth, or anywhere in between, collections around the globe open their gates every morning to excited children, students clasping clipboards, couples on their first date – all trekking to our sites to get lost for a while in the wonder of admiring the natural world, up close and personal. This has been going on, in some form or other, for centuries – zoos and aquariums are intrinsically entwined in the history of so many countries and cultures. But now, we need to look to the future.

The wonderful thing about our institutions is that they are, by their very nature, accessible and inclusive, at least in principle. Anyone can be blown away by seeing a giraffe nibbling on browse or a turtle gliding through the water in real life. Sexuality, disability, gender, age, race, none of that matters – certainly not to the non-human inhabitants. Zoos and aquariums have the potential and ability to welcome people from all walks of life, and inspire them to cherish and protect our planet's wildlife. However, to truly grasp this opportunity of such a global audience, we need to be making it clearer that everyone is welcome through those gates – be they staff, volunteers, visitors, researchers, the list goes on. The classic saying is that 'you can't be what you can't see.' It may seem an odd concept, the relevance of representation in zoos, but its importance cannot be underestimated. If a visitor enters your site and sees a lack of representation and diversity in your keepers, visitors and volunteers, you have the potential to be creating a feeling of alienation, albeit unintentionally. If this means they don't return to your institution, everybody loses.

Offering an inclusive, accessible day out, alongside appealing to a diverse range of audiences, should be an integral aspect in the future planning and design of any zoo and aquarium strategy. Taking steps into embracing a culture of diversity and inclusion can seem overwhelming, but even the smallest changes can herald significant acknowledgement and positivity. Celebrating Pride month by allowing your staff to wear rainbow and pronoun badges, working with your local and national disability charities to find ways to make your site's exhibits more accessible, developing signage and interpretation warning those with sensory needs of environmental changes before they enter your tropical house – all of these concepts, whilst simple in themselves, can move your organisation in the direction of being a workplace – or fun place – for all. This goes beyond the physical aspects of visiting your collection as well.

Your website, your social media, posters on local bus stops – these all offer the opportunity to showcase how welcoming you are to a wide range of staff and volunteers, and the inclusive visitor experience you offer.

Offering an inclusive, accessible day out, alongside appealing to a diverse range of audiences, should be an integral aspect in the future planning and design of any zoo and aquarium strategy.

↑ Diversity and inclusion © Beflast Zoo

Beyond the many internally faced arguments for embracing diversity and inclusion within zoos and aquariums, which cover aspects like increased revenue or better staff recruitment and retention, there is also the crucial aspect of responsibility. Field conservation often fails to consider aspects of health and safety – the practicalities of managing menstruation in remote locations, protection for those identifying as LGBTQ+ in countries where this is illegal, the list goes on. It is fantastic to have such a range of people working to support our zoos and aquariums, and the wildlife they protect, but in acknowledging this, we must also protect the people themselves. Open conversations on these sensitive topics and acknowledging the needs of individuals can only make us stronger as an industry. Another angle, turning once again to look inwards, is the key development of cultural sensitivity and working with indigenous and local communities when designing both field conservation projects, as well as our own exhibits, theming and interpretation back at home. Particularly for those of us based in Western organisations, the white saviour look is not a good one, and certainly not the message we want visitors to be taking home.

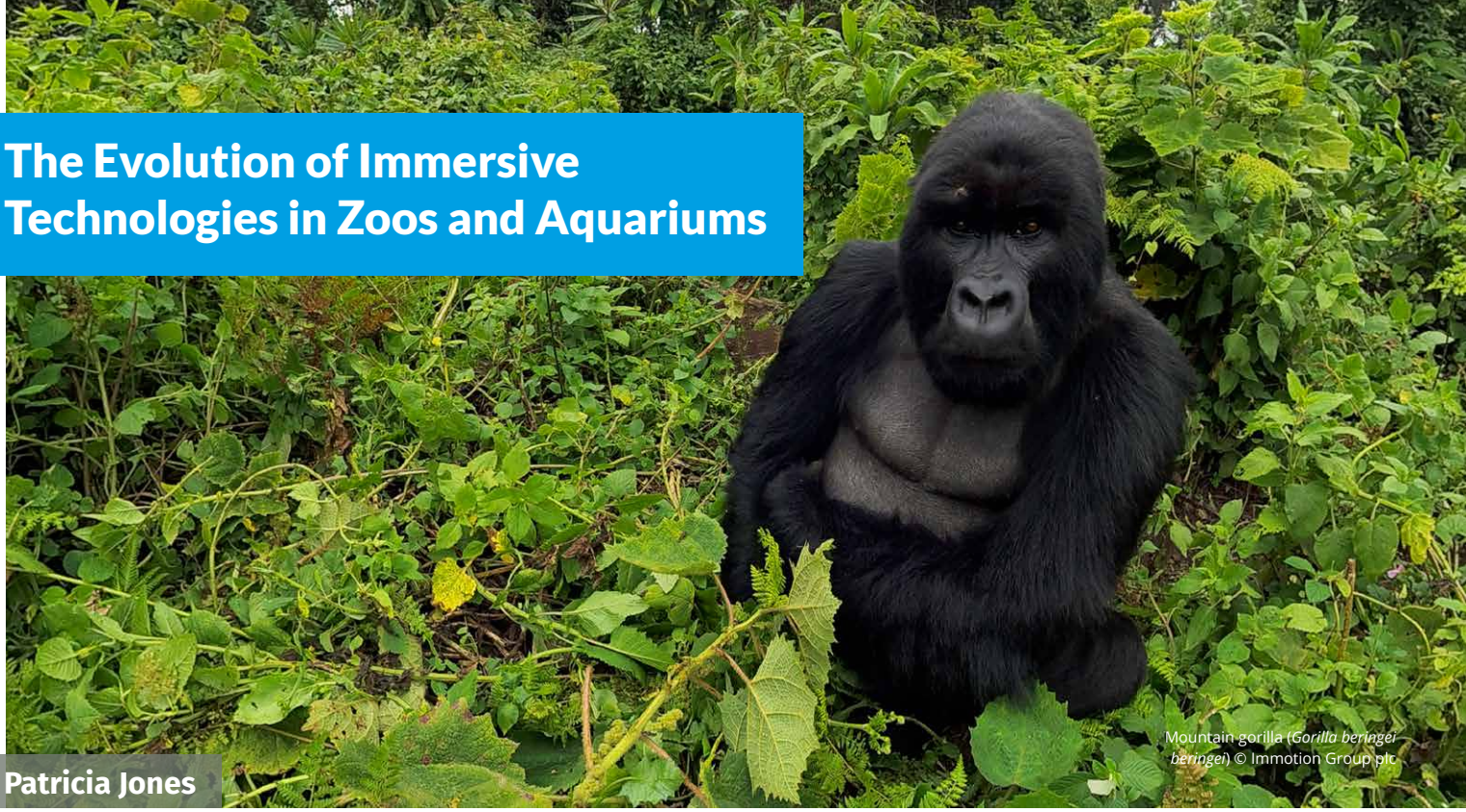
This brings me full circle back to a point raised earlier – steering your organisation under an umbrella intricately woven around diversity and inclusion can, at first, seem an impossible task. As mentioned, even the smallest steps do not go unnoticed, and beyond that, there are so many organisations willing to help. No one expects you to know everything, particularly involving areas that you yourself may never have had to deal with on a personal or professional level, but there is no shame in asking for guidance. The zoo and aquarium community prides itself on open forums and conversations, the willingness to share resources, contacts and ideas simply for the greater good of all. There is no reason this cannot extend from husbandry care sheets and best practice guidelines, to sharing how diversity and inclusion could look in different settings. Looking beyond our own internal networks, hundreds of charities and institutions exist, supporting and offering advice on every aspect of diversity and inclusion, often very local to your own site – you just have to look for them, and send that first email to get the conversation going.

Zoos and aquariums have so long looked inwards, fiercely protective of the animals within our care, but when we look to the future, we also need to take a step back – widen our net of preservation to include the humans too. This might ruffle some feathers (pun not intended), and some might question the necessity. But as modern organisations forever striving to uphold and improve our standards, it is simply impossible for our institutions to ignore this elephant in the room any longer. It is time to embrace the world – natural and human – for the colourful, messy, diverse chaos it truly is.

And that work needs to start right now.

↑ ↑ BIAZA Gold Award Winner Ashleigh Fox © Belfast Zoo
↑ Frankie Lawrence-Thompson © BIAZA

The Evolution of Immersive Technologies in Zoos and Aquariums



Mountain gorilla (*Gorilla beringei beringei*) © Immotion Group plc

Patricia Jones
Immotion Group

The adoption of new technology into zoos and aquariums has been a widely debated topic for years. Is technology a distraction from the mission of zoos and aquariums, preventing people from having real-life encounters with animals? Or can it be layered onto the visit to enhance and deepen the visitor experience?

Companies like Immotion, a US/UK-based immersive 'edutainment' company, have been leading a paradigm shift, focusing exclusively on virtual reality (VR) experience centres for zoos and aquariums with their own brand of live-action documentary content combined with motion-platform seats. Already installed in over thirty aquariums, 2022 marks Immotion's expansion into zoos as they partner with the Dian Fossey Gorilla Fund to create their latest VR experience, Gorilla Trek.

The Dian Fossey Gorilla Fund (DFGF) has long championed education as the cornerstone of conservation. So when Immotion approached CEO Dr Tara Stoinski to participate in the Gorilla Trek VR project, she jumped at the chance. "It was an amazing opportunity for us to transport people to Rwanda to see the mountain gorillas close up and to understand the delicate balance that exists in the conservation efforts," said Stoinski.

The world-renowned primatologist and the Immotion team trekked from DFGF's new Ellen DeGeneres Campus through Rwanda's Volcanoes National Park, where they embedded themselves with a family of mountain gorillas. "Filming the mountain gorillas in stereoscopic 360° virtual reality was the experience of a lifetime," said director Ken Musen, "Once the animals are used to you and accept your presence, they just go about their business, and we essentially become part of the family. So sometimes, they are just a few feet away from the camera." With Dr Stoinski offering in-the-moment commentary, we gain access into the intense interpersonal dynamics of a unique gorilla family. This family has six silverbacks in the troop, but all defered to the dominant, or alpha silverback... or they did until recently. The crew were lucky enough to capture a unique moment, where a beta silverback vied for control. A physical encounter ensued, and the conflict led to the departure of the beta silverback, who left with a female to start his own new family apart from the original group.

The narrative of the virtual reality experience not only showcases the behaviour and internal struggles of a large gorilla family, but it also offers a glimpse into the population plight of the endangered mountain gorillas. The hope is that with the ostracized beta silverback and mate, a new family of gorillas will form. With each new family, there is hope for mountain gorillas to repopulate their decimated numbers.

> **"What is unique about this VR experience is that we're not only seeing the gorillas in the wild, we're transported to their habitat. We are completely immersed in the jungle with them, and the seats move along with the camera motion, adding another level of immersion," said Rod Findley, President (LBE) at Immotion."**
> **Rod Findley, President (LBE) at Immotion.**

The first installation of Gorilla Trek opened at Milwaukee County Zoo in July of this year, where the zoo provided 4,000 square feet of exhibit space. For Amos Morris, Zoo Director, incorporating VR into the guest experience was an easy decision. "Using tech to draw our guests in, to get them excited about where they are, I think it's critical to use all the tools in our toolbox to engage and draw our guest into the zoo," he explained.

As the guests wait to enter the 40-seat motion-platform theater, they experience a fully interactive pre-show. Setting the stage for the conservation message, guests learn about Dian Fossey's legacy; about the differences between eastern and western lowland, cross river, and mountain gorillas; and about the environmental challenges facing mountain gorillas which have led them to being on the brink of extinction. One interactive touchscreen experience allows guests to identify different gorilla behaviours, many of which they will witness first-hand in the VR film. Another interactive element offers guests the chance to compare human and gorilla anatomy, highlighting the distinct parallels. Then there is a final more light-hearted feature, dubbed the Gorilla Personality Quiz, where guests answer questions to discover who they're most similar to, temperament-wise, of all the gorillas in the film.

The pre-show interactive experience primes the guests for a unique and entertaining visit to the VR theater. Before even entering the actual theater space, guests already understand the environmental pressures that adversely affect gorillas and empathise with their plight. Once seated in the VR theater, true transformation begins.

"To be able to fly the visitors over the top of the rainforest, set them down right into the middle of a gorilla troop, while learning all about the social hierarchy and what it takes for these animals to survive in the wild, it connects our visitors," explains Milwaukee's Curator of Primates, Trish Khan. "It gives them the opportunity to bond with the animals and understand why saving them and their environment is so critically important."

The reactions from guests, many of whom had never experienced VR before, has been phenomenal. "I've been coming to this zoo for 65 years and I've never experienced anything like this before," said one guest. "I felt so close to the animals." In fact, VR has been called the "empathy engine," as it has been proven to trigger a stronger empathic reaction than a traditional 2D film projected on a screen. This makes sense, given the technology's capacity to immerse the user in the world – the viewer literally feels transported from their usual surroundings to the new environment. "It made me feel like I was part of that family. It's hard not be moved by what's going on with them," said another guest.

Studies have indeed shown that the memories created in a virtual reality experience are stored in a different part of the brain than images simply watched in a 2D non-immersive video. Users experience the emotional resonance of having actually visited the places they explore in their VR experience, rather than merely having viewed them.

This type of guest experience has been integral to the success of the VR experiences in Immotion's aquarium content deployed over the last three years. The team has worked with marine biologists in Tonga to study the behaviour of humpback whales and their calves. They traveled to The Bahamas, teaming up with Bimini Shark Lab, to swim with tiger sharks in an effort to demystify their role in the ecosystem. Future plans involve traveling to Mozambique to partner with the Marine Megafauna Foundation, and marine biologist Andrea Marshall to study the migratory patterns of manta rays.

Now, the implementation of immersive content and the use of technology throughout zoos and aquariums to enhance education and engagement is no longer a controversial discussion. In addition to its VR offerings, Immotion is currently working on Augmented Reality experiences that tie in, not only to the theme of attractions themselves, but also creating a mesh that can be overlaid across the entire zoo or aquarium.

Education needs to be a two-way street where guests are not just the passive recipients of information, but enjoy a give-and-take where they are actively engaged – where conservation becomes a conversation. The hope is that these new immersive technologies can spark this engagement.

> **"I've been coming to this zoo for 65 years and I've never experienced anything like this before,"**
> **Guest**

↑ Visitor Experience © Immotion Group plc

Engaging Discovery Tour with Portals to Virtual Worlds

AR Hybrid Quest Turns Park Guests From Strollers Into Actors

Anja D'Hondt

Managing Partner BoldMove Nation

↑ AR Quest © BoldMove Nation

Imagine taking your guests on a discovery tour across your park and unlocking virtual portals to other continents or even to past worlds and ages. Combining entertainment with education will make this Augmented Reality experience more immersive, memorable and valuable. BoldMove's AR Hybrid Quest connects your guests to the park's DNA in every sense of the word while offering the perfect mix between actual and virtual realities.

The gameplay is very intuitive and accessible to all ages, it can be enjoyed individually or with family and friends.

AR Hybrid Quest is a "phygital" attraction that combines 'Physical' spaces with 'Digital' gameplay on the guest's smartphone. It contributes to efficient crowd management by spreading people across the venue and optimising the space. This new entertaining and engaging way to enhance and 'augment' the park environment will help guests to better understand the parks dynamics and become a participating actor rather than a distant viewer. Guests will be challenged to discover new things in the physical world and unlock new virtual worlds.

Guests embark on an engaging mission, loading assignments at several physical stations. These can range from playing augmented reality mini games to filling out quizzes and even physical activities relating to the park and animals. In between, tips and information can be made available, or alerts can be given on e.g. feeding of animals or an exciting event taking place in the park, alongside some entertaining games. Virtual portals can be unlocked, inviting guests to enter a 360-degree digital world to view animals in their natural habitat (like a desert) or even meet extinct animals like dinosaurs. A predetermined or non-linear route can be established to manage crowds and guide guests to ensure a smooth and comprehensive visit.

How Can We Work Together?

BoldMove Nation can undertake the entire deployment of the game and attraction setting: from building the stories, implementing the scenes and tools, up to mapping the stations and marking the park areas and installing themed stations. The expert team has over 20 years of expertise in creating successful immersive attractions at theme and water parks, including technical and experience design, integrated storytelling, 3D animation and character design, theming and decor, light and sound technologies and interactivity, up to the actual installation.

→ AR Dino World © BoldMove Nation

We start with a visitor analysis and link this to the park DNA and environment so we can develop together a unique story and experience that perfectly fits your venue. We offer services like StoryLAB, a unique integrated storytelling experience, focus groups and other techniques to engage all participants across the entire process up to the operator training, marketing and merchandising programmes.

How Does AR Hybrid Quest Actually Work?

Upon arrival at the park, the visitor scans a QR code that leads to the application page for log in or registration. This process can be completed at home on the park website before the visit. The QR code can be distributed as a flyer or as part of a promotional campaign. Participants can register individually or as a group with friends or family members, making it accessible for all ages.
On arrival at the park, guests then leave on their quest for different stations, while still enjoying the animal habitats along their trail. However, with AR Hybrid Quest, we can guide them to discover new areas or spend more time at specific areas to solve puzzles and riddles. Stations can vary from a simple sign in a decor to an orchestrated and decorated action stop. The system directs the players in a logical sequence of stations or following an algorithm to those they have not visited yet. The duration of the experience can be adjusted according to the season, the time of day, the crowd in the park or any other criterium.

↑ AR Quest Journey © Boldmove Nation

Together we define the places to visit or highlight at your park, mapping out the entire trail and developing a complete attraction with augmented reality mini games that activate the environment or specific elements. These contribute to a high scoring for the players and their teammates. Guests can also be encouraged to discover something at a specific place – for example, counting the number of black birds in the cage, reading a message in the temple, or finding out what food certain animals like, etc. The app can then display further information with fun and educational facts. During the entire game the players gather points to unlock secret virtual portals that can 'transport' them into another age or environment on the planet – an amazing experience that will WOW your guests! Guests can also collect 3D images of animals to build their own digital library, and project these anywhere in the park or even at their home. We create a themed picture frame so they can take a selfie with their animal of choice and post it on their social media channels or share with friends. Players can exit the game temporarily or put the quest on hold and resume at any chosen time. Upon completion of the quest, they will be sent to a specific end location where they can make a Giant Selfie, encapsulated in the park design and theming. This can be posted on their own and the park's social networks.

From Casual Stroller to Engaged Actors

The major benefit of the AR Hybrid Quest is that it forges a stronger connection between the park and the visitors, turning them into active participants rather than passive strollers. Guests will feel more involved and engaged, be encouraged to discover, and unveil things they would not have seen by just walking around.
Secondly, the product offers an opportunity to boost the educational programme of the park in a more immersive way. By integrating appealing characters and theming, guests will be more inclined to learn and absorb information. It is an entertaining and educational way of engaging family members of all ages.
An opportunity for the younger generation to be glued to their smartphones for a different reason!

Finally, the AR Hybrid Quest gives new ways to sell themed merchandise or offer rewards and discounts to draw more guests to the food and beverage locations. Players can unlock new quests to ensure they have a complete collection, whilst encouraging the flow of guests to restaurants and shops. The gameplay cartoon characters are available to buy so that players can take a physical souvenir home with them.

Fun Theming and Gameplay

On the subject of IP, the AR Hybrid Quest can be customised to themes like wildlife, dinosaurs, or even mythical creatures. Additionally, an extra seasonal dimension can be added, or it can be adjusted for corporate teambuilding and school groups. We also provide customised content to fit the already established identity of the zoo which will convey the message in a more fun and engaging manner.

We can also integrate likeable cartoon creatures, like the Marsupilami which is an adventurous exotic character and a perfect guide for children and families. Marsupilami is a superhero animal from the Palombian forest that can jump and fly on its large tail, and cares for the environment and family values. TooMush is another IP developed by BoldMove Nation, featuring a funny mushroom that lives in the forest. Both of these are available with an extensive merchandising programme that can be offered in the park's shop as fun souvenirs, generating extra profit for the park.

BoldMove also creates media based dark rides with fun gameplay for the entire family. The leading French theme and animal park Le PAL is soon opening a Smash & Reload dark ride with TooMush characters and gameplay. This double action dark ride takes guests on a fun filled dynamic mission to save the Mushies, with a high scoring feature for repeat visits. Such indoor attractions are very popular and allow for an all-year round experience, which can be purchased with an additional ticket.

Find out more about our different products on www.boldmove-nation.com or contact Anja D'Hondt at anja@boldmove-nation.com

Behind the ZIMS

Q&A With Peter Müller, Tiger International Studbook Keeper

Sumatran Tiger (*Panthera tigris sumatrae*)
© San Diego Zoo Wildlife Alliance

Paula Cerdán
Animal Welfare and Conservation Coordinator, WAZA

Behind the ZIMS aims to showcase the behind the scenes work of International Studbook Keepers and to show the relevance and contributions of WAZA International Studbooks in the work we do in wildlife conservation and professional population management.

Q&A with Peter Müller

Peter Müller
Graduate Biologist & Zoo Director (retired)
Tiger International Studbook Keeper

ISB kept: International Tiger Studbook, including International Studbooks for all six living subspecies of the Tiger (*Panthera tigris sp*)
ISB Host Organisation: Zoological Garden Leipzig, Germany
Year Started as ISBk: 1973

For how many years have you been acting as the species' International Studbook Keeper (ISBk) and why did you become an ISBk?

Dr Vratislav Mazak was the first keeper of the "Studbook for Rare Tiger Subspecies" in Prague. In 1973 Leipzig Zoo took over the studbook and Dr Siegfried Seifert was the official studbook keeper.

Given my role as curator of the carnivores in this time, I was tasked with the important and interesting duty of working on and since 1993 I have been responsible for the studbook alone.

As all surviving subspecies were already threatened, in 1976 we started to publish the studbook under the current title annually, initially with the data for the Amur and Sumatran tigers only. The remaining four subspecies were added in the following years.

How has the International Studbook (ISB) contributed to the species' conservation? What do you see as the value of your ISB?

When this studbook was initiated in 1966, there were no existing regional or global breeding programmes for any of the subspecies and the number of tigers in scientifically managed zoological gardens was critically low. Time-consuming research into their pedigrees was required in order to include only pure-bred individuals into the studbooks of the subspecies. Starting with Dr Mazak's datasets of 454 registered individuals, the main task of this studbook has always been to collect reliable and complete datasets to lay the foundation for scientifically managed populations for all six subspecies.

In 1981, the Species Survival Plan (SSP) of the back then American Association of Zoological Parks and Aquariums (AAZPA), now Association of Zoos and Aquariums (AZA) was the very first regional breeding programme for tigers. Other regional programmes for the different subspecies in additional countries followed in consecutive years.

In 1984, Prof Dr Ulysses Samuel Seal developed the first Global Animal Survival Plan (GASP) for tigers together with the Conservation Breeding Specialist Group (CBSG). It was followed by the two Global Species Management Plans (GSMPs) for the Sumatran tiger (2008) and the Amur tiger (2012). All these breeding programmes use the international studbook data for population management purposes. Today, there are 10,570 pure-bred tigers registered in the international studbook, out of which nearly 1400 individuals are currently living in human care.

How has the ISB contributed to *ex situ* conservation in practical terms?

Due to the exact data collection for all registered tigers, it was possible to identify reported errors through genetic analysis and to subsequently exclude hybrids or tigers with unknown origin from the breeding programmes. The detailed datasets about the individual's pedigrees allow for the best possible population management by reducing inbreeding effects to a minimum, therefore ensuring the best genetic diversity of the population.

Based on my information, data of the International Studbook has been analysed especially in its annual editions, as well as in the publications of the regional and global breeding programmes.

Furthermore, data has been used to contribute to the following publications:

TIDIERE, M., P. MÜLLER, A. SLIWA, A. SIBERCHICOT and G. DOUAY (2021): Sex-specific actuarial and reproductive senescence in zoo-housed tiger (Panthera tigris): The importance of sub-species for conservation. Zoo Biology 40, pp. 320-329

TIDIERE, M., G. DOUAY, P. MÜLLER, A. SIBERCHICOT, A. SLIWA, M. WHIPPLE and M. DOUHARD (2021): Lifespan decreases with proportion of sons in males but not females of zoo-housed tigers and lemurs. J Evol Biol 34, pp.1061-1070.

How do you see your work as an ISBk supporting conservation action for the species in the wild?

Originally, a relatively large number of wild born animals had reached zoological gardens, which contributed to build up today's populations of tigers under human care. Through dedicated population management efforts, inbreeding effects within the *ex situ* populations of the subspecies could be increasingly reduced over time and a nearly natural genetic diversity could be achieved today. Therefore, no additional wild born animals are required for future breeding efforts to maintain the insurance populations under human care.

In addition, through the annual publications of the studbook, we have the opportunity to highlight all necessary efforts for the protection of wild populations.

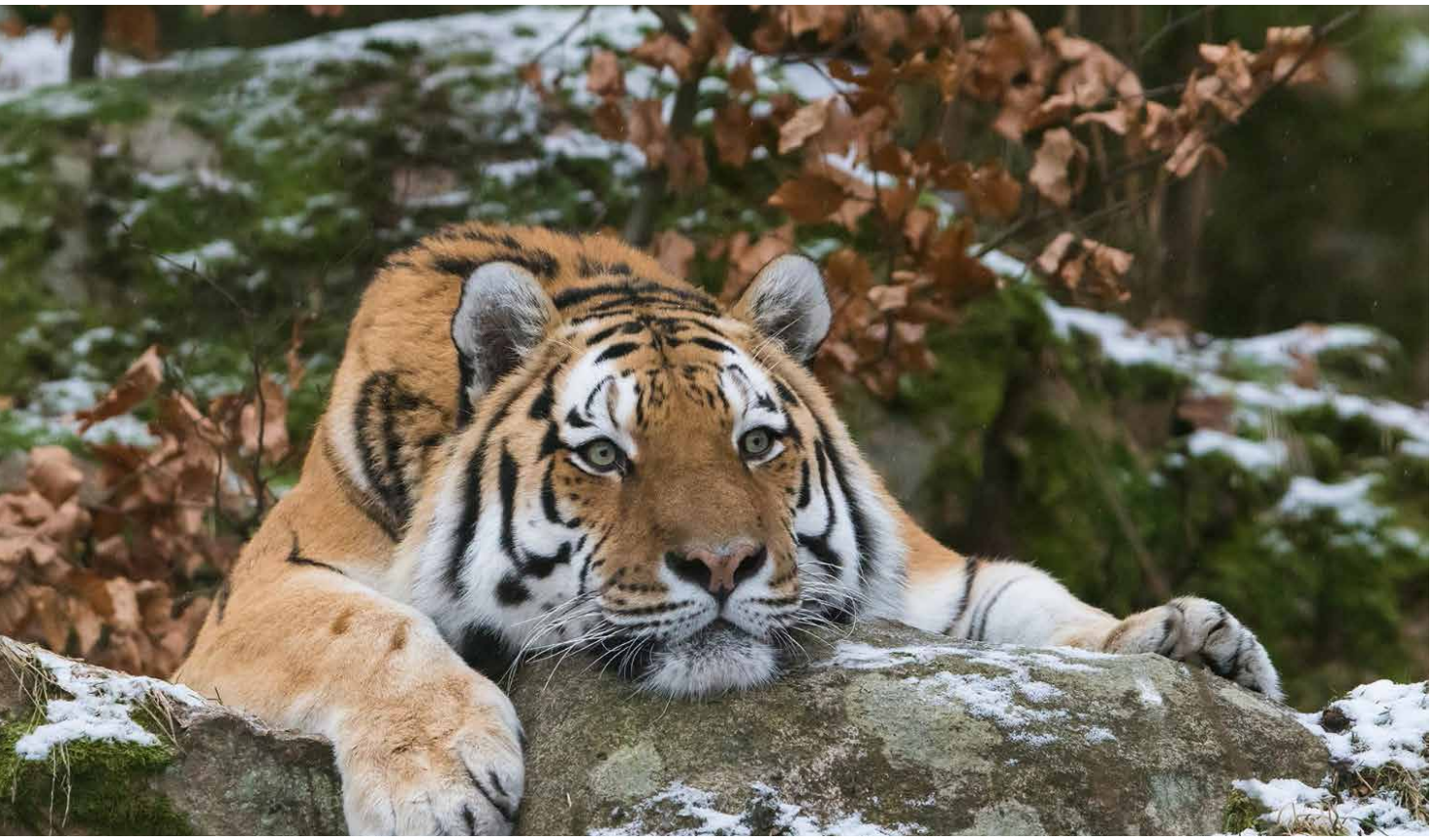
"Through the cooperation between WAZA and individual zoos with the WWF, demands for stricter protection actions can be pushed for at political levels. In some tiger states, for example, the number of tigers has risen again in the last 50 years, while in others they are unfortunately still declining."

The International Tiger Studbook also contributes to the conservation of *ex situ* populations of the subspecies, which are already or almost extinct in the natural range. These are the South China, the Indochinese and the Malayan tiger. A reintroduction of tigers is unfortunately only a theoretical alternative for safety reasons and because of the loss of natural habitat at this point in time.

What do you see as the next chapter or role for International Studbooks?

One of the most important responsibilities of my international studbooks in the future is to provide the data basis for a healthy *ex situ* population of all subspecies of the tiger, so that they can at least survive in the zoological institutions for the time being and potentially serve as a source for future reintroductions. It is one of the most impressive and charismatic mammal species, which is also of great cultural importance in its Asian range countries.

It is important to continue to support breeding programmes as well as to improve not only the acceptance of the necessity, but also the importance of international studbooks, especially in Southeast Asian countries. Furthermore, it is important to increase contact with the individual tiger holders, strengthening cooperation by providing regular information updates and the acquisition of new tiger holders among the zoological gardens of the world as well as focusing on the continuous improvement of knowledge on the husbandry of tigers.



↑ Siberian tiger (*Panthera tigris altaica*) © Erik Edvardsson

Update on International Studbooks (ISBs) and Global Species Management Plans (GSMPs)

Changes between 10 June to 14 November 2022.

ISBs Published

- **Hartmann's Mountain zebra** (*Equus zebra hartmannae*), 2021 ed. – Tania Langenhorst (Marwell Zoo, UK)
- **Grevy's zebra** *(Equus grevyi)*, 2021 ed.– Tanya Langenhorst (Marwell Zoo, UK)
- **Persian leopard** *(Panthera pardus saxicolor)*, 2021 ed. – Susana Nolasco (Jardim Zoológico de Lisboa, Portugal)
- **Vicugna** (*Vicugna vicugna*), 2021 ed. – Christian R. Schmidt (Zoo Zürich, Switzerland)
- **Cheetah** (*Acinonyx jubatus*), 2021 ed. – Laurie Marker and Becky Johnston (Cheetah Conservation Fund, Namibia)
- **Mexican wolf** (*Canis lupus baileyi*), 2022 ed. – Sarah Greely (The Living Desert Zoo Gardens, US)

ISB Transfers

- **Coquerel's Sifaka** (*Propithecus coquereli*). Intra-instiutional transfer from Katherine Byrnes to Danielle Lynch (Duke Lemur Center, US)

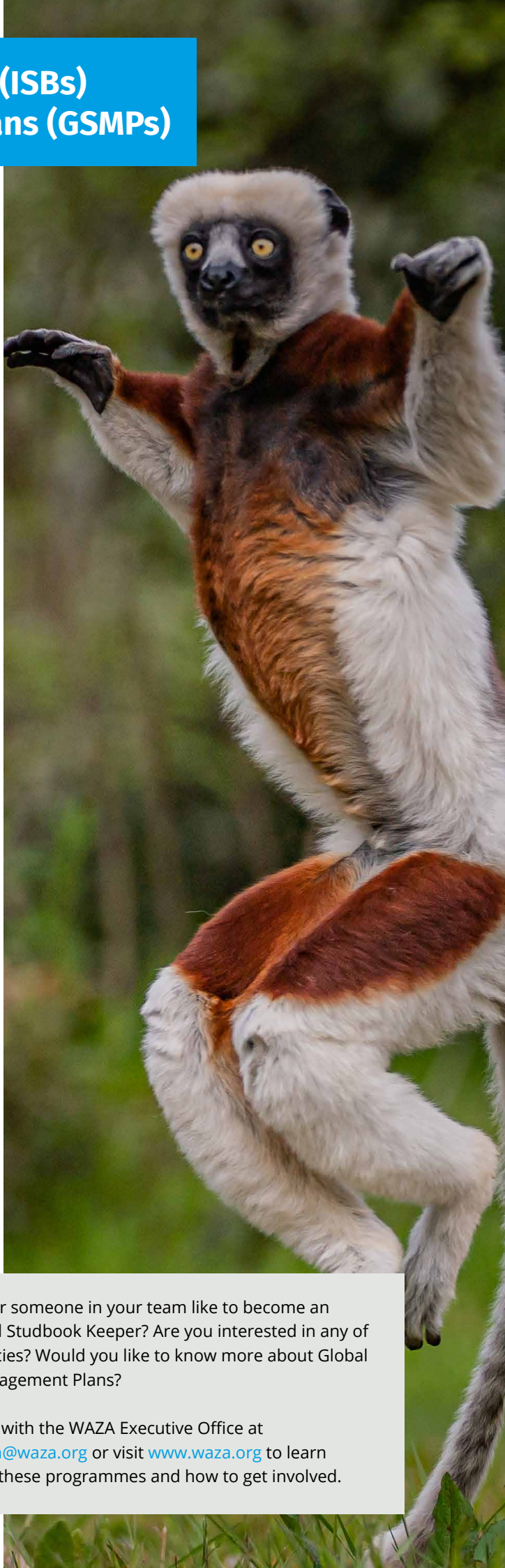
Archived ISBs

Noting the failure to migrate the studbook datasets into ZIMS for Studbooks and a subsequent assessment by WAZA's Committee for Population Management (CPM), the CPM decided during its annual and mid-year meetings to proceed with the discontinuation of the following International studbooks:

- **Red-billed curassow** (*Crax blumenbachii*)
- **Giant Panda** (*Ailuropoda melanoleuca*)
- **Golden Monkey** (*Rhinopithecus roxellana*)
- **Black necked crane** (*Grus nigricollis*)
- **European bison** (*Bison bonasus*)

Vacant Studbooks

- **Buff-crested Bustard** (*Lophotis gindiana*)



→ Coquerel's Sifaka (*Propithecus coquereli*)

Would you or someone in your team like to become an International Studbook Keeper? Are you interested in any of these vacancies? Would you like to know more about Global Species Management Plans?

Get in touch with the WAZA Executive Office at conservation@waza.org or visit www.waza.org to learn more about these programmes and how to get involved.

New Animal Welfare and Conservation Related Books

Linde de Nijs

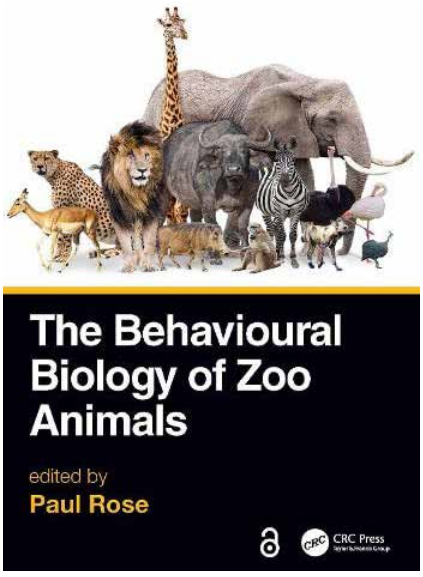
WAZA Executive Office

The Behavioural Biology of Zoo Animals

The book The Behavioural Biology of Zoo Animals edited by Paul Rose focuses on zoo animals as a diverse population of species from all around the world. The book provides insights in the importance of key aspects of natural ecology factored into animal care when they are living in human care, as well as considerations relating to welfare, life history and behavioural needs. The Behavioural Biology of Zoo Animals is the first book on the behaviour of animals under human care and how this applies to welfare.

The Behavioural Biology of Zoo Animals enables all aspects of zoo husbandry and management such as nutrition, enclosure design, handling and training, enrichment, and population management to be based on knowledge of the species, its evolutionary history, and its natural history. Chapters from expert authors cover a range of species, from primates and elephants to marine mammals and freshwater fish, to reptiles, birds, and invertebrates. The book also looks to the future, considering animal health and wellbeing, the visitor experience and future visions for zoos and aquariums.

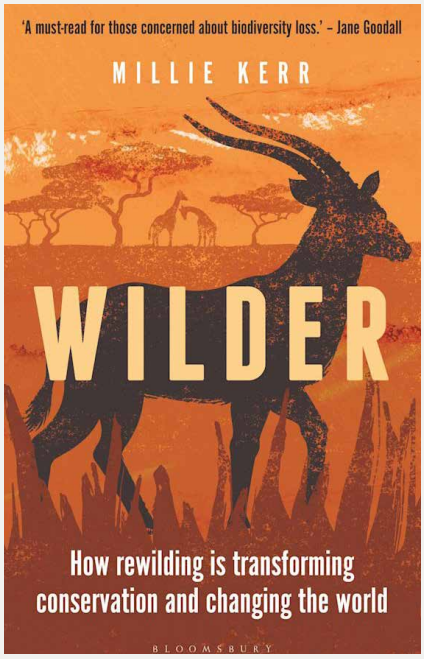
Dr Paul Rose holds a PhD in investigating the behaviour and welfare of captive flamingos using a variety of methodological approaches including social network analysis. He completed his first in-zoo research in 2002 and has been professionally involved in zoo animal behaviour in an academic and practitioner capacity since 2006. His research predominantly focuses on behaviour and welfare, and evidence for zoo husbandry.



Wilder: How Rewilding is Transforming Conservation and Changing the World

The book Wilder by Millie Kerr takes readers on a global rewilding journey, exploring innovative and eye-opening projects led by a diverse group of passionate conservationists. She considers the practicalities and possibilities of ecological restoration around the world, while exploring first-hand some of the most ambitious undertakings occurring today, many of which involve species reintroductions in the Global South. Wilder details the return of jaguars to an Argentinian national park, the first-ever pangolin reintroduction project in South Africa, and the ways in which giant tortoises are aiding the recovery of ecosystems throughout the Galápagos Islands, among many others. Wilder's message is one of innovation and optimism. By focusing on conservation success stories and showing that there are bands of determined conservationists fighting for a better future, Wilder inspires to become part of the solution.

Millie Kerr used to work as a lawyer, but decided to pursue her passions of storytelling, travel, and wildlife conservation. She has spent the last ten years working as a freelance journalist and conservation communicator, and has also become an award-winning wildlife photographer.

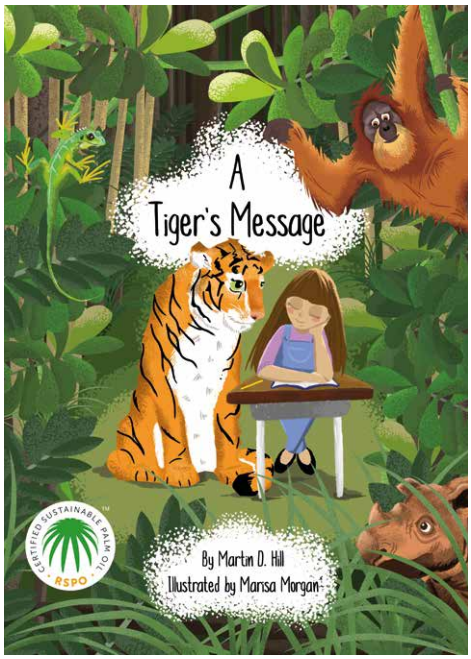


A Tiger's Message

Published in 2019

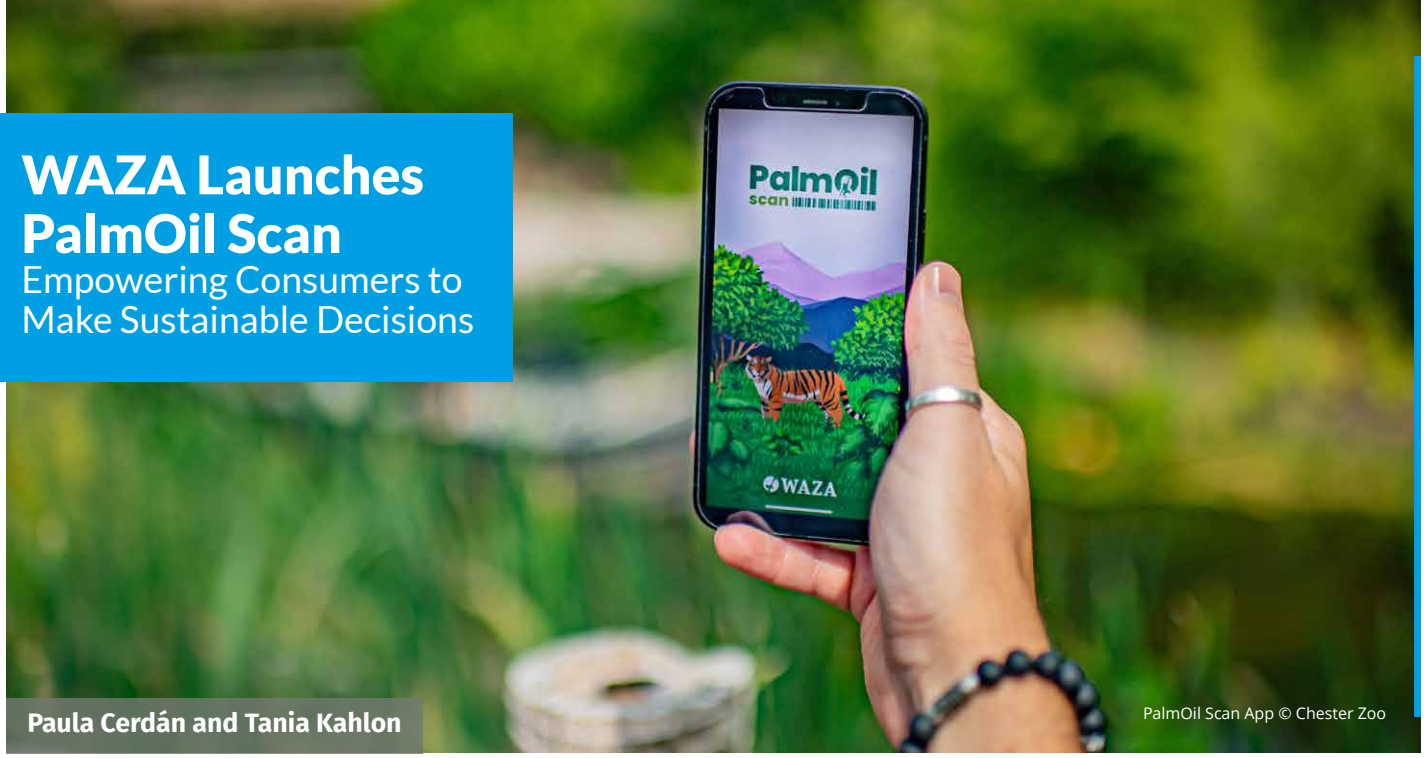
The new children's book A Tiger's Message by Martin Hill is about a young girl's imagination, which draws her into the dwindling Sumatran rainforest. There she meets a young tiger who asks her for help. It's an inspirational tale about the young girl Emma and the tiger named Indy, which speaks to the inner conservationist in all of us. The book is about sustainable palm oil to end deforestation and is supported by the Roundtable on Sustainable Palm Oil (RSPO). A Tiger's Message is aimed at children from 0 to 9 years old, reading level key-stage 2.

Martin Hill has been working as a big cat keeper for 20 years and has a long history of getting to know the personality of majestic wild animals. He introduces this passion to young readers through story. He continues his support for wildlife and conservation through his writing.



WAZA Launches PalmOil Scan

Empowering Consumers to Make Sustainable Decisions



PalmOil Scan App © Chester Zoo

Paula Cerdán and Tania Kahlon

WAZA Executive Office

The exponential increase in demand for vegetable oil has led to the search for cheaper and more easily available oils that can help address this demand. Palm oil is one such vegetable oil which is widely used in products ranging from food items to cosmetics. Its use is so ubiquitous that it has been estimated that nearly 50% of products in an average supermarket now contain palm oil. This may be attributed to the fact that it is an extremely efficient crop and produces more oil per land area than any other equivalent vegetable oil crop [1].

The growing demand for this commodity has raised concerns for sustainability and biodiversity in countries such as Malaysia and Indonesia where 85% of the global palm oil supply comes from [2]. Oil palm expansion has been a key driver for deforestation in these countries and has subsequently led to a decline of natural habitats, thereby threatening biodiversity. Thus, it is imperative that Certified Sustainable Palm Oil (CSPO) becomes the norm as the demand for palm oil is expected to increase by 1.7% each year until 2050. This is because CSPO has the potential to fulfil increasing global food demand and support affordable food prices, while also preventing damage to wildlife and the land they inhabit, as worldwide zoos and aquariums work to protect them.

To promote the use of sustainably produced palm oil, the WAZA Palm Oil Subcommittee and its member institutions: Cheyenne Mountain Zoo representing the United States (US) and Canada, and Chester Zoo representing the United Kingdom (UK), launched PalmOil Scan, a mobile app that allows consumers to make an informed decision on the purchase of palm oil. The app scans a product's barcode and informs the consumer whether or not the company is committed to sourcing CSPO.

Major corporations are rated on a scale of either 'No Commitment' to CSPO, 'Poor', 'Good', or 'Excellent'. App users can also enter a Keyword Search to find products based on key descriptor words and can contact the app's Administrators with any questions they may have about a specific company. The tool not only highlights the impact of consumers' choices in supporting the use of sustainable palm oil through their purchasing decisions, it is also a key initiative in emphasising the importance of zoos and aquariums in the pursuit of a sustainable future.

PalmOil Scan is currently available in the US, Canada and the UK, with more countries such as Australia and New Zealand being added in the coming months as increasing numbersof zoos and aquariums join as app administrators. WAZA members can become app administrators with Cheyenne Mountain Zoo currently acting as the administrator for the US and Canada, and Chester Zoo has taken on the role of app administrator for the UK. The administrators monitor the sourcing commitments for companies operating in their regions who are seeking to purchase palm oil.

The launch of this tool is WAZA's most recent contribution on promoting the use of sustainable palm oil among its members. WAZA and the Roundtable on Sustainable Palm Oil (RSPO) signed a Memorandum of Understanding (MoU) in 2017 to establish a framework to further their shared goals and objectives. WAZA also published a Short Guide and a resources website to help members turn to the use of certified sustainable palm oil.

References

1. https://www.worldwildlife.org/industries/palm-oil
2. https://www.iucn.org/resources/issues-briefs/palm-oil-and-biodiversity

The new PalmOil Scan app is now available to download from the App Store and Google Play Store.

Download on the App Store

ANDROID APP ON Google play

PalmOil scan

Sustainable shopping in the palm of your hand

WAZA Welcomes New Members

↑ © American Humane

American Humane

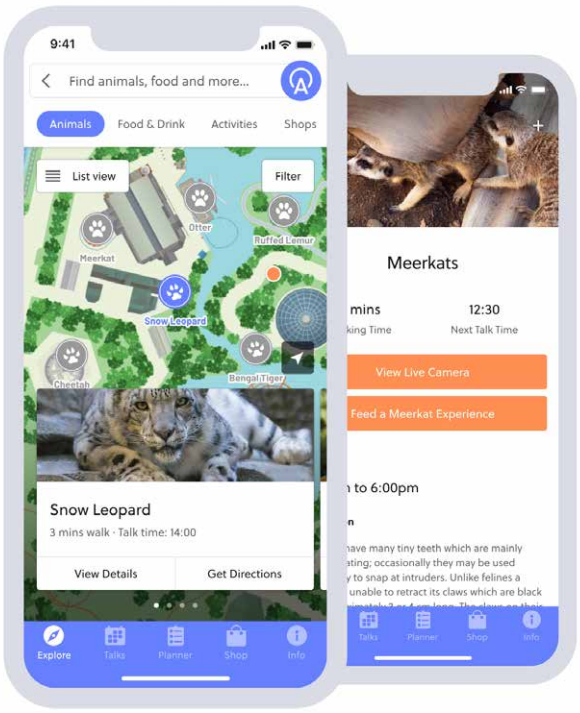
Located in Washington DC, United States of America, American Humane is the United States' first national humane organisation and strives to work towards the safety, welfare and well-being of animals. Founded in 1877, the organisation has adopted and used innovative and science based programmes to nurture the bonds between humans and animals.

In 2016 American Humane launched the world's first certification programme dedicated solely to the welfare of animals in zoological institutions. Utilising the foundation of science and evidence-based practices, they set the benchmark for verifying the humane treatment of animals in human care worldwide. This American Humane Certification provides independent reassurance from a reputable and trusted organisation that animals are receiving exceptional care. American Human joins WAZA as a new corporate member.

Attractions.io

Established in 2009, Attractions.io, United Kingdom, is the only mobile app platform built specifically for the visitor attractions industry. Comprising a guest-facing mobile app and accompanying operator management console, Attractions.io's guest experience platform enables real-world businesses to lead in the digital age.

With more than 10 years of experience supporting world-leading wildlife attractions and WAZA members such as Chester Zoo, the San Diego Zoo Wildlife Alliance and Zoo Tampa, the team at Attractions.io will work to develop a connected guest experience that eliminates friction from your guest journey, increases guest satisfaction and creates new opportunities for learning and engagement. WAZA is pleased that Attractions.io has joined as a corporate member.



↑ Zoo App map screen © Attractions.io

ELSS Engineering

Established in 2005, ELSS Engineering, United Kingdom, provides professional services to the aquarium and oceanarium industry. These services include initial feasibility studies, complete design, consultancy, and project management packages.

ELSS Engineering has participated in a host of conservation projects such as leading the design for the Benicassim Turtle Rehabilitation Centre in Spain as well as working with the Australian Marine Wildlife Research and Rescue Organisation Centre (AMWRRO) to help improve their Rescue and Rehabilitation Pool in their facility in Adelaide, Australia. ELSS Engineering has joined WAZA as coporate member.

Fundação Zoológico de São Paulo (CECFau - FZSP)

Established in 1958, the Fundação Zoológico de São Paulo, Brazil, focuses on preserving and restoring ecosystems through research, developing new products and diagnoses and acting effectively for society and biodiversity.

The Fundação Zoológico de São Paulo is also a member of the AZAB – Associação de Zoológicos e Aquários do Brasil and APAZA – Associação Paulista de Zoológicos and in 2018 was recognised as a Scientific and Technological Institution of the State of São Paulo for its applied technological work in the field of biotechnology, research and innovation.

The CECFau / FZSP seeks different approaches and continues to improve techniques that can improve the well-being and quality of life of animals under human care, including in their standards of well-being, the development and maintenance of the health of the animals through the implementation of annual preventive management, as well as the supply of diagnostics and veterinary treatments. WAZA is pleased to welcome CECFau / FZSP as an affiliate member.

Jacksonville Zoo and Gardens

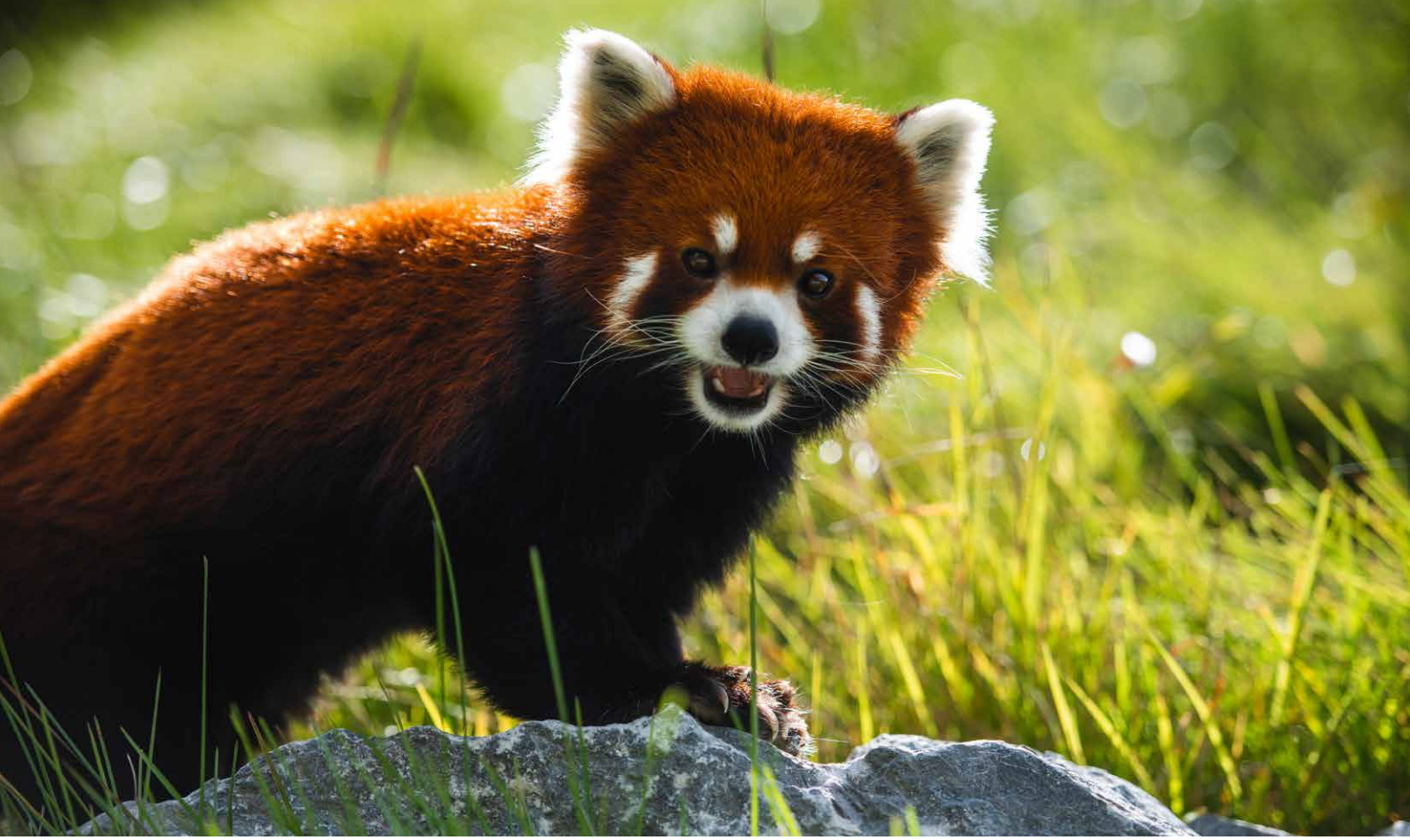
Established in 1914, Jacksonville Zoo and Gardens, United States of America, and takes care of over 1700 amphibians from 22 species, nearly 350 birds across 69 species, over 370 fishes across 12 species and over 270 mammals from 51 species. Their Zoo is home to more than 2,000 exotic animals and 1,000 plant species and serves as the largest botanical garden in Northeast Florida.

The institution inspires discovery, appreciation, and conservation of wildlife, plants, and the natural world and welcomes more than one million visitors annually. In 2020, they began operating with a mission dedicated to connecting their community with wildlife and wild places. Jacksonville Zoo and Gardens join WAZA as an institution member.

↑ Baharain Aquarium © ELSS EngineeringAlliance

↖ Lear's Macaw (*Anodorhynchus leari*) © Paulo Gil

← Sifaka (*Propithecus*) © Jacksonville Zoo and Gardens



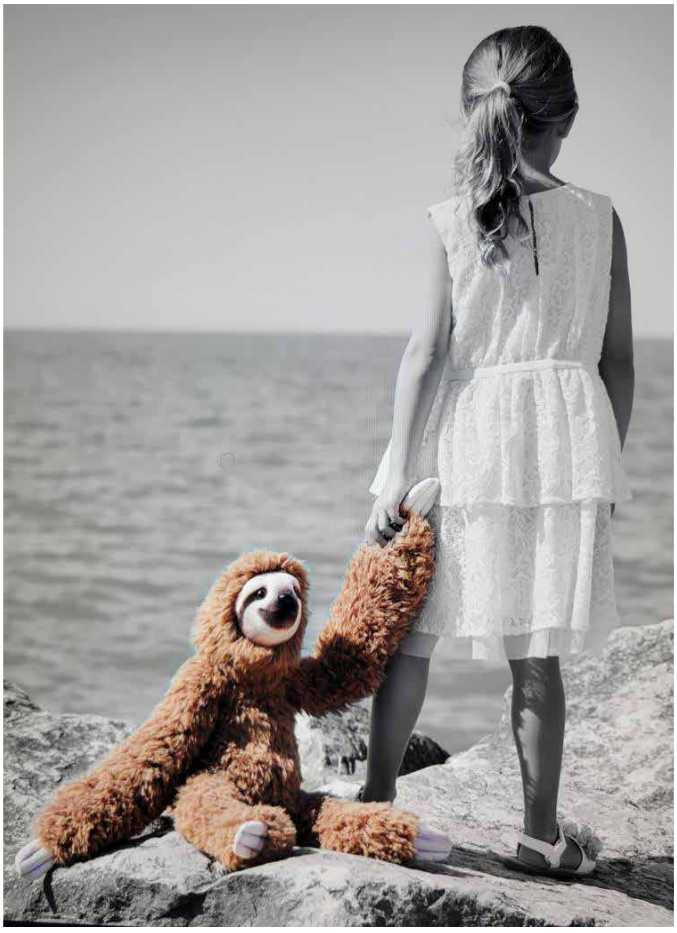
↑ Red panda (*Ailurus fulgens*) © Zoo Sauvage de St-Félicien

Wild Republic

Established in 1999, Wild Republic is the proud supplier of animal toys to WAZA members while also being the operator of shops in three WAZA member zoos.

Over the years, Wild Republic has strived to maximise their impact on the community and the planet. They have also worked to ensure that their high quality products contribute to the income generated by zoos and aquariums.

Wild Republic is determined to positively impact the visitor experience and income generation of zoos and aquariums while also caring for the planet. Wild Republic is now a corporate member of WAZA.



↑ Brand photo © Wild Republic

Zoo Sauvage de St-Félicien

Located in Québec, Canada, Zoo Sauvage de St-Félicien was established in 2005 and is a member of Canada's Accredited Zoos and Aquariums (CAZA) as well as Species360. The zoo is home to 105 birds across 27 species, 304 mammals from 43 species and 14 reptiles from 5 species and has joined WAZA as an institution member.

The zoo's mission is to help people develop a love of nature so that they may be inspired to protect it. Thus, they aim to introduce a wide variety of species to their visitors with animal welfare at the heart of their vision, combined with conservation, education, research and visitors' wellbeing.

Communications Assistant Joins WAZA Executive Office

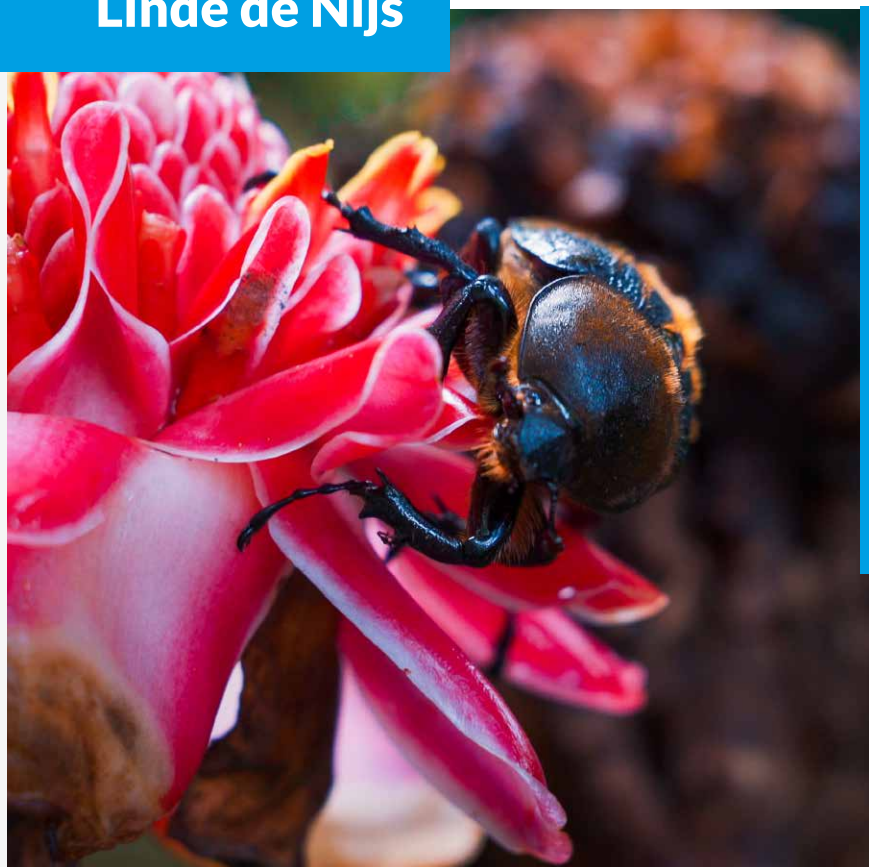
Linde de Nijs

WAZA is happy to announce the appointment of Linde de Nijs as the Communications Assistant at WAZA Executive Office.

Ms Linde de Nijs joins WAZA as the Communications Assistant, after recently moving to Barcelona from the Netherlands. She also lived in Barcelona for half a year in 2018. During this time, she was doing a minor for her studies. Now, she decided to come back for work.

She holds a Master's degree in Communication Science, specialised in Prosocial Communication. She is passionate about media and cares for animals and sustainability. She is an optimistic person who likes to explore new places, cook, meet people, and watch movies and series.

She is excited to join the WAZA team, to develop new skills and learn more about animals and sustainability.



→ Choleoptera on a torch ginger (*Etlingera elatior*) © Guadeloupe Zoo

↓ Coquerel's Sifaka (*Propithecus coquereli*) © Chester Zoo

WAZA

World Association of Zoos and Aquariums

www.waza.org