

**Mandai**  
WILDLIFE GROUP

**Mandai**  
N A T U R E



# Asian Biobanking Workshop and Networking Forum

20–21 November 2025, Singapore

Workshop Report

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# Acknowledgements

The International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) Animal Biobanking for Conservation Specialist Group (ABCSG) would like to sincerely thank Mandai Nature for their support, especially Dr. Sonja Luz (Chief Executive Officer (CEO), Mandai Nature), for generously sponsoring our session and many of our invited guests, Dr. Chia-Da Hsu, Dr. Daniel Calvo, the Mandai Nature team (Naqia, Claris, and Annie, for helping with accommodation, flights, and payment requests), and the Endangered Species Conservation via Assisted Reproduction (ESCAR) team for assisting with the hands-on session.

Organisers: Ms. Hui Li Yeo, Dr. Oz Pomp, Ms. Mitali Sharma, and Dr. Boripat Siriaronrat.

## **Report credits:**

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Day 2 section compiled by Ms. Mitali Sharma (IUCN SSC ABCSG).

Edited and formatted by Ms. Mitali Sharma (IUCN SSC ABCSG), Ms. Hui Li Yeo (ESCAR, Mandai Nature), and Ms. Christine Pang (Mandai Nature).

# Acronyms

ABCSG: Animal Biobanking for Conservation Specialist Group  
ART: Assisted Reproductive Technology  
ASAP: Asian Species Action Partnership  
ASCM: Asian Society of Conservation Medicine  
ASEAN: Association of Southeast Asian Nations  
CBD: Convention on Biological Diversity  
CEO: Chief Executive Officer  
CITES: Convention on International Trade in Endangered Species  
CR: Critically Endangered  
CSS: Center for Species Survival  
DNA: Deoxyribonucleic Acid  
Duke-NUS: Duke-National University of Singapore  
EAZA: European Association of Zoos and Aquaria  
EN: Endangered  
ESCAR: Endangered Species Conservation via Assisted Reproduction  
EW: Extinct in the Wild  
IACUC: Institutional Animal Care and Use Committee  
IECN: Institute for Ecology and Conservation of Nature  
iPSC: Induced Pluripotent Stem Cell  
IUCN: International Union for Conservation of Nature  
IVM: In Vitro Maturation  
KUVACB: Kasetsart University Veterinary Animal Cell Bank  
LABNet: Latin American Biobanking Network  
Lao PDR: Lao People's Democratic Republic  
LC: Least Concern  
NBSAP: National Biodiversity Strategy and Action Plan  
NIES: National Institute for Environmental Studies  
NParks: National Parks Board of Singapore  
PGC: Primordial Germ Cell  
PI: Principal Investigator  
PLANETIIUM: Planetary Survival for Sustainable Well-being, International Islamic University Malaysia  
RZSS: Royal Zoological Society of Scotland  
SCAT: Stem Cell Associated Techniques  
SCOPE: Summit for Conservation Pathology Engagement  
SDZWA: San Diego Zoo Wildlife Alliance  
SEAZA: Southeast Asian Zoos and Aquariums Association  
SSC: Species Survival Commission  
UAE: United Arab Emirates  
UK: United Kingdom  
UP PGC: University of the Philippines Philippine Genome Center  
USA: United States of America  
ZIMS: Zoological Information Management System (Species360)  
ZPOT: Zoological Park Organization of Thailand

# Executive summary

The November 2025 workshop hosted by Mandai Wildlife Group, Mandai Nature, and the IUCN SSC ABCSG successfully facilitated the formation of the Asian Conservation Biobanking Network to address the urgent need for coordinated biobanking efforts for wildlife conservation in Asia. The event featured technical presentations from 11 countries and hands-on demonstrations at Mandai's zoological facilities, emphasising the high conservation potential of living biomaterials like gametes, embryos, and cell lines for advanced reproductive technologies and cloning.

Participants identified critical challenges such as permit hurdles, funding limitations, and technical gaps in non-mammalian taxa, proposing standardised protocols and the establishment of regional hubs as primary solutions.

Under the newly elected leadership of Dr. Manabu Onuma, the network is set to implement a strategic plan focusing on a regional gap analysis, a survey of viable cell cultures, and eventual integration into the global ABCSG structure to sustain long-term conservation momentum.

# Context

Biobanking—the preservation of biomaterials such as non-viable samples and viable (living) materials, including living cell lines, reproductive tissues, blood fractions, and frozen tissues—is an invaluable tool for wildlife conservation. Southeast Asia, a globally recognised biodiversity hotspot, faces an urgent need for coordinated conservation action. Currently, only a few isolated projects in the region utilise living materials biobanking as a conservation strategy.

In 2022, Taipei Zoo hosted the first Asia Biobanking Network meeting, envisioning the development of a collaborative network of biobanks across Southeast and East Asia. This initiative had the vision for countries to share resources and expertise while building a worldwide repository of irreplaceable animal biomaterials—particularly reproductive and genetic materials—for species conservation.

However, effective regional collaboration remains limited. This workshop, hosted by Mandai Wildlife Group, Mandai Nature, and the IUCN SSC ABCSG, aimed to bring together experts, strengthen connections, and foster a unified network that enhances capacity building, knowledge sharing, and the efficient use of limited biobanking resources.

# Day 1 (20 November 2025)

## Facilitators

- Dr. Oz Pomp, Head of Laboratory, Mandai Nature
- Ms. Hui Li Yeo, Project Manager, Mandai Nature

## Oral session

The first day of the workshop included an oral session on the biobanking initiatives in Singapore and conservation-focused projects.

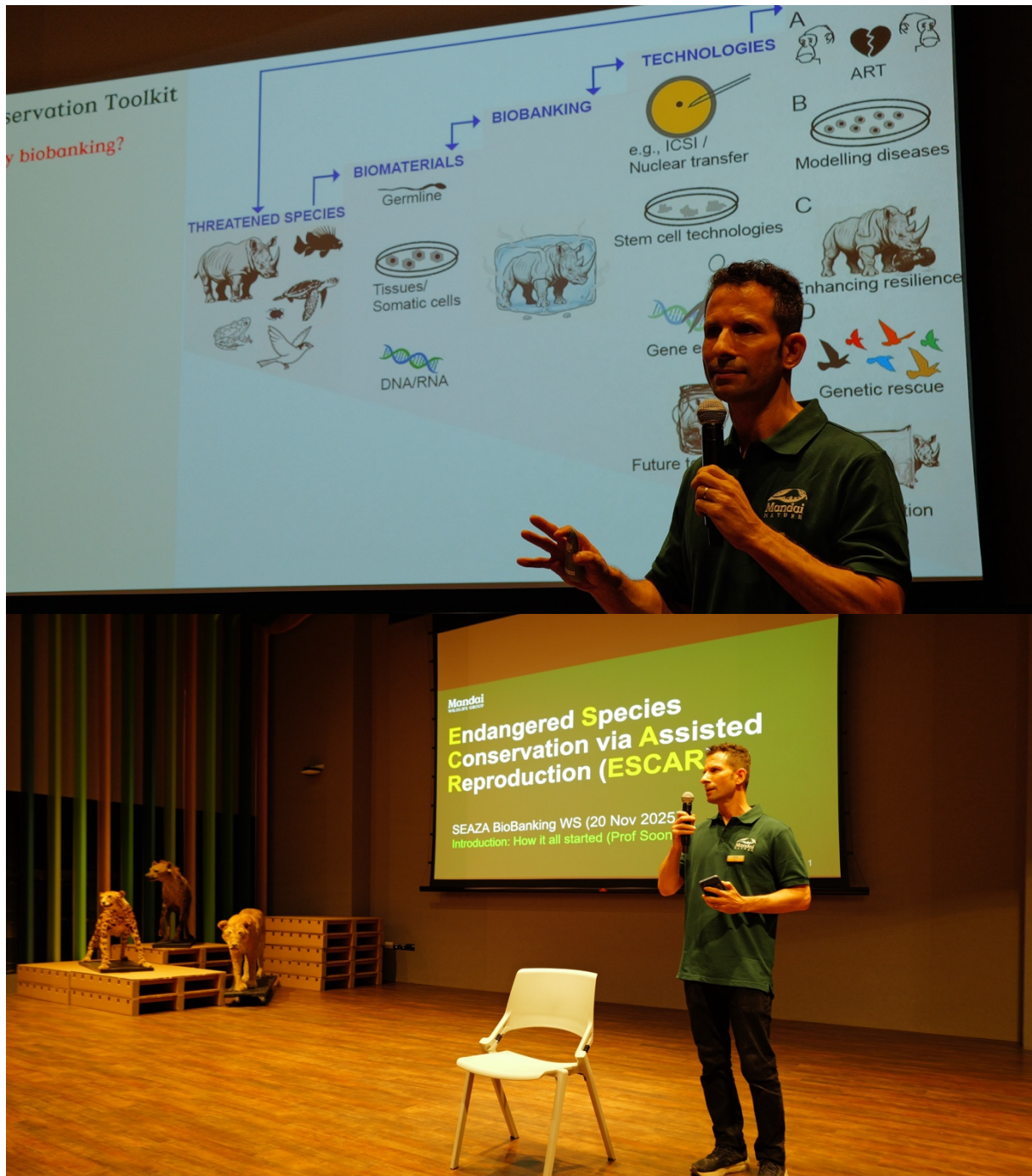
### Opening speech by Prof. Ng Soon Chye (Mandai Nature ESCAR Co-Principal Investigator (PI), National University of Singapore, Yong Loo Lin School of Medicine, Sincere Healthcare Group)

The session opened with Dr. Oz Pomp introducing **Prof. Ng Soon Chye**, founder of the ESCAR Laboratory. Prof. Ng provided an overview of ESCAR's origins, its early development, and the roadmap guiding the laboratory's work over the years.



## Dr. Oz Pomp (ESCAR, Mandai Nature, Singapore)

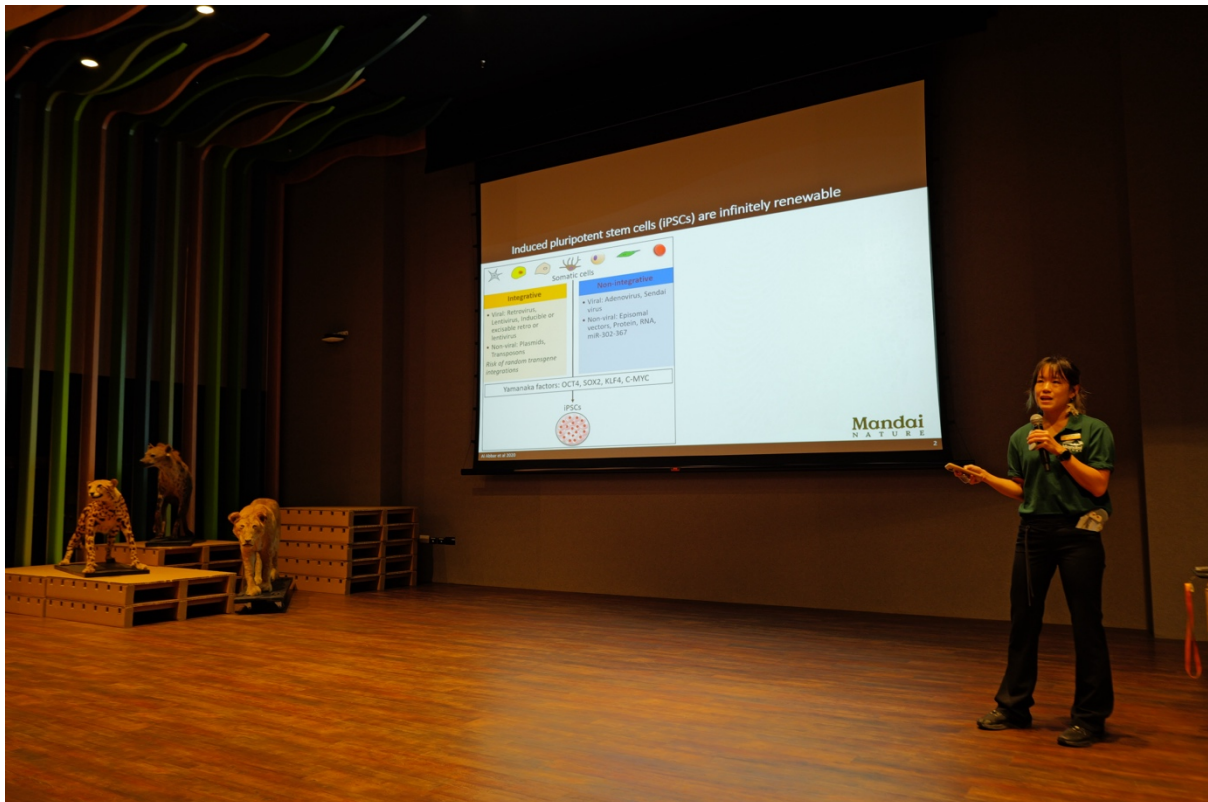
Following this, **Dr. Oz Pomp** highlighted the importance of biobanking for conservation and presented an overview of the research and activities conducted at ESCAR. His key take-home message was that effective conservation biobanking requires the collection of biological materials across all taxonomic groups and from as many individuals as possible within each threatened species. This helps capture genetic diversity and maximises the likelihood of successful future genetic rescue.





## Dr. Nicole Tay (ESCAR, Mandai Nature, Singapore)

Another example of applying stem cell-based technologies to advance the conservation of threatened species was presented by **Dr. Nicole Tay**. She shared her project, *“Developing an Integrated Stem Cell-Based Embryo Model in a Non-Human Primate,”* introducing her orangutan blastoids system.



## Mr. Foo Maosheng (Lee Kong Chian Natural History Museum, National University of Singapore)

Mr. Foo Maosheng highlighted the Lee Kong Chian Natural History Museum's core activities—research, curation, and education—and described the zoological reference collection, which comprises more than one million specimens supporting biodiversity research. He also noted that the museum's cryogenic collection serves as a backup for Mandai's biobank and outlined the tripartite collaboration between the museum, Mandai Wildlife Group and Mandai Nature, and the National Parks Board of Singapore (NParks).



## Dr. Mart Matthias Lamers (Duke-National University of Singapore (NUS), Singapore)

**Dr. Mart Lamers** introduced the use of organoid systems for biobanking and disease modelling. As viral threats continue to impact both humans and biodiversity, he emphasised the growing need to model zoonotic and non-zoonotic diseases. In his laboratory, Dr. Lamers has developed methods to generate organoids from adult stem cells derived from primary tissues targeted by viruses (e.g., airways), enabling in vitro disease modelling. Notably, some organoids can be obtained non-invasively, making them particularly attractive for biobanking and reprogramming applications.



**Prof. Barbara De Mori (Director of the Ethics Laboratory for Veterinary Medicine, Conservation and Animal Welfare, Padua University, Italy), Mr. Steven Siong Meng Seet, Head Unit Strategic Communication, Leibniz Institute for Zoo and Wildlife Research (Leibniz Institute for Zoo and Wildlife Research), Department of Reproduction Management, Berlin), and Ms. Hui Li Yeo – Project Manager, ESCAR, Mandai Nature, Singapore)**

Finally, **Ms. Yeo Hui Li** participated in a joint session with **Prof. Barbara De Mori** and **Mr. Steven Seet**, where she emphasised the importance of establishing a robust ethics framework to support biobanking activities at Mandai.





Following the oral session, the participants headed to the hands-on session.

## Hands-on session: Biobanking practical

Participants rotated through the following stations:

### **Station 1: Post-mortem Room, Wildlife Health and Research Centre, Singapore Zoo**

Dr. Chia-Da Hsu (Senior Veterinary Pathologist, Mandai Wildlife Group) demonstrated sample collection techniques (e.g., nasal swabs, skin, fat, and internal organs).



## Station 2: Laboratory, Singapore Zoo

Dr. Oz Pomp (ESCAR, Mandai Nature) demonstrated sample processing for primary cell generation.



## Station 3: Nursery and Post-mortem Room, Bird Paradise

Bird Paradise staff provided a tour of the Nursery and Post-mortem Room.



## Station 4: Laboratory, Bird Paradise

Ms. Hui Li Yeo (ESCAR, Mandai Nature) demonstrated an example of avian sample processing, including fertilised egg and pin feather handling.



## Welcome dinner at Forest Lodge, Singapore Zoo

The first day closed with a welcome dinner for the participants, which included opening remarks, a round of introductions, networking, and closing remarks to set the scene for the next session on November 21.



*Dr. Sonja Luz (CEO, Mandai Nature) (top) and Dr. Boripat Siriaronrat (Co-Chair, IUCN SSC ABCSG) (bottom) providing closing remarks at the welcome dinner.*

# Day 2 (21 November 2025)

## Facilitators



- **Dr. Boripat Siriaroonrat**, Co-Chair, IUCN SSC ABCSG
- **Ms. Mitali Sharma**, IUCN SSC ABCSG

## Introduction to the ABCSG

The second day of the workshop began with a recorded presentation from the Co-Chair of the IUCN SSC ABCSG, **Dr. Oliver Ryder**, to introduce the [ABCSG](#). He firstly introduced the roles of the IUCN and SSC, which the ABCSG is a part of. Dr. Ryder then provided context for the need for biobanking for conservation, including its role in the One Plan and One Health approaches, and contributions to various frameworks, such as the United Nations Sustainable Development Goals, Convention on Biological Diversity Kunming-Montreal Global Biodiversity Framework targets, and discussions related to the Nagoya Protocol. The group is also a direct response to IUCN's 2020 Resolution O79, which calls for the establishment of a collaborative global biobanking network—the ABCSG's mission is to create a global network for sharing information and expertise to establish facilities that cryopreserve viable animal cells and tissues. Dr. Ryder also introduced the core ABCSG team and four Task Forces:


- (1) Frozen Tissues and Blood Fractions
- (2) Reproductive Cells
- (3) Viable Cell Cultures
- (4) Justice, Diversity, Equity, and Inclusion

Lastly, Dr. Ryder mentioned the ABCSG's [targets for 2026–2029](#), which include goals such as developing capacity, conducting assessments, collecting samples, and raising awareness.



# Presentation

- 01 IUCN and the IUCN SSC
- 02 Context
- 03 Overview
- 04 Our mission statement
- 05 Our team
- 06 Our Task Forces
- 07 Membership distribution
- 08 Targets



# Overview

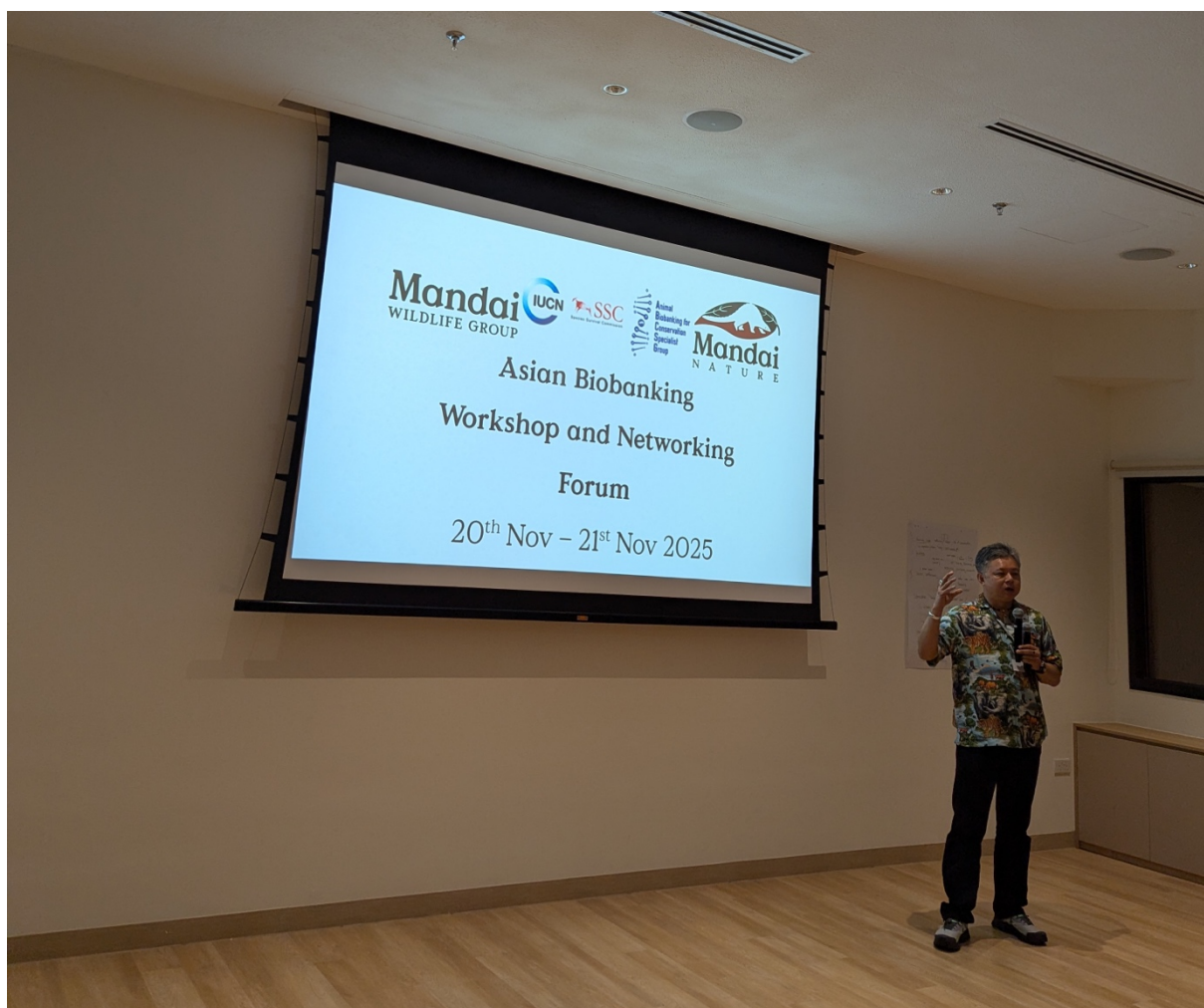
Established in 2022, the ABCSG promotes cooperation amongst the world's non-human animal biobanks, notably those with a focus on biodiversity characterization and conservation; fostering a culture of transparency around the existence, quantity, and location of banked samples is essential for the effective management of collections.

We encourage the conservation community—ranging from individuals to institutions—to consider incorporating sample collection for the purpose of biobanking into their efforts, and to do so with collaboration and inclusion in mind.

*Dr. Ryder's recorded presentation on the ABCSG.*

## Introduction to the session

**Dr. Boripat Siriaroonrat**, Co-Chair of the IUCN SSC ABCSG, gave an introduction to the session. Dr. Siriaroonrat firstly provided context for the workshop, reminding participants that it is a continuation of the Asia Biobanking Network meeting in Taipei, which took place in 2022. One of the key next steps identified during that meeting was to “Develop an organisation structure and formalise participation in the network amongst all stakeholders in the region”, amongst other tasks such as conducting a horizon scan, developing a white paper, and sharing a communications strategy whilst working in partnership with the ABCSG. Dr. Siriaroonrat also gave an overview of the responses to the pre-workshop questionnaire that was sent to the participants in order to gain a better understanding of their contributions to biobanks, the materials they work with, the main expectations from this workshop, and their intended contributions to the workshop. Dr. Siriaroonrat closed by highlighting the key expected outputs from this session, which includes a report and the formation of an Asian Biobanking Working Group/Network.



*Dr. Siriaroonrat discussing the workshop session.*

## Country/institutional presentations:

### Bhutan/National Biodiversity Center

**Mr. Tshering Dorji**, Program Head of the Animal Genetic Resources Program at the National Biodiversity Center, Ministry of Agriculture and Livestock, Bhutan, provided an overview of the biobanking efforts in Bhutan and his institution. Mr. Dorji first provided an introduction of Bhutan's natural environment and biodiversity. Then, Mr. Dorji described the establishment of a national animal gene bank in Bhutan. It has three main functions: (1) Conduct research and study genetic diversity to generate required information and necessary interventions, (2) coordinate, implement, and support in situ conservation and sustainable utilisation of genetic resources with relevant stakeholders, and (3) prepare mitigation measures for the species at risk of loss. The biobank has collected and archived 29,751 genetic materials of the different domestic and wild fauna in the country, and initiated Embryo Transfer Technology for key native livestock. Lastly, Mr. Dorji introduced the key policy documents that mention the biobank in Bhutan: Biodiversity Act of Bhutan 2023, Forest and Nature Conservation Act of Bhutan 2023, Livestock Act of Bhutan, 2024, and Bhutan's National Biodiversity Strategy and Action Plan (NBSAP).



*Mr. Dorji introducing Bhutan's work on biobanking.*

## Germany/Leibniz Institute for Zoo and Wildlife Research

**Mr. Steven Siong Meng Seet**, Head of Strategic Communications at the Leibniz Institute for Zoo and Wildlife Research and a PhD candidate at the University of Padua, provided insight into the biobanking efforts across institutions in Germany. Mr. Seet firstly provided context on the importance of biobanking, then introduced different biobanks in Germany and Europe, including the [Bio-cryobank at the Leibniz Institute for Zoo and Wildlife Research](#), the [Leibniz Institute for the Analysis of Biodiversity Change \(LIB\) Biobank](#), and the [European Association of Zoos and Aquaria \(EAZA\) Biobank](#). Mr. Seet also provided a case study on using assisted reproductive technologies (ART) and Stem Cell Associated Techniques (SCAT) to save the Northern White Rhino from extinction, which is a part of the [BioRescue project](#). The three key strategies for this are using (1) natural gametes, (2) stem-cell derived gametes, and (3) “enriched” gametes. Lastly, Mr. Seet introduced a new initiative on biobanking in space, led by the [BioBanking Space Agency](#).



*Mr. Seet providing an overview of biobanking across Germany.*

## Japan/Biodiversity Division, National Institute for Environmental Studies (NIES)

**Dr. Manabu Onuma**, Senior Researcher at the Center for Environmental Biology and Ecosystem Studies, National Institute for Environmental Studies (NIES), Japan, described the status of genetic resource banking at the NIES. Dr. Onuma first provided an overview of cryopreservation facility development in Japan and how these efforts include considerations for both internationally (from zoos) and nationally endangered species. He then provided case studies on how cryopreservation and cultured cells could be used in different situations for endangered species and [pathogenicity assessments](#). Dr. Onuma also mentioned NIES's collaboration with international institutions to build capacity, including ones in Nepal, Bhutan, Singapore, and Malaysia. Lastly, he highlighted a [paper](#) published in 2018 with Dr. Ryder, which revealed that the cells of 65 species categorised as Critically Endangered (CR) and Extinct in the Wild (EW) in the IUCN Red List had been cryopreserved.



*Dr. Onuma introducing the work of his institution, NIES.*

## Malaysia/International Islamic University Malaysia

**Prof. Muhammad Lokman Md Isa**, Director of the Institute of Planetary Survival for Sustainable Well-being, International Islamic University Malaysia (PLANETIUM), Malaysia, provided an overview of the latest initiatives at the IIUM Frozen Zoo. Prof. Lokman first highlighted the biodiversity at risk in Malaysia, with a focus on primates. Then, Prof. Lokman discussed how in vitro maturation (IVM) can mature oocytes without extensive ovarian stimulation, and its implications for reproductive medicine and conservation efforts. He also mentioned how the integration of CMRL-1066 media and Brilliant Cresyl Blue staining in the IVM protocols of macaque oocytes represents a significant advancement in reproductive biology. Lastly, Prof. Lokman discussed the applications of using blockchain technology to secure deoxyribonucleic acid (DNA) data, highlighting its advantages over using traditional databases, including how it is permanent, immutable, transparent, and does not have a single admin.



*Prof. Lokman sharing his institution's efforts on biobanking.*

# Nepal/Center for Biotechnology, Agriculture and Forestry University

Dr. Himal Luitel, Associate Professor at the Center for Biotechnology, Agriculture and Forestry University, Nepal, discussed the wildlife biobanking initiatives in Nepal. Dr. Luitel began with providing context on Nepal's biodiversity, conservation plans, and notable animals in the IUCN Red List. Then, Dr. Luitel introduced the status of biobanking in Nepal: Nepal currently has a gene bank, semen cryopreservation and AI facility, and embryo preservation capacity. Dr. Luitel concluded that efforts for wildlife biobanking in Nepal are currently underway, but a laboratory has been set up, and a legal framework is being finalised.

A  
F  
U

## **Wildlife Biobanking in Nepal (Where we are?)**

- 🌿 Laboratory set up: Completed
- 🌿 Finalization of legal framework: in progress
- 🌿 Animal selection: Vulture and Rhino in the beginning, framework → opens for wider species

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graph TD; DNPWC[DNPWC  
Overall regulatory body  
of the government] --> AFU[AFU  
(Center for  
Biotechnology)  
Cell culture  
Characterization  
of cells,  
cryopreservation]; DNPWC --> NTNC[NTNC  
Field studies  
Sample collection  
Preservation of  
tissues]; DNPWC --> NP[National  
Parks  
Field studies  
Sample collection  
Documentation]; AFU --> DDM[Digital data management,  
Portal entry of every  
activities]; NTNC --> DDM; NP --> DDM; DDM --- GLOBE((Globe)); DDM --- MON1[Monitor]; DDM --- MON2[Monitor];
```

Dr. Luitel's presentation showcasing an overview of wildlife biobanking in Nepal.

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## **Philippines/University of the Philippines Philippine Genome Center (UP PGC)**

**Prof. Cynthia Palmes Saloma**, Director of the Program in Biodiversity, Ethnicity and Forensics at the University of the Philippines Philippine Genome Center (UP PGC), provided insight into establishing a network of wildlife biobanks in the Philippines. Prof. Saloma began by explaining how the current biobanking framework in the Philippines was designed for biobanking human tissues and genetic material. DNA and blood (plasma, serum, and whole blood) comprise the highest number and type of samples stored in UP's biobanks. Prof. Saloma continued by noting that there is no active wildlife biobanking initiative in the Philippines, but the current biobanking framework for human specimens can be expanded for wildlife biobanking by forming a consortium of institutions that are already actively involved with biodiversity conservation efforts. She also highlighted that the Philippines has a unique research opportunity from the marine mammal strandings occurring in the country, with an average of 83 annually, as these can be used for tissue sample collection. Prof. Saloma concluded by highlighting the goal of creating a wildlife biobank consortium and how the top priorities for wildlife biobanking in the Philippines are endemic and endangered marine and terrestrial mammals, as well as avian species.



*Prof. Saloma describing efforts to establish a network of wildlife biobanks in the Philippines.*

## Thailand/Kasetsart University Veterinary Animal Cell Bank

**Dr. Sukumal Prukudom**, Principal Investigator at the Zebrafish Laboratory Research Unit, Kasetsart University Veterinary Animal Cell Bank (KUVACB), Thailand, provided insight into the [KUVACB's work](#) as a cryo-sanctuary. Dr. Prukudom's talk firstly focused on culturing and characterising primordial germ cells (PGCs) from Thai indigenous chicken, wild pheasants, peafowls, and ducks. Dr. Prukudom also mentioned the KUVACB's work on culturing PGCs from soft-shelled turtles and crocodiles. Apart from PGCs, Dr. Prukudom introduced her institution's currently unpublished work on skin fibroblasts in avians, mammals, and fish.



## Thailand/Zoological Park Organization of Thailand (ZPOT)

**Dr. Ampika Thongphakdee**, Senior Wildlife Specialist and Chief of the Wildlife Reproductive Innovation Center at the Animal Conservation and Research Institute, Zoological Park Organization of Thailand (ZPOT), Thailand, provided an overview on the ZPOT biobank's capacity and progress. The ZPOT biobank has three types of collections: (1) blood fractions & non-viable tissue samples, (2) viable reproductive cells, and (3) viable cell cultures, with 51,065 samples in total. Dr. Thongphakdee went over several scientific studies that ZPOT was involved with using these samples, including genetic diversity assessments with blood samples, artificial insemination with reproductive cell samples, and cellular reprogramming with viable cell cultures.



*Dr. Thongphakdee sharing the work of her institution.*

## United Arab Emirates (UAE)/Ekthar

**Dr. Janaina Torres Carreira**, Deputy Head of Research at Reneco International Wildlife Consultants, Ekthar, United Arab Emirates (UAE), gave insight into the African and Asian Houbara bustards' semen bank at her institution. Firstly, Dr. Carreira provided context for the zoos in the UAE, which are all private, and are where captive breeding takes place. Then, Dr. Carreira described a case study on African and Asian Houbara bustards. This is a 30-year long captive breeding conservation project that supports both in situ and ex situ conservation. Semen is collected through a voluntary collection method that allows display and copulation behaviour, after which it is evaluated using species-specific methods and cryopreserved in the semen bank. Around 22,938 semen samples have been cryopreserved in the bank to date. Dr. Carreira noted that the semen is also used in conservation breeding through artificial insemination.



*Dr. Carreira describing the work of the African and Asian Houbara bustards' semen bank.*

## United Kingdom (UK)/Royal Zoological Society of Scotland (RZSS)

**Dr. Alexander Ball**, WildGenes Programme Manager at the Royal Zoological Society of Scotland (RZSS), United Kingdom (UK), introduced the work of the RZSS and RZSS WildGenes. RZSS WildGenes is the RZSS's own onsite conservation genetics lab. It was established in 2010, and it is the only zoo-based conservation genetics lab in the UK. Its mission is to use genetic data to inform conservation management decisions. Dr. Ball provided insight on how their samples are used for in different projects, such as hybridisation testing and genetic screening for CR species. Dr. Ball also noted how the RZSS is partnered with the CryoArks, which is a UK-wide biobanking initiative, and EAZA Biobank, which brings together samples across West Asia and Europe. RZSS is one of the four regional hubs of the EAZA Biobank. As of December 2024, the RZSS Biobank has over 5,000 samples from 527 species, the majority of which are birds (40%) and mammals (39%), and species listed as Least Concern (LC) in the IUCN Red List. Dr. Ball closed by highlighting the challenges and opportunities in this space, including: increasing taxonomic representation and collaboration, dealing with permits and sample transportation, and developing the EAZA Cryopreservation Network.



*Dr. Ball sharing the work of the RZSS.*

## United States of America (USA)/San Diego Zoo Wildlife Alliance (SDZWA)

**Dr. Elizabeth Davis**, Researcher II in Community Engagement at the San Diego Zoo Wildlife Alliance (SDZWA), United States of America (USA)/Vietnam, provided insight into the biobanking efforts at SDZWA. Dr. Davis' talk focused on the Frozen Zoo®, which houses a living collection of gametes, embryos, and cell lines. It was founded in 1975 and is the largest and most diverse collection of its kind, housing around 1,349 species/subspecies of cell lines and 480 species/subspecies of gametes and embryos as of October 2025. The collection is mainly comprised of mammals, as well as birds, reptiles, and amphibians. Insects and plants were recently added to the collection as well. The Frozen Zoo® also includes rare representation of the female reproductive system, with ovarian tissue and female reproductive organoids. Dr. Davis' presentation also highlighted an example of cloning via somatic cell nuclear transfer using cells from the Frozen Zoo®, collaborations with the Center for Species Survival (CSS)-Biodiversity Banking and ABCSG, capacity development efforts, and some challenges and opportunities. Challenges included finding personnel with appropriate skills at the appropriate scale, ownership and permits, and connecting biobanks to samples, and opportunities included using these samples for wildlife conservation and increasing the scale of contributions.



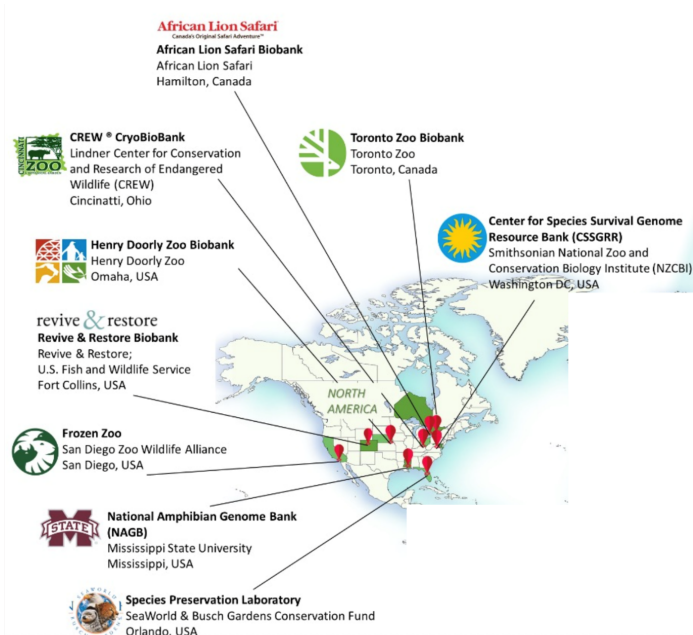
*Dr. Davis giving insight into the work of the SDZWA.*

## USA/Smithsonian Institution, Smithsonian's National Zoo and Conservation Biology Institute

**Dr. Pierre Comizzoli**, Senior Program Officer for Science at the Smithsonian Institution/Research Biologist at Smithsonian's National Zoo and Conservation Biology Institute, USA, introduced the Pan-Smithsonian Cryo-Initiative and provided insight on wildlife biobanking in North America. The Pan-Smithsonian Cryo-Initiative is a programme that aims to collect, manage, and share Smithsonian's frozen biomaterials with excellent standards to better understand and sustain biodiversity. Across the Smithsonian's various institutions under this initiative, there are:

- ~1,200,000 samples representing 18,000 species
  - 900,000 DNA samples, 150,000 cell lines, and 150,000 germplasms
- Three major biorepositories
  - 250 cool/ultra-cold freezers, 40 nitrogen vats, and 35 small tanks

This initiative also contributes to conservation breeding efforts. Dr. Comizzoli then highlighted aspects that need to be improved for a more concerted effort for wildlife biobanking in North America, including standards for collecting samples and storage, sharing biological samples and associated data, more somatic and reproductive cells in biobanks, and more capacity building and training. Lastly, Dr. Comizzoli discussed common challenges and current efforts for biobanking, including the need for more species-specific technologies and strategics, banking more non-mammalian species, developing inexpensive and field-friendly techniques, involving local communities in conservation actions and listening to their needs, and having custodians rather than “owners” for samples.



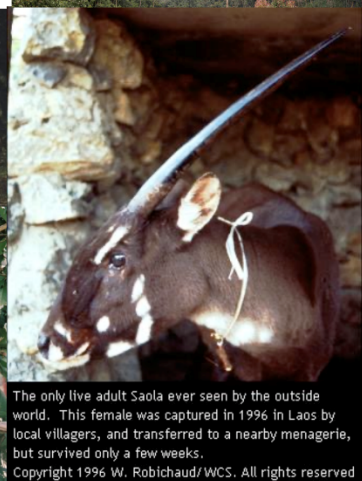
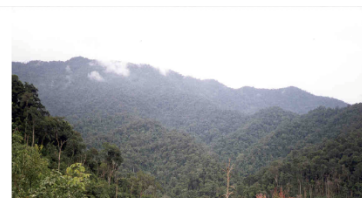
*Dr. Comizzoli's presentation highlighting biobanking efforts across North America.*

## Vietnam/Institute for Ecology and Conservation of Nature (IECN)

**Prof. Cao Tien Trung**, Director of the Institute for Ecology and Conservation of Nature (IECN), Vinh University, Vietnam, discussed the establishment of a national biobanking network in Vietnam and the Annamite mountain range in Southeast Asia. He mentioned how the Annamite mountain range has highly important biodiversity that has been globally recognised for its value. Then, Prof. Trung highlighted some new opportunities, such as biobanking for conservation receiving attention from the government in Vietnam, and the potential to rebuild wildlife populations as communities increasingly take ownership of conservation efforts. The IECN has been involved in all the major conservation work in Vietnam in conjunction with Vinh University, and the institute believes that it is important to work with local people to build a biobanking conservation network. SDZWA is also a key partner in this effort. IECN's vision for the future is to establish a national biobanking network in Vietnam, with the long-term goal to rescue and restore stable wildlife populations and promote community engagement in conservation. Prof. Trung also mentioned four strategic areas for IECN and partners: (1) Building and developing a standard biobanking laboratory and cell storage area, (2) perfecting the legal framework for biobanking activities in Vietnam, (3) connecting protected areas and rescue centre networks, and (4) building a community network connected to wildlife monitoring and sample collection for biobanking. Lastly, he closed by addressing capacity development needs and the long-term sustainability of this programme.

### Characteristics of flora and fauna in Annamites mountain

- Many rare endemic species
- Many new species described
- Many flagship species
- Habitat diversity



The only live adult Saola ever seen by the outside world. This female was captured in 1996 in Laos by local villagers, and transferred to a nearby menagerie, but survived only a few weeks.  
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*Prof. Trung's presentation noting the characteristics of flora and fauna in the Annamite mountain range.*

## Insights from the Latin America biobanking workshop

**Dr. Boripat Siriaronrat**, Co-Chair of the IUCN SSC ABCSG, attended the first Latin American workshop on genomics, biobanks, and biotechnology in Cali, Colombia, from October 20 to 22, 2025, and provided insights on the outcomes from that event. The two key aims of the workshop were to (1) examine the systemic, institutional, and resource-based challenges that limit the involvement of minority scientists, communities, and institutions in conservation genomics and biobanking, and (2) highlight the logistical, technological, and funding disparities that hinder the establishment and use of biobanks in marginalised or resource-limited regions. Dr. Siriaronrat noted how the participants in the workshop identified several challenges, such as a conceptual confusion with biobanks, infrastructure and resource limitations, weak governance, inequality in capacities, and a lack of technical training and formal recognition. Dr. Siriaronrat also highlighted the recommended strategies identified by the participants, including defining a phased plan with clear goals, promoting local and regional collaboration, strengthening technical capacities, giving a formal status to existing initiatives, and fostering financial sustainability. Dr. Siriaronrat closed by mentioning the workshop's main conclusion, which was to strengthen the Latin American Biobanking Network (LABNet), will require moving from a collection of fragmented initiatives to a coordinated, inclusive, and sustainable network based on real collaboration, common standards, and a clear narrative about the value of biobanks for conservation.



*Participants from the first Latin American workshop on genomics, biobanks, and biotechnology in Cali, Colombia, in October 2025.*

## Panel discussion

Moderated by **Dr. Boripat Siriaroonrat** (IUCN SSC ABCSG)

Panellists: **Dr. Sonja Luz** (CEO, Mandai Nature), **Dr. Pierre Comizzoli** (Smithsonian Institution, Smithsonian's National Zoo and Conservation Biology Institute), **Dr. Manabu Onuma** (Biodiversity Division, National Institute for Environmental Studies), and **Dr. Ampika Thongphakdee** (ZPOT)

Dr. Siriaroonrat started the panel discussion by asking the panellists what they see as the next step for the regional network, in terms of priorities.

Dr. Luz mentioned that structure is needed to keep the momentum going, such as potentially housing the network under the ABCSG. Dr. Luz also mentioned that the network should find a way to connect to existing platforms more, such as [Species360's Zoological Information Management System \(ZIMS\)](#), which now has a biobanking module. She noted that this would help address the biggest challenges of staying connected and sharing data, by improving data sharing and building trust. Additionally, Dr. Luz proposed connecting with the Asian Society of Conservation Medicine (ASCM), since they meet annually. The network could then host a short meeting at the end of ASCM meetings each year.

Dr. Siriaroonrat invited Dr. Onuma, who is also the President of the ASCM, to respond to Dr. Luz's proposal, before asking Dr. Onuma the same question as Dr. Luz on priorities. Dr. Onuma responded positively to this proposal and noted that the ASCM's next meeting would be in Indonesia in 2026. As for next steps and priorities, Dr. Onuma would like to see more Asian countries start biobanking, with a focus on Endangered (EN) and EW species. Dr. Onuma also highlighted the importance of knowing who is keeping what and where, and surveying institutions on their biobanking efforts, which can also help determine priorities. Dr. Onuma referred to his [paper published in 2018](#) with Dr. Ryder, as mentioned during his presentation, and how that could be updated. Ideally, Dr. Onuma would also like to see biobanking information on the IUCN Red List website someday.

Dr. Siriaroonrat asked the participants in the audience if they would be willing to support Dr. Onuma's vision and everyone agreed to share their data and help if Dr. Onuma leads this effort.

Dr. Thongphakdee responded to the question posed by Dr. Siriaroonrat earlier, highlighting the need for reliable storage, and to develop protocols for different species in different locations, including sample collection for species in the wild versus those in zoos. Dr. Thongphakdee also voiced her hope for SEAZA to form a network for biobanking like EAZA's, and for genetic resources to be exchanged between zoos and countries in the future.

Lastly, Dr. Thongphakdee noted the importance of not waiting for species to become too threatened until collecting samples from them, as it becomes much more difficult to obtain good ones at that point.

Dr. Siriaroonrat continued the discussion and asked Dr. Comizzoli about ideas to resolve the gaps and needs for biobanking, with a focus on capacity building and communication. In the short term, Dr. Comizzoli strongly recommended participants to share what they learnt during this workshop when they return to their respective institutions and engage more people from their institutions to become involved and follow up. He mentioned that it is especially important to engage younger people who are motivated and have the time to work on the resulting action points to make further progress. Dr. Comizzoli also noted that it will be very important to share information and help each other within this biobanking network, as every country and institution is at a different level of progress, and to make more people aware of this network. Dr. Comizzoli concluded by emphasising that when this group meets again, it will be important to provide progress reports on the work accomplished, or the reasons for not being able to make progress and to seek help from the group, instead of only gathering to strategise again.

Dr. Siriaroonrat gave the panellists an opportunity to respond to each other, and Dr. Luz added that, aligned with Dr. Thongphakdee's remarks, network members should bank anything they can get their hands on as it builds experience. However, Dr. Luz noted that it is also important to focus on other critical species, including [Asian Species Action Partnership \(ASAP\) Species](#), which are CR land and freshwater vertebrates in Southeast Asia. Many of these are difficult species to biobank; hence, institutions that have the capacity and experience can prioritise these. Lastly, Dr. Luz added that, at the moment, it is still about getting institutions to start biobanking and doing it well.

Dr. Siriaroonrat then opened the floor for questions and comments from the participants, as well as responses from the panellists. Several suggestions were made, including:

- Collaborating with both SEAZA and ASCM, and having the Asian network fall under an overarching umbrella
- Understanding ways to share skills with different types of organisations like wildlife rescue centres across different countries, while accounting for the challenges in different nations
- Using this network to post new positions and postgraduate opportunities since it is hard to find people with specific skillsets

- Having countries with more biobanking experience help countries who are getting started
- Establishing national working groups for biobanking and having members from this network help as advisors to help governments better understand this work

The session closed with Dr. Luz highlighting that to will be important to come up with goals for what this network aims to achieve over the next year or five years.



*Dr. Siriaroonrat posing a question to the panellists.*

## Breakout session

The participants were split into five groups to answer three main questions, the first of which had two sub-questions. After the discussion, a representative summarised their group's discussions to the rest of the participants. Their responses have been summarised below.

### **1. What challenges are you facing/did you face with collecting samples and how did you overcome these?**

*1.1. If you are already collecting tissue and blood samples, what are the difficulties with expanding the effort to reproductive and living cells and viable biopsies?*

*1.2. Which animal groups, technical capacities, or institutional links are most underrepresented, and what concrete actions could fill these gaps to make efforts inclusive and functional?*

### **Challenges**

The groups mentioned various challenges, the most common ones being issues with obtaining permits and funding, and a lack of standard guidelines and protocols to support sample collection across taxa. Other challenges included:

- Difficulties with accessing samples in certain areas with restrictions or conflict
- Issues with collecting samples from certain species due to low numbers and diversity
- Contamination of samples and delays with transfers
- Issues with communication and cooperation across staff groups
- Understanding ownership

### **Underrepresented animal groups, technical capacities, and institutional links**

The groups mentioned several underrepresented animal groups, including fish, invertebrates, avians, amphibians, and reptiles. Additionally, the groups believed that the main underrepresented technical capacities are having sufficient human resources with the proper training, including the capacity to freeze avian sperm and assess animals for zoonoses before sampling. Lastly, the groups felt that the most underrepresented institutional links are rescue centres, government institutions, and universities.

### **Potential solutions**

The most common solution that was mentioned by the groups was to develop a standard operating procedure and protocol for sample collection, handling, processing, and storage for different taxa to increase technical capacity and reduce issues. Several potential solutions were mentioned, such as:

- Increasing connections between veterinary facilities and universities to support effective sample collection for native wildlife species
- Establishing a network for wildlife roadkill management
- Integrating advanced wildlife science into veterinary curriculums
- Having a material transfer agreement to resolve issues with ownership
- Using genetic enhancement to support species with low numbers and diversity
- Increasing financial resources through institutional support
- Ensuring safe storage by having more backup sites and power
- Teaching and empowering more staff about the importance of this work and how to collect samples, including people across different types of fields and institutions
- Increasing preparedness for sample collection and supporting staff by preparing the sample collection media for them in advance
- Having national hubs or centres to send samples to
- Developing an efficient way to contact biobanking experts for support, such as through a network and mailing list
- Increasing networking and learning opportunities through staff exchanges and groupwork

## **2. How can biobanking, genomics, and ARTs be integrated across Asia to maximise conservation impact?**

All the groups mentioned the need to develop a relevant strategy and action plan. Some specific actions included:

- Establishing national networks for biobanking and having focal points and thematic groups in each country that work together

- Training locals to have expertise in their own protocols to increase efforts locally
- Increasing government buy-in and support from different stakeholders, including local communities, through greater communication and outreach efforts
- Having country and regional hubs with a database of the samples
- Understanding the capacities and advantages of different institutions to improve coordination and collaboration
- Increasing communication and collaboration with the conservation community and those working on species-specific programmes on the importance of biobanking, linking it to the One Plan Approach and population management goals to open opportunities for more genetic exchanges
- Using a bottom-up approach and increasing collaborations between universities, while also increasing university networks for biobanking
- Having opportunities for continued professional development and knowledge sharing through regular meetings
- Increasing government-to-government collaboration

### **3. What policy, legal, and ethical frameworks are needed to enable responsible access, sharing, and use of genetic resources across countries, in line with the Convention on Biological Diversity (CBD) and the Kunming-Montreal Global Biodiversity Framework? (country level, SEAZA level, global level)**

Most of the groups highlighted the importance of complying with the Nagoya Protocol framework to support fair and equitable access and benefit sharing. To support this, it was suggested that the Nagoya Protocol country contacts and relevant national authorities should be identified, which can be done online. Another global standard that was mentioned was following the Convention on International Trade in Endangered Species (CITES) requirements for permits. On a regional level, it was suggested that there should be an Association of Southeast Asian Nations (ASEAN)-level policy for a biobanking system in Southeast Asia, similar to the one in the European Union. Lastly, on a more institutional and local level, standards set by local Institutional Animal Care and Use Committees (IACUCs) should also be adhered to, to meet ethical and welfare requirements for animal use, as should relevant biosafety and biosecurity protocols.

## Plenary session and conclusions

The main aim of the plenary session was to discuss the potential to create an animal biobanking for conservation network in Asia, and related governance structures. Through a vote, the group unanimously agreed to form a network. Furthermore, after being nominated by a participant, the group also unanimously agreed for Dr. Onuma to lead the network, given his vast experience and strong motivation to support countries with biobanking in the region. After various considerations, it was decided that the network will be led independently from the ABCSG until a proposal is submitted to the ABCSG for approval, after which it can be integrated into the group as a regional network in the future. A tentative name for the network was also decided: “Asian Conservation Biobanking Network”, and the network will only focus on wildlife. Once it is under the ABCSG, this will likely be modified and referred to as the ABCSG–Asia Network or Chapter. In addition, Dr. Luz stated that Mandai Nature is willing to support the network financially.

The next steps include identifying a way to communicate with each other, which will most likely be through a mailing list of the workshop participants initially. It was suggested that more Asian countries should be added to this network, including Brunei, and potentially other IUCN SSC Specialist Groups for species-specific work. The workshop coordinators will provide this list to Dr. Onuma to start discussions related to this network. Discussion topics include working on a gap analysis publication and planning the next network meeting, which could potentially be after the ASCM meeting next year in Indonesia (and/or in Lao People's Democratic Republic (PDR) in 2027), or after SEAZA in the Philippines.



*Unanimous vote to have Dr. Onuma lead the new Asian network.*

## Joint closing session

The workshop closed with a joint session with the pathology workshop that was taking place next door. Dr. Luz's closing remarks highlighted the similarities between the work of pathologists and biobankers, noting how the two should increase collaboration since pathologists work with many specimens that could be biobanked. Dr. Luz then invited Dr. Siriaroonrat and Dr. Carmen Simth from the pathology workshop to discuss both of their workshops.

Dr. Siriaroonrat echoed Dr. Luz's sentiments about the similarities between the work of pathologists and biobankers, mentioning how they have slightly different agendas but both work for wildlife and support wildlife health. Dr. Siriaroonrat then introduced the pathology workshop participants to the IUCN SSC and ABCSG, including the Frozen Tissues and Blood Fractions Task Force, which he felt would be most relevant to their work. He also emphasised the importance of avoiding colonial science, and to follow global standards and give back to the countries where samples are collected from. Lastly, Dr. Siriaroonrat encouraged the pathology workshop participants to become involved in sample collection efforts, and mentioned that the group would try to share some protocols and best practices to support this effort in the future.

Dr. Smith provided insight into the types of attendees, presentations, practical demonstrations, and discussions at the pathology workshop, which is their first meeting as a network, called "SCOPE" (Summit for Conservation Pathology Engagement). He mentioned that around 30 institutions were represented by 40 attendees spanning different professions, including different types of vets, pathologists, and field biologists. Dr. Smith shared that their pathology group discussed experiences with wildlife pathology and challenges. He noted that the biobanking group and larger community could help address these challenges as well, due to both groups' shared vision of caring about wildlife conservation. Dr. Smith also supported Dr. Siriaroonrat's remarks on avoiding colonial science, noting that this was discussed within their workshop. Finally, he mentioned that it would be beneficial for the biobanking group to facilitate training by sharing simple standard protocols that pathologists and field biologists can use for sample collection to support biobanking efforts.

Dr. Siriaroonrat and Dr. Luz closed the meeting by sharing some final remarks on their hopes for future collaboration between both groups at potentially other SEAZA events, after ASCM meetings, or other meetings in general to keep the momentum going, aiming to keep participants informed of any updates.



*Dr. Luz giving her closing remarks during the final session of the workshop.*



*Joint group photo with the pathology workshop participants.*

## **Next steps**

Dr. Onuma, as the elected Chair of the new Asian network, will reach out to the workshop participants to work on a direction for the group and decide the location for the next meeting. A strategic plan for the network will be developed after further consultations that will take place after the workshop.

A key output that was agreed on by the members during the workshop was contributing to a survey on viable cell cultures. The ABCSG and CSS-Biodiversity Banking will be supporting this effort.

In the future, this network may become a part of the ABCSG once a proposal has been submitted.