

SCIENCE AND ACTIONS FOR SPECIES PROTECTION Noah's Arks for the 21st Century

Concluding Statement of a conference by the Pontifical Academy of Sciences with international partners from Natural History Museums, Zoological Gardens, Botanical Gardens and Specialists in Biodiversity Protection, 13-14 May 2019. Casina Pio IV, Vatican City – May 15, 2019

1. We have come together at this conference of the Pontifical Academy of Sciences including leaders from **natural history museums, zoological gardens, botanical gardens**, nature conservation specialists, and policy advisors to **call for action to build new sustainable relations between humanity and the natural world of which we are an integral part**. We need to change our mindset, our mentality of exploitation that has driven us to the point where we are now. We seem to live in an immense and fantastic world, forgetting about what has been given to us. The encyclical *Laudato Si'* by Pope Francis represents a strong critique of human impact on biodiversity: "Each year sees the disappearance of thousands of plant and animal species which we will never know, which our children will never see, because they have been lost forever. The great majority become extinct for reasons related to human activity. Because of us, thousands of species will no longer give glory to God by their very existence, nor convey their message to us. We have no such right" (Pope Francis, *Laudato Si'*, pp. 24-25). The conference is also a follow up to *Laudato Si'* toward action by broad alliances. We take note and build on recent scientific conferences about the causes and consequences of extinction, such as the joint Pontifical Academies' conference in 2017.^[1]

2. An estimated **one fifth of all life forms other than bacteria are in danger of extinction in the next few decades**, and as many as half by the end of the 21st century; at least 80% of these species are unknown scientifically. The extinction rate now is an estimated 1,000 times its historical rate, and is increasing continuously. We note that species extinctions have always been part of the evolutionary process, but the dominant causes of species loss today are different from these natural processes. We reaffirm **that in our times human activities are the primary cause of species extinction and loss of biodiversity**, especially as a result of our competition for land and water, the pollution we generate, and the actions we take that impact the climate and the global environmental in general. **The loss of species and of biodiversity is a significant concern** because of the intrinsic value of species and biodiversity, the value of potential uses of biodiversity including agro-biodiversity in the future in the changing world ecologies, and most fundamental, because with this loss we limit or lose the mechanisms of future evolution of nature.

3. **Collectively the natural history museums, zoological gardens, botanical gardens reach hundreds of millions of people, including youth, and introduce them to the wonders of nature and the need to preserve them for the sake of those who will come after us**. These organizations committed at this conference to enhance their scientific educational mission and their public outreach activities by working more closely together both locally and globally, for example by sharing information, best practices, and exhibitions. The worldwide communities of **natural history museums, zoological, and botanic gardens are catalytic and significant allies in the global drive toward species protection and nature preservation**. Our common fascination with nature and role as stewards of global nature knowledge and natural heritage leads us to preserve species threatened by human

caused environmental destruction, including climate change and the related loss of species. In these, as well as in natural history museums, endangered and/or extinct species can be studied, so that conservation can have a sound basis. The capacities of these institutions need sustained support and strengthening. They can be drivers of the necessary change, fostering deep reflection and reevaluation of our relation to nature. Their communications and educational activities build public support for appreciating and conserving nature and for the level of international cooperation that alone can make widespread, effective conservation efforts possible.

4. We understand that attempts to build “**Noah’s Arks for the 21st century**” will not be sufficient to comprehensively prevent the threats of global loss of species by establishing islands of protection. Fundamental societal change is needed. Reduction of the ecological footprint is necessary, and **consumption patterns must change**. Fossil fuel consumption, food waste, land-use change, and deforestation are fundamental drivers of climate change leading to biodiversity losses and species extinctions. These patterns of social behavior need a course correction, as highlighted by the joint Pontifical Academies’ conferences and declarations.[2] Our economic systems need to be redesigned toward circular bio-based economic systems, in which humankind and nature are less in conflict. Science and innovation, sound governance, and incentives for industry and agriculture need to come together to achieve such a **sustainable bioeconomy**, adjusted to local circumstances.

5. **Natural history museums** and their collections are key to learning about nature and evolution – its past, its present, and its future. These collections are a unique and truly global scientific infrastructure for science and society as well as the source of much of the information on which effective conservation action can be based. These institutes also attract millions of visitors every year. The overall capacity of these institutions for science, education, as forums of public dialogue and enjoyment, as well their expertise to help setting environmental policies should be maintained and strengthened.

6. **Zoological gardens and aquaria** at local, regional, and global level provide a chance for people-animal interaction and learning about the beauty of and respect for animals. Zoos also maintain high-level contacts with local, national and regional legislators, global conservation bodies and in situ conservation projects, zoological researchers, educational institutes, and organizations with a shared interest in learning about and preserving biodiversity. The unique ability of zoos and aquaria to save small populations of animals from extinction needs to be more strongly addressed and societies and decision-makers need to be asked to ensure the adequate support to enable them to sustainably perform their vital functions.

7. The living collections of **botanical gardens** have an educational function for the general public, whom they teach about the essential role of plants in enabling our survival and adding beauty and refreshment to our lives. Using these lessons, they teach the public about the need for conservation, with many of them actively pursuing conservation goals. Of the nearly 3,000 botanical gardens in the world, perhaps a quarter also house herbaria and libraries. Using these facilities, botanical gardens conduct research laying the basis for effective conservation activities. Seed banks and tissue culture centers, supported by botanical and other facilities, play an important role in plant conservation. For these reasons, botanical gardens, seed banks, and tissue culture centers clearly need sustained long-term support.

8. **National parks, protected areas** and other biodiversity rich areas have an important role to play. Zoological and botanical gardens must work together with them in order to become mutually sustainable. People inhabiting parks and protected areas should be

supported and made aware of the importance of conserving biodiversity for future generations. It is essential to include a **people-centered approach** to conservation, with special attention to **indigenous peoples** and their knowledge about biological systems and species uses. Empowerment of people, especially women and children, is called for and their existing levels of welfare will have to be strengthened for our conservation efforts to succeed. The huge inequities within and between nations need to be addressed globally, as does the empowerment of women and children. Only then can we come together successfully to achieve a sustainable economic system globally. The one-plan approach of IUCN can tighten the bonds of the stakeholders.

9. We support the finding of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). We see an **important opportunity for international action in the upcoming UN Biodiversity conference 2020 in China**. The Convention on Biological Diversity (CBD) is dedicated to promoting sustainable development, with the objectives of conservation of biological diversity (all ecosystems, species, and genetic resources); the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the use of genetic resources, notably those destined for commercial use. It has not, however, been particularly effective, with about a quarter of the world's tropical forests having been cleared since the CBD came into effect in 1993, and the very real threat that virtually all such forests may be gone before the end of this century. **We urge the CBD's post-2020 global biodiversity framework to become more ambitious than it has been in the past, particularly in facilitating cooperation between nations while enough time remains to save a major proportion of the world's existing biodiversity**. The kind of education that results from cooperation between the communities of natural history museums, zoological gardens, botanical gardens, and nature conservation specialists has the potential of improving the results that the CBD will be able to achieve in the decades to come.

10. Social justice, combined with a deep, sincere concern for one another, must form the basis for international conservation efforts if they are to succeed. We note the need for **science and policy to engage with religious and moral authorities** to implement joint strategies aimed at changing the trajectory of humankind. We should not try to make the world a paradise, but we can learn how to take care of the world. And we must use all our strength to find ways of making the world more human, giving people the possibility to live their lives so that we may share the richness and the resources given to us in a way that could never be possessed or owned by us. In principle, all major world religions are committed to respecting and preserving nature and can agree on joint actions for this objective. These communities are called upon to explore new synergies for enhanced impact on people's world views and **new joint collective actions** to address extinction problems. This will include an assessment of the potentials and challenges of building **"Noah's Arks" of our times** with new virtual and practical approaches.

END NOTES

[1] "Biological Extinction", Proceedings of the Joint PAS/PASS Working Group, 27 February - 1 March 2017. Scripta Varia 134. Vatican City

<http://www.pas.va/content/accademia/en/publications/scriptavaria/extinction.html>

[2] "Health of People and Planet: Our Responsibility", PAS-PASS Conference 2017, with a focus on climate change <http://www.pas.va/content/accademia/en/events/2017/health.html>

CONFERENCE CO-ORGANIZERS

[Joachim von Braun](#) / President of the Pontifical Academy of Sciences, Germany

[Marcelo Sánchez Sorondo](#) | Bishop Chancellor of the Pontifical Academy of Sciences

Thomas Kauffels | Director, Opel-Zoo, Kronberg, Germany, and Chairman, European Association of Zoos and Aquaria (EAZA), UK

[Peter H. Raven](#) | PAS Academician, ecologist, USA

Johannes C. Vogel | Director of Natural History Museum, Berlin, Germany

CONFERENCE PARTICIPANTS

[Vanderlei S. Bagnato](#) | PAS Academician, Brazil

Wilhelm Barthlott | Prof. em., Nees-Institute for Biodiversity of Plants, University of Bonn, Germany

Philippa J. Benson | Managing Editor | Science Advances, Washington, DC, USA

Lori Bettison-Varga | President & Director, Natural History Museum of Los Angeles County, USA

John R. Clark | Chair of the Center for Plant Conservation, San Diego, California, USA

Sarah Darwin Vogel | Botanist, Berlin, Germany

Bruno David | President Muséum National d'Histoire Naturelle, Paris, France

Hailemariam Desalegn Boshe | Former Prime Minister of Ethiopia and Chair of Hailemariam & Roman Foundation

María Clara Domínguez | Cali Zoological Foundation, Colombia

Alberto Gómez Mejía | President of Colombian Botanical Garden Network, Colombia

Anthony N. Hitchcock | Kirstenbosch National Botanical Gardens, SANBI, South Africa

Marco Lambertini | Director General, WWF

Richard W. Larivière | President, The Field Museum, Chicago, Illinois, USA

Theo B. Pagel | Zoo Director and CEO of Cologne Zoo, Germany

Mark Pilgrim | Vice-Chair EAZA and Chester Zoo CEO, UK

Paul Smith | Secretary General of Botanic Gardens Conservation International, London, UK

Gloria Svampa Garibaldi | President, Italian Association of Zoos and Aquaria, Zoological Director of the Education & Nature Conservation Departments of the City Museum of Zoology of Rome, Italy

Virgilio Viana | Member of the Leadership Council of the UN, founder of Amazonas Sustainable Foundation, Manaus, Brazil

Sergey Volis | Kunming Institute of Botany, Cas, China

Christina Walters | Seed storage, USDA-ARS National Laboratory for Genetic Resources Preservation, Fort Collins, Colorado, USA

Yehoshua Weisinger | “Bioethics and Law Initiative”, Sackler Faculty of Medicine, Tel Aviv University, Jerusalem, Israel

Mikkel Wold | Lutheran Parish Priest at Marmorkirken, Copenhagen, Denmark