



UNITED NATIONS  
Office for Outer Space Affairs

IAC-16,B1,6,8

67<sup>th</sup> IAC

30 September 2016 | Guadalajara, Mexico

**Space Technology and Applications for  
Monitoring and Protecting Biodiversity and Ecosystems:  
A New Thematic Priority of the United Nations  
Programme on Space Applications**

Werner R. Balogh\*, Lorant Czarán\*, Remi Chandran<sup>§</sup>

\*United Nations Office for Outer Space Affairs  
United Nations Office at Vienna

<sup>§</sup>National Institute for Environmental Studies, Japan





# Overview

- I. UN Programme on Space Applications
- II. State of Biodiversity and Ecosystems
- III. Space Solutions for Biodiversity and Ecosystems
- IV. UN/Kenya Conference
- V. Conclusions

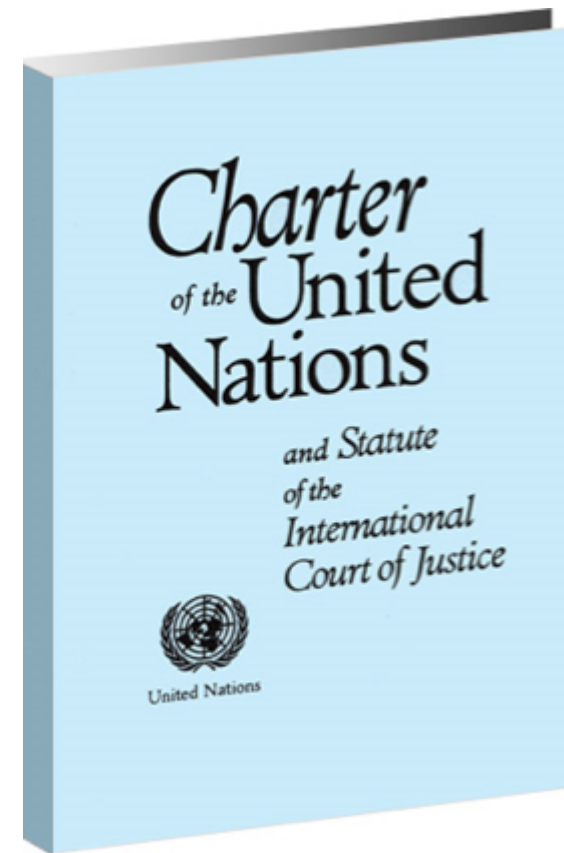
Note: United Nations documents quoted in this paper are available from the website of the Office for Outer Space Affairs at [www.unoosa.org](http://www.unoosa.org) and from the Official Document System of the United Nations at [documents.un.org](http://documents.un.org).

Disclaimer: The views expressed in this paper are purely those of the author and do not necessarily reflect the position of the United Nations and its Office for Outer Space Affairs.



# United Nations and Outer Space

- Article 1
  - *Maintain international peace and security;*
  - *Develop friendly relations among nations ... and to take other appropriate measures to strengthen universal peace;*
  - *Achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character ...; and*
  - *Be a centre for harmonizing the actions of nations in the attainment of these common ends.*
- Article 56
  - *Take joint and separate action in cooperation with the Organization for the achievement of these purposes ...*



As cited in para. 35 of the report of the Ad Hoc COPUOS meeting (A/4141)



# Office for Outer Space Affairs

- Originated as a small expert unit in the UN Secretariat to service the Ad Hoc COPUOS meeting
- 25 staff members (scientists, lawyers, political scientists), plus several seconded staff and interns

The United Nations Office for Outer Space Affairs (OOSA) is responsible for promoting international cooperation in the peaceful uses of outer space and for assisting Member States, in particular the developing countries, in using space science, technology and its applications







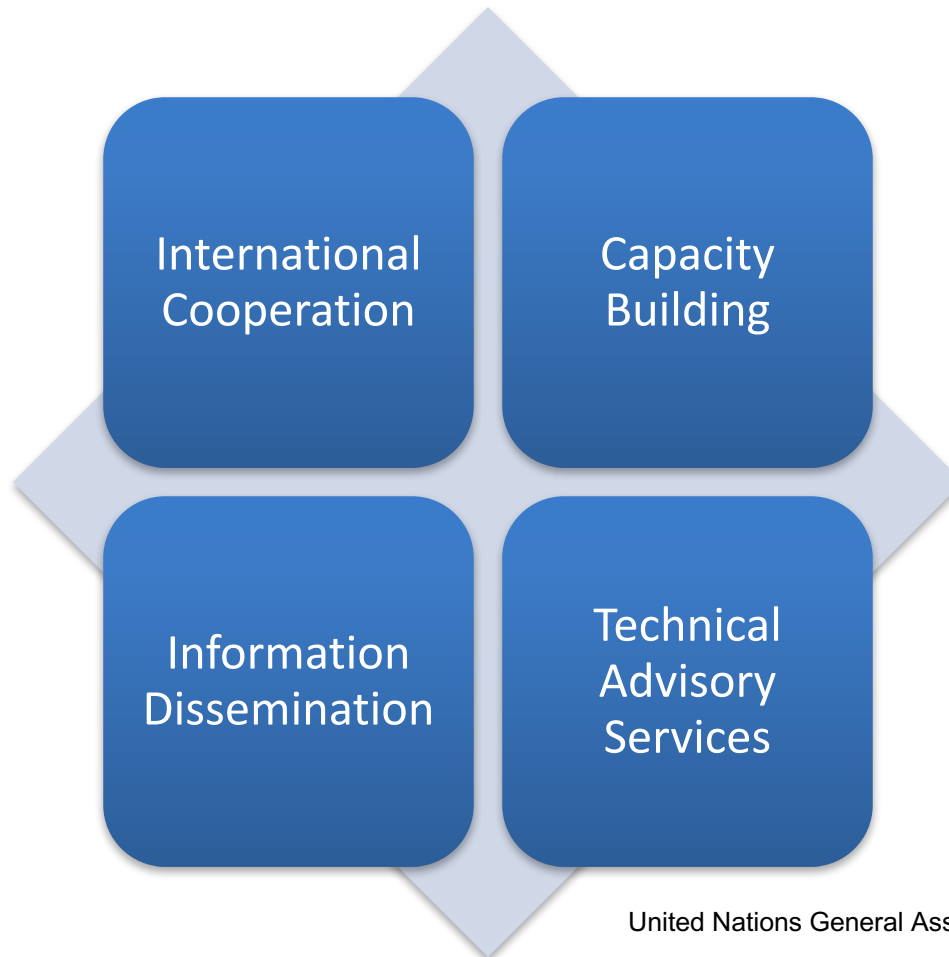
# Programme on Space Applications



- Supports capacity building in space science, technology and its applications
- Established in response to recommendations of the first UNISPACE conference in 1968
- Operational from 1971 and implemented by UNOOSA
- Strengthened mandates as a result of the discussions at the UNISPACE conferences held in 1982 and 1999



# Programme Mandate

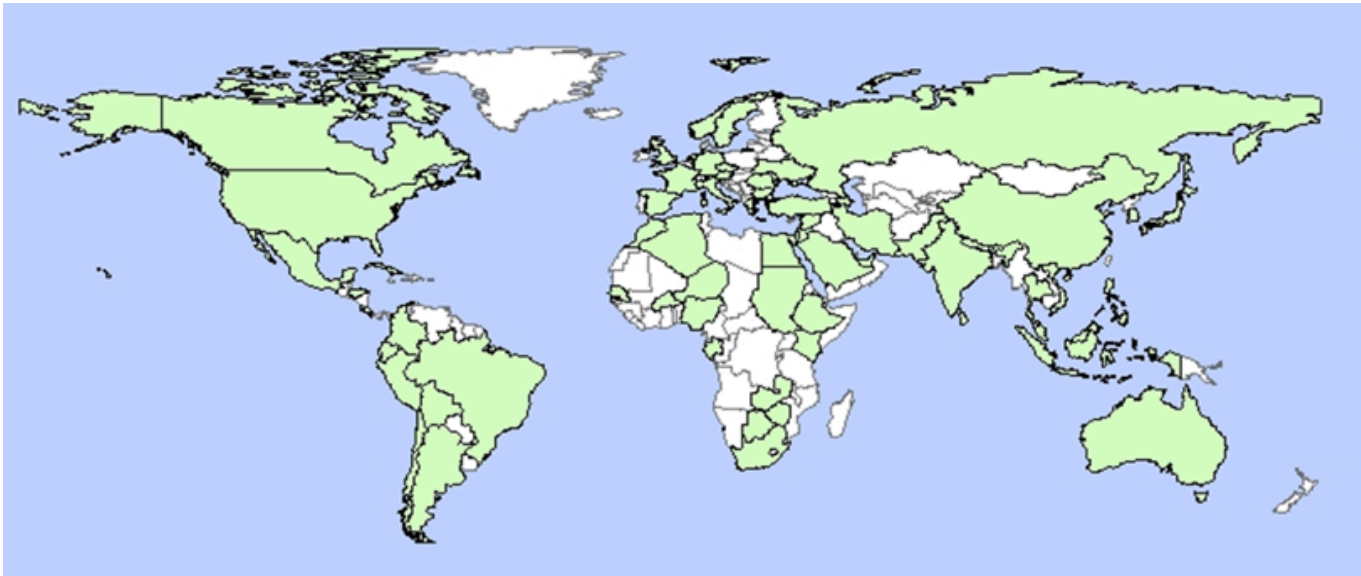


United Nations General Assembly Resolution 37/90, para. 7





# Programme Activities 1971-2014



- 305 Expert Meetings/Seminars/Workshops/Conferences
- 75 countries, more than 21000 participants
- **Topics covered:** Biodiversity/Ecosystems (new), Climate Change, Disaster Management, Environmental Monitoring and Natural Resource Management, Global Health, Global Navigation Satellite Systems, Satellite Communications, Basic Space Science Initiative (BSSI), Basic Space Technology Initiative (BSTI), Human Space Technology Initiative (HSTI)



# Biodiversity and Ecosystems

- Biodiversity is the variation of life within and across species and ecosystems
- Biodiversity contributes to the functioning of ecosystems and raises their performance in valuable ways
- Ecosystem services provide, regulate, support, and have a cultural function





UNITED NATIONS  
Office for Outer Space Affairs

# Transforming our world: 2030 Agenda For Sustainable Development





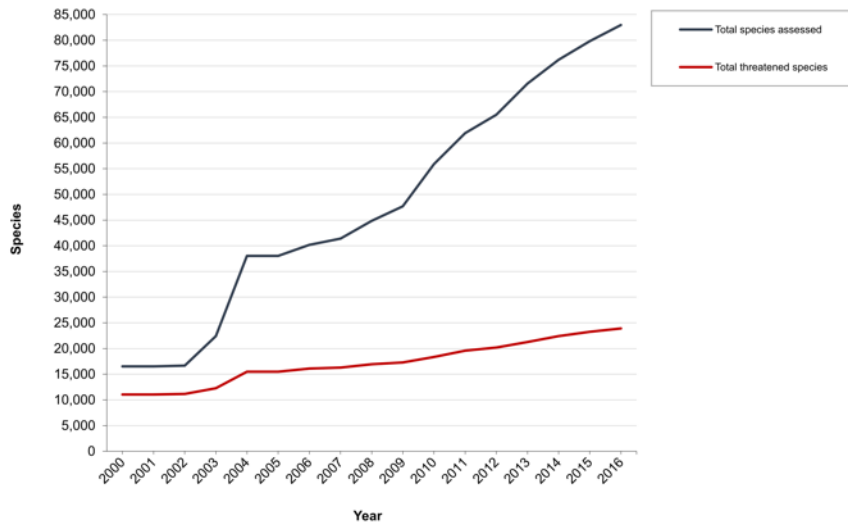
# Agenda 2030 & Sustainable Development Goals



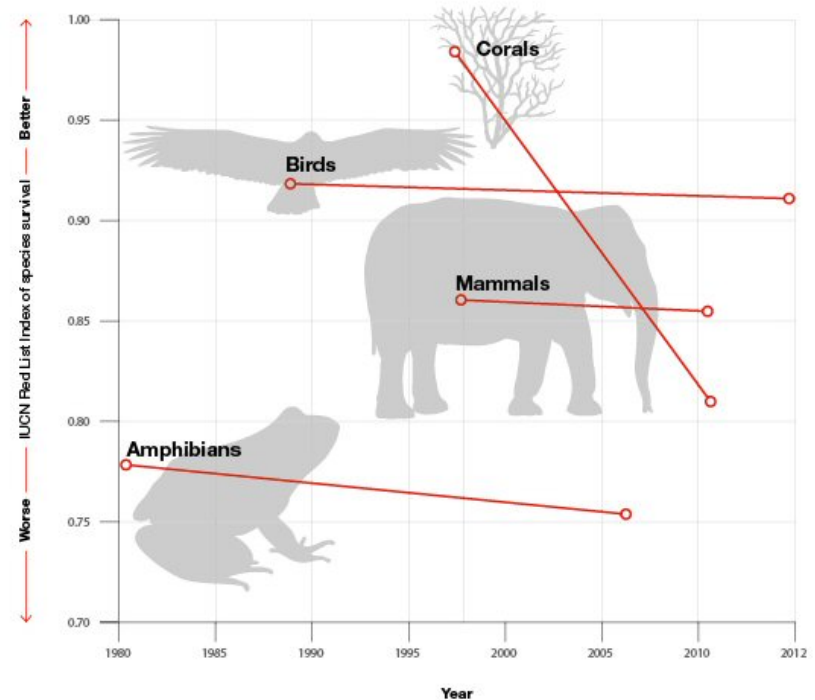




# Global Status of Biodiversity



Number of species assessed and number of species threatened (2000–2016)  
(Source IUCN red list 2016)

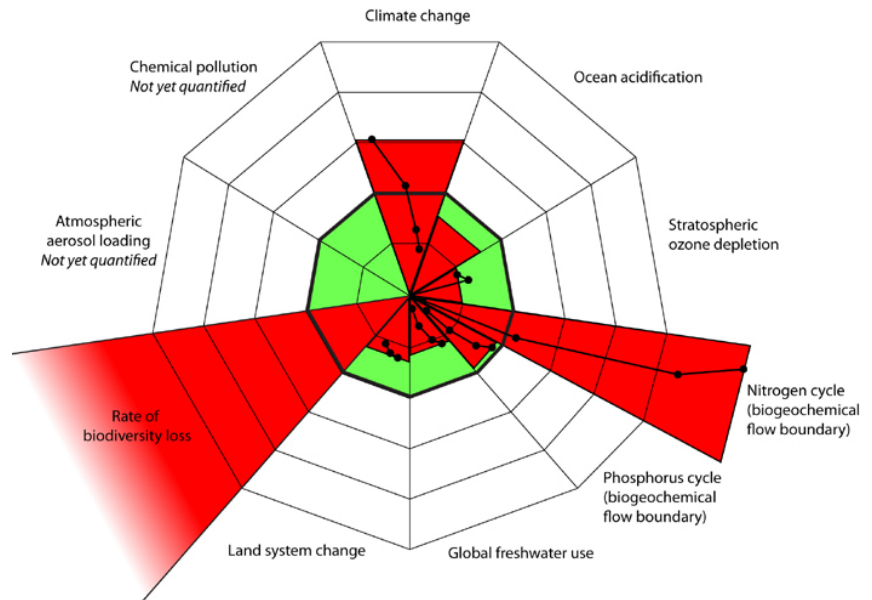


Extinction risk of various species  
(Source IUCN red list 2016)



# Alarming State of Affairs

- Planetary boundaries
- **Boundary:** Annual species extinction rate no more than 10 per million per year
- **Current level:** At least 100 per million per year
- **Diagnosis:** Boundary far exceeded
- Sixth great extinction



Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* 14(2): 32





# Major Reasons for Biodiversity Loss



## Encroachment & Deforestation

Source: <http://blog.worldagroforestry.org/wp-content/uploads/2012/12/oil-palm-plantation-klum1.jpg>

## Demand Driven Poaching and Illegal Trade



Source: CNN



## Demand Driven Poaching

- "Last year, 1175 rhinos were poached in South Africa, up from just 13 in 2007."
- "In 2014, the United Nations estimated the illegal wildlife trade to be worth between \$50 billion and \$150 billion annually."
- "Black rhino numbers have shrunk by 96 % due to poaching."

Source: Foreign Policy 09/10 2016, p. 37, "Do you Have Any Tigers to Declare"

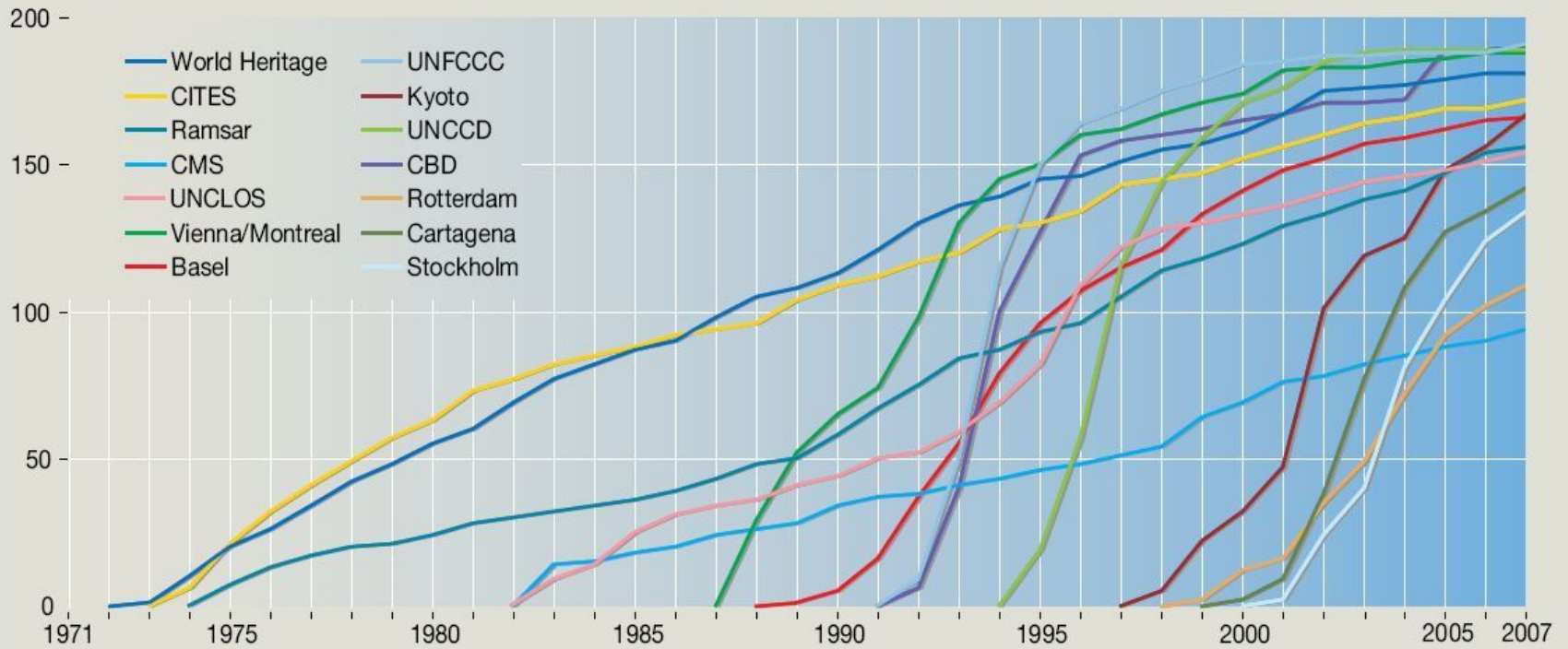




# Multilateral Treaties

## Ratification of multilateral environmental agreements

Number of countries



Source: UNEP, Yearbook 2008.



# Action Requires Evidence-based Policies

- Case 1 – **No evidence and no policy** – Information doesn't exist for formulating policies
- Case 2 – **Policy based evidence** – Information exists but is not used for decision making
- Case 3 – **Evidence based policy** – Decision based on scientific evidence
- **Need for accurate geospatial data and technology for real time monitoring!**






# Action Requires Evidence-based Policies

**Evidence Based Policy-Making in Addressing Wildlife Crime**

Combating Wildlife Crime

This story map addresses the importance of sharing information related to trans-boundary wildlife crime for law enforcement, scientists, policy makers and NGO's working on governance, international relations and public policy to combat illegal trade.

UNITED NATIONS UNIVERSITY



**London Conference**

February 12, 2014: The UK government brought global leaders together to help eradicate illegal wildlife trade and better protect the most iconic species from the threat of extinction. [Read More](#) | [Video](#) (Photo by Foreign & Commonwealth Office)

1 London Conference

2 London Declaration

3 The Asia-Africa Link

4 The Asia-Africa Link

5 The Asia-Africa Link

6 The Asia-Africa Link

7 The Asia-Africa Link

8 The Asia-Africa Link



# 2030 Agenda: Relevance of Space Technology

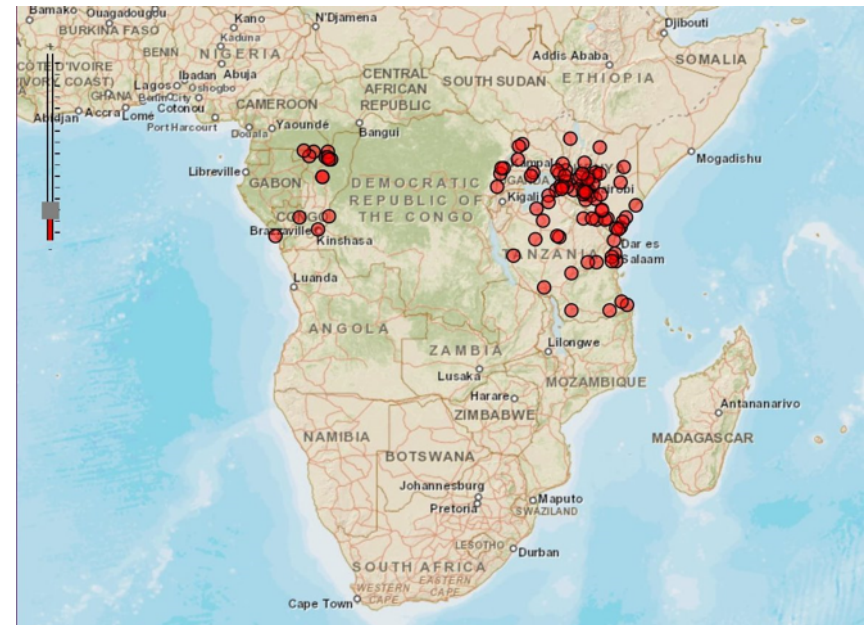






# UNOOSA-UNU Discussions

- In 2010 United Nations University (UNU) implemented the Wildlife Enforcement Monitoring System (WEMS) project in Africa to address information gaps on illegal trade of wild flora and fauna in Africa.
- UNOOSA to provide expert advise on the use of spatial information for enforcement support.
- Discussions between UNOOSA and UNU identified the need for bringing together multiple stakeholders working on addressing wildlife crime including Governments, International Agencies, NGO's and Industries in Asia and Africa.



**Bridging Stakeholders in Asia and Africa**  
-Tokyo Conference on Combating  
Wildlife Crime – 3<sup>rd</sup> March 2014



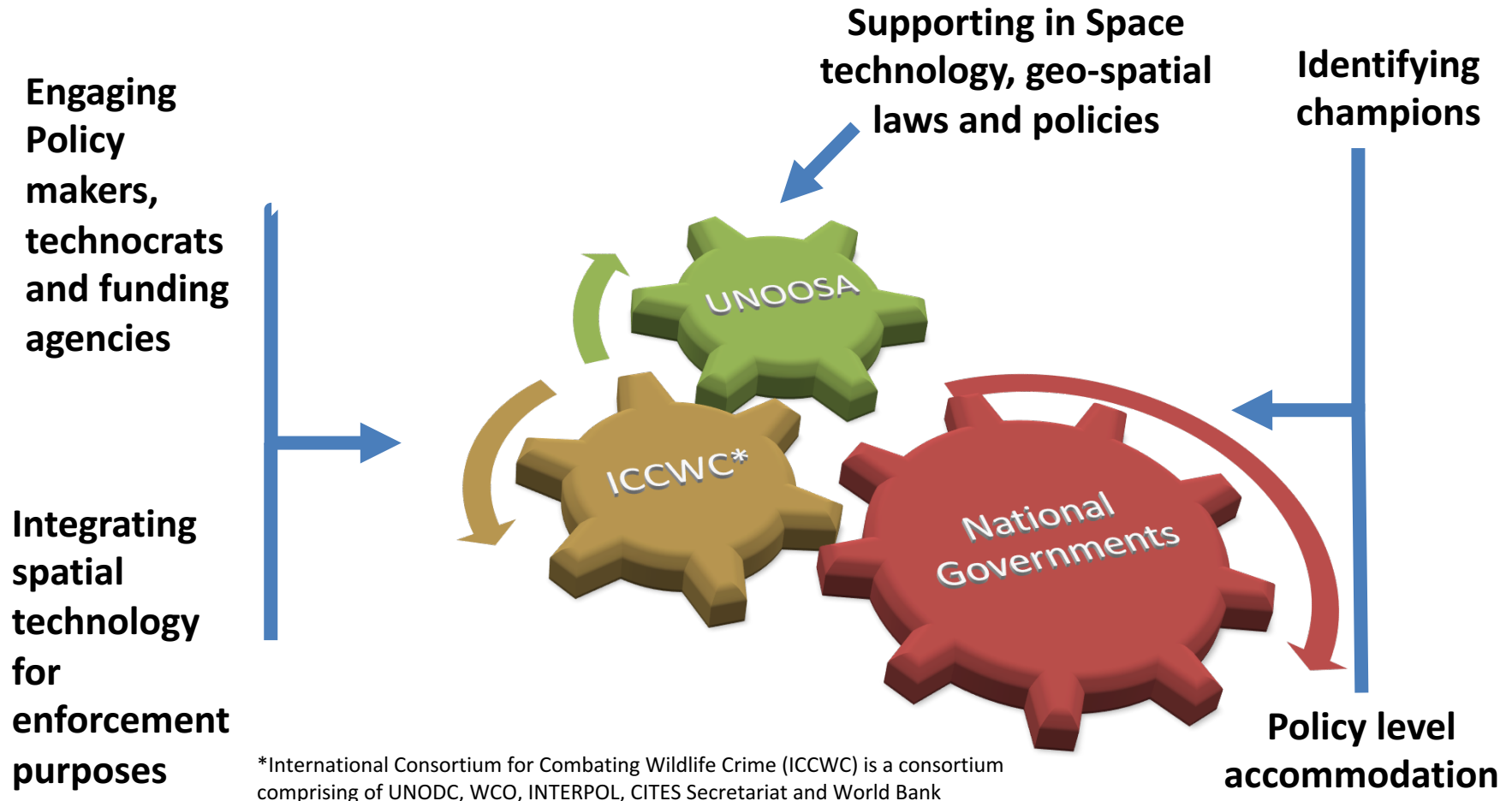
# Tokyo Conference on Combating Wildlife Crime







# Linking Space & Wildlife Community





UNITED NATIONS  
Office for Outer Space Affairs



## United Nations/Kenya Conference on Space Technology and Applications for Wildlife Management and Protecting Biodiversity



**27-30 JUNE 2016, UNITED NATIONS OFFICE AT NAIROBI, NAIROBI, KENYA**

**Organized by the United Nations Office for Outer Space Affairs**

**and the Government of the Republic of Kenya**

**supported by the European Space Agency**

**and hosted by the United Nations Environment Programme (UNEP)**

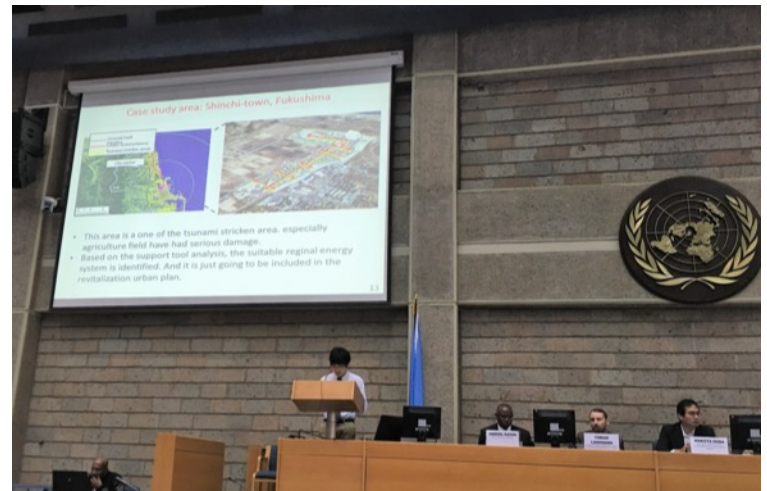






# United Nations/Kenya Conference

- UN/Kenya Conference on Space Technology and Applications for Wildlife Management and Protecting Biodiversity, 27-30 June, 2016 at UNEP in Nairobi
- 300 delegates from 29 countries: scientists, policy makers, industrial representatives and NGOs
- ESA, UNEP, UNODC, UNOOSA, UNDP, INTERPOL, CITES, World Bank
- Lusaka Agreement Task Force and ASEAN representatives





# Space for Biodiversity/Ecosystems



## ICARUS FLIGHT HARDWARE - BUILT AND READY FOR THE LAUNCH IN JUNE 2017

Published by Max Planck Institute on Fri, 08/05/2016 - 15:08



The ICARUS Antenna ready for the launch to the International Space Station ISS in June 2017. The picture was taken at SpaceTech GmbH in Innsbruck where the ICARUS hardware was built.

## ICARUS PRESENTED AT THE ILA (INTERNATIONAL AEROSPACE EXHIBITION) 2016 IN BERLIN

Published by Max Planck Institute on Mon, 08/05/2016 - 12:28



ICARUS was successfully presented at the DLR (German Air and Space) Space Pavilion during the ILA (International Aerospace Exhibition) 2016 in Berlin.

## THE ICARUS EXECUTIVE BOARD

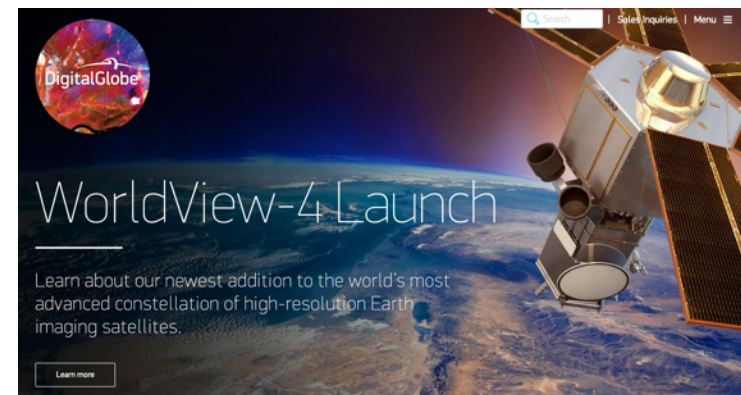
**Prof. Dr. Martin Wittekindt**, Director of the Max Planck Institute for Ornithology, Department of Migration and Immunology and Professor at the University of Konstanz, Germany. Head of the ICARUS Project.

**Prof. Dr. Mag. Christof**, Assistant Professor, Department of Anthropology, USC Davis and Swarthmore Tropical Research Institute (STRI), Pasadena.

**Prof. Dr. Roland Kays**, Research Associate Professor, North Carolina State University and Director of the Biodiversity & Earth Observation Lab, Nature Research Center, NC Museum of Natural Sciences, U.S.A.

**Prof. Dr. Kaijser Theres**, Head of Ringing Section-Nature History Museum of Denmark, University of Copenhagen, Denmark.

**Dr. Gergely Vattai**, Senior Researcher, Institute of Geography, Russian Academy of Sciences, Moscow, Russia.



## Content

Harness the unmatched quality, resolution and accuracy of the world's most advanced constellation of Earth-imaging satellites.

## Access

Unlock critical information about our changing planet with our world-class data and analytics.

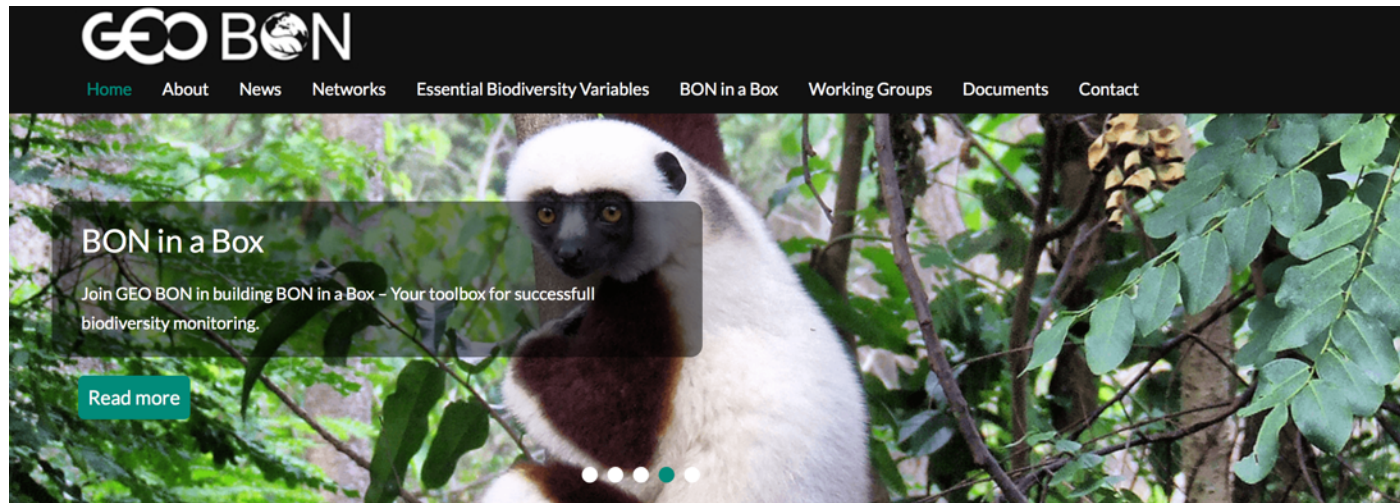
## Expertise

Leverage our unsurpassed insight and analysis to solve even the most complex challenges.





# GEO BON – Essential Biodiversity Variables



## Networks



criteria for BON endorsement

## Latest news

### 8th meeting of AP-BON



September 29, 2016

GEO BON took part in the 8th meeting of the Asia Pacific Biodiversity Observation Network (AP-BON) which was hosted in the Biodiversity Research Center of the Academia Sinica, in Taipei,

### Map of Life – New Releases and Partnerships



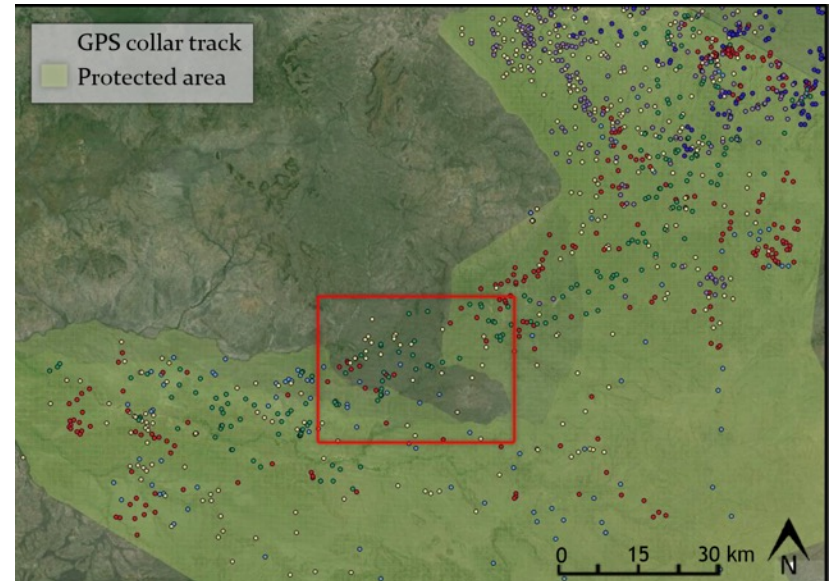
September 21, 2016

New partnerships for policy and conservation The MacArthur Foundation has awarded Map of Life and its partner the, Field





## GPS tracking of animals in Serengeti National Park

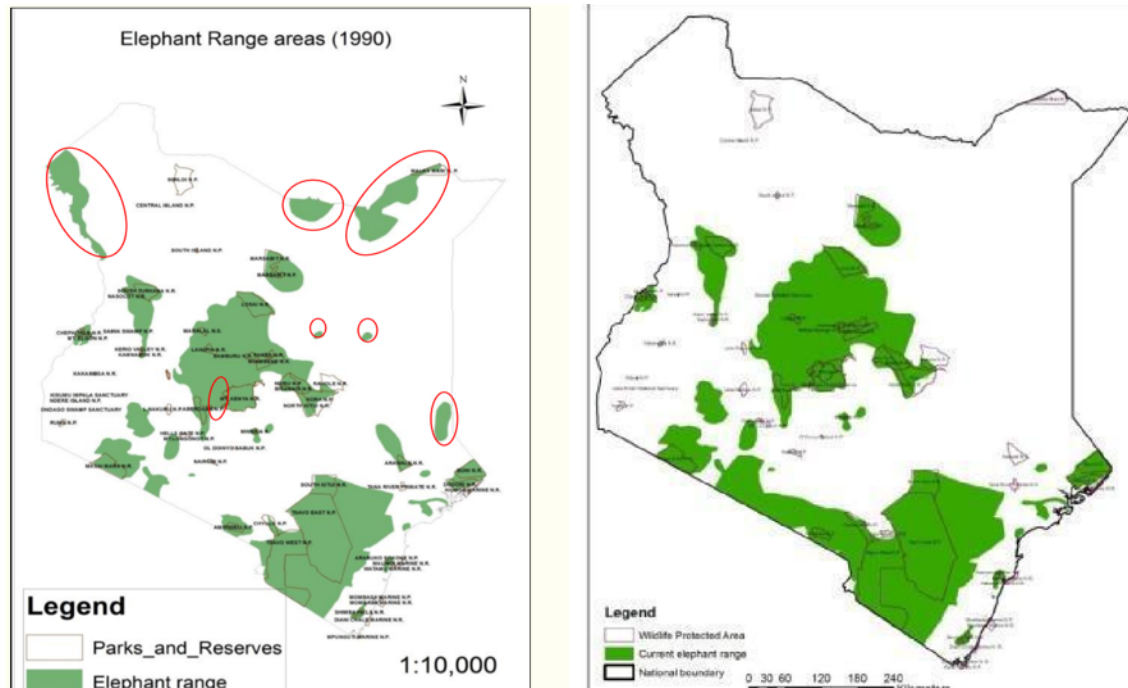


- Source: Lacey Hughey Douglas McCauley University of California, Santa Barbara, *The gnu frontier: Advancing behavioural ecology with remote sensing*, presented at the Kenya/United Nations conference on Space technology and application for wildlife Management; 27-30 June 2016





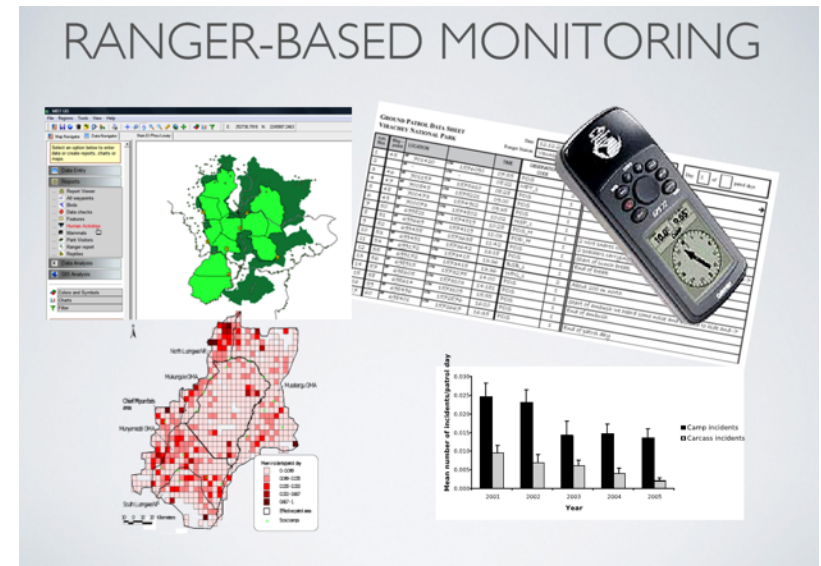
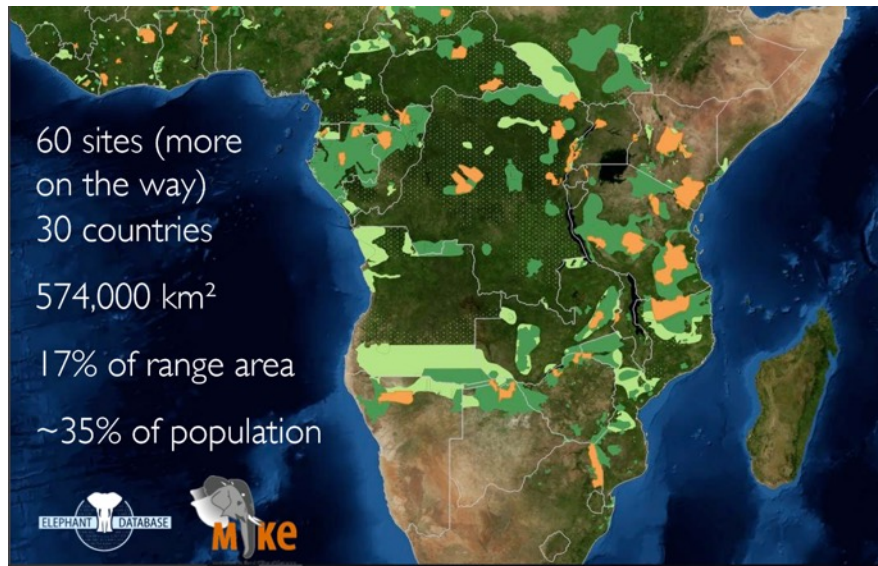
# Changes in elephant range areas (1990-2015)



- Source: Sospeter Kiambi (2016) *Population status for elephants in Kenya*, presented at the Kenya/United Nations conference on Space technology and application for wildlife Management; 27-30 June 2016



# Monitoring of Illegal Killing of Elephants (MIKE)



- Source: Julian Blanc (2016) *Monitoring the Illegal Killing of Elephants (MIKE) and the Elephant Trade Information System (ETIS)* presented at the Kenya/United Nations conference on Space technology and application for wildlife Management; 27-30 June 2016

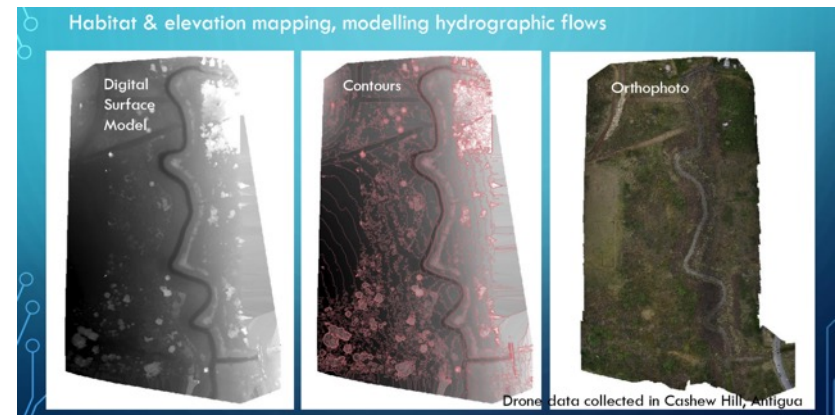




# Use of Drones in Conservation



Carried out by the Department of Environment, Government of Antigua and Barbuda.



- RUTH SPENCER (2016), Drones for Conservation presented at the Kenya/United Nations conference on Space technology and application for wildlife Management; 27-30 June 2016



## Conference Outcomes

- Brought together space representatives, policy makers and wildlife managers to address wildlife and ecosystem monitoring
- Case studies demonstrated the wide field of operational applications
- Opportunities and challenges, particularly in the Africa region, were highlighted and possible solutions to address the problems were discussed



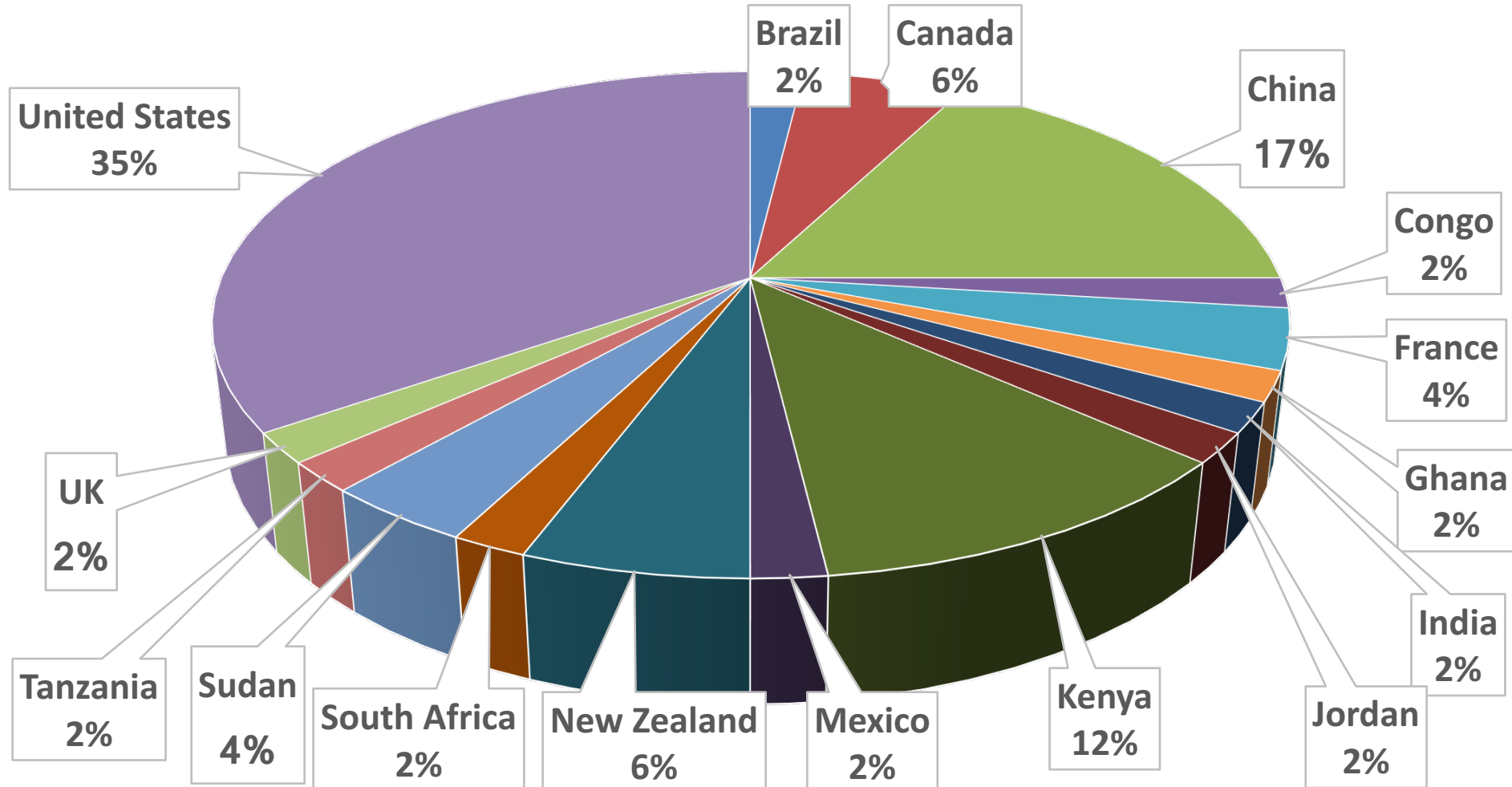


## Conference Outcomes

- National Commission of Space Technology (NACOSTI) of Kenya and Remote Sensing Technology Center of Japan (RESTEC) signed an MoU for capacity development. (Asia-Africa cooperation)
  - Industrial partners agreed to support the capacity of African institutions. (linkage between Industry, Academia and Government)
  - A UN General Assembly Report on the Conference will be prepared
- 
- A photograph showing three individuals standing together in a conference setting. On the left is a man in a dark suit and glasses. In the center is a woman in a blue patterned jacket. On the right is a man in a dark suit and glasses. They are all wearing name tags and appear to be at a formal event.
- The Government of Kenya will organize a national follow-up meeting to act on the Conference's observations and recommendations



# Media Coverage







# Space tech could spur biodiversity management in Africa

Join  
Us

by [SciDev.Net Sub-Saharan Africa- Gilbert Nakweya](#) | [@scidevnet](#) | SciDev

Thursday, 28 July 2016 10:32 GMT





# Thematic Priorities

- 1. Global partnership in space exploration and innovation***
- 2. Legal regime of outer space and global space governance: current and future perspectives***
- 3. Enhanced information exchange on space objects and events***
- 4. International framework for space weather services***
- 5. Strengthened space cooperation for global health***
- 6. International cooperation towards low-emission and resilient societies***
- 7. Capacity-building for the 21<sup>st</sup> Century***





# Conclusions

- The UN/Kenya Conference demonstrated the wide range of space applications for biodiversity and ecosystem monitoring
- It built a bridge between representatives of the space community, policy- and decision makers and wildlife managers
- It identified the need for further capacity building, in particular in the field of geospatial applications
- UNOOSA will further pursue capacity building activities under the thematic priority biodiversity and ecosystems of the United Nations Programme on Space Applications
- Follow-up conferences are planned to be held in the Asia-Pacific and in the Latin America and Caribbean regions

For further details please visit the Conference Webpage at  
[http://www.unoosa.org/oosa/en/ourwork/psa/schedule/2016/conference\\_kenya\\_biodiversity.html](http://www.unoosa.org/oosa/en/ourwork/psa/schedule/2016/conference_kenya_biodiversity.html)







UNITED NATIONS  
Office for Outer Space Affairs

# THANK YOU

United Nations Office for Outer Space Affairs  
United Nations Office at Vienna

[werner.balogh@unoosa.org](mailto:werner.balogh@unoosa.org)

[www.unoosa.org](http://www.unoosa.org)

@unoosa