



Using UN Biodiversity Lab to Support National

Conservation and Sustainable Development Priorities

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March 24 – April 7, 2020

Course Structure



- Three, 1.5-hour sessions on March 24, 31, and April 7
- There will be 3 sessions per day presenting the same material in
 - English (9:00-10:30 EST)
 - French (11:00-12:30 EST)
 - Spanish (14:00-15:30 EST)
 - Please only sign up for and attend one session per day.
- Webinar recordings, PowerPoint presentations, and the homework assignment can be found after each session at:
 - https://arset.gsfc.nasa.gov/land/webinars/un-biodiversity-2020
- Q&A: Following each lecture and/or by email
 - <u>amberjean.mccullum@nasa.gov</u>
 - juan.l.torresperez@nasa.gov



Homework and Certificates

- Homework:
 - One homework assignment
 - Answers must be submitted via Google Forms
- Certificate of Completion:
 - Attend all three live webinars
 - Complete the homework assignment by **Tuesday**, April 21 (access from ARSET website)
 - You will receive certificates approximately two months after completion of the course from: <u>marines.martins@ssaihq.com</u>



Homework: Remote Sensing for Freshwater Habitats

This homework includes questio webinar. Some questions refer to completing the steps. Thus, it m before submitting them here. Yo this form at a later time.



NASA's Applied Remote Sensing Training Program (ARSEI) presents a certificate of completion to « Name » for completing:

Remote Sensing for Freshwater Habitats

September 17 – October 1, 2019

Trainers: Amber McCullum & Juan Torres-Pérez



Prerequisites and Course Materials

- Prerequisites:
 - Please complete <u>Sessions 1 & 2A of</u> <u>Fundamentals of Remote Sensing</u> or have equivalent experience.
- Course Materials:
 - <u>https://arset.gsfc.nasa.gov/land/w</u>
 <u>ebinars/un-biodiversity-2020</u>



Course Outline

Session 1: Intro to Remote **Sensing and Policies for Biodiversity**

- NASA satellites and sensors
- Global policy context •
- Introduction to UNDP's • work on spatial data
- NASA-supported • biodiversity projects

Session 2: UN **Biodiversity Lab:** Introduction and Training

- Overview of UN **Biodiversity Lab**
- Data products and tools
- Demonstration of data access and analysis

Session 3: How Are **Countries Using Spatial** Data to Support **Conservation of Nature?**

- Overview of countries involved in UN **Biodiversity Lab**
- Country-specific examples for English, French, and Spanish



Session 3 Agenda

- Global perspectives on the challenges and success stories of using spatial data for monitoring ecosystem health and threats
- Costa Rica case study
 example
- Columbia case study
 example
- Training summary
- Question and Answer Session



Assessing conversion of forests to agriculture in Papua New Guinea with Landsat, and SPOT 4 and 5. Image Credit: <u>NASA</u>





Guest Speakers: Christina Supples, Rafael Monge, Christian Vargas, and Susana Rodríguez-Buriticá

TRAINING OUTLINE

Recap of Our First Two Sessions
 Global Perspective: Stories and Impacts of UN Biodiversity Lab
 Costa Rica
 Colombia
 What's next?



1. UN BIODIVERSITY LAB | RECAP



RECAP | PREVIOUS WEBINARS

Training #1: Introduction to Spatial Data and Policies for Biodiversity
 Training #2: UN Biodiversity Lab – Introduction & Training

2. GLOBAL PERSPECTIVE | IMPACTS & STORIES



WHY Isn't SPATIAL DATA Being

used?

UNDP conducted a needs assessment with 60 Parties:

- 1. Data are inaccessible
- 2. Data are not usable
- 3. Data are not nationally validated
- 4. Governments lack capacity to use data

Gap between the *potential* for spatial data and the *capacity* of policymakers to use it

WHAT IS UN BIODIVERSITY LAB?

- Created to support policymakers in their biodiversity commitments
- Provides 137 governments with access to FREE high-quality global spatial data layers & analytic tools
- Does NOT require GIS expertise

We Issued a challenge to all Parties

DOUBLE

THE NUMBER OF MAPS

BETWEEN YOUR

5NR and 6NR



Increase in SOC on Croplands After 20 Yr - High Scenario. Tonnes of carbon per hectare. Zomer, R.J et al. 2017. *Scientific Reports 7*, 15554. Map created in UN Biodiversity Lab.

DID COUNTRIES MEET THE CHALLENGE?





Photo: Equator Prize Winner FUMA Gaskiya

TRENDS IN THE USE OF SPATIAL DATA ACROSS 6NRs

		Fifth National Repo	ort	Sixth National Report			
Indicator	Non-GEF countries	GEF-eligible	All countries	Non-GEF countries	GEF-eligible	All countries	
Number of countries	35	154	189	33	101	134	
Total of maps	201	1052	1253	121	1719	1840	
Average # of maps	5.7	6.8	6.6	3.7	17.0	13.7	
% of NR/NBSAP with 20+ maps	5.7%	9.1%	8.5%	3.0%	25.4%	25.4%	
% with 4 or fewer maps	54.3%	56.5%	56.1%	81.8%	22.8%	37.3%	
% with no maps	8.6%	11%	10.6%	15.2%	9.9%	11.2%	

TRENDS IN THE USE OF ACTIONABLE MAPS ACROSS 6NRs

	5N	R	6NR		
Мар Туре	Non-GEF countries	GEF- eligible	Non-GEF countries	GEF-eligible	
% of the total <mark>Actionable</mark> maps found in 5NR & 6NR	2.7	30.5	0.2	51.6	
% of the total Potentially actionable maps found in 5NR & 6NR	2.6	30.7	2.8	46.1	
% of the total Non- actionable maps found in all three policy documents	0.7	22.6	4.7	41.2	

STORIES FROM AROUND THE WORLD | UN BIODIVERSITY LAB



UNEP-WCMC and IUCN (2020), Protected Planet: The World Database on Protected Areas (WDPA)[Online], March 2020, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.

IRAQ | USING SPATIAL DATA TO ESTABLISH AND MONITOR PROTECTED AREA NETWORKS

• As of April 2019 only 2% of Iraq's land area was protected.

• A list of a further 19 sites are in the process of formal ratification, which would increase the land area to 8.5%.

• Iraq currently falls short of Aichi Biodiversity Target 11 to protect 17% of terrestrial land area. The government sees UN
 Biodiversity Lab as a key tool for prioritizing the location of new protected areas

 Spatial data from UN Biodiversity Lab will also be key to informing PA management



Jones, K.R., Venter, O., Fuller, R.A., Allan, J.R., Maxwell, S.L., Negret, P.J., Watson, J.E.M., 2018. One-third of global protected land is under intense human pressure. Science 360, 788–791. <u>https://doi.org/10.1126/science.aap9565</u>

Venter, O., et al. 2016. Sixteen years of change in the global terrestrial human footprint and implications for biodiversity conservation. Nature Communications 7, 12558. https://doi.org/10.1038/ncomms12558

VIET NAM ASSESSING THREATS TO BIODIVERSE FOREST ECOSYSTEMS



- Viet Nam is ranked 16th among the Earth's most biodiverse countries
- Experiencing rapid population increases coupled with an increase in resource demand
- Spatial data can be used to map the threats and trends for each unique ecosystem

 By overlaying these datasets, the government is able to create maps that identify which PAs face the most pressure from urbanization, industrialization or pollution.



Data: Forest Cover Loss (2000-2017) Country: Vietnam

Forest Cover

Year of Loss

Data Sources: Hansen, M.C., et al., 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. Science 342, 850–853. Global Administrative Unit Layers (GAUL). 2015. UN Cartographic Unit. \odot

mapx



Biodiversity Intactness

Newbold, T., et al. 2016. Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment. Science 353, 288–291. https://doi.org/10.1126/science.aaf2201

Human Footprint (2009)

Venter, O., e al. 2016. Sixteen years of change in the global terrestrial human footprint and implications for biodiversity conservation. Nature Communications 7, 12558. https://doi.org/10.1038/newmrs12558





Data: Key Biodiversity Area Protection Country: Vietnam

Data Sources:

World Database of Key Biodiversity Areas. Developed by the KBA Partnership (BirdLife International, International Union for the Conservation of Nature, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Global Wildlife Conservation, NatureServe, Rainforest Trust, Royal Society for the Conservation of Birds, Wildlife Conservation Society and World Wildlife Fund); UNEP-WCMC, IUCN, and NGS, 2018. Protected Planet: The World Database on Protected Areas (WDPA) [On-line], October 2018. Cambridge, UK: UNEP-WCMC and IUCN; Flanders Marine Institute (2018). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 10; Global Administrative Unit Layers (GAUL). 2015. UN Cartographic Unit





PAPUA NEW GUINEA | USING SPATIAL DATA TO HALT ILLEGAL TRADE IN WILDLIFE & TIMBER

Photo: Equator Prize Winner Wanang Conservation Area

 Papua New Guinea contains part of the third largest intact tropical rainforest in the world

• Legal and illegal logging forms a major industry in the country

• Illegal trade in wildlife also is a key threat to biodiversity

 Spatial data can be used to monitor and report on illegal activities

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Layers S	Selected layers		5 5 4		3 S . S . S
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Land use/	/Land use changes			A REAL PROPERTY OF THE PARTY OF	
TerraPNG	analysis				PNG REDD+ and Forest
4. 2	and and				Monitoring Web Portal

CURRENT LOGGING CONCESSIONS, LOGGING TRACKS, AND FOREST LOSS

- Web portal developed by the Climate Change Development Authority & the Forest Authority
- Establish rates of forest sover shange, identify key sources of forest less, identify illegel

Map of accessibility to cities

•

Potential to overlay with the known collection points and distribution range of Pig-Nosed Turtle (Carettochelys insculpta)



Weiss, D.J., et al 2018. A global map of travel time to cities to assess inequalities in accessibility in 2015. Nature 553, 333–336. https://doi.org/10.1038/nature25181

INTERESTED IN MORE STORIES?

- Visit our success stories page: https://www.mapx.org/successstories/
- Watch our best practices webinar series: <u>http://bit.ly/SpatialData_BestPractic</u>
 es



3. COSTA RICA | IMPACTS & STORIES



"Using UN Biodiversity Lab to Support National Conservation and Sustainable Development Priorities"





Rafael Monge- rmonge@minae.go.crChristian Vargas- cvargas@cenat.ac.cr

Costa Rica



Costa Rica



Costa Rica's Protected Wildlands





Importance of Biodiversity

- Nature contributes services to human beings all over the world valued at **\$125 trillion** annually (WWF-2018).
- 70% of the world's poor live in rural areas and depend directly on biodiversity for their survival and well being.
- An annual investment of \$150 billion is needed to meet the Aichi Biodiversity targets. However, in 2018, only \$55 billion were invested.

Rodríguez is the chair of the Convention on Biological Diversity's (CBD) high-level panel for resource mobilization. He sees the need for a greater commitment to nature.

"On a global basis, we need to be mobilizing at a minimum \$150 billion a year – equivalent to about 0.8% of GDP – to fill the gap between current funding for nature conservation and what is needed," Rodríguez tells Euromoney.

Rodríguez estimates that 2018 total conservation investment was around \$55 billion.

"Actually my recommendation is for 1% of global GDP – this is what Costa Rica formally presented as its commitment for conservation finance for the post-2020 finance agreement."



Carlos Manuel Rodríguez

Associated Policies

National Biodiversity Policy 2015-2030

National Biodiversity Strategy 2016-2025



Política Nacional de Biodiversidad 2015=2030 Costa Rica

Source : http://chmcostarica.go.cr/recursos/documentos-ypublicaciones/politica-nacional-de-biodiversidad-2015-2030-costarica



Strategic Theme : In situ conservation

Target 1

Aichi Targets 5-11-15



Results

- Prior technical studies to create new protected areas (ASPs).
- Scenarios for inland water areas.

Strategic Theme: Reversing the Loss and/or Degradation of Important Biodiversity Elements

Target 18

Aichi Targets 12-19



Results

- Proposed list of endangered species.
- Updating of lists based on methodological review.
- Analysis of data in combination with information from UN Biodiversity Lab – Ecoregions, human pressures
Strategic Theme: Reversing the Loss and/or Degradation of Important Biodiversity Elements

Target 25

Aichi Target 7



Results

- In progress.
- Analysis of data in combination with information from UN Biodiversity Lab – Adequate cultivation, 2020 population density, among others.

Sexto Informe Nacional al Convenio de Diversidad Biológica de Costa Rica

POLICIES FOR DECISION MAKING



RESULTS 6NR

• Landscape Connectivity



Source Costa Rica's Sixth National Report to the Convention on Biological Diversity (2018). Obtained from: https://www.cbd.int/doc/nr/nr-06/cr-nr-06-p1-es.pdf

Sexto Informe Nacional al Convenio de Diversidad Biológica O e Costa Rica





P N U D Alterido de la persona gef

FIP DATA APPLIED TO 6NR

• Human Footprint



Source Costa Rica's Sixth National Report to the Convention on Biological Diversity (2018). Obtained from: https://www.cbd.int/doc/nr/nr-06/cr-nr-06-p1-es.pdf

Sexto Informe Nacional al Convenio de Diversidad Biológica Ce Costa Rica



P N U D Argenetic de la persona

FIP DATA APPLIED TO 6NR

• Forest Structural Condition Index



Source: Costa Rica's Sixth National Report to the Convention on Biological Diversity (2018). Obtained from: https://www.cbd.int/doc/nr/nr-06/cr-nr-06-p1-es.pdf

 National Environmental Information Systems



http://simocute.go.cr/

SOCIALIZATION Social Media



HANDS-ON EXERCISE

UN Biodiversity Lab Data

Sistema Nacional de Información Ambiental

Linking with National Information



UN Biodiversity Lab. https://unbiodiversitylab.org/ (26/02/2020)

THE BIG ENCHILADA | LA GRAN ENCHILADA

Mapping Nature for People and Planet El mapeo de la naturaleza para las personas y el planeta







FOUR CRITICAL STEPS

- 1. Identify key national policies.
- 2. Identify key targets and indicators within these policies.
- 3. Identify global and national data layers that can map these targets.
- 4. Use systematic conservation planning to create an action map of your country's essential life support areas.

CHALLENGES FOR THE FUTURE



- Standardization of data and methodologies in state institutions with the goal of generating national and international reports.
- Improvements in information integration processes in both realms (global vs. local data).
- Development of environmental accounts of ecosystem services.

"Using UN Biodiversity Lab to Support National Conservation and Sustainable Development Priorities"





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4. COLOMBIA | IMPACTS & STORIES



ALEXANDER VON HUMBOLDT INSTITUTE

Using UN Biodiversity Lab to Support National Conservation and Sustainable Development Priorities UNDP AND NASA-ARSET WEBMINAR SERIES, APRIL 2020

and a state and a state in Susana Rodriguez-Buritica, PhD. Analysis and Synthesis **BIODIVERSITY EVALUATION AND MONITORING** PROGRAM





BIODIVERSITY SCIENCES

BASIC INFORMATION ON SPECIES AND STRATEGIC ECOSYSTEMS AND THEIR RESOURCES





MONTANA STATE UNIVERSITY





1. NATIONWIDE CHARACTERIZATION OF DRY TROPICAL FOREST DEGRADATION

> Forest dynamics, landcover change, fragmentation dynamics, forest structural condition human pressure dynamics temporal trend on climatic variables temporal trend on RS-ecosystem functioning variables (EVI) time span (2000-2015)



FOREST CHANGE HAS A STRONG REGIONAL SIGNAL DUE TO CLIMATIC DIFFERENCES



BUT DIFFERENT TRENDS IN FOREST DEGRADION RESPOND TO LOCAL DYNAMICS



2. BIODIVERSITY RESPONSE TO DRY TROPICAL FOREST DEGRADATION Macuira Tayrona Tran_Pern 💋 High 📕 High high High low High med Low





3. FOREST INTEGRITY LAYERS TO DETECT AREAS FOR FUTURE EXPLORATION



PROJECT SANTANDER BIO: 2 YEARS EXPLORATION TO CHARACTERIZE STATE BIODIVERSITY 4. IDENTIFYING AREAS OF INTEREST FOR ECOLOGICAL STUDIES: THE AREAS THAT HAVE BEEN STABLE DESPITE A HISTORY OF REGIONAL LANDSCAPE TRANSFORMATION



TERRITORIAL MANAGEMENT OF BIODIVERSITY

ANALYSES FOR LAND MANAGEMENT

Portfolio of restoration opportunities for Amazonia











PATCH SIZE PERIMETER STRUCTURAL CONDITION DEGREE OF FRAGMENTATION

INTEGRITY INDEX FOR NATURAL AREAS

RESTORATION OPPORTUNITIES FOR THE COLOMBIAN AMAZON



COLOMBIAN HUMAN FOOTPRINT 1970 TO 2015





Human Footprint Index Dynamics (1970-2015)

BIODIVERSITY ASESSMENT AND MONITORING

ANALYSIS AND SYNTHESIS OF BIODIVERSITY INFORMATION

DECISION SUPPORT SYSTEM AND INDICATORS

COLOMBIA B.O.N.

National initiative of a Biodiversity Observation Network







Essential Biodiversity Variables (EBV)



EBV

Genetic Composition e.g. Allelic diversity

Species Populations e.g. Species distribution

Species Traits e.g. Body size, phenology

Community Composition e.g. Species interactions

Ecosystem Structure e.g. Ecosystem extent

Ecosystem Functions e.g. Disturbance

INDICATOR

Genetic Composition e.g. Allelic diversity

Biodiversity Intactness Range Rarity Species Richness Threaten Species Richness

Intact Forest Landscapes Last of the Wild Wilderness Loss Human Footprint Difference

Aboveground live woody carbon density change Global Soil Organic Carbon





DATA INTEGRATION AND CUSTOMIZED PRODUCTS





IMPROVING NATIONAL REPORTING

- Review Biodiversity Indicators that have global information in accord with CDB suggestions (63 indicators were evaluated)
- 2. What do they respond to (SDG, Aichi, EBV)?
- 3. How useful is the information to Colombia?

Biodiversity Indicators Partnership (BIP)= 5 data layers Digital Observatory for Protected Areas (DOPA)= 7 layers UN Biodiversity Lab = 16 layers
IMPROVING NATIONAL REPORTING

63 Suggested indicators
28 (44%) were available
18 (64%) with at least two time periods
20 (71%) With downloadable info in GIS formats
26 (92%) Will add information to the National Info
12 (46%) of these don't included clear methods to be replicated.
8 were selected for a first round of analyses

Intact Forest Landscapes Last of the wild Biodiversity Intactness Index 2005 for forests Geocarbon Global Forest Aboveground Biomass Aboveground live woody carbon density change Indicador Global Soil Organic Carbon Human Footprint Difference Red list index

BIOTABLERO

DECISION SUPPORT SYSTEM FOR COLOMBIA

biotablero.humboldt.org.co







USERS ARE ENVIRONMENTAL AUTHORITIES AND RESEARCHERS



¿QUÉ PREGUNTAS SE PODRÍAN ABORDAR CON BIOTABLERO?

¿Cuáles áreas conservar, restaurar o manejar de manera especial?

¿Dónde y cómo **compensar?** ¿Cómo analizar aspectos bióticos en los **estudios** ambientales?



ALEXANDER VON HUMBOLDT INSTITUTE FOR RESEARCH ON BIOLOGICAL RESOURCES



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5. WHAT'S NEXT? | UN BIODIVERSITY LAB



MAPPING NATURE FOR PEOPLE AND PLANET

How can spatial data help us identify essential life support areas?



ESSENTIAL LIFE SUPPORT AREAS



AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR CARBON SEQUESTRATION

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR WATER SECURITY

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR DISASTER RISK REDUCTION

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR FOOD SECURITY

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR JOBS & LIVELIHOODS

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR SPECIES PERSISTENCE

AREAS ESSENTIAL TO PROTECT, RESTORE, AND EFFECTIVELY MANAGE FOR NATURAL CAPITAL



THANK YOU!

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- ARSET Website:
 - <u>http://arset.gsfc.nasa.gov</u>

Questions



- Please enter your questions into the Q&A box
- We will post the questions and answers to the training website following the conclusion of the course





Thank You!



NASA's Applied Remote Sensing Training Program