

CONNECTING BIODIVERSITY CITIZEN SCIENCE IN LATIN AMERICA.

FINAL REPORT OF THE LATIN AMERICAN WORKSHOP ON CITIZEN SCIENCE FOR BIODIVERSITY CONSERVATION, MEXICO 2018.

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1. INTRODUCTION: CITIZEN SCIENCE AND BIODIVERSITY CONSERVATION

Humankind is increasingly pressuring natural systems, projecting an unsustainable future for all forms of life. Understanding how this process occurs is crucial to generate deep care and responsibility for the planet. Citizen science (CS) or participatory science initiatives imply a comprehensive way of connecting people with biodiversity and the challenges faced for its conservation. National Geographic Society promotes CS efforts on the bases of three pillars:

1. Education, formal and informal, inspiring citizen scientists;
2. Mobilization. By engaging public and community organizations, fostering scale up solutions, and empowering citizen explorers through access to technology;
3. Growth. Improving volume and quality of data for scientific analysis and decision making.

CS efforts allow us to collect data that otherwise would be impossible to get, and are also a powerful vehicle for community building, because they break barriers that separate science and society, engaging people in research projects. Furthermore, the interaction between citizen scientist and specialists, through identification of species and analysis of essential biodiversity variables facilitates: addressing data gaps for conservation planning, conducting applied research, engaging society through accountability and collaboration, providing amusement and incentives to interact with nature beyond urban settings, among other benefits.

2. CITIZEN SCIENCE FOR BIODIVERSITY CONSERVATION IN LATIN AMERICA

Context

CS for biodiversity conservation is growing fast because the increasing influence of global initiatives (e.g. iNaturalist and eBird), access to technology (like smart phones) and the development of multiple country and local projects. The Workshop on Biodiversity Citizen Science in Latin America held in Mexico City, had as its first objective to share basic information on the state of the art of CS for biodiversity initiatives in this region, which concentrates the higher number of megadiverse countries in the world. A second goal was to identify what are the achievements, challenges and opportunities of CS initiatives in the continent.

Map showing countries represented in the workshop



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Results of the workshop

During the two-day workshop, representatives of institutions and organizations presented an outlook of citizen science in their countries and specific initiatives (see Annex II for workshop program and links to presentations).

During the sessions, at least 42 initiatives were mentioned (Table I). The most recurrent areas of focus of these initiatives are related to capacity building/community engagement (12 initiatives), education and training (9 initiatives) and birdwatching (6 initiatives). Biodiversity conservation and protected areas management are also very frequent themes and a number of initiatives present an application oriented problem-solving approach (e.g. health/combating zika in Brazil or waste management in Chile). Finally, in almost all efforts, there is a common intention to connect people, and particularly urban populations, with nature.

Some of the initiatives presented operate at different levels and scales, integrating various themes, projects and objectives, for example, improving technological platforms, promotion, training and education, professional identification of species, modeling and analysis of data, etc. There are also local, regional national and international projects (See section 3 for a comprehensive synthesis of initiatives). Furthermore, the initiatives may be developed by non-government organizations, academic or government organizations.

A relevant feature that was mentioned for almost all the cases presented was the positive influence of eBird and iNaturalist across the continent, which was the seed to trigger many of these initiatives. Furthermore, these platforms allow for the integration of projects from local, regional, national and international scales. Additionally, in a few cases some of these efforts are directly linked to the Global Biodiversity Information Facility (GBIF) and /or to the National Information Systems for Biodiversity (if existent), where all the data gathered is verified, compiled and stored (e.g. Enciclovida in Mexico).

Table I. Citizen science initiatives in Latin America

	Country	Name	Organization	Focus Area
1	México	AverAves	CONABIO (eBird network)	Birds
2		Naturalista	CONABIO (iNaturalist network)	Integrated information system (science, education)
3		Enciclovida	CONABIO	Multi-tool and collaborative platform
4		Mayan Jays	Mayan Jays	Network of community monitors
5		Natoure	Natoure	Connecting tourists with communities and institutions
6	Guatemala	National table of Avitourism	Government Uses eBird	Avitourism Protected Areas

7	Honduras	Biodiversity monitoring	Government (Protected areas)	Biodiversity monitoring
8		Birds monitoring	Ornithology Association (uses eBird)	Birds
9		CS training	Universidad Zamorano (uses iNaturalist)	Education
10	Costa Rica	Biodiversity Atlas	INBio	Information system Training and education Tourism
11	Cuba	Various initiatives	Protected areas and universities and research centers	Protected areas management
12	Colombia	Bosque Seco (Caribe-Andes)	Humboldt Institute (iNaturalist network)	Participatory monitoring
13		Antioquia-Cornare		Participatory inventory
14		Santander BIO (expedition)		Training of local explorers
15		Boyacá BIO (expedition)		Participatory rural assessment
16	Venezuela	Sporadic projects for Bird count	Ornithologist Association Universidad Central (using eBird and social networks)	Birds
17	Ecuador	Galapago's guides	Strategic alliances between Galapagos Park, universities and NGO's	Biodiversity monitoring
18		Shark count		
19		Cóndor group		
20		Birds Quito		Coffee production/migratory birds adaptation to Climate Change
21		Jacotoco		
22		Randi-Randi		
23	Perú	School workshops in the Amazonía; Global Big Day and Citizen science-Peru	Government, NGO's	Education Biodiversity monitoring Social participation
24		GLOBE and COMOCA	Government, NGO's, mining industry	Monitoring mining activities
25		Inka Terra	Inka Terra	Ecotourism & conservation
26	Brazil	Various initiatives	ICMBio	Conservation assessment and monitoring
27			RedeLep via iNaturalist and social networks	Local community capacity building
28		Go Mosquito	Institute for Global Environmental Strategies	Combating Zika. Education and stewardship; Community empowerment; Co-Creation; Gamification; Data validation; and Partnerships
29	Bolivia	Natural resources management/ Indigenous communities	WCS	Problem-driven citizen science
30		'Our wild neighbors'		Biodiversity monitoring
31		Identidad Madidi		Connecting urban population with nature

32	Regional	Citizen science for Amazonía	WCS	Migratory fish Connecting ecosystems and people across the Amazon
33	Chile	Scientist of waste	Centro UC-CAPEs Citizen science foundation	Research protocols about waste problems in the cost line
34		Chinita arlequín		Monitoring of the invasive species <i>Harmonia axydiris</i>
35		Let's save our bumblebee		conservation of <i>Bombus dahlbomii</i>
36		Flower flies of Chile		Flower flies
37		Ocean Eyes		Biological monitoring in oceans with divers (finding of the Chilean Nemo)
38		MICRA	MICRA	Butterflies (Cultural change/education)
39	Argentina	Community monitoring in National parks	Ministerio de Ambiente y Sustentabilidad	Conservation Capacity building
40	Paraguay	Guyra App (birds)	Guyra	Birds identification
41		Massive participation initiatives	Housewives league, Military, National police, Park rangers)	Biodiversity monitoring Social participation promotion
42		Ethnobiology	Indigenous communities	Education/capacity building

The final component of the workshop was a session where participants had the opportunity to work in groups in order to identify challenges and opportunities for the future of CS in the region. The three questions that participants addressed during this session were:

- ¿How do we visualize the future of the CS platforms in the region?
- ¿What are the main challenges and opportunities?
- ¿How could we benefit from those challenges and opportunities?

Table II provides a summary of this discussion and conclusions of the teams.

**Table II. Conclusions/Outlook of CS in LA
(main shared concerns and proposals)**

Challenges	Opportunities
Creation of a continental network	<ul style="list-style-type: none"> • Create the Latin America list of CS initiatives • Search for results from other CS events (connecting with other initiatives and networks) • Analyzing projects with the potential of linking CS strategies in different countries • Analyzing research protocols for replicability

	<ul style="list-style-type: none"> • Enabling a website and digital magazine containing the learnings from the multiple initiatives (new projects could benefit from this) • Recycling equipment in benefit of other initiatives • Create and advisory board for the Latin America CS network
Attending specific problems of each country	<ul style="list-style-type: none"> • Each country needs to figure out its strategy. CONABIO's experience has been successful because of continuity (26 years), agglomerates initiatives, generates trust among the public and works with public resources.
Spreading out and connecting biodiversity CS to other social issues (education, health, social development, culture, etc.)	<ul style="list-style-type: none"> • More initiatives on bio-cultural heritage • Learning from and interacting more with community (e.g. indigenous) knowledge
Multiply social scientists through increasing empowerment and trust from society	<ul style="list-style-type: none"> • More education and training initiatives oriented to particular audiences, particularly children • More diffusion
Keeping data quality	<ul style="list-style-type: none"> • Training and integrating more local curator • Adding more validating methods
Access to Internet and more advanced technology	<ul style="list-style-type: none"> • Increasing Internet connectivity in remote areas and off-line technology
Compatibility of technology (i.e. platforms)	<ul style="list-style-type: none"> • Integration of local platforms already in operation (between local initiatives and with other countries' initiatives)
Increasing financing and integrating CS results to laws and policies	<ul style="list-style-type: none"> • More institutional commitment (domestic and international)

The idea to create a continental network of citizen science had divided opinions, because of the different level of achievements and developments each country has in CS efforts, access to data, transparency in the use of data, etc. Nevertheless, all participants agreed that regional collaboration was a key component for the success of these initiatives and that this workshop was a first step to start building more collaborations, exchange of information, knowledge and capacity building.

Another key question on this matter is if a new technological regional platform may be required or if it is desirable to operate under international “umbrella” platforms covering existing local projects, such as iNaturalist. Indeed, the participants concluded that a more comprehensive research on local initiatives is needed as one further step towards the continental goal. In any case, there is a consensus about the priority of consolidating human connections over technology solutions, which are more easily reachable. Interestingly, one of the key requisites for improving connection between countries is the clear definition of domestic strategies to enhance citizen science, considering local problems, multiplying users, keeping data quality and linking data analysis to sound solutions for society.

3. SYNTHESIS OF WORKSHOP PRESENTATIONS (COUNTRY FILES)

MÉXICO

Country overview <p>The country has a federal agency devoted to promoting biodiversity knowledge, use, and conservation: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). CONABIO was created in 1992, and since 2016 the agency administers formally a National Information System on Biodiversity: Sistema Nacional de Información sobre la Biodiversidad (SNIB). CONABIO has made citizen participation a key feature of its platform, working closely with iNaturalist and eBird, and supporting many other projects of citizen science. Indeed, 40% of its records originates in citizen science. Observers and identifiers have been increasing since 2013, when Naturalista was launched. Finally, they provide continuous diffusion thorough mass and social media, conferences, workshops and training.</p>	
Facts 1 (general) <ul style="list-style-type: none"> • 14 million records (110 thousand species) • 1,387 projects Facts 2 (naturalista) <ul style="list-style-type: none"> • 16 curators (taxonomists). 235,904 identifications realized • 19 tutors (trainers) • 22 promotion spaces (museums, NGO's, botanical gardens etc.) • 911,612 observations • 25,415 species • 36,593 participants • 1,000 daily photographs received 	Projects* <p>1976. Urquhart's project, hibernation sites of Monarch butterfly Since 1992. Correo Real, conservation of the migration phenomenon of Monarch butterfly (in Canada, USA and Mexico) http://correoreal.org.mx/ 2004. aVerAves/eBird México https://ebird.org/averaves/home 2013. naturalista (CONABIO) (iNaturalist) https://www.naturalista.mx/ 2014. Mayan Jays. Network of community monitors https://goo.gl/XNTSei 2016. enciclovida. Multi-tool and collaborative platform (CONABIO) http://enciclovida.mx/ 2016. Natoure. Connecting tourists with communities and institutions https://natoure.org/</p>
Challenges <ul style="list-style-type: none"> • High percentage of no-identified observations (67%) • Conduct more analysis of the available (abundant) information • More effective retro alimentation (platform-users) • Missing actions in relation to illegal activities • To generate attractive options for people to go outside to observing nature (recovering the custom of traveling to the countryside) 	

*Refers to projects with participation or mentioned during the workshop

aVerAves/eBird México

<https://ebird.org/averaves/home>

Objectives <ul style="list-style-type: none"> • Gaining knowledge of species distribution and the phenomenon of bird migration • Establishing relations species-habitats • Bird demographics • Evaluating anthropogenic impacts (e.g. indicator species) • Modeling of natural conservancy 	Community monitoring <ul style="list-style-type: none"> • 539 monitors • 14 states • 124 communities • Created a manual for community monitoring • Community monitors become trainers • Strong sense of community (national meetings since 2012)
Diffusion <ul style="list-style-type: none"> • Presence in the social networks • Publishing for divulgation and serious science 	Users <ul style="list-style-type: none"> • Academic/students (48%) • NGO/government (28%)

<ul style="list-style-type: none"> Increasing presence in Central America 	<ul style="list-style-type: none"> General (21%) Commercial (3%)
Challenges <ul style="list-style-type: none"> More investment in training Systematized monitoring (i.e. through research protocols) Empowerment of communities for the conservation of their habitats: birds are associated to productive activities 	

Naturalista Network:

<https://www.naturalista.mx/>

Education

Objectives <ul style="list-style-type: none"> Teaching science Environmental education Inclusion in curricular contents 	Antecedents <ul style="list-style-type: none"> Working with primary schools at local level in the State of Veracruz Widespread of TICs is a great news for this kind of initiatives
Challenges <ul style="list-style-type: none"> Low quality of photographs and lack of internet connectivity, Maintaining schools' authorities and teachers' interest in the project. The project is not part of the curricula, then it is vulnerable to political cycles Necessary to involve students from secondary and tertiary levels 	

Science

Objective Connect society with science	Contributions <ul style="list-style-type: none"> 19 species discovered via the platform: plants (10), spiders (5), insects (3) and reptiles (1) 29 first records of species in Mexico Hybrids (macaws) Albinos (peccaries) 747 (invasive species) The only photographic evidence of <i>Peromyscus madrensis</i> (a mouse of the Tres Marias Islands)
Challenges <ul style="list-style-type: none"> Divulging information more quickly than scientific journals (some findings lose validity) Conduct more analysis of the available information The platform could function as a reservoir of extinct species 	

Natoure: explore, connect and conserve

<https://natoure.org/>

Objective Fostering conservancy of Natural Protected Areas and cultural heritage by revolutionizing the way of traveling	How? Natoure App connects travelers, local communities and institutions
Facts <ul style="list-style-type: none"> Pilot in protected areas: 20 in Mexico; 5 in Bolivia More than 35 host communities (e.g. working with indigenous tourism network). 	Challenges <ul style="list-style-type: none"> Strengthening allies' network Include more local organizations and natural protected areas

Mayan Jays

<https://goo.gl/XNTSei>

Work Bird watchers' network with strong sense of community in the Yucatan Peninsula	Facts <ul style="list-style-type: none"> • Led by a naturalista tutor • 4 years of monitoring • 50% of members is women • Involved in different topics (e.g. sing language and waste management) • 25 workshops with 700 participants
Diffusion They give retro alimentation to communities via printed guidelines, a periodical publication and other diffusion campaigns (prints in buses)	

GUATEMALA

Country overview Their National Information System on Biodiversity is under development to consolidation (Sistema Nacional de Información sobre Diversidad Biológica -SNIDB-). It is administered by the national agency of protected areas: Consejo Nacional de Áreas Protegidas (CONAP). The system supports the decision making on conservancy strategies. They don't have evidence of the impacts of the use of this information in the country.
Projects* They have installed a National Table of Avi-tourism , using eBird as citizen science tool. <ul style="list-style-type: none"> • The objective is to promote birdwatching and capacity building on tourism • They produce a checklist of birds per each protected site • Ornithologists and trained guides are part of the project • They are planning to launch next year a national project of citizen science
Challenges <ul style="list-style-type: none"> • Integrate more specialists to the platform and more economic resources • More promotion and training • Build alliances between institutions and the private sector, domestically and internationally • Develop an image bank: at the moment the reliability of records is low because they lack pictures and audios. However, they see as an especial challenge the transfer of rights for using the pictures. • Urban and rural populations are very different (i.e. they can't have only a general program)

HONDURAS

Country overview The government has not included the creation of an information system on biodiversity in the biodiversity's national strategy (DIBIO 2017). Citizen science is the dominant source of biodiversity information. Information originated in citizen science allows filling distribution gaps in Central America. The country also provides high diversity sites for birdwatching. People, students in particular, are becoming more enthusiastic about citizen science.	
Facts <ul style="list-style-type: none">• Low participation in iNaturalist in the country• Around 100 persons provide information in eBird (Honduras represents 9% of Central America lists)	Projects* <ul style="list-style-type: none">• In the document Strategy of Biological Monitoring in Honduras, 2013-2023, Komar y Lara (2013) recommended the utilization of citizen science• There are research and monitoring plans with citizen science in 10 natural protected areas (Instituto de Conservación Forestal, Áreas Protegidas y Vida Silvestre)• Since 2015, the Honduran Association of Ornithology (ASHO) promote collaboration with eBird among its members and its 10 affiliated clubs• Since 2017 students of Zamorano University are realizing academic tasks using iNaturalist

<ul style="list-style-type: none"> 15% of spiders reported represent first records for this country 	<ul style="list-style-type: none"> Students also tried Project Noah USAID has also promoted the use of citizen science Incentives for avitourists (initiative from a freelance birding guide)
Challenges <ul style="list-style-type: none"> People is excited about the discovery of citizen science and the related tools, however more experts are needed: curators and professionals around the world that provide feedback More diffusion and field work to spread the advantages provided by the internet and digital cameras 	

COSTA RICA

http://www.crbio.cr/crbio/?page_id=2&lang=es

Country overview The Atlas of biodiversity of Costa Rica was created in 2006. It is based on the Atlas of Biodiversity of Australia. It operates with open-source software and offers open data access and collaborative environments. They have trained people from rural communities as para-taxonomists to identify species.	
Facts <ul style="list-style-type: none"> Around 6.5 million records 95% of records are georeferenced 393 data bases (form 169 institutions of 34 countries) 5,000 specie's files More than 50,000 images The higher density of data in Latin America 	Projects* <u>Atlas of Biodiversity of Costa Rica</u> <ul style="list-style-type: none"> Open access: the platform was built to providing access to different kinds of users; data is downloadable; allows integration and inter-operability of data; every provider of data maintains ownership over her information The platform has a section devoted to legends associated to recorded species Working closely with tourist sector (project is related to social responsibility of business) Promotion of participation of science students
Challenges <ul style="list-style-type: none"> Achieve the continuity of Bio-explorer operation, that worked for two years, but it has been out of work for the past three years. Consolidate citizen participation Undertake genetic analysis of biodiversity Integrate data of sea biodiversity 	

CUBA

Country overview The country doesn't have a national information system, but different informatics tools, which are not updated. However, the creation of a biodiversity information system by 2020 is included in the country's biodiversity program.	
Facts <ul style="list-style-type: none"> They have documented citizen participation in specific projects leaded by provincial research centers and protected areas (e.g. marine turtles) 	Projects* <ul style="list-style-type: none"> Sporadic, no systematized projects managed by natural protected areas, research centers and universities Citizen science has contributed to natural protected areas management
Challenges <ul style="list-style-type: none"> Current policy includes only the system of protected areas that represents only 30% of Cuban territory. They want to establish local monitoring goals Strengthening one of the specific projects currently working (infoGeo) to systematize national information 	

COLOMBIA

Country overview Colombia has a network of biodiversity information systems, based on Humboldt's Institute I2D and SiB. They register biodiversity but also cartography. There is also Naturalista and e-Bird Colombia, which is the most used platform. Colombia is one of the most biodiverse countries in the world (number one in birds and orchids). NGO's and Universities are very involved with communities and are central to citizen science projects. The Humboldt Institute has the objective of increasing direct work with communities using a participatory and local knowledge approach (knowledge transfer to and from communities). Recently they started working in areas that for years were inaccessible because of the armed conflict.	
Facts <ul style="list-style-type: none"> Over 150 national initiatives of citizen science Public and private financing Principal users: NGO's and Universities 2.28 million biological records, mostly birds 	Projects* <ul style="list-style-type: none"> Bosque Seco (Caribe-Andes): participatory monitoring Antioquia-Cornare: participatory inventory Santader BIO (expedition): training of local explorers Boyacá BIO (expedition): participatory rural assessment
Challenges <ul style="list-style-type: none"> Violence is still rising in the country. They suggest to follow a gradual approach to communities in conflict areas. People want to be more than data collectors so it's important to empower people and acknowledge the relevance of their participation. Integrate more women Reduce information gaps: Biomodels (expert curating and modeling data) Sustainability both financial and people's commitment 	

VENEZUELA

Country overview Since 2012 they have had a national information system but the platform is currently out of order (Sistema Venezolano de Información sobre Biodiversidad Biológica). Citizen science is incipient through personal, no-coordinated initiatives. Many sporadic, short life cycle initiatives.	
Facts <ul style="list-style-type: none"> E-Bird: 4 revisers for Venezuela, 100 very active users Facebook group Aves de Venezuela: 6000 members (200 very active) 	Projects* <ul style="list-style-type: none"> The Venezuelan Union of Ornithologists is the best organized group E-bird and other initiatives operating via Facebook Since 2006, Neotropical Aquatic Birds Census (16-19 volunteers) Citizen monitoring of Whale shark University Central monitoring of Conotos (Oropendola crestada) in Caracas Aves de Venezuela.net (until 2016) University Simón Bolívar monitoring of lionfish (Pterois) (until 2016) Minea: monitoring of marine turtles
Challenges <ul style="list-style-type: none"> Don't have a clear plan 	

ECUADOR

Country overview They don't have a national platform of information but they are working towards an integrated system. At this point, they are mapping the multiple national initiatives. There are strategic alliances between the Galapagos park, universities and NGO's. The recent country Constitution acknowledges environmental rights and biodiversity as a strategic sector.
Projects*

<ul style="list-style-type: none"> • Galapagos guides monitoring network (monitoring by naturalists guides) • Shark Count: Galapagos • Cóndor Group Ecuador (expert group) • Birds Quito: informal group linked to a Facebook group, they promote Instagram use and also have published scientific articles • Jacotoco Ecuador Foundation (coffee production and migratory birds) • Randi Randi (research and adaptation to Climate Change)
Challenges <ul style="list-style-type: none"> • Conclude the official progress assessment of the national system of biodiversity data bases • Establish a common data visualization platform • Divulcation at all levels • Interoperability with other platforms • Defining scales and indicators for citizen science • Strengthening strategic alliances • More visibility and social recognizing

PERÚ

Country overview Megadiverse country with compartmented biological information: multiple, researchers, initiatives and institutions devoted to biodiversity monitoring. They have observed that the most successful projects are organized by NGO's and provide direct incentives to participants. Experiences of corporate funding for citizen science in the country. They find increasing opportunities for citizen in tourism expansion and socio-environmental corporative responsibility (mining, hydrocarbons and tourism).
Projects* <ul style="list-style-type: none"> • School workshops in the Amazonía. Since 1989. Part of the international-high school program. Students apply research protocols for biodiversity sampling • GLOBE Program (MINAM) http://www.minam.gob.pe/diversidadbiologica/ and Water quality monitoring (COMOCA). Initiatives to monitoring the activities of a mining enterprise. • Global Big Day (World Champion 2015 and 2016). Successful coordination by the organization CORBIDI http://www.corbidi.org/gbd.html • Program of biodiversity monitoring http://www.pmbcamisea.org/ • Citizen science (CONCYTEC) https://goo.gl/PeMLB3 • Citizen science-Peru https://www.facebook.com/Ciencia-Ciudadana-Perú
Challenges <ul style="list-style-type: none"> • Increase awareness about citizen science as vehicle of sustainable development and conservation • Incorporate citizen science as key tool for share-management of projects between companies and society • Obtain more resources to offer to promoters of citizen science (e.g. via international corporations) • Select serious initiatives

InkaTerra (Peru)

<https://www.inkaterra.com/>

Objectives <ul style="list-style-type: none"> • Conservation of natural heritage • Scientific research. Measuring ecotourism impacts on natural areas • Education. Workshops of environmental leadership for children • Economic development • Preservation on native cultures 	Facts <ul style="list-style-type: none"> • 214 bird species • 372 native orchids • Rescue center for the Andean bear (<i>Tremarctos ornatus</i>) • +4,000 persons trained in activities related to ecotourism • Research is attractive to tourists, but also it is a powerful tool for education and community wellbeing
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	<ul style="list-style-type: none"> • They started the ecotourism project by restoring grazing land with native knowledge
Challenges/Goals <ul style="list-style-type: none"> • Promoting ecotourism to bringing closer urban travelers to natural areas and preserving native cultures 	

BRAZIL

<http://www.icmbio.gov.br/portal/>

Country overview Multiple platforms of biodiversity information, the most important are: Science and technology biodiversity system (STBS) (scientific collections and museums) and Portal Bio-Institute Chico Mendes (recent field studies and threatened species). There is citizen involvement in conservation actions: records of threatened species have provided for new locations and people interest have increased for joining private and governmental initiatives of citizen science. The use of biodiversity information (e.g. for analysis) is not public, permit required	
Facts <ul style="list-style-type: none"> • Estimated 1.8 million species in the country • STBS: 10.4 million occurrence records and 155,614 species • Portal Bio: 1.6 million threatened species records (1,173 threatened species in 2014) • Fast increase of threatened species • RedeLep has approx. 100 academic participants • Monitora has trained 150 people • Data for fruit-feeding butterflies at several sites • Restrictive legislation for the use of biodiversity information, they prioritize security and quality of information. Diffusion is very limited (e.g. iNaturalist use is very limited) 	Projects* <ul style="list-style-type: none"> • ICMBio: several programs that benefit from citizen science: action plans, species conservation assessments and monitoring • RedeLep via iNaturalist and social networks • Monitora (ICMBio): native villagers (uses paper files for field sampling and Internet campaigns ask for pictures from 'wanted' butterflies)
Challenges <ul style="list-style-type: none"> • Data sharing in remote areas (i.e. lack of cell phones and internet connections at locations far from cities) • Improve credibility of species identification: involve more taxonomists • Magnitude of country's megadiversity makes unviable to identify all species • Nature of legislation limits diffusion and use of information 	

GO mosquito (Brazil)

Institute for Global Environmental Strategies

<https://www.iges.or.jp/en/>

Objectives <ul style="list-style-type: none"> • Combating Zika. Using an informatic APP, people take images of standing water to identifying breeding sites of the mosquitos that spread the disease • Simple tool used by the people who have the greatest stake in this problem to be moved to action to be a part of the solution Principles: <ul style="list-style-type: none"> • Education and stewardship; Community empowerment; Co-Creation; Gamification; Data validation; and Partnerships
Challenges/Goals <ul style="list-style-type: none"> • Zika is a disease of poverty, like other diseases spread by vectors, and is preventable • These diseases remain a global challenge and remote sensing data is crucial to developing predictive models of spreading

BOLIVIA

Country overview

Lack of national biodiversity system and behind neighbor countries in systematization of information. However, the country has improved a lot in the last 30 years. Increasing systematization of information for some taxonomic groups
Projects* <ul style="list-style-type: none"> • Citizen science for the Amazonía (migratory fish) • Indigenous communities' natural resources management: Problem-driven citizen science and work that connects research and decision-making (e.g. hunting) • 'Our wild neighbors' (Nuestros vecinos salvajes) (monitoring of wild species in La Paz City and surroundings). At least 50 species records; 200 participants • Identidad Madidi www.facebook.com/IdentidadMadidi is the most biodiverse protected area in the world. Increasing diffusion and communication of citizen science has increased recognition of the area by urban population (the area has already an audience and requires further involvement of citizens)
Challenges <ul style="list-style-type: none"> • Urbanization is a dominant pattern. It is needed to connect urban population with wild life and natural environments. Promote visiting of such areas and citizen science monitoring

Citizen science for Amazonía (WCS)

Objective <ul style="list-style-type: none"> • Connecting ecosystems and people across the Amazonía • Organizations already monitoring migratory fish in the Amazon using citizen science. This project integrates 40 of those organizations to connecting citizens and scientists. 	Facts <ul style="list-style-type: none"> • 128 initiatives (5 at national or regional scale) • 45% low tech • 15% open data • 34 fish species • 14 bird species • 16 local organizations (pilot sites) • 10 universities or research centers • 3 innovation labs • 4 government agencies • 8 Amazonian networks (from 8 countries)
Challenges/Goals <ul style="list-style-type: none"> • Create a Latin-American alliance 	

CHILE

Country overview <p>There is not a national platform for biodiversity information in the country but there is a law project (Service of biodiversity and protected areas) that already includes its creation. An important number of citizen science initiatives had helped to gathering information that otherwise would have been impossible to acquire.</p>
Projects* <ul style="list-style-type: none"> • Citizen science foundation. Since 2015. Objectives: a) Improve education and communication of CS; b) link CS initiatives; c) monitoring evolution of CS; d) increasing CS projects. They developed a guide and a book for SC design http://cienciaciudadana.cl/ • Scientist of waste (Científicos de la basura). Since 2007. Researchers of the Universidad Católica del Norte. Research protocols about waste problems in the cost line. They have produced scientific articles and research has helped to decision making • Chinita arlequín (since 2011). Monitoring of the invasive species <i>Harmonia axydiris</i> • Let's save our bumblebee. Involves citizens in the conservation of <i>Bombus dahlbomii</i> • Flower flies of Chile. 2, 400 participants gather basic information about these insects. • Ocean Eyes. Biological monitoring in oceans with divers (finding of the Chilean Nemo)
Challenges <ul style="list-style-type: none"> • Maintain equilibrium between orthodox science and citizen collaboration

- Consolidate linkage between science and society for decision making
- Strengthening long term initiatives (increasing institutional support)
- Generating interoperability between CS projects

Micra Mariposas de Chile

www.micra.cl

Objectives <ul style="list-style-type: none"> • Produce cultural changes to developing meaningful links between people and nature • Promote deep involvement of society with butterflies • They created an App and a field guide to realizing collaborative mapping and design of interactions/expediciencies to engaging audiences (particularly visual materials for children) 	Facts <ul style="list-style-type: none"> • Butterflies are key ecological indicators and in Chile 99% of them are native. They can be found across all national territory and every person could interact with them • Total audience of 80,000 persons • 250,000 sighting records • They have set butterflies in the environmental agenda • They have strengthened collaboration with scientists
Challenges/Goals <ul style="list-style-type: none"> • Amplify the scope of the digital tool to promoting learning outside the classrooms (working with schools) • Include butterflies and their associated flora in studies of environmental impact • Strengthening records of emblematic species by eco-regions 	

ARGENTINA

Country overview (<i>link to workshop presentation</i>) Currently it doesn't exist a national biodiversity information system. There are databases in government institutions and NGO's but they are not interlinked and diffusion is limited.
Projects* <ul style="list-style-type: none"> • In national parks (e.g. monitoring of yagueté). Community monitoring: hunting, key species. Participants have to agree on how the information is used. It's relevant to observe the differences between conservation plans and the actual practices of communities.
Challenges <ul style="list-style-type: none"> • Projects lack integration • Use of iNaturalist is limited • Very often people want something in exchange for conducting monitoring • Risks about how information is used

PARAGUAY

<http://guyra.org.py/>

Country overview There is a national information system but it is too slow. There are multiple initiatives of citizen science both public and private, but the private initiatives have been more successful.
Projects* <ul style="list-style-type: none"> • Guyra Paraguay > 2,500 participants • eBird: 350 users • Projects involving important numbers of persons: Housewives league > 75,000, Military, National Police, Park rangers • Ethnobiology/ornithology, project with indigenous communities
Challenges <ul style="list-style-type: none"> • Increase participation (and incentives) • Educate on indigenous traditions (to value them) • More compromise of media • More availability of information (and facilitate access to all audiences)

- Giving more relevance to nature in tourism

Guyra App (bird in Guaraní language)

Objective <ul style="list-style-type: none"> • Bird identification 	Facts <ul style="list-style-type: none"> • eBird partner • 100 users of eBird Paraguay in 2016, currently there are 352 users • 701 records (98% of Paraguay birds) • Increasing promotion of avitourism
Challenges/Goals <ul style="list-style-type: none"> • Not all species are included in the platform because lack of images (this is changing rapidly because the increasing access to photos) • Create local/specific bird lists • Associate records to singings • Increase response to citizen's inquiries (e.g. macaws in Asunción City) 	

iNaturalist

Network members: Mexico (CONABIO) and Colombia (Humboldt Institute)

<https://www.inaturalist.org/>

Objectives <ul style="list-style-type: none"> • Connect the general public with Nature and high-quality data (sharing of photos and to create high quality data) • Unite people, communities and scientist • Identify what are the animals or the plants photographed using computer vision (also implemented in Seek app)
Achievements/Goals <ul style="list-style-type: none"> • Collaboration of scientists. Identification of animals that are not easily found • The platform is useful for drawing distributions, and time-related -series distributions (intersection Taxonomy-Geography) • Privacy. It is possible for users to obscure their location • Occurrence is not the same than distribution: relevance of distribution models. Records are increasing very fast in the platform. Registered observations are increasing very rapidly, the size of their data base soon will eliminate many statistical problems and to realize more inferences will be possible

eBird

<https://ebird.org/home>

Biodiversity samplings at higher scales requires of volunteers	
Hypothesis Data collected by birdwatchers could help to facilitating the comprehension of patterns of abundance and distribution of bird populations, through multiple scales of time and space (Sullivan <i>et al.</i> , 2009)	
Facts <ul style="list-style-type: none"> • 530 million observations • 42 million lists • 3.5 million visitors (2018) • 10,410 species • 4 million checklists • 6 million pictures and recordings • 30 million hours of observations gathering 	
Achievements/Goals	

- A primary challenge for citizen science efforts is to achieve sound scientific objectives while finding ways to maintaining participant engagement (and high-quality data) (Wood *et al.*, 2011)
- Analyzing changes in natural systems through essential biodiversity variables of birds.
- Modeling of temporal trends by each species
- Facilitate access to distribution models and explaining methodology

ALL DOCUMENTS, PRESENTATIONS AND LIST OF PARTICIPANTS OF THE WORKSHOP ARE ACCESSIBLE AT:

<https://bit.ly/2PEoDow>

PHOTOS OF THE WORKSHOP













Workshop: Biodiversity Citizen Science in Latin America
24th and 25th of September, Mexico City.
UNIVERSUM Museum of Sciences, UNAM

Objectives of the Workshop:

1. Learn about the status of Citizen Science initiatives in Latin America.
2. Learn and exchange best practices of citizen science efforts in Latin America
3. Promote the iNaturalist network in Latin America.

Agenda:

Monday 24th of September	
8:30	Meeting at the lobby for transfer to UNIVERSUM.
9:00 – 9:30	Welcoming remarks Conabio, National Geographic & iNaturalist
9:00 – 9:45	Setting the agenda for the day + brief presentation of participants
9:45 – 10:00	Session 1: Setting the stage: The importance of Citizen Science as a biodiversity conservation tool. <i>Kasie Coccoaro y Mary Ford, National Geographic Society.</i>
10:00 – 11:15	SESSION 2: The state of Citizen Science in Latam: Short presentations to inform about the state of citizen science initiatives and efforts in the countries participating in the workshop. Format: Panel presentations followed by Q&A session. <ul style="list-style-type: none"> • México. <i>Carlos Galindo Leal, CONABIO.</i> • Guatemala. <i>Mercedes Barrios, CECON.</i> • Honduras. <i>Oliver Komar, Universidad Zamorano.</i> • Costa Rica. <i>Randall García, INBIO.</i> • Cuba. <i>Jorge Ferro, Centro de Estudios Ambientales.</i>
11:15 – 11:30	Coffee Break
11:30 – 12:45	Continue session 2: <ul style="list-style-type: none"> • Colombia. <i>Carolina Soto, Instituto Humboldt.</i> • Venezuela. <i>Jon Paul Rodríguez, Instituto Venezolano de investigaciones Científicas.</i> • Ecuador. <i>Diego Inclán, Instituto Nacional de Biodiversidad.</i> • Perú. <i>Antonio Salas, Centro para la Conservación de la Biodiversidad.</i> • Brasil. <i>Onildo Marini, Instituto Chico Mendes de Conservação da Biodiversidade.</i>

12:45 – 12:50	Transition time (change panel participants)
12:50 – 14:00	Continue session 2 : <ul style="list-style-type: none"> • Bolivia. <i>Rob Wallace, Wildlife Conservation Society.</i> • Chile. <i>Francisca Boher, Centro de Ecología Aplicada y Sustentabilidad.</i> • Argentina. <i>Gustavo Porini, Ministerio de Ambiente y Sustentabilidad.</i> • Paraguay. <i>Alberto Yanosky, Guyra Paraguay.</i>
14:00 – 15:00	LUNCH
15:15 – 16:00	Session 3. iNaturalist: a global citizen science platform. (Presentation +Q&A) <i>Scott Loarie y Carrie Seltzer, iNaturalist</i>
16:10	Transfer to downtown venue for the public event organized by Conabio.
17:00 – 20:30	Public event organized by CONABIO on Citizen Science.
Tuesday 25th of September	
8:30	Meeting at the lobby for transfer to UNIVERSUM.
9:00 – 9:40	Continue Session 3: eBird and AverAves. (Presentation +Q&A) <i>Christopher Wood (eBird) and Humberto Berlanga (AverAves)</i>
9:40 – 10:20	Session 4. What is working in Latin America? Presentation of cases that illustrate what is working in citizen science. Panel presentation followed by a Q&A <ul style="list-style-type: none"> • MICRA. <i>María de los Ángeles Medina, Chile</i> • Guyrapp. <i>Viviana Rojas, Paraguay</i> • Go Mosquito. <i>Renée Codsí, Estados Unidos</i> • Citizen Science in Amazonia. <i>Gina Leite, Wildlife Conservation Society.</i>
10:20 – 10:25	Change panelists
10:25 – 11:00	Continue session 4 <ul style="list-style-type: none"> • Natoure. <i>Rodolfo Salinas, México</i> • Inkaterra. <i>Gabriel Meseth, Perú</i> • Mayan birding. <i>Cecilia Álvarez, México</i>
11:00 – 11:15	Coffee Break
11:15 – 11:50	Continue session 4 <ul style="list-style-type: none"> • Tutors, curators and amplifying spaces. <i>Roberto Arreola, México.</i> • Civil Society. <i>Carlos Velasco, México</i> • Education. <i>Arturo Hernández, México</i> • Science. <i>Juan Cruzado, México</i>
11:50 – 12:00	Transition to working group sessions: moderator explains the dynamic we will follow for session 5 and we split into 4 groups

12:00 – 13:45	<p>Session 5. Challenges and Opportunities for Latam. Group open discussion (facilitated by moderator).</p> <p>Part 1: Break down in four groups. Questions to be addressed:</p> <ul style="list-style-type: none"> - How do we want to see the future of Citizen Science (evolution of platforms) in Latam in the next 5 years? - Where are the biggest challenges and opportunities to get there in five years? - How can the challenges be tackled and opportunities taken? <p>Part 2: A representative from each group presents the main conclusions of each group in plenary.</p> <p>Part 3: Coincidences / Clarifying points/ other questions</p>
13:45 – 14:30	Session 8. Close of the workshop
14:30	Closing Lunch followed by a NATURE WALK at the Ecological Reserve of Pedregal.
Wednesday 26th of September	
All day	Participants fly back to their countries

SESSION 2 GUIDELINES: COUNTRY PRESENTATIONS.

The format is a panel with 5 speakers. We will have a facilitator keeping track on time and moderating the question and answer session. Each speaker will be allowed 10 minutes total. We encourage to use photos and no much text (short phrases or key words, with a minimum of 30 point font). The maximum number of slides allowed is 10.

Guidelines for the presentations.

- Context/background. Provide a snapshot of biodiversity knowledge in your country.
- Is there a National Information System on Biodiversity? Is the information used to build public policies or conservation initiatives?
- In your country, are there any citizen science initiatives for biodiversity conservation? And what kind of institutions (public or private) promote these initiatives?
- In case there are initiatives: how many citizens participate? What information / data are being generated? And how does the information that these generate?
- Are there some concrete actions where the information generated through citizen science is being used for decision making? And what impacts are registered
- In your country, what are the most important opportunities and challenges for citizen science initiatives to grow and strengthen?

SESSION 4. SUCCESS STORY CASES: PROJECT SLAM FORMAT

Each speaker will get 5 minutes for their presentation. There will not be time for questions between each project presentation, at the end of the segment we will have a Q & A session.

A maximum of 3 TOTAL slides should be used in support of the talk with a minimum of 30 point font (you can elect to skip explanatory text all together on slides. Instead you can use graphics and images that support your narrative). Presenters will be asked to submit PowerPoint slides **PRIOR** to the conference

Guideline questions for developing your presentation:

- What is the problem you wanted to solve? Context/background
- What is your project/action? (Project overview)
- What has resulted (impact) + lessons learned
- Next steps / what is the ultimate impact you hope to make both on the data collection and user side