United Nations Educational, Scientific and Cultural Organization

EUROPEAN CITIZEN SCIENCE ASSOCIATION

doing it together science

Global 'Citizen Science' Observatory

1st Meeting
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LIST OF PARTICIPANTS:

Speakers:

- *UNESCO*: Anil Mishra, Francesca Santoro, Bernard Combes, Miguel Clusener-Godt, Douglas Nakashima, Riel Miller, Khalissa Ikhlef, Ernesto Fernandez Polcuch,
- *European Citizen Science Association (ECSA)*: Claudia Goebel,
- *Doing-it-Together science (DITOs)*: Aleksandra Berditchevskaia,
- *Young Marine Explorers (Bahamas)*: Nikita Shiel-Rolle

Other participants from UNESCO: Lucy Hoareau, Anathea Brooks, Leo Trembley, Manuel Galindo Moreno, Fernanda Bohn Hamilton, Tanara Renard--Truong Van Nga, Yoslan Nur, Susan Schneegans, Alessandra Bello, Alex Albert.

PRESENTATION OF UNESCO'S ACTIVITIES WITH CITIZEN SCIENCE COMPONENT

"Citizen Science approach to deliver hydro climate services"

Anil Mishra – UNESCO/International Hydrological Programme

Water resources, and water systems, such as the Qanats, in early days were built with the involvement of citizens or societies. In IHP programme, we are trying to implement programme activities with citizen science approach (as we understand it), and to provide the data, tools and methodology to stakeholders in order to test and validate hydro-climate services needed to address water security challenges.

According to the World Water Report (2017), 2/3 of the world population experience water scarcity for at least one month a year. 6-8 million people die each year from water-related diseases and disasters (IHP VIII 2014-2021). We do not have enough water when or where we need it. Because of climate change, these phenomena will have additional pressure.

IHP through its different flagship programmes and activities provides contributions to implement SDG target 6 'Ensure availability and sustainable management of water and sanitation for all'. IHP is working with member states, scientific networks and policy makers to provide a platform by mobilizing international cooperation to improve knowledge and innovation to address water security challenges, IHP is facilitating and assisting to develop institutional and human capacity for water security and sustainability, and strengthening science policy interface to reach water security at local, regional and global levels.

International Hydrological Programme (IHP) works within 3 axis – and 6 different themes (Figure below).

UNESCO's programme for Water and Development Information for Arid Lands – a Global Network (G-WADI) addresses the need for increased regional and international cooperation on sustainable development of water resources in arid and semi-arid regions. G-WADI networks provides relevant scientific knowledge for decision-making and practice. Website: www.gwadi.org . G-WADI provides data tools and methodologies to member states such as the PERSIANN satellite-based gridded precipitation products, drought monitors for Africa and Latin America, and regional frequency analysis. The Namibian Hydrological Services of the Ministry of Agriculture, Water and Forestry uses precipitation estimates from the G-WADI PERSIANN Geoserver.

During COP-21 a Glacier app for mobile devices was launched by UNESCO and World Glacier Monitoring Service. This information system aims at bringing scientifically sound facts and figures on worldwide glacier changes to decision makers at governmental and intergovernmental levels as well as reaching out to the interested public.
During COP-22, IHP together with Center for Hydrometeorology and Remote Sensing (CHRS) of University of California launched a new App (iRain) for mobile devices with remotely sensed rainfall data, which is essential for water resource planning and preparing for floods and droughts. The application is based on PERSIANN (precipitation estimation from Remotely Sensed Information using Artificial Neural Networks) which is developed by CHRS under the framework of IHP's G-WADI programme.

"The ocean and you: Citizen Science initiatives as a contribution to ocean knowledge"

Francesca Santoro - UNESCO/Intergovernmental Oceanographic Commission

According to the Medium Term Strategy (2014-2021), increasing the number of oceanic ecosystems observations is one of our priorities.

The IOC capacity development strategy also includes Ocean literacy programme as one of its main foreseen outputs.

Ocean Literacy is framework based on 7 essential principles:

- The Earth has one big ocean with many features
- The ocean and life in the ocean shape the features of Earth
- The ocean is a major influence on weather and climate
- The ocean makes Earth habitable
- The ocean supports a great diversity of life and ecosystems
- The ocean and humans are inextricably linked
- The ocean is largely unexplored

At present, Citizen Science is predominantly associated with terrestrial projects. However, it also has the potential to make significant contributions to marine sciences and to Ocean literacy.

Example of IOC initiatives:

- Crab watch is an activity of an EU funded project Sea-Change which aims at increasing ocean literacy in in Europe focusing on 3 target groups: Schools, General Public, Decision and policy makers. Sea Change is part of an agreement between EU, US and Canada called the Trans-Atlantic Ocean Research Alliance. . Crab watch will generate data to enhance our knowledge of the changing distribution of native and non-native crabs, as well as information to support environmental management. The initiative will involve the creation of an App to enable people to collect data and geo-reference them. Data collected will be checked and validated before being passed to relevant marine and wildlife data hubs (e.g. EUROBIS) where they will be freely accessible to all.
- Barcelona World Race to gather ocean data (boats equipped with Argo floats to collect data related to temperature, salinity and other parameters) – *Sailing for a purpose*

Conclusion: Citizen Science has a great potential to improve our knowledge on oceans. There is a European Marine Board working group on citizen science to identify key parameters to success and good practices.

Next results will be presented in May 2017 in the UK at the occasion of the European Maritime Day

"United for Biodiversity: biodiversity education in UNESCO sites"

Bernard Combes - UNESCO/ Education

For UNESCO, Education for Sustainable Development (ESD) can be done at any age and anywhere, in all levels and settings of education. 75% of the things we learn, we learn outside of school. We believe that you really have to experience what you are learning, for education to be relevant and in phase with the realities of the world.

For the 'United for Biodiversity' initiative (see attached pdf for additional information) and its pilot projects, biosphere reserves, natural World Heritage sites and Geoparks were used as learning places. Here are different examples of our work related to citizen science.

- Cambodia, Tonle Sap Biosphere reserve: We organized trainings for teachers to encourage them to look at biodiversity issues, then, we involved students (counting birds, measuring water quality…). At the end of the process, teachers decided to rewrite textbooks because all of this biodiversity related knowledge was not in the original textbooks. A new textbook on biodiversity is now available in all secondary schools in Cambodia. It had a great impact.
- Chile, biosphere reserve near Santiago: Schools decided to go to the biosphere reserve to map out the different areas, species and their roles (how to use them). They created a website where you can see the results, and people can find information on the biosphere reserve.
- Democratic Republic of Congo, forest areas: In this area, bush meat is a real issue. We organized training and campaign awareness to explain the value of certain species to the community, and how to monitor them.
- Indonesia, Oman, Ethiopia, and Vietnam: the focus was on developing bioliterate and sustainable schools in which children are taught about what is around them, the natural disasters AND link them to research institutes to monitor what has been found. The idea is to enable communities to identify their own risks and threats. This Initiative encourage them to be bioliterate citizens who understand Biodiversity Conservation and Restoration. It is also a tool for climate change mitigation and disaster risk prevention.
- India: we worked in a number of sites, notably on the man and tiger relationship.
- Baltic Sea Project: this is a long standing UNESCO Associated Schools flagship project to awaken young people's interest in environmental issues, protection and sense of responsibility, schools developed tools to monitor, collect data and raise awareness of the environmental history of the region.

If you want to have a good Citizen Science process, you need to have a good link/dialogue between communities, schools, researchers and scientists.

Other initiatives with links to citizen science include: World Water Day global monitoring, UNESCO Green Citizens initiative, the UNEP/UNESCO YouthxChange initiative focusing on young people, lifestyles and different issues (climate change, green skills, biodiversity) and how can you contribute to change.

"Biosphere Reserves and Global Geoparks: UNESCO tools to achieve the sustainable development goals"

Dr. Miguel Clüsener-Godt - UNESCO/Natural Sciences Sector/Division on Ecological and Earth Sciences

Biosphere Reserves and Geoparks are sites nominated by UNESCO upon request from national governments.

The Man and Biosphere Programme is an intergovernmental scientific programme that aims to establish a scientific basis for enhancing the relationship between people and their environments. It focuses on the use/relationship, and on the conservation: it is an original vision in the UN system. It promotes solutions reconciling the conservation of biodiversity with its sustainable use. There are 669 Biosphere Reserves in 120 countries, including 16 transboundary sites. Biosphere reserves are home to more than 200 million people, they have diverse activities.

Geoparks use the geological heritage, in connection with all other aspects of the area's natural and cultural heritage, to enhance awareness and understanding of key issues facing society, mitigating the effects of climate change and reducing the impact of natural disasters. The network currently includes 120 sites in 33 counties. The creation of innovative local enterprises, new jobs and high-quality training courses is stimulated as new sources of revenue are generated through sustainable geotourism, while the geological resources are protected.

UNESCO Biosphere Reserves and Global Geoparks contribute to the implementation of the SDGs 2, 4, 13, 15, 17.

"Community-based knowledge"

Douglas Nakashima - UNESCO/Natural Sciences Sector/Policy and Capacity Building/ Small Islands and Indigenous Knowledge

Question: how can we relate Indigenous and Local Knowledge to Citizen Science? It depends on the definition of Citizen Science. In our programme LINKS (Local and Indigenous Knowledge Systems), we acknowledge the existence of different knowledge systems and the difference between scientists and other knowledge holders.

Presentation of science of snow: Arctic peoples today face impacts from climate change. Climate change is expected to cause important environmental changes in the Arctic - rise in average temperatures and changes in the frequency of extreme events. These affect the ecosystems and resources on which societies depend. Indigenous peoples living in close relationship with their environment are excellent observers of climate change impacts. Our programme contributes to a comprehensive understanding of climate change and its impacts by bringing together indigenous and scientific observations and knowledge.

Other example: Creation of an application in South Africa to track animals, which is accessible to non-literate people thanks to pictograms and a user-friendly interface.

"Using the Future for Citizen Science"

Riel Miller - UNESCO/Social and Human Sciences Sector

Features Literacy is a capability, one that is essential for all scientific activities because time as past, present and future is a crucial attribute of all aspects of tangible and intangible 'reality'. Thus gaining a better understanding of how to use the future is a crucial attribute of diffusing the scientific stance with respect to sensing and making-sense of the world.

One of the striking things revealed by UNESCO's work on Futures Literacy is that people are indeed putting the future to use in many different ways. UNESCO has been showing that people deploy many different kinds of anticipatory systems and processes. They are doing so, in part because they are trying to reconcile our approaches to perception and agency in ways that are consistent with what we know about complexity and emergent novelty.

Futures Literacy as a capability empowers people to take 'science' into their own hands, rooted in their own context and the richness of specificity. This is a science that embraces uncertainty as the source of freedom and is not frightened by a lack of certainty, predictability or the failure of efforts to colonise tomorrow with today's idea of what the future should be like.

Developing people's Futures Literacy enables them to use the future in new ways, to become better able to conduct life in a scientific fashion.

Hopefully there will be opportunities to integrate the processes for advancing people's Futures Literacy as part of efforts to advance citizen science.

"Sandwatch – A Global 'Citizen Science' Observatory of Changing Environments"

Khalissa Ikhlef - UNESCO/Natural Sciences Sector/Policy and Capacity Building Division/ Small Islands and Indigenous Knowledge Section

Sandwatch is an open-access framework where different members of the society work together to scientifically monitor, critically evaluate and practically address the problems facing their beach environments. Active in primary, secondary and higher-level schools in 30 countries worldwide, the programme has a complete toolbox comprising a manual available in four languages (English, French, Spanish and Portuguese, soon available in Chinese), training videos and an international database. The Global Sandwatch database provides a safe and a secure place to store collected data; to analyse the changes taking place in the beach environment resulting from climate variability and climate change; to share information between groups and the wider community about ways in which beaches are changing. The project is being adapted to new and improved technology (a mobile phone application is being considered for the last two years, as a complementary mechanism to the global database).

Sandwatch is one of UNESCO's successful longest running programmes, having been operational since 2001 and is a good example of applied citizen science. In this context, based on the experience of Sandwatch, citizens in general or enthusiasts in particular, through a specific methodology based on the Sandwatch MAST approach (Measure, Analyze, Share, Take Action), can observe and monitor their environment (beaches, rivers, forests, marine and terrestrial biodiversity, space, natural elements, etc), and share their data through global databases. This will instill a sense of social responsibility and consciousness about the environment and the need to preserve it.

This inclusive citizen science is able to mobilize and empower society to sustain the development of their countries and actively contribute to mechanisms to monitor impacts of climate change and processes for deciding on how best to respond to its impacts.

Introduction to Sandwatch: ***youtube.com/sandwatchvideosENG***

PRESENTATION OF EUROPEAN NETWORKING INITIATIVES FOR CITIZEN SCIENCE

Dr Aleksandra Berditchevskaia and Ms Claudia Göbel

www.ecsa.citizen-science.net

The **European Citizen Science Association (ECSA)** is a European NGO with its Headquarters hosted at the Museum für Naturkunde Berlin, Leibniz Institute for Evolution and Biodiversity Research, Germany. It has the mission to connect citizen and science through fostering active participation with the aim of contributing to sustainable development and inclusive knowledge societies. To achieve this, ECSA works with those organisation and individuals who implement Citizen Science activities, referred to as "Citizen Science practitioners". The ECSA **network of research institutes, universities, museums, civil society groups, private sector, researchers and communicators** currently has more than **200 members from 27 countries**, mostly from the EU, but also the United States, Israel, Australia and other countries.[1] Since its foundation in 2014, ECSA membership has doubled each year and the majority of members are from academia with civil society and private sector being the second and third largest sectors of society represented.

ECSA encourages the growth of the Citizen Science movement in Europe and internationally by:

- **Promoting Sustainability through Citizen Science:** through its focus on environmental research and policy by stimulating cross-border cooperation, the implementation of EU-wide Citizen Science programmes, and linking to decision makers;
- **Building a Think Tank for Citizen Science:** fostering the exchange of knowledge and skills between practitioners as well as connectivity between various stakeholders, providing expertise and fostering excellence, and linking to international Citizen Science communities represent the core activities of the association;
- **Developing Participatory Methods for Cooperation, Empowerment and Impact:** by carrying out synthesis work and research on Citizen Science as well as spurring dialogue on methods of participatory research as the foundation of sharing experiences and best practice between the diverse practitioner communities.

ECSA's work is implemented through various channels. First, the association hosts **9 working groups on key topics of Citizen Science**: Best Practice, Policy, Communication, Data & Tools, Education & Learning, Responsible Research & Innovation, Open Science, Identifying topics for European-wide Citizen Science projects, International Synergies for CS work on Mosquito Monitoring, European BioBlitz Network. Tangible examples of this work include the **10 Principles of Citizen Science**[2] – a set of guidelines on what constitutes good CS practice that

[1] See also: https://ecsa.citizen-science.net/community/map (31.03.2017)
[2] 10 Principles of Citizen Science in 26 languages: https://ecsa.citizen-science.net/documents (31.03.2017).

has been created in 1.5 years of deliberation between ECSA members and has been translated to 26 languages to date – and an **ontology for sharing CS data and metadata to foster interoperability and data re-use** on global scale[3]. The policy-related activities of the association address **environmental policy** (especially use of data from biodiversity and environmental monitoring for decision making and monitoring of EU legislation) as well as **research policy** (especially Responsible Research & Innovation and Open Science agendas). Second, ECSA implements knowledge generation, networking and capacity building activities through its participation in **2 Horizon2020 projects**: **LANDSENSE**, a Citizen Observatory and Innovation Market Place for Land Use and Land Cover Monitoring in which ECSA contributes expertise on stakeholder engagement; and **Doing-it-Together science (DITOs)**, a Coordination and Support Action for public engagement with S&T in which ECSA is in charge of policy-engagement work and serves as legacy institution of the project (see below). A third stream of action is realized through **partnerships** with related bodies, including organizations (e.g. European Universities Public Relations and Information Officers), national Citizen Science networks and associations (e.g. in Germany, Austria, Switzerland, Spain, the US, Australia) and research projects (e.g. EU BON). A key activity is the biennial European Citizen Science conference (every four years as international conference), which will take place next in June 2018 in Geneva.

CITIZEN SCIENCE COST ACTION

http://cs-eu.net

A connected European networking initiative for Citizen Science is the **COST Action CA15212 "Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe"**. As COST provides an inter-governmental instrument for networking of researchers, this COST Action **links scholars working on Citizen Science to lift its untapped potential for social innovation and socio-ecological transition**.[4] The Action is coordinated by Dr. Katrin Vohland (Museum für Naturkunde Berlin, Executive Chair of ECSA). Its aims are:

- To bundle research capacities on key aspects of Citizen Science across Europe and advance a common research agenda,
- To investigate and extend the impact of the scientific, educational, policy, & civic outcomes of Citizen Science,
- To involve stakeholders from all sectors concerned,

[3] Find a summary of ongoing initiatives here: http://citizenscience.org/2016/02/09/data-and-metadata-reporting-from-the-citizen-science-data-and-service-infrastructure-meeting-in-italy/ (31.03.2017).

[4] A leaflet summarizing the work plan for the COST Action can be downloaded here: https://www.cs-eu.net/sites/default/files/documents/FactSheet-CS-CA.pdf (31.03.2017).

- To gauge the potential of citizen science as enabler of social innovation and socio-ecological transition.

This is realized via **6 working groups**[5] focusing on scientific quality, synergies with formal and informal education, science-society-policy interfaces, impacts for civil society and social innovation, data standardization and interoperability, and overall synthesis.

http://togetherscience.eu/

Doing-it-Together science (DITOs), funded by Horizon 2020, is a three-year project about celebrating and supporting DIY and grassroots initiatives in science and technology. A central element of the project is an 'escalator' model of engagement, which recognises that people engage at levels of participation that match their needs, interests, and abilities.

DITOs aims to:

- Strengthen European cooperation through capacity building,
- Strong focus on cross-fertilisation and knowledge sharing between hubs and activity centres,
- Extend a particular effort towards reaching currently excluded groups,
- Strengthen local capacity and share resources in local languages,
- Engage with wider policy narratives at national and European levels: Responsible Research & Innovate (RRI), Open Science, Sustainability, Air Quality, STEAM skills, Open Data.

Based across 10 European countries, the 11 partners of the DITOs consortium work with many participatory event formats including exhibitions, hands-on workshops, science cafes, bioblitzes, training courses, etc. focussing on the themes of **Environmental Sustainability, Biodesign, and Policy Engagement**. DITOs is not only about a wider public being empowered to take part in the scientific process but also opening up the discourse to promote ethics and responsibility of practice.

Policy Engagement is built into the project through events such as national and European roundtable discussions, fact-finding missions for policy and decision makers (Discovery Trips),

[5] More information on COST Action working groups: https://www.cs-eu.net/wgs (31.03.2017).

conferences and culminating in a European policy forum in Brussels in 2019. The consortium partners will also produce 6 Policy Briefs by 2019, two of these will be released in May 2017: Introduction to DIYbio; Coordination across borders for environmental sustainability: Bioblitz case study.

The DITOs policy working group is committed to working with like-minded partners to make citizen science more sustainable in the long term. As a key DITOs partner, ECSA will take over guardianship of the DITOs project after 3 years to help to sustain the legacy and avoid “projectification”.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 709433.

PRESENTATION FROM THE FIELD ON A CITIZEN SCIENCE RELATED ACTIVITIES

"Post-disaster community-based data collection in the Bahamas"

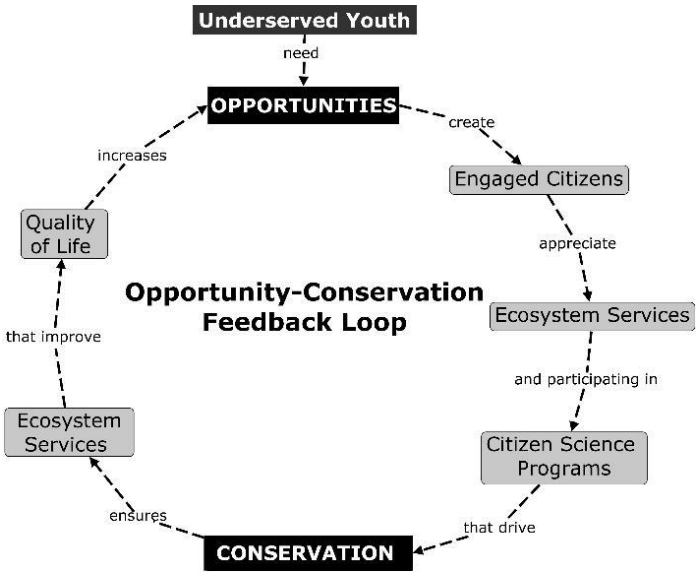
Ms Nikita Shiel-Rolle, Young Marine Explorers (via Skype)

Developing marine citizens can inspire youth to address environmental and social challenges – as well as national conservation issues. Our project prepares Bahamian youth with to address local conservation challenges and social issues.

YME believes that a holistic approach is required to achieve the UN SDG's. YME directly answers goals 13, 14 and 15 of the UNSDGs and TNC 2020 challenge. When people are in the midst of personal issues and battling with the realities of their social and economic challenges, they are often not in a position to make the behavioral changes required to address most conservation issues as a result the YME curriculum works towards developing Marine Citizens with the skills to become active members of society with the ability and desire to become involved in long term conservation citizen science projects.

There are major education challenges in The Bahamas; the graduating average of high school seniors is a D. The poor education output directly relates to the high level of youth unemployment and crime in the country. Young Marine Explorers has a 28-week curriculum, working with students from underserved communities during their last three years of high school. Classes are held once a week for two hours, and fieldtrips on Saturdays. The curriculum is culturally relevant and it reinforces weak points in subjects taught in high school. Once students have developed the necessary skills for gainful employment, built self-confidence, and believe in their ability to create positive change they can become engaged in long term citizen science projects.

The YME theory of change:



Citizen Science Project Example - The Hurricane Matthew Project:

This project divided the island of New Providence into different communities. The project conducted a rapid impact assessment to document damage in developed and protected coastal environments. The assessment will produce risk maps showing the extent of the damage for rebuilding and future mitigation. We are developing a community-based rapid ecological assessment protocol to assess future storm damage more efficiently.

It is the first time that high school students/citizens were engaged in such a project in the Bahamas. One of the biggest challenges in the Bahamas, is that the Citizen science is not really discussed at the policy level. Working with UNESCO could help to integrate our projects in the policy agencies discussions.

In June 2018, I will participate to the Marine Conservation Congress in Kuchhing. I will be working with the UNESCO Malaysia office to try and develop citizen science opportunities and to further build our network.

Remarks from *Miguel Clusener-Godt*: Bahamas does not have a biosphere reserve (UNESCO). It may help after with your projects.

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CONCLUSION AND NEXT STEPS:

On the one hand, experiences from UNESCO's activities, which cover a diverse range of Citizen Science and related activities and a broad scope of topics, represent valuable resources for the broader Citizen Science communities in Europe and internationally. On the other hand, networking and exchange with these communities could benefit UNESCO's activities through exchange of good practice and the standards applied, training opportunities as well as joint initiatives.

In this first scoping meeting, the following topics with potential for synergies and cooperation have been identified:

- Citizen Science data, data from SIDS, data standards and interoperability,
- Citizen science apps and platforms,
- How can Citizen Science help achieving SDGs,
- What can Citizen Science learn from representation of indigenous knowledge systems,
- Science Policy – how can Citizen Science give input to decision making and what in conditions are necessary to support citizen science,
- Cross-border citizen science project and their link to decision makers,
- Sustainability of citizen science activities.

Potential next steps include:

- Continue and deepen the exchange of experience on Citizen Science in areas of mutual benefit through exchange of information and joint events, e.g. a training workshop.
- One potential opportunity for cooperation would be a UNESCO session at the European Citizen Science conference organized by ECSA and DITOs in June 2018 in Geneva. This would offer visibility to UNESCO activities, a venue for exchanging experience with international Citizen Science practitioners and decision-makers, and to further explore synergies with various Citizen Science networks.
- Identify projects within European networking initiatives which are thematically or otherwise related to UNESCO's initiatives and stimulate exchange.
- Participation of UNESCO experts in DITOs events is also very welcome, e.g. in Discovery Trips focussed on Environmental Sustainability or Informal Science Education as well as European-level Roundtable discussions.