



# The Landscape of Citizen Observatories across the EU

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European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

Margaret Gold, European Citizen Science  
Association (ECSA)



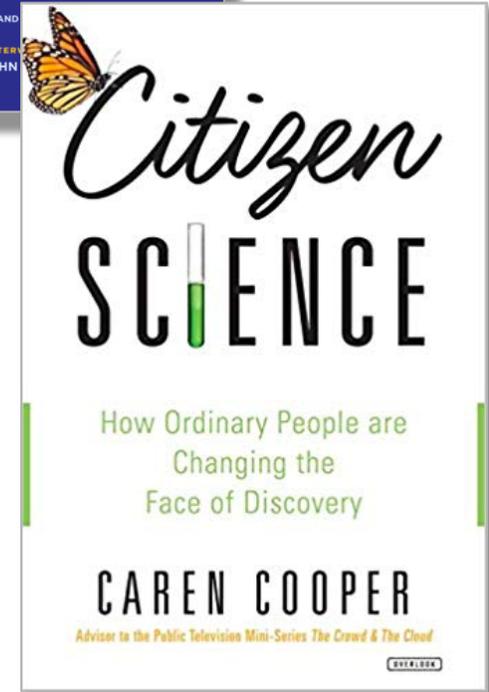
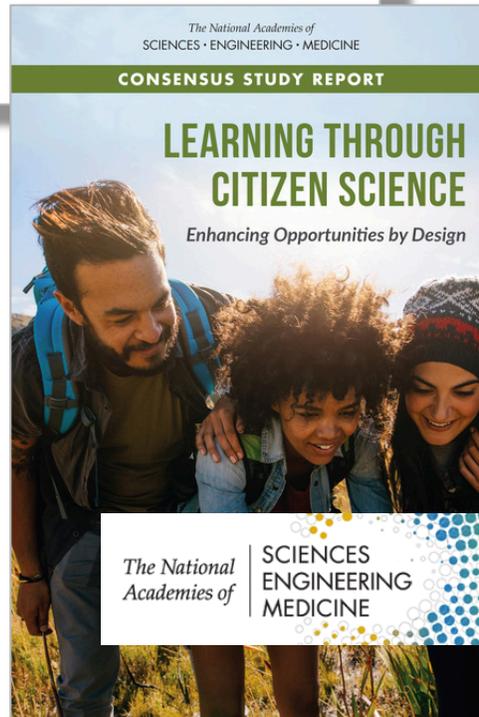
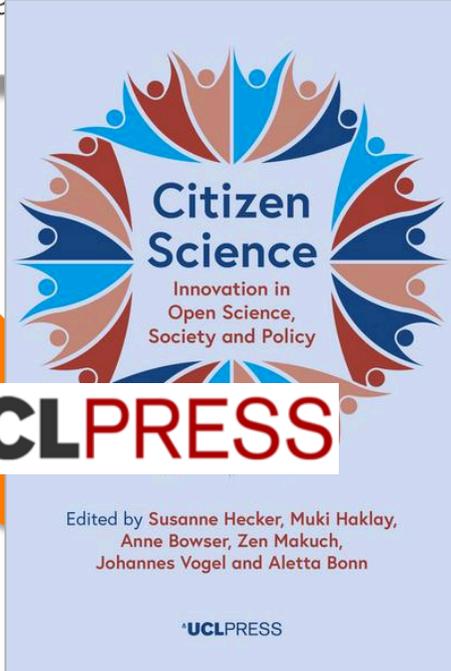
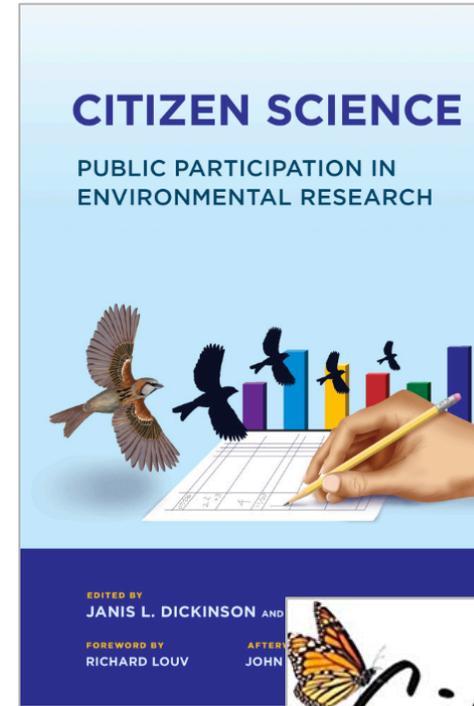
EUROPEAN  
CITIZEN SCIENCE  
ASSOCIATION



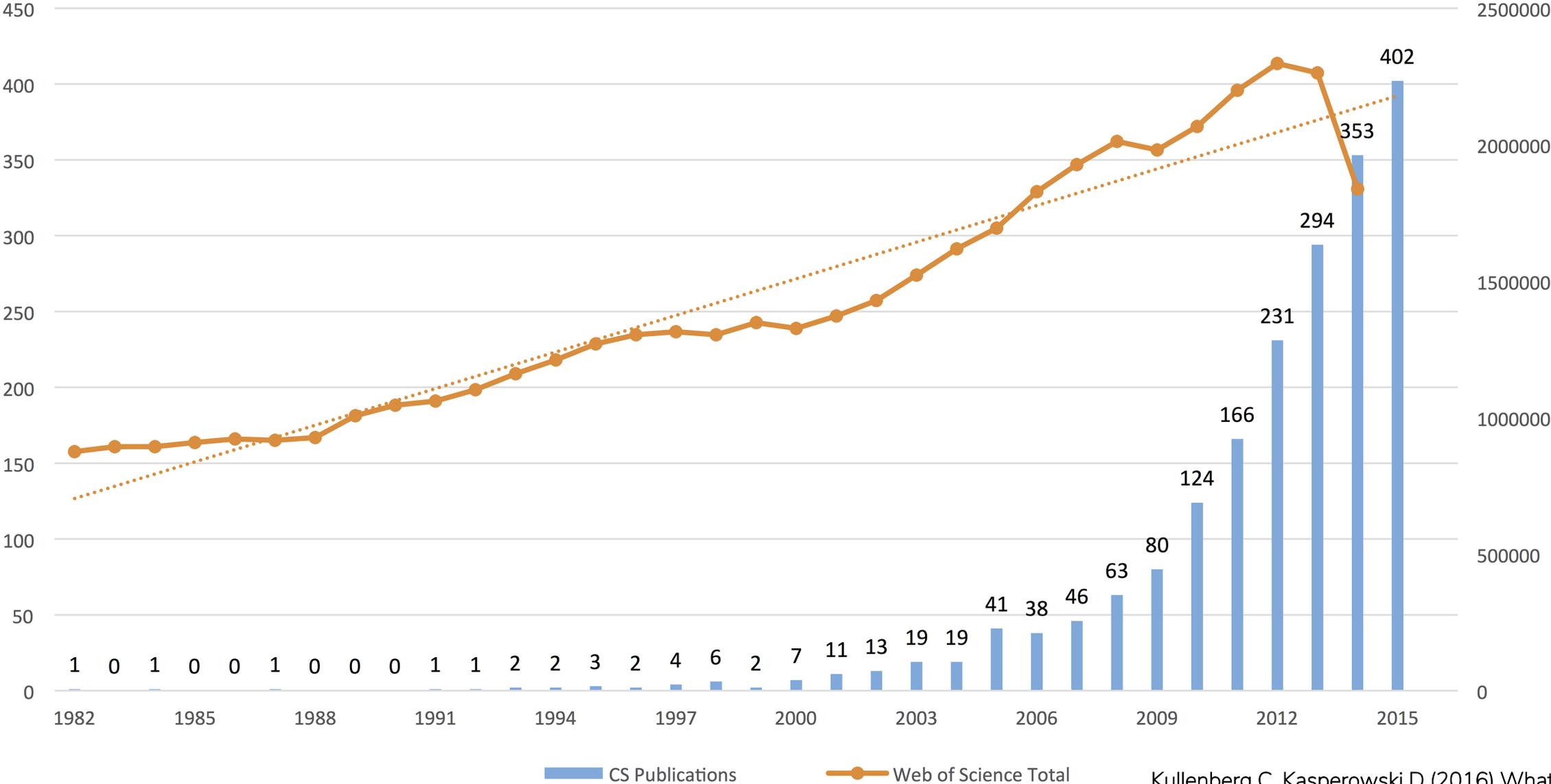
NEWS FEATURE • 23 OCTOBER 2018

# No PhDs needed: how citizen science is transforming research

*Projects that recruit the public are getting more ambitious and diverse, but the field faces some growing pains.*



# Growth of Citizen Science publications in absolute numbers compared to Web of Science total



Kullenberg C, Kasperowski D (2016) What Is Citizen Science? – A Scientometric Meta-Analysis.

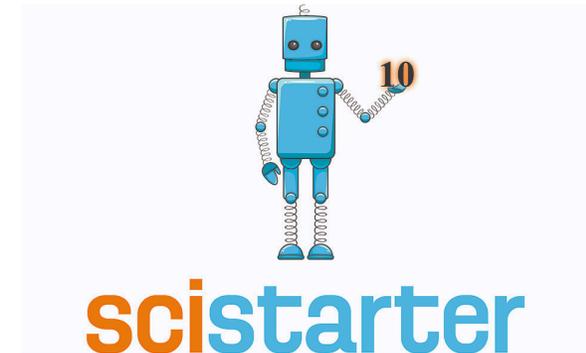
# Professionalisation of Citizen Science

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# Citizen Science Platforms & Knowledge Exchange

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ELSEVIER

## Biological Conservation

Volume 181, January 2015, Pages 236-244



Global change and local solutions: Tapping the unrealized potential of citizen science for biodiversity research

Within projects sampled (n = 388), ~**1.3 million** volunteers participate, contributing up to **\$2.5 billion in-kind** annually.

## Journal of Environmental Monitoring

Cite this: *J. Environ. Monit.*, 2011, **13**, 2687

[www.rsc.org/jem](http://www.rsc.org/jem)



**PERSPECTIVE**

### The role of 'Big Society' in monitoring the state of the natural environment

Colin Mackechnie,<sup>a\*</sup> Lindsay Maskell,<sup>b</sup> Lisa Norton<sup>b</sup> and David Roy<sup>c</sup>

Terrestrial biodiversity surveillance in UK involved **> 30 different organizations**, to which volunteer contributions had an estimated value of **£20 million**, for a government investment of £7 million.

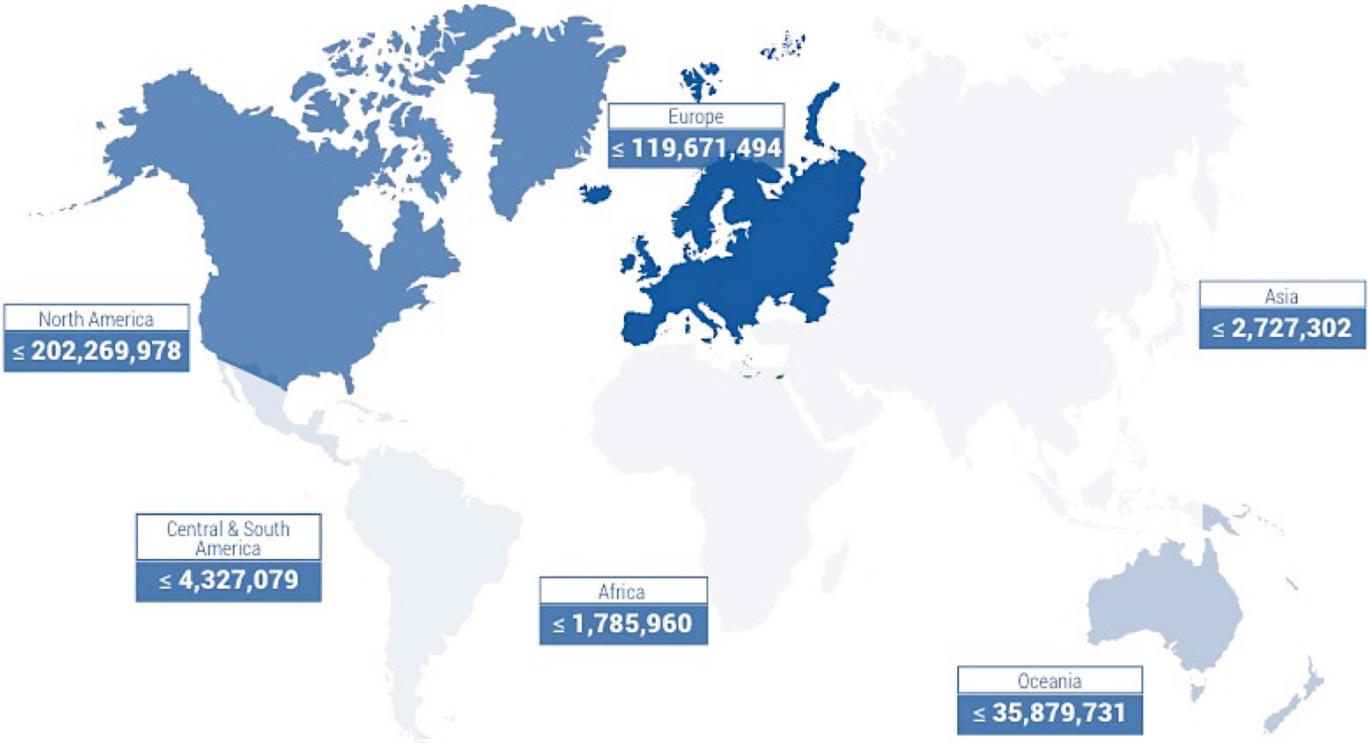
Theobald, E., Ettinger, A., Burgess, H., DeBey, L., Schmidt, N., & Froehlich, H. et al. (2015). Global change and local solutions: Tapping the unrealized potential of citizen science for biodiversity research. *Biological Conservation*, 181, 236-244. doi:10.1016/j.biocon.2014.10.021

Mackechnie C., Maskell L., Norton L. & Roy D. (2011) The role of "Big Society" in monitoring the state of the natural environment. *Journal of Environmental Monitoring*, 13, 2687–2691

# Citizen science contributions to the GBIF global index

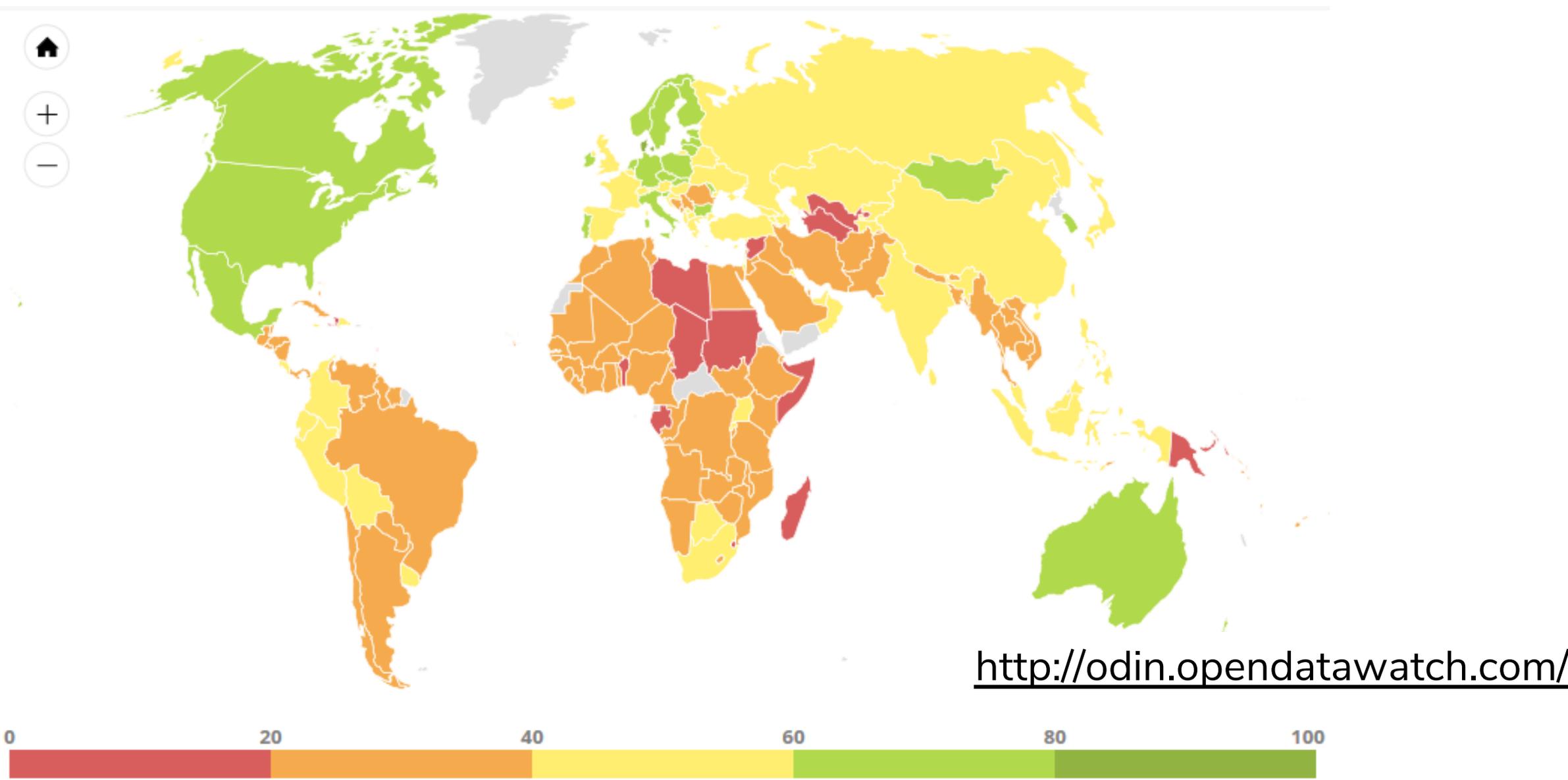


Analysis as of 1 March 2016



Mark Chandler, Linda See, Kyle Copas, Astrid M.Z. Bonde, Bernat Claramunt, Finn Danielsen, Jan Kristoffer Legind, Siro Masinde, Abraham J. Miller-Rushing, Greg Newman, Alyssa Rosemartin & Eren Turak (2016) Contribution of citizen science towards international biodiversity monitoring. *Biological Conservation* [doi:10.1016/j.biocon.2016.09.004](https://doi.org/10.1016/j.biocon.2016.09.004)

# Open Data Watch – Open Data Inventory 2017



JAN  
2018

# DIGITAL AROUND THE WORLD IN 2018

KEY STATISTICAL INDICATORS FOR THE WORLD'S INTERNET, MOBILE, AND SOCIAL MEDIA USERS

TOTAL  
POPULATION



**7.593**  
BILLION

URBANISATION:  
**55%**

INTERNET  
USERS



**4.021**  
BILLION

PENETRATION:  
**53%**

ACTIVE SOCIAL  
MEDIA USERS



**3.196**  
BILLION

PENETRATION:  
**42%**

UNIQUE  
MOBILE USERS



**5.135**  
BILLION

PENETRATION:  
**68%**

ACTIVE MOBILE  
SOCIAL USERS



**2.958**  
BILLION

PENETRATION:  
**39%**

we  
are  
social



we  
are  
social



**SOURCES:** POPULATION: UNITED NATIONS; U.S. CENSUS BUREAU; INTERNET: INTERNETWORLDSTATS; ITU; EUROSTAT; INTERNETLIVESTATS; CIA WORLD FACTBOOK; MIDEASTMEDIA.ORG; FACEBOOK; GOVERNMENT OFFICIALS; REGULATORY AUTHORITIES; REPUTABLE MEDIA; SOCIAL MEDIA AND MOBILE SOCIAL MEDIA: FACEBOOK; TENCENT; VKONTAKTE; KAKAO; NAVER; DING; TECHRASA; SIMILARWEB; KEPIOS ANALYSIS; MOBILE: GSMA INTELLIGENCE; GOOGLE; ERICSSON; KEPIOS ANALYSIS. **NOTE:** PENETRATION FIGURES ARE FOR TOTAL POPULATION (ALL AGES).



# Citizen Science

*community-based monitoring*

*volunteer based monitoring*

*volunteer monitoring*

*participatory monitoring*

*participatory sensing*

*participatory science*

*public engagement*

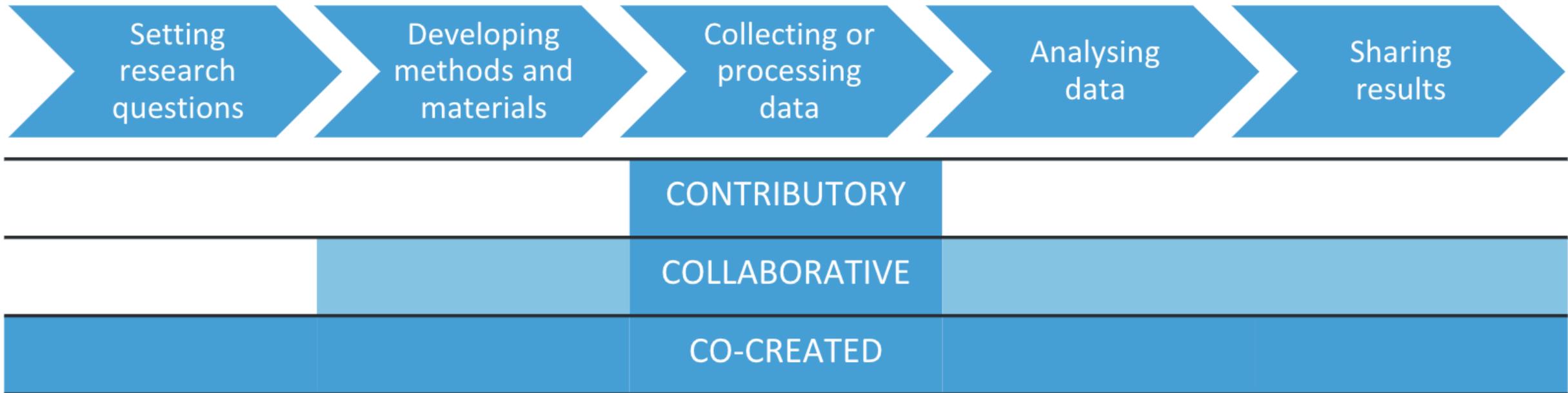
*popular epidemiology*

*Do It Yourself Science*

*crowd science*

**public participation in  
scientific research**

# Stages of the scientific process that involve citizens in different types of citizen science projects



SOURCE: Bonney, R., Cooper, C. B., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K. V. and Shirk, J. (2009). Citizen science: A developing tool for expanding science knowledge and scientific literacy. *BioScience*, 59(11). 977–84. DOI:10.1525/bio.2009.59.11.9

AS ILLUSTRATED IN: Sarah West and Rachel Pateman (2017). How could citizen science support the Sustainable Development Goals? Policy brief. Stockholm Environment Institute.



# Citizen Observatories

“Community-based environmental monitoring and information systems that build on innovative and novel Earth observation applications” (EU)



## An Ecosystem of Citizen Observatories for Environmental Monitoring

### VISION

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Citizen Observatories are an integral component of managing environmental challenges and empowering resilient communities



### MISSION

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Move Citizen Science into the mainstream by building a sustainable ecosystem of Citizen Observatories and related activities



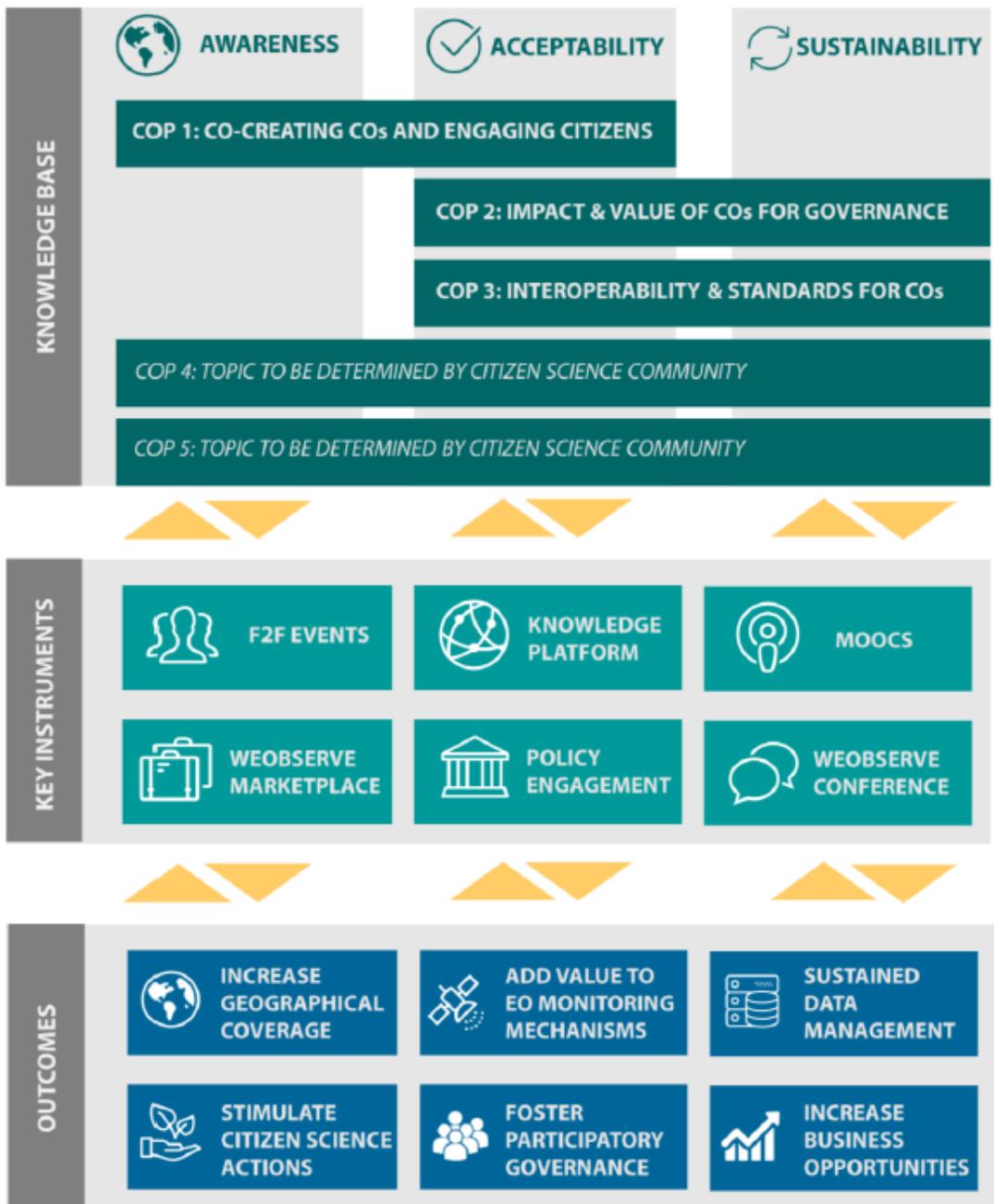


Figure 1: WeObserve Concept

# Global Citizen Observatory

## The Role of Individuals in Observing and Understanding our Changing World

“it is no longer sufficient to develop passive lists or reports to ‘inform’ citizens of changes in our environment. We need to engage with citizens and ask how they can ‘inform’ us.”



Prof. Jacqueline McGlade’s 2009 Earthwatch Lecture

# WeObserve Communities of Practice (CoPs)

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JOIN the WeObserve Communities of Practice

<https://tinyurl.com/WOCOPs>

# WeObserve Communities of Practice (CoPs)

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CoP 1 : Co-creating citizen observatories and engaging citizens

CoP 2 : Impact and value of citizen observatories for governance

CoP 3 : Interoperability and standards for citizen observatories

**CoP 4 : UN Sustainable Development Goals and Citizen Observatories**



# Citizen Science & the Sustainable Development Goals

Help leverage the SDG efforts with the application of new methodologies to enhance the quality of such data.\*

Support SDG implementation through transformative practices - attitude and behaviour change.



\* UN. (2017). The Sustainable Development Goals Report 2017. New York: UN. Retrieved from <https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf>



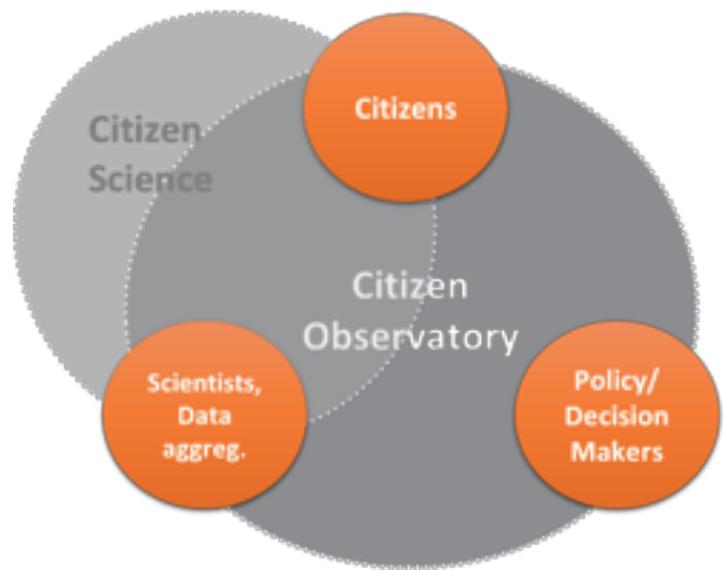
CS is a subset of COs

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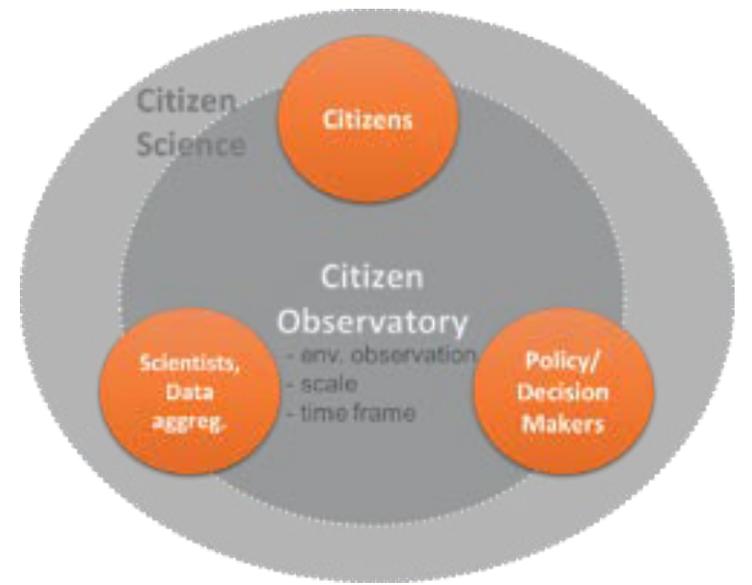
CS is a subset of COs and beyond

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COs are a subset of CS

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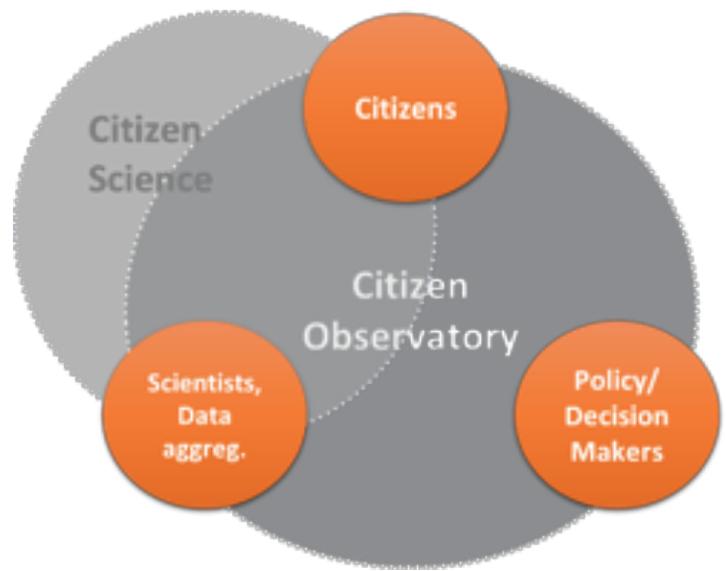
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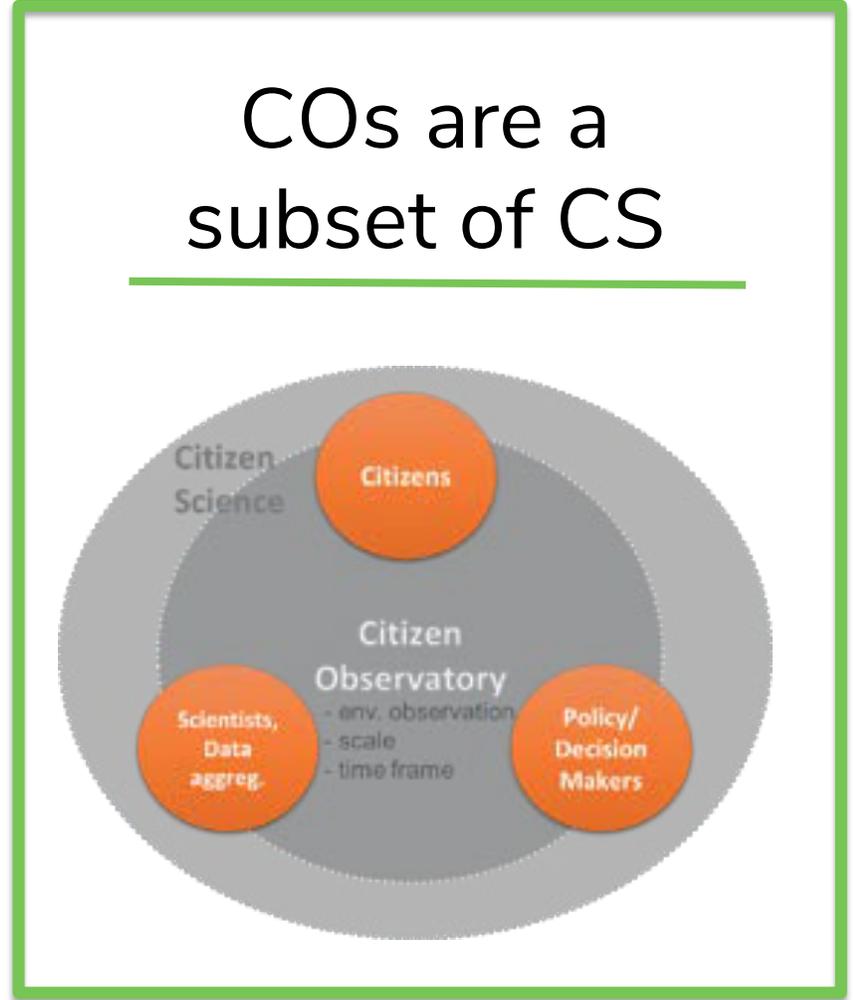
CS is a subset of COs and beyond

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COs are a subset of CS

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## **WeSenseIT**

“a method, an environment and an infrastructure supporting an information ecosystem for communities and citizens, as well as emergency operators and policymakers, for discussion, monitoring and intervention on situations, places and events”

2013

## **CITI-SENSE**

“the citizens’ own observations and understanding of environmentally related problems and in particular ... reporting and commenting on them within a dedicated ICT platform”

2014

## **ALAN GRAINGER**

“any use of Earth observation technology in which citizens collect data and are empowered by the information generated from these data to participate in environmental management.”

2017

# COMMON ELEMENTS



**PARTICIPATION OF  
CITIZENS 'IN-SITU'**



**MOBILE + WEB  
TECHNOLOGIES**



**ENVIRONMENTAL  
MONITORING**

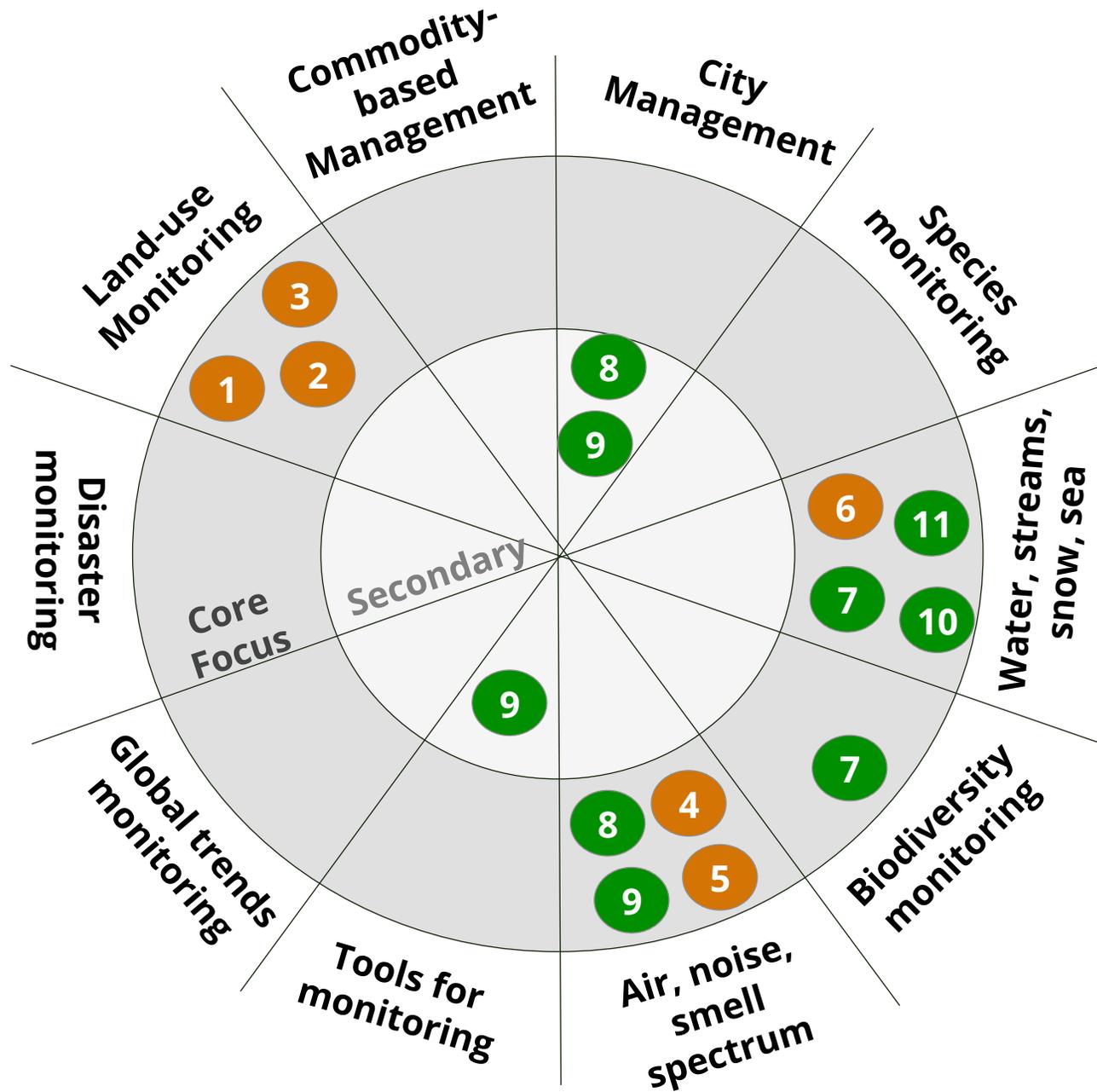


**BI-DIRECTIONAL DATA  
& INFO**

# EU funded Citizen Observatories (FP7 & H2020)

FP7 - funded COs	Focus	Timeline
<b>COBWEB</b>	Biosphere monitoring	2012 - 2016
<b>OMNISCIENTIS</b>	Odour monitoring	2012 - 2014
<b>CITI-SENSE</b>	Air pollution monitoring	2012 - 2016
<b>WeSenselt</b>	Flood and drought monitoring	2012 - 2016
<b>Citclops</b>	Coastal and marine water quality monitoring	2012 - 2015
H2020 - funded COs		
<b>Ground Truth 2.0</b>	Flora and fauna, water availability and water quality, for land and natural resources management	2016 - 2019
<b>GROW</b>	Soil, land-use, crop planting, and water resources	2016 - 2019
<b>LandSense</b>	Land use and land cover	2016 - 2019
<b>Scent</b>	Water supply & quality, flood risks	2016 - 2019





## Domains Represented

### H2020 COs

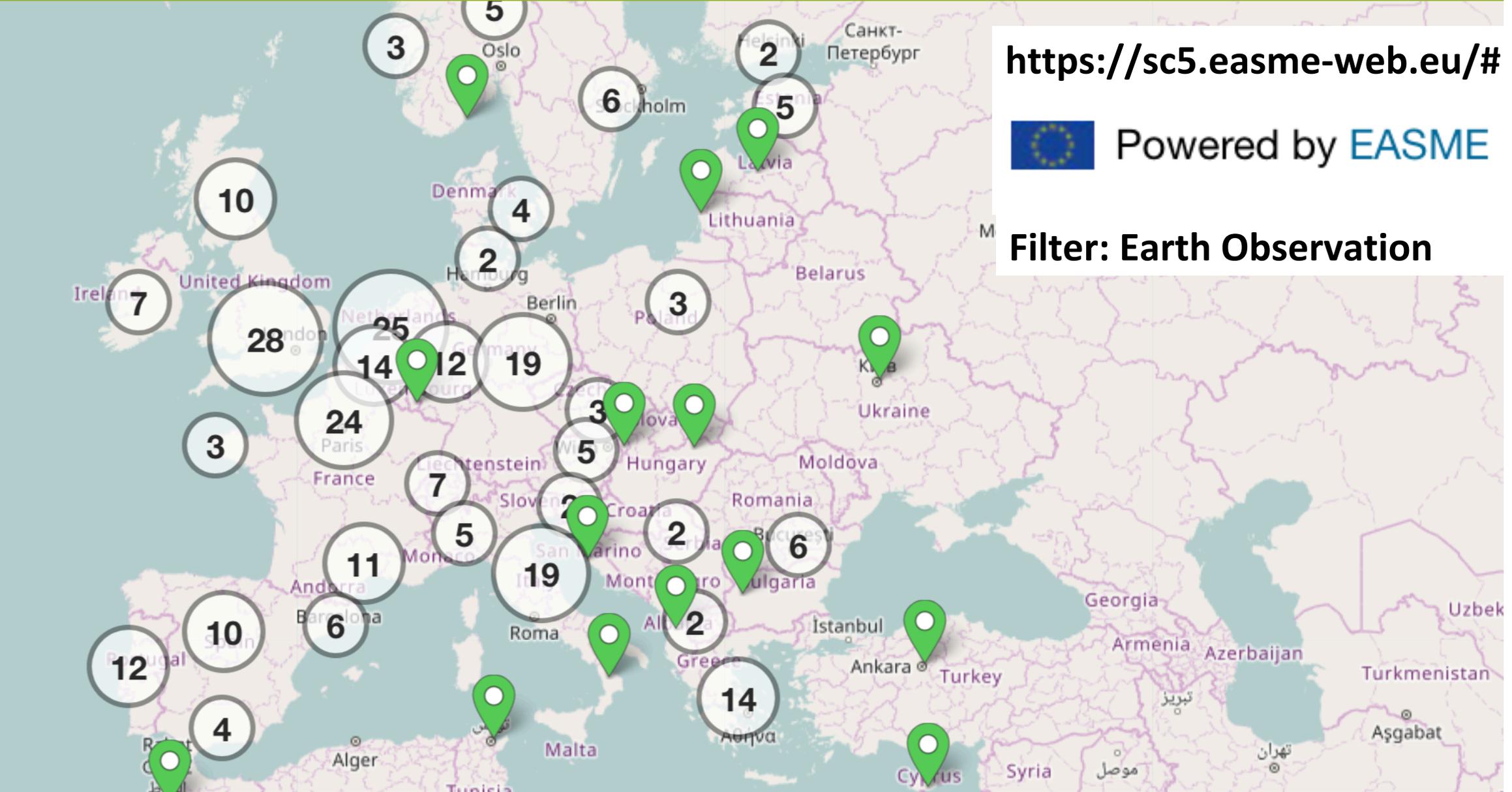
1. Ground Truth 2.0
2. GROW
3. LandSense
4. Scent
5. D-Noses
6. Monocle

### FP7 COs

7. COBWEB
8. Ominscientis
9. Citi-Sense
10. WeSenselt
11. Citiclops



# Horizon 2020 Environment and resources data hub



<https://sc5.easme-web.eu/#>



**Filter: Earth Observation**

# Add YOUR Citizen Observatory

## Add your Citizen Observatory to the WeObserve Landscape of COs across Europe

Thank-you for sharing information about your Citizen Observatory with the greater community. We would like to share this information on the WeObserve website, and in our Landscape reports, which will contribute greatly to the shared learning amongst practitioners of COs in ongoing research, and towards developing future projects. At the end of this form we will ask your permission to do so.

This template has been developed within the WeObserve project for the purpose of describing COs across a range of aspects, for the purpose of evaluation and comparison, and also to map the landscape of COs in Europe according to their characteristics.

The full report describing these frameworks is available for download online at: <https://www.weobserve.eu/wp-content/uploads/2018/08/D2.1-776740-WeObserve-EU-Citizen-Observatories-Landscape-Report-Frameworks.pdf>

You can stay informed of our progress by subscribing to the WeObserve Newsletter at <https://lists.weobserve.eu/wws/subscribe/newsletter>

\* Required

Thank-you for taking the time to make this valuable contribution - you can continue to edit your CO information at any time.



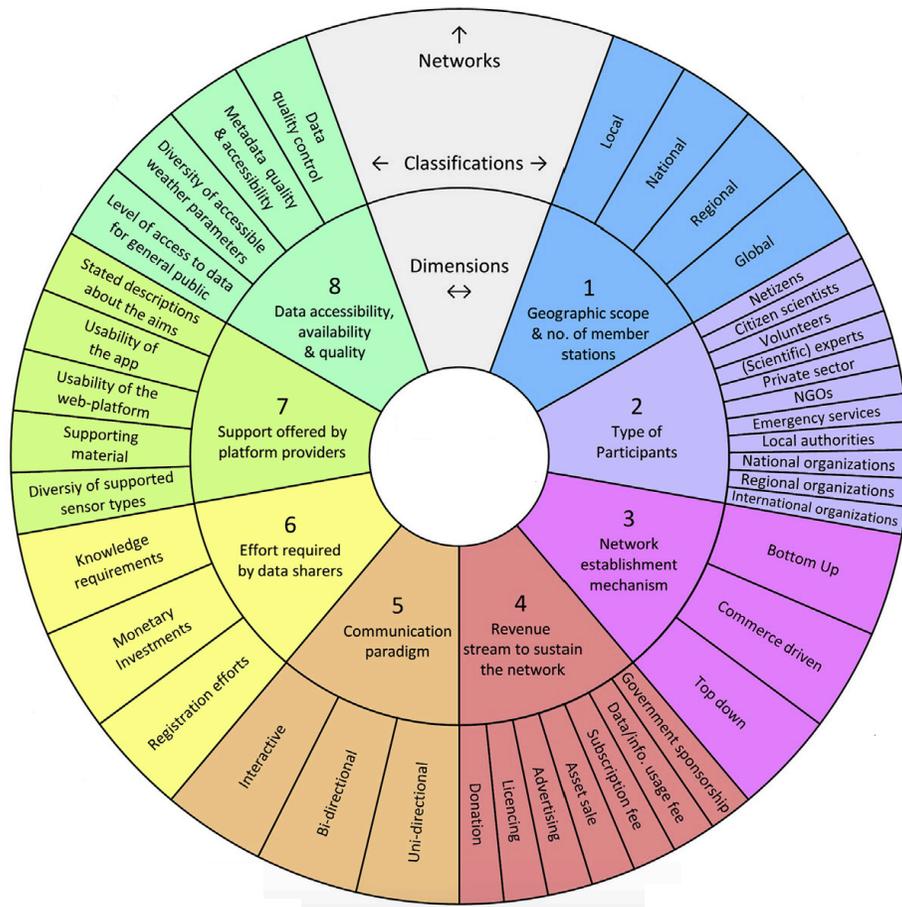
PROJECT OVERVIEW

We are now compiling project details on as wide a range of initiatives in Europe as possible. Please share project information with us via this online form.

<https://tinyurl.com/COlandscape>



# Developing a Framework for Benchmarking COs across Europe



1. Geographic scope
2. Type of participants
3. Network establishment mechanism
4. Revenue stream
5. Communication Paradigm
6. Effort required
7. Platform support
8. Data accessibility, availability & quality



# Environmental Citizen Science & the UN SDGs

## Inventory of Citizen Science activities for environment policies

>500 projects examined, incl. first mapping to SDGs

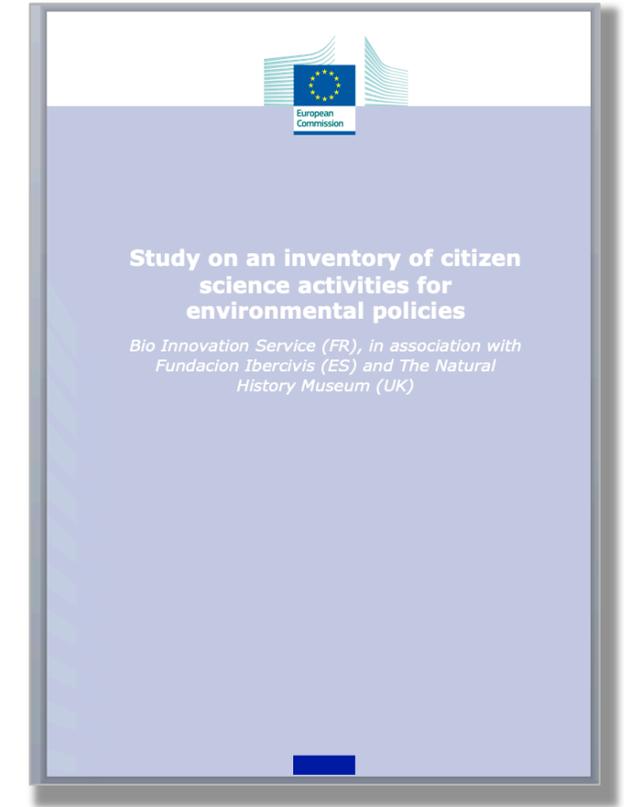
Possible starting point for more detailed investigations

Results to be published for re-use in the coming weeks

Attributes were carefully selected...

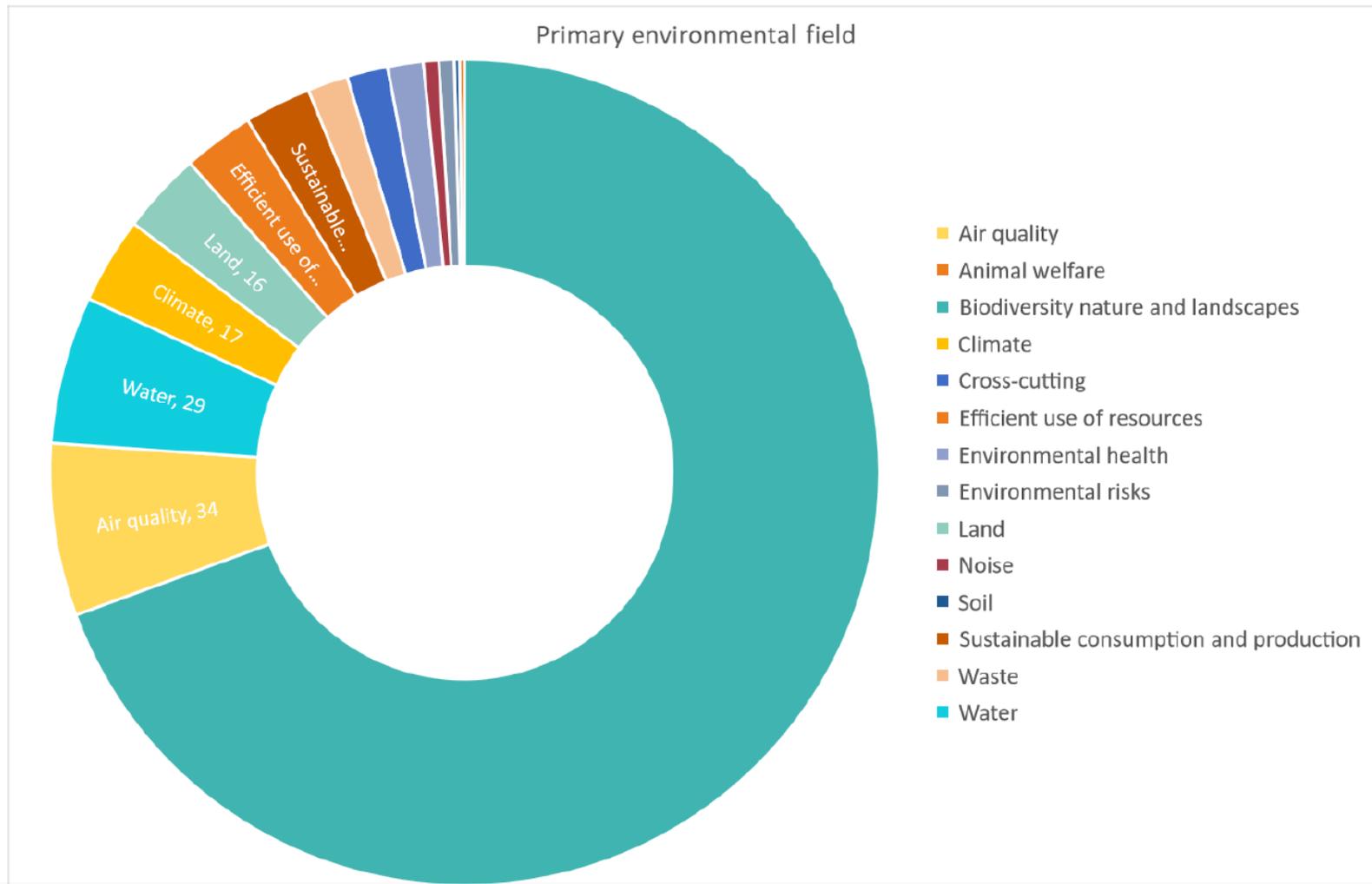


Study on an inventory of citizen science activities for environmental policies

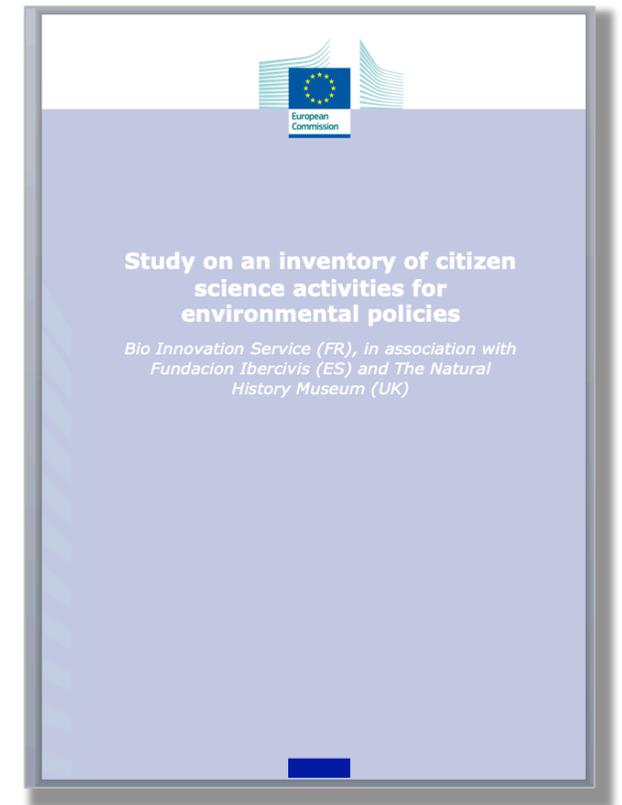


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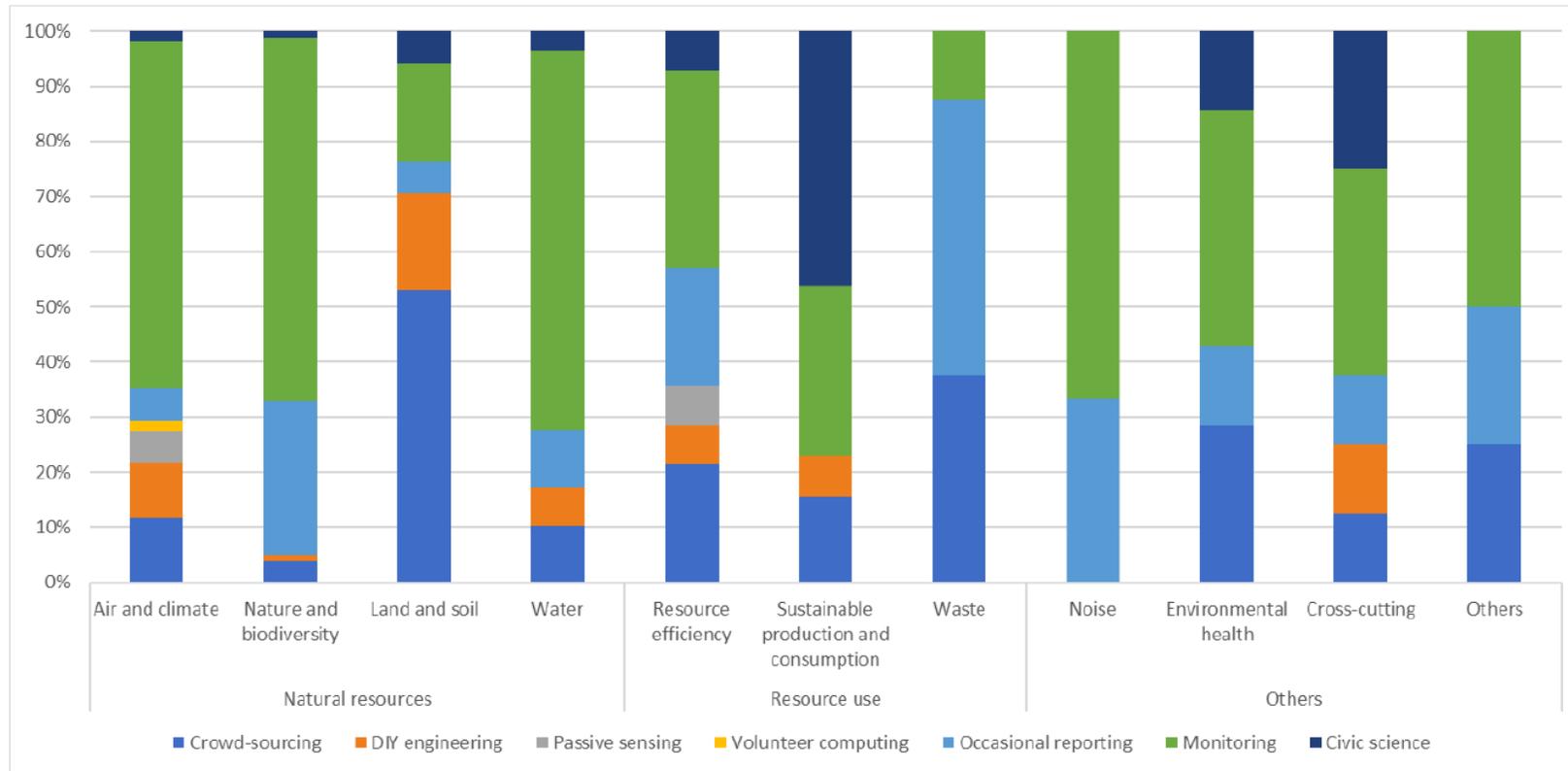
# Inventory – Fields Covered



Study on an inventory of citizen science activities for environmental policies



# Inventory – Type of Projects

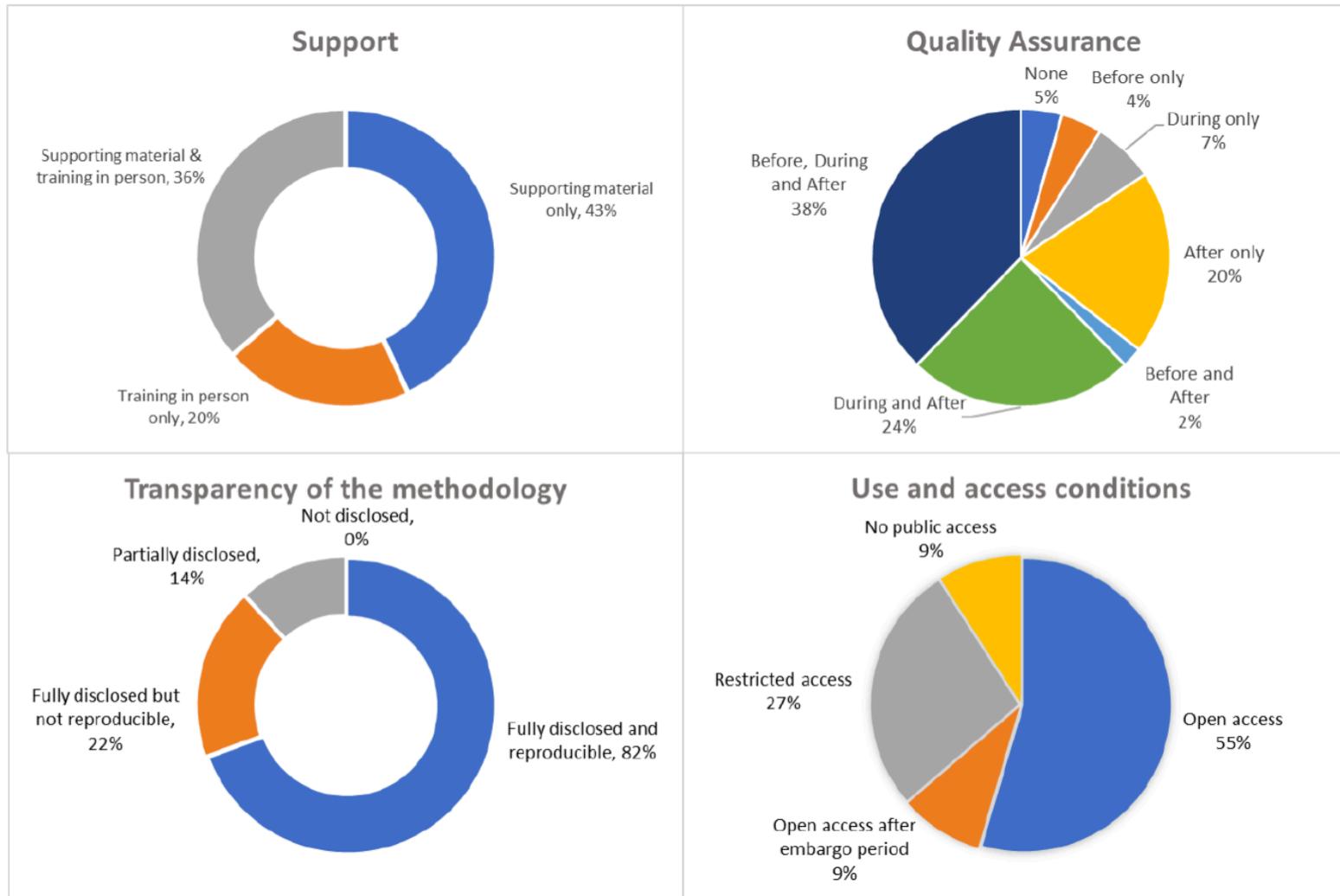


Study on an inventory of citizen science activities for environmental policies



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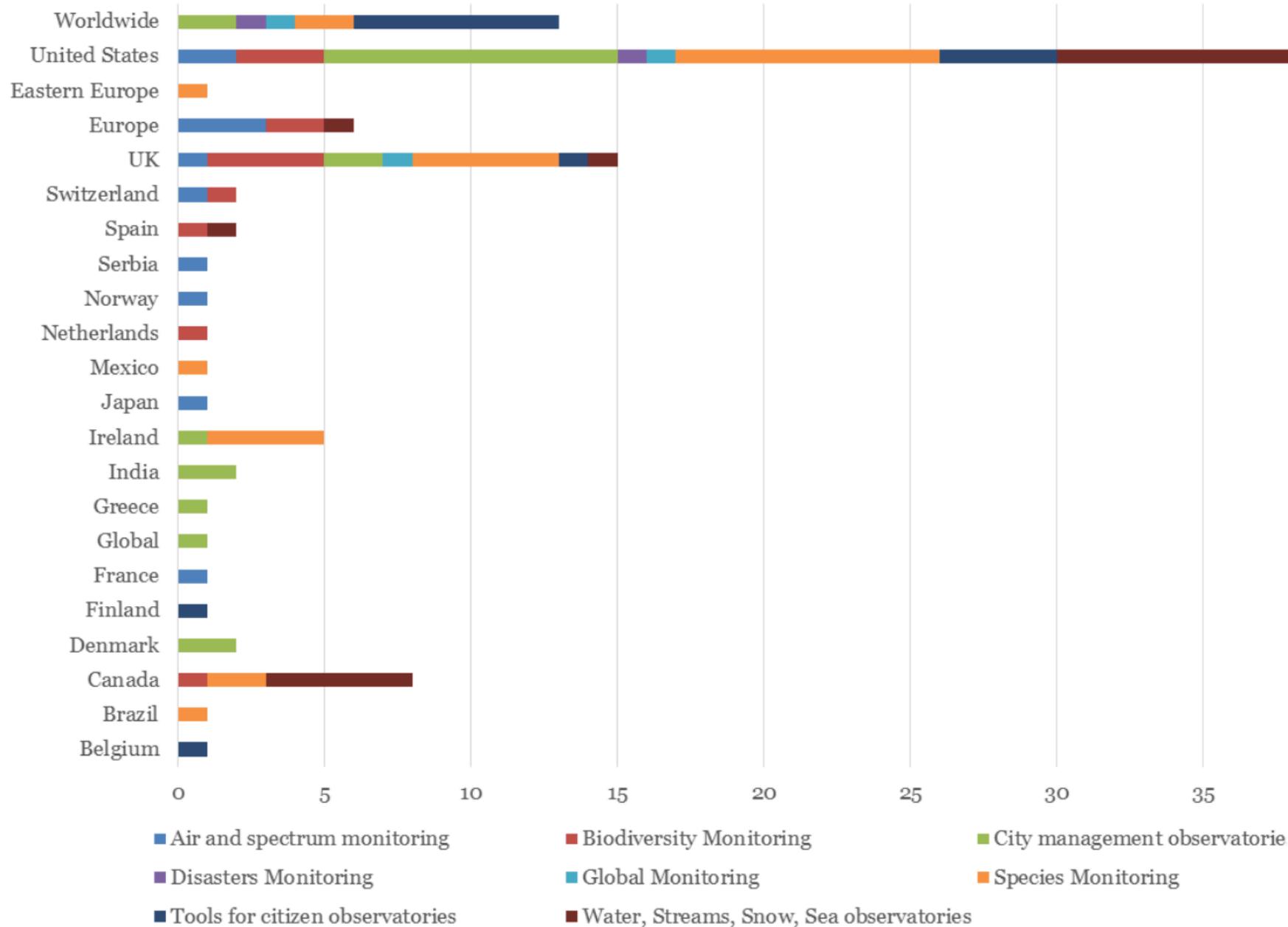
# Analysis – Scientific Data Quality



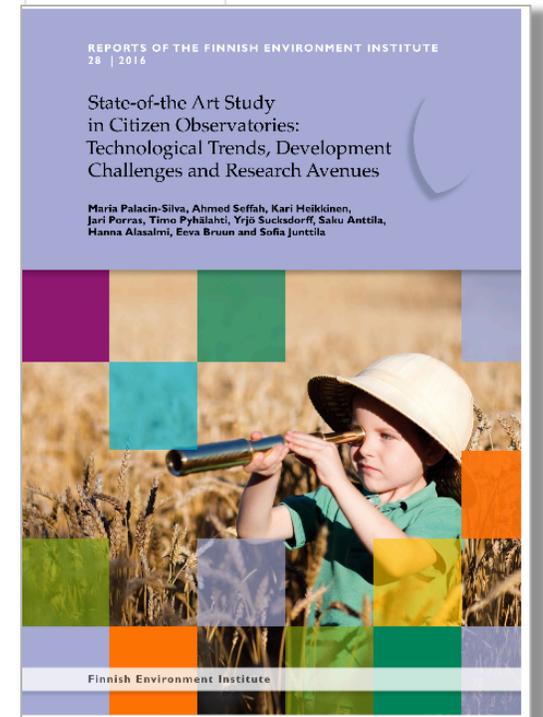
Study on an inventory of citizen science activities for environmental policies



## Citizen Observatories Focus by Location

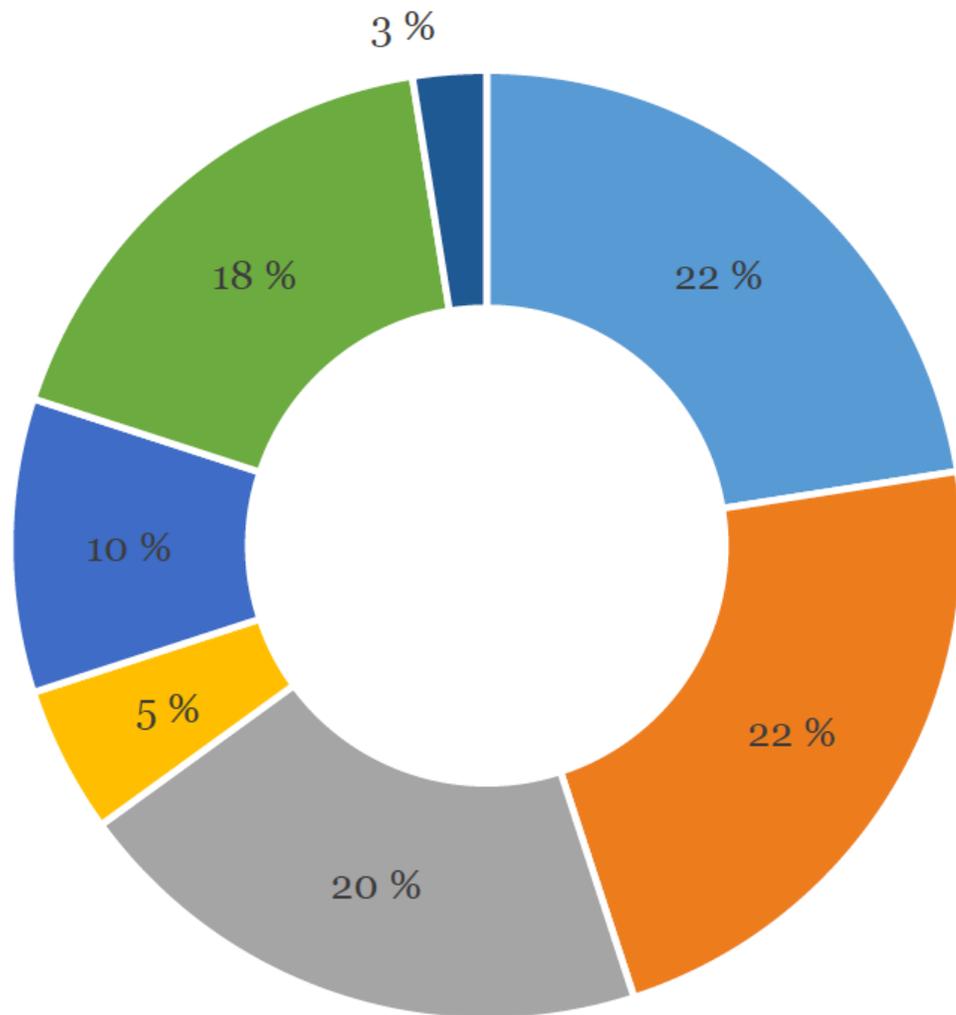


## State-of-the Art Study in Citizen Observatories

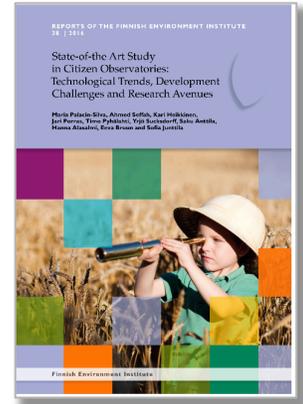


Palacin-Silva et al. State-of-the Art Study in Citizen Observatories: Technological Trends, Development Challenges and Research Avenues; Finnish Environment Institute: Helsinki, Finland, 2016

# European Citizen Observatories



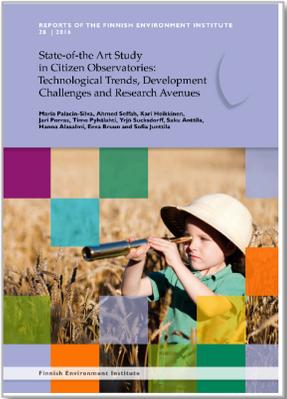
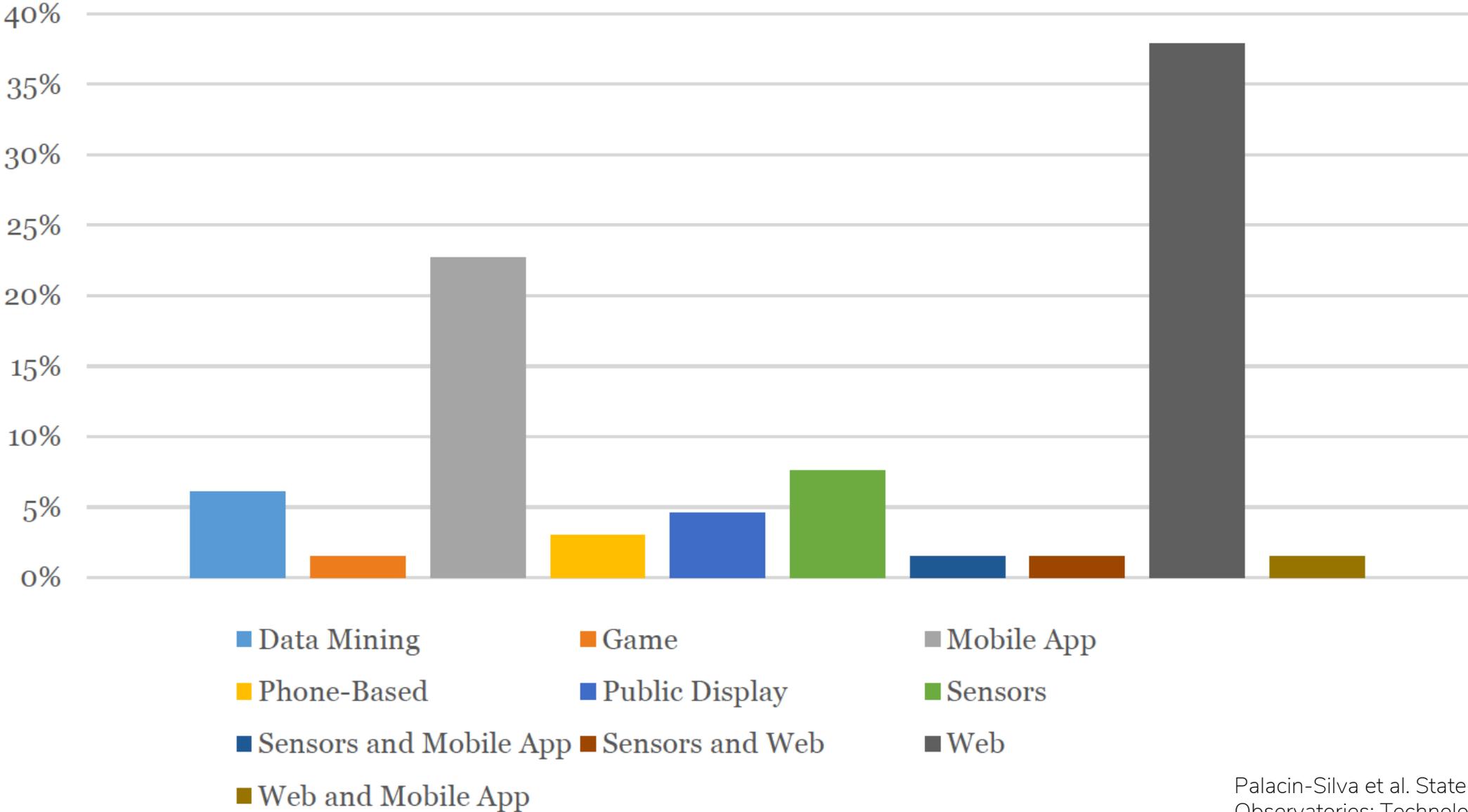
- Species Monitoring
- Biodiversity Monitoring
- Air and spectrum monitoring
- Tools for citizen observatories
- Water, Streams, Snow, Sea monitoring
- City management monitoring
- Global Monitoring



**Figure 32:** Citizen Observatories Focus Areas in Europe

Palacin-Silva et al. State-of-the Art Study in Citizen Observatories: Technological Trends, Development Challenges and Research Avenues; Finnish Environment Institute: Helsinki, Finland, 2016

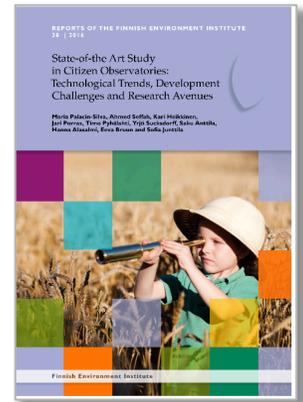
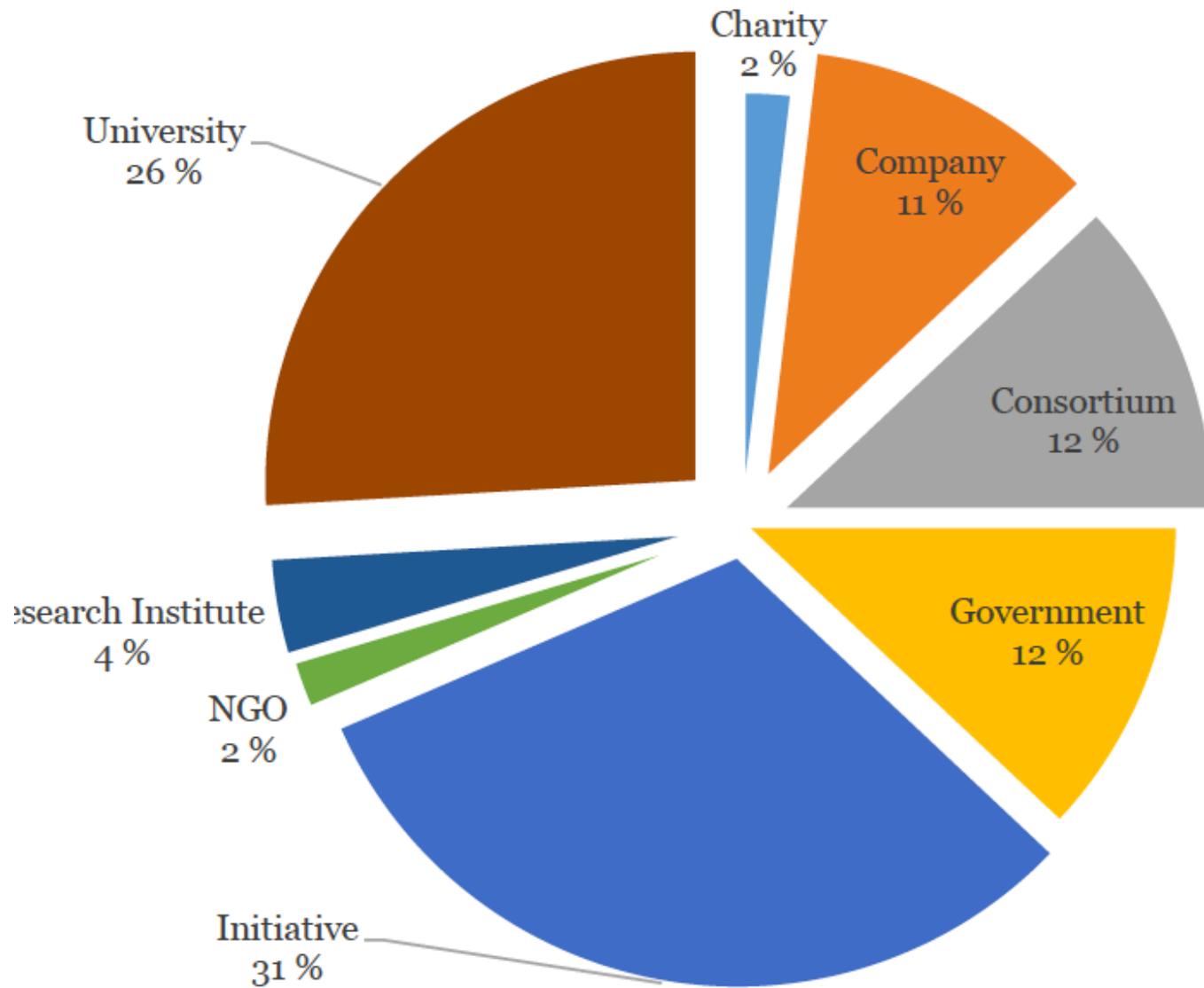
# Citizen Observatories Technologies



**Figure 8:** Citizen Observatories' by technology use

Palacin-Silva et al. State-of-the Art Study in Citizen Observatories: Technological Trends, Development Challenges and Research Avenues; Finnish Environment Institute: Helsinki, Finland, 2016

# Institutions Running Citizen Observatories

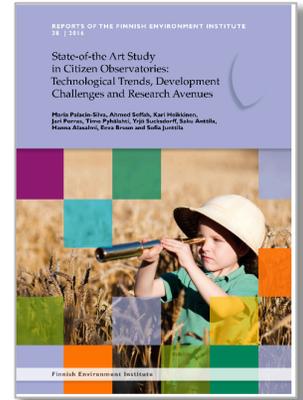
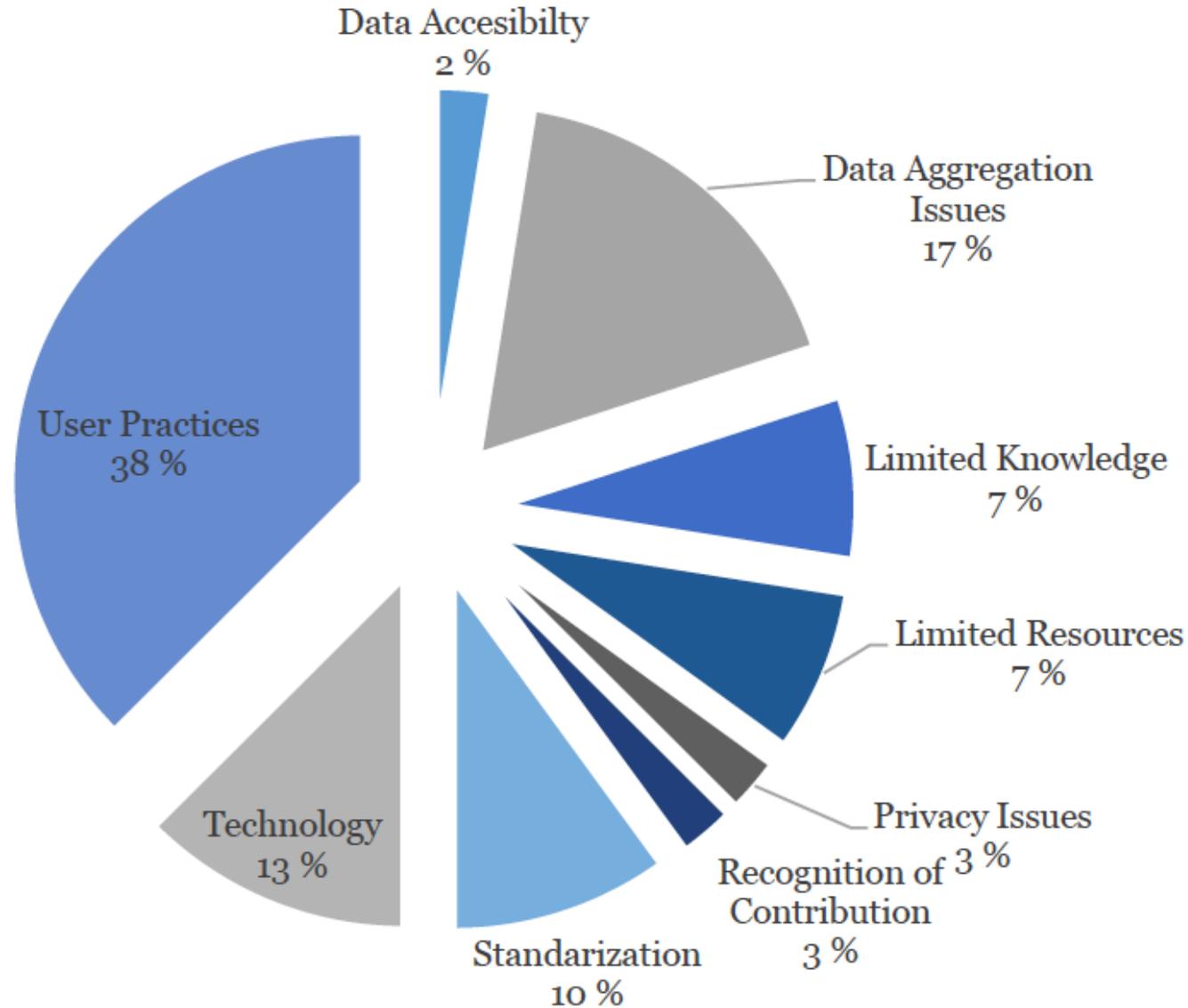


**Figure 16:** Institutions Running Citizen Observatories Worldwide

Palacin-Silva et al. State-of-the Art Study in Citizen Observatories: Technological Trends, Development Challenges and Research Avenues; Finnish Environment Institute: Helsinki, Finland, 2016

**Figure 17: Common Problems and Limitations among Citizen Observatories**

### Citizen Observatories Problems and Limitations



Palacin-Silva et al. State-of-the Art Study in Citizen Observatories: Technological Trends, Development Challenges and Research Avenues; Finnish Environment Institute: Helsinki, Finland, 2016

# DATA QUALITY



# How do we Ensure Data Quality?

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- Quality Assurance Project Plan
- Repeated sample/tasks
- Participant tasks involving control items
- Uniform or calibrated equipment
- Personal knowledge of participant skills/expertise
- Participant training
- Participant testing
- Rating participant performance
- Filtering of unusual reports
- Contacting participants about unusual reports
- Automatic recognition techniques
- Expert Review
- Paper data sheets submitted in addition to online entry
- Digital vouchers
- Data triangulation
- Data normalization
- Data mining
- Data quality documentation



# Can volunteers collect data?

- There are over 50 papers that are exploring the reliability of citizen science in collecting data
- Most show that data is of good quality and can be used for many purposes

Contents lists available at ScienceDirect

**Biological Conservation**

Journal homepage: [www.elsevier.com/locate/bioco](http://www.elsevier.com/locate/bioco)

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Lessons from citizen science: Assessing volunteer-collected plant phenology data with Mountain Watch

Caitlin McDonough MacKenzie<sup>a,\*</sup>, Georgia Murray<sup>b</sup>, Richard Primack<sup>c</sup>, Doug Weihrauch<sup>b</sup>

<sup>a</sup> Boston University, Department of Biology, 7 Center Street, Boston, MA 02215, USA  
<sup>b</sup> Research Department, Agricultural Research Centre, 261 Road 26, Colyton, NZ 01301, USA

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Storey, R. G., A. Wright-Stow, E. Kin, R. Davies-Colley, and R. Scott. 2016. Volunteer stream monitoring: Do the data quality and monitoring experience support increased community involvement in freshwater decision making? *Ecology and Society* 21(4):32. <https://doi.org/10.5751/ES-08934-210432> <https://doi.org/10.5751/ES-08934-210432>

Research, part of a Special Feature on [Sustainably Managing Freshwater Resources](#)

**Volunteer stream monitoring: Do the data quality and monitoring experience support increased community involvement in freshwater decision making?**

*Richard G. Storey<sup>1</sup>, Arian Wright-Stow<sup>1</sup>, Elzaviethe Kin<sup>2</sup>, Robert J. Davies-Colley<sup>1</sup> and Rebecca Scott<sup>1</sup>*

**ABSTRACT.** Recent freshwater p making and management. Involvin discuss this knowledge with pro interactions rarely occur because, i between volunteer (community gov months, community groups and re; periphyton and benthic macroinve Community groups achieved clos conductivity, visual water clarity, a 0.4, respectively). Volunteer assess of thick periphyton growths (% str for a macroinvertebrate biotic ind difference was 12% of the index sco and attentiveness to local and nati-community. Most groups had dev engaging in freshwater decision m; reliable enough to augment profes to engage in freshwater decision m

the public to research, and answer ed into questions, and citizens review five years of volunteer-ci over our efforts to investigate if scientists' self-assessed and acti cation or reported location, con his project, must assess their da – in order to produce quality da ily an observations from seaso

10 Elsevier Ltd. All rights reserved

**Journal of Applied Ecology**

Journal of Applied Ecology 2017, 54, 2053–2062 doi: 10.1111/1365-2664.12921

**Safari Science: assessing the reliability of citizen science data for wildlife surveys**

Cara Steger<sup>a,1</sup>, Bilal Butt<sup>2</sup> and Mevin B. Hooten<sup>3</sup>

<sup>1</sup>Natural Resource Ecology Lab, Department of Ecosystem Science and Sustainability, Colorado State University, Fort Collins, CO 80523-1499, USA; <sup>2</sup>School for Environment and Sustainability, University of Michigan, Ann Arbor, MI 48103, USA; and <sup>3</sup>U.S. Geological Survey, Colorado Cooperative Fish and Wildlife Research Unit, Departments of Fish, Wildlife & Conservation Biology and Statistics, Colorado State University, Fort Collins, CO 80523, USA





Menu



MyeXtend / Introduction to Citizen Science & Scientific C...

# Introduction to Citizen Science & Scientific Crowdsourcing

## CONTENTS



- Welcome to Introduction to Citizen Science and Scientific Crowdsourcing  
Progress: 0 / 9
- Week 1: Introduction  
Progress: 0 / 36
- Week 4: User Experience for Citizen Science II  
Progress: 0 / 23
- Week 5: Citizen science data management issues  
Progress: 0 / 26
- Week 7: Legal and ethical issues; citizen science with non-literate participants  
Progress: 0 / 18
- Week 8: Evaluation in a new light  
Progress: 0 / 21

An Introduction to Citizen Science

Environmental Citizen Science

Information Technology in Cit Sci

Understanding Participant Motivation

Evaluation

## OPENING UP SCIENCE FOR ALL! A citizen science training course

Our ambition is for public involvement in all stages of the scientific process

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# Citizen Science, an introduction

Welcome to this free online introductory course about citizen science – the participation of people outside science (universities, research centres and government bodies) in scientific research.



## The WeObserve Massive Open Online Course (MOOC) for COs

<https://tinyurl.com/WO-MOOC-Survey>

It takes only 5 to 10 minutes to take part in the WeObserve Online Course Survey!

WeObserve aims to configure an online course to be launched in 2019 to help people understand, participate in and create their own observatories. Complete the questionnaire to the best of your knowledge and support our effort.

### WeObserve Online Course Survey

WeObserve is building an ecosystem of citizen observatories for environmental monitoring. As part of this, we are creating an online course that will launch in 2019 to help people understand, participate in and create their own citizen observatories.

We define citizen observatories as community-based environmental monitoring and information systems, that invite individuals to share observations, typically via mobile phone or the web.

To make sure we create a helpful and usable course, we need to hear from you!

This survey should take between 5-10 min to complete. The deadline for submission is Wednesday 31st October 2018.

Please answer every question to the best of your knowledge, but do not feel you have to answer everything. You may contact us at any time to ask questions or withdraw from this study, to do so, please email Saskia at [s.m.coulson@dundee.ac.uk](mailto:s.m.coulson@dundee.ac.uk)

We would like to thank you for your time in completing this questionnaire and support in our project.

For more information on the project, and to sign up to our database please visit: [www.weobserve.eu](http://www.weobserve.eu)

\* Required



 <https://tinyurl.com/WOCOPs>

 <https://tinyurl.com/WO-MOOC-Survey>



Margaret Gold  
ECSA Project Officer  
(WeObserve & LandSense)  
mg@margaretgold.co.uk  
@MobileMaggie



