

AN OVERVIEW OF CITIZEN SCIENCE AND GEOGRAPHIC CITIZEN SCIENCE

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OUTLINE

- Citizen Science
- The ‘science’ of citizen science: Typologies and other research challenges discussed in the citizen science literature
- Geographic Citizen science
- Extreme Citizen Science
- Examples of geographic and extreme citizen science from the global South

CITIZEN SCIENCE

“To have a just and sustainable world we need to adopt a new cultural norm, and to be a responsible person on this planet means that we observe our surroundings with intention and we share that we share, see, smell, find...we and our devices become part of a network taking the pulse of the planet”

Caren Cooper

<https://www.youtube.com/watch?v=G7cQHSqfSzI>

CITIZEN SCIENCE: WHAT IS IT?

Citizen Science is described as:

- “developing concepts of scientific citizenship which foregrounds the necessity of opening up science and science policy processes to the public”

(Alan Irwin, 1995)

Irwin, A. (1995). *Citizen Science: A Study of People, Expertise and Sustainable Development*. Routledge. [ISBN 9780415130103](#).

- CS as projects in which non-scientists, such as amateur birdwatchers, voluntarily contributed scientific data

Rick Bonney, 1996

Bonney, R. (1996). Citizen science: A lab tradition. *Living Bird* 15(4): 7–15.

CITIZEN SCIENCE: DEFINITION

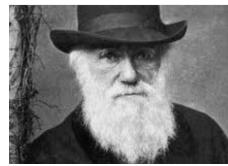
The scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions

Oxford English Dictionary, 2014

CITIZEN SCIENCE: BRIEF HISTORICAL OVERVIEW



Gentlemen making
scientific discoveries



Early Science
(1600-1800s)

High number of
illiterate people



Term 'Scientist' is
coined in 1833 by
William Whewell



Professional Science
(1800s – 1900s)

High number of people with
some form of basic education

*Responsible Research
and innovation*

*Creating a shared responsibility between
science, policy and society, to ensure that
science promotes socially beneficial action as
well as freedom of thought*



Open Science
(since 2000s)

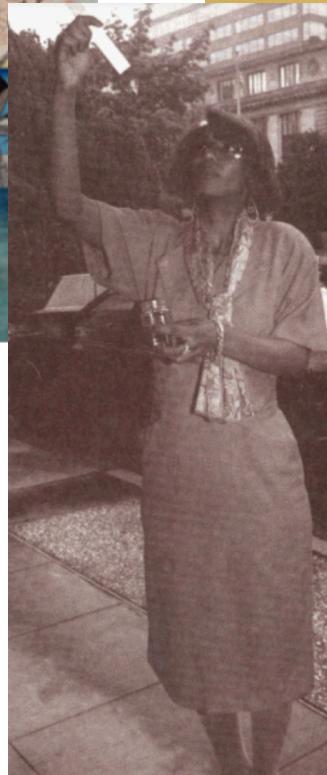
High number of people with
university degree

EARLY EXAMPLES OF CITIZEN SCIENCE

National Audubon Society's annual Christmas Bird Count



Painting of Hanami in Goten-yama around 1847 (Credit: Tokyo Metropolitan Library)



CITIZEN SCIENCE TYPOLOGIES I

	Traditional Science	Citizen Science				
		Contractual	Contributory	Collaborative	Co-created	Collegial
Question						
Study Design						
Data Collection						
Data Analysis and Interpretation						
Understanding the results						
Management Action / Publication						
Geographic scope of the project	Variable	Narrow	Broad	Broad	Narrow	Narrow
Nature of the people taking action	Scientists	Public	Scientists	Scientists / Public	Scientists / Public	Public
Research priority	Highest	Medium	High	High	High	Medium
Education priority	Low	Medium	High	High	High	High

Public Project owner

Haklay based on Shirk et al.'s (2012) five models of public participation in scientific research (PPSR).

Image is from:
Haklay, M. (2021).

Geographic Citizen Science: An overview.

In: Skarlatidou, A. and Haklay, M (eds)

Geographic Citizen Science Design: No one left behind. London: UCL Press.

Shirk, J.L., Ballard, H.L., Wilderman, C.C., Phillips, T., Wiggins, A., Jordan, R., McCallie, E., Minarchek, M., Lewenstein, B.V., Krasny, M.E. and Bonney, R. (2012). Public participation in scientific research: a framework for deliberate design. *Ecology and Society* 17(2): 29.

CITIZEN SCIENCE TYPOLOGIES II

Level 4 'Extreme Citizen Science'

- Collaborative science - problem definition, data collection and analysis

Level 3
'Participatory Science'

- Participation in problem definition and data collection

Level 2
'Distributed Intelligence'

- Citizens as basic interpreters

Level 1
'Crowdsourcing'

- Citizens as sensors

Haklay, Mordechai (Muki). 2013. 'Citizen Science and Volunteered Geographic Information: Overview and Typology of Participation.' In *Crowdsourcing Geographic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice*, edited by Daniel Z. Sui, Sarah Elwood, and Michael F. Goodchild, 105–22. New York: Springer.

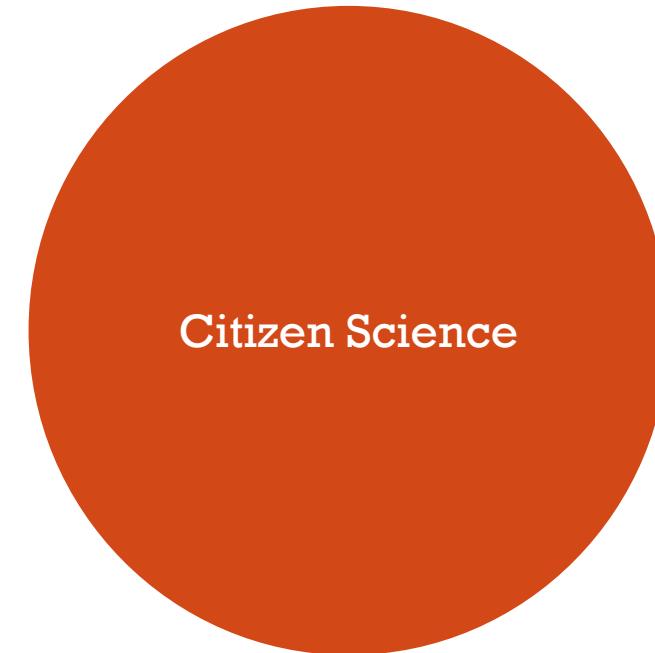
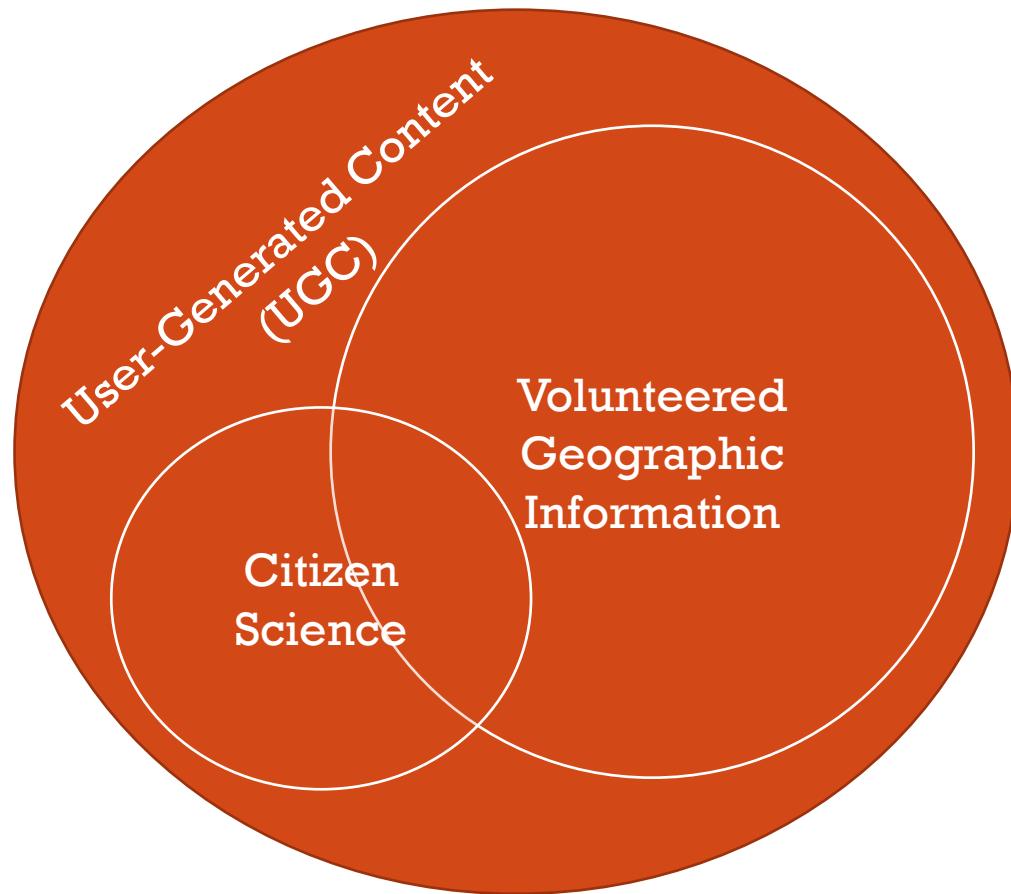
SOME CITIZEN SCIENCE CHALLENGES

- Data Quality with an emphasis on scientific protocols
- Volunteers: Motivating, Retaining and Rewarding participants
- Lack of evidence to demonstrate citizen science impacts (Evaluation)
- Digital Technology Design and User Experience aspects
- Data Management Issues
- Training
- Ethics and Data protection
- Disciplinary Differences and Policy issues
- ...



- **GEOG0152: Introduction to Citizen Science and Scientific Crowdsourcing**
- **Master of Science (MSc.) in Citizen Science and Scientific Crowdsourcing**

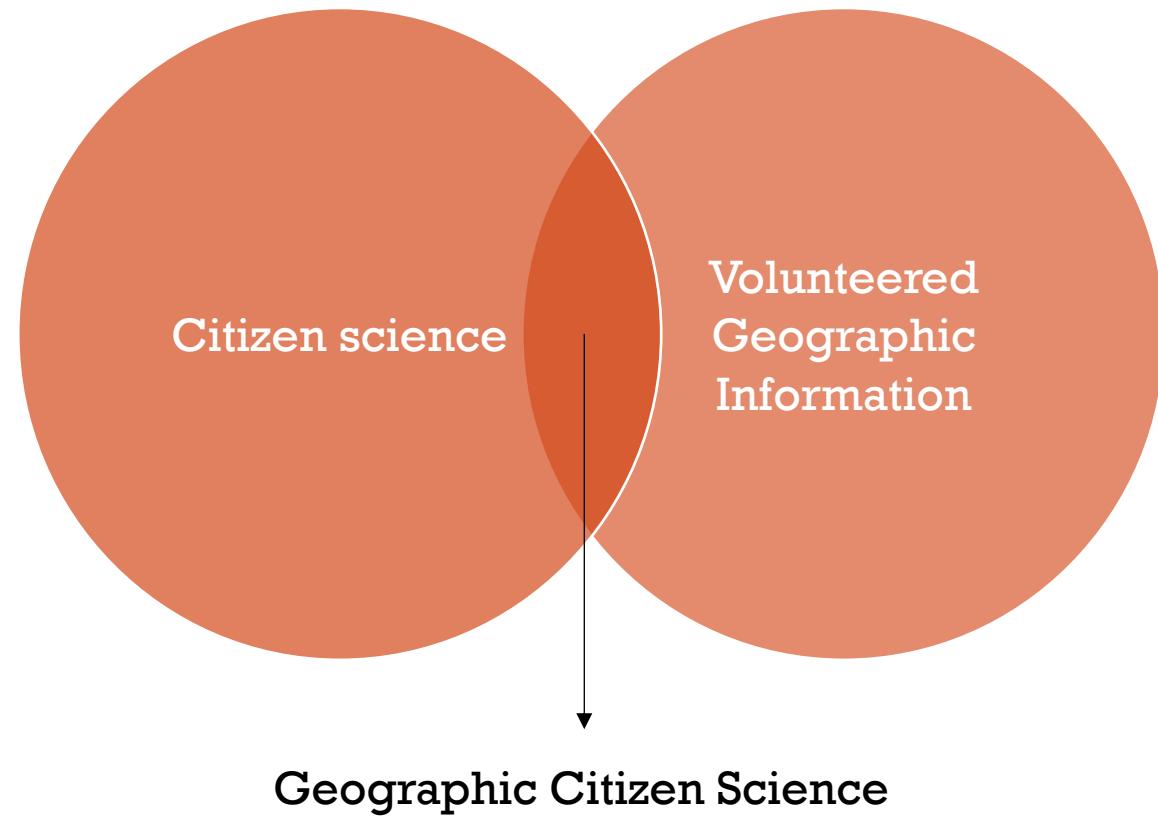
GEOGRAPHIC CITIZEN SCIENCE: VGI & CITIZEN SCIENCE



'Digital geographic information is the geographic and public where the data is shared by individuals' a deliberate and explicit geographic aspect

GEOGRAPHIC CITIZEN SCIENCE: VGI & CITIZEN SCIENCE

Geographic citizen science: the scientific work undertaken by members of the general public where the data generated has a deliberate and explicit geographic aspect and follows specific protocols or processes.



GEOGRAPHIC CITIZEN SCIENCE



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URGENT

#9142

COVID-19 - Saint Catherine - Part I, Jamaica

The 2020 Atlantic Hurricane Season began June 1st. HOT has been

1234 total contributors

Beginner Mapper



URGE

#9507

COVID-19 - Bankass Ce UPDATE 1 - Buildings, Landuse, Roads, Water

HOT has been requested to map areas in Mali susceptible to, or

142 total contributors

Intermediate Mapper



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This is part of:

[kite-mapping](#)

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URGENT

#9734

Cyclone Molave Flooding - Vietnam AOI1 - Roads, Settlements and

Help map flooded areas in Vietnam! Cyclone Molave brought heavy rains,

160 total contributors



URGENT

#9764

Cyclone Molave Flooding - Vietnam AOI2 - Roads, Settlements and

Help map flooded areas in Vietnam! Cyclone Molave brought heavy rains,

153 total contributors



URGENT

#9767

Hurricane Eta - Nicaragua Coast - Buildings 2 (Update)

Hurricane Eta brought wind, rain and storm surge to the coast of

10 total contributors



URGENT

#9780

#RollyPH - Oas and Polangui, Albay and Buhi, Camarines Sur - Buildings

The Ministry of Mapping together with MapBeks, MapaDatos, Mental

661 total contributors



URGENT

#9838

Typhoon #ULYSSES Response -- SAN MATEO AND RODRIGUEZ

The GeoLadiesPH of the OSM Philippines community has activated

864 total contributors

EXTREME CITIZEN SCIENCE

Extreme Citizen Science | ExCiteS | is



a philosophy of situated, bottom-up initiatives which take into account the local needs, practices and cultures to work with broad networks of people to design and build new devices and knowledge creation processes which can transform the world.

Extreme Citizen Science & Sustainability

- Citizen science: the activity where amateur volunteers participate in data collection (occasionally also in processing and analysis).
- Western beliefs about techno-scientific innovation, top-down approaches which exclude communities from the broader sustainability agenda and debate are highly problematic.

“People are integral to how their environments are shaped and the diversity that these environments support” (Jerome Lewis, 2018)

- Using citizen science approaches to collect and analyse Traditional Ecological Knowledge (TEK) – and other mainly environmental data – in collaboration with local communities (and sometimes in support of local NGOs), to support them address issues important to them and enable them to contribute to the global and local sustainability debates.

Working with indigenous communities



Free, Prior, Informed Consent (FPIC) process



Establishing a Community Protocol



Participatory (Interface) Design & Evaluation

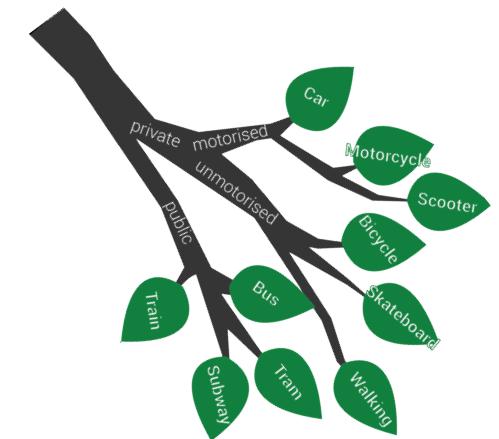


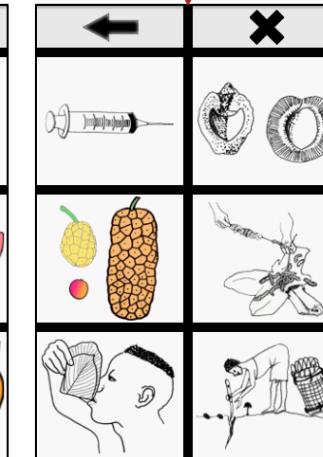
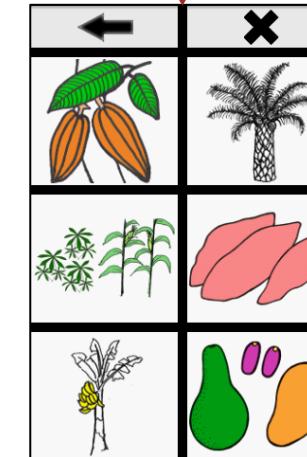
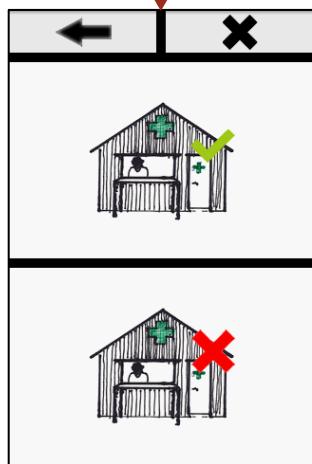
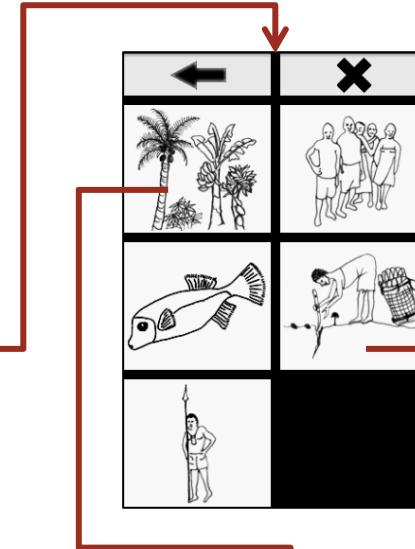
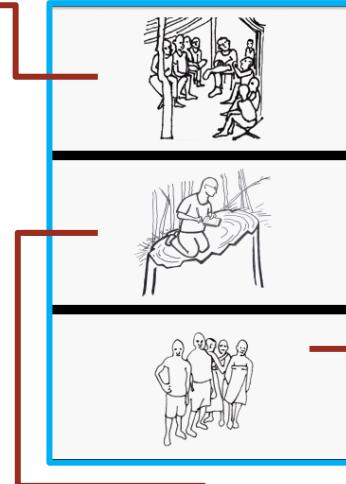
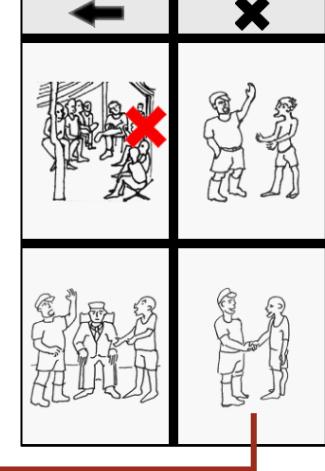
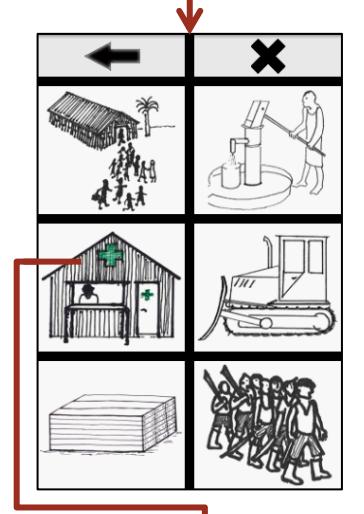
Tools and Methods: Overview



Sapelli Collector

- Sapelli is an Android-based **mobile data collection and sharing platform** designed primarily (yet not exclusively) for non-literate or illiterate users with little or no prior ICT experience.
- Sapelli uses a decision tree, hierarchical architecture in a pictorial-based interface design





Tap&Map – Data Collector

- Designed to overcome interaction barriers (in the use of hierarchical decision trees, touch screen interfaces etc.)
- Tap&Map is a smartphone application accompanied by a set of cards equipped with near field communication (NFC) technology. Each card has an icon printed on one side of the data items that are collected.



Sapelli Viewer – towards an “Intelligent Maps” interface

The image displays four screenshots of the Sapelli Viewer interface, illustrating its evolution from a basic setup screen to an advanced, intelligent map.

- Setup Screen:** Shows a list of projects: "Farming_EMG (v1.0)" with 615 contributions and 32 media; "Patrols (v1.0)" with 543 contributions and 67 media; and "Air Quality (v4.6)" with 1,947 contributions and 0 media. It includes a "FINISH SETUP" button and a "Load a project manually and add to GeoKey" link.
- Icon Assignment Screen:** A modal window titled "ASSIGN ICONS TO MONTHS" shows a grid of icons next to a calendar. It also has "ASSIGN ICONS TO YEARS", "KEEP AS DEFAULT:", and "RETURN TO SETUP" buttons, along with a "SAVE" button at the bottom.
- Map View:** A satellite map of a forested area with several data layers. It includes a legend on the left, a toolbar at the bottom with icons for eye, hand, and foot, and a sidebar on the right with a lock, user profile, and other icons.
- Detailed View:** A zoomed-in view of a path through a forest. It shows a legend on the left, a toolbar at the bottom, and a sidebar on the right with a lock, user profile, and other icons.

EXTREME CITIZEN SCIENCE CASE STUDIES



Congo-Brazzaville: Reporting Illegal Logging with the Mbendjele Yaka Pygmies



Brazil (Pantanal Wetlands): Natural Resource Management for New Conservation Legislation with Indigenous Communities



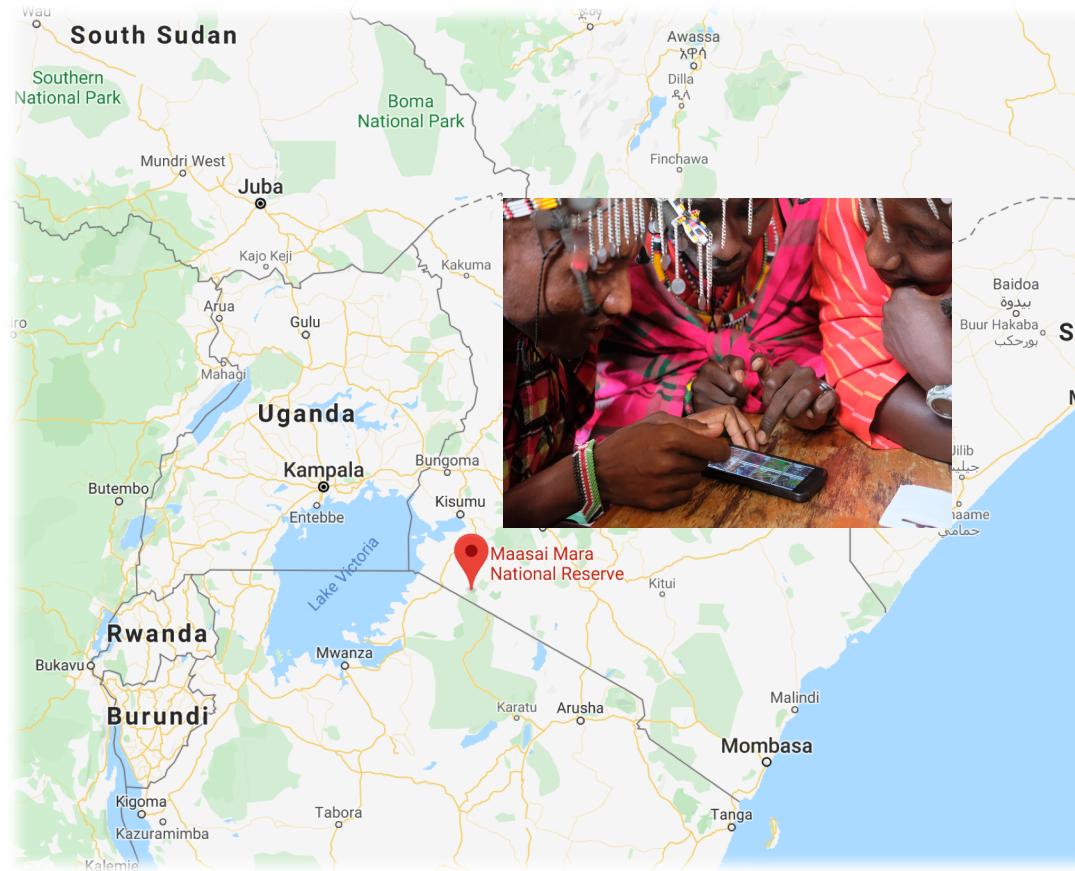
Source: wildbrazil.com.br



Namibia: Natural Resource Management and Fighting Illegal Cattle Invasions with the Ju | 'hoansi



Kenya: Collecting Data for Indigenous Plants with the Maasai



Cameroon: Supporting Baka communities Tackle Illegal Wildlife Crime and Animal Monitoring



SEMINAR THIS WEEK

'Whose Land-Whose Map? Land Use Mapping in the Digital Earth Era', by PhD student Marcos Moreu