Digital Conservation: Biodiversity Monitoring and Citizen Science

By

Sarah West

from

Stockholm Environment Institute,
Environment Department
University of York

SEI STOCKHOLM ENVIRONMENT INSTITUTE

sarah.west@york.ac.uk

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How can we protect things if we don't know they are there?

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sarah.west@york.ac.uk

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The Stockholm Environment Institute (SEI)

SEI is an independent international research institute. We have been engaged in environment and development issues at local, national, regional and global policy levels for more than 20 years.

The Institute was formally established in 1989 by the Swedish Government and celebrated its 20th anniversary in October 2009. SEI has established a reputation for rigorous and objective scientific analysis in the field of environment and development.

Mission

SEI's mission is to support decision-making and induce change towards sustainable development around the world by providing integrative knowledge that bridges science and policy in the field of environment and development.

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sarah.west@york.ac.uk

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What is citizen science?

- A form of public participation in scientific research (PPSR) which is rising in popularity
    - PPSR also encompasses participatory action research (PAR), volunteer monitoring, community-based participatory research etc.
- *"Projects in which volunteers partner with scientists to answer real-world questions."*

Cornell Bird Observatory

sarah.west@york.ac.uk

Citizen science and biodiversity

Many potential uses of citizen science in protected Areas, e.g.

- Monitoring extent of habitat using GPS
- Identifying invasive species and mapping locations
- Mapping species ranges and shifts with changing climate
- Investigating social values of protected areas

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It's nothing new!

- In historical terms, most science has been done by non-professionals (Miller-Rushing et al 2012)
- 1880, lighthouse keepers started recording bird strike data, 1890 National Audubon Society started Christmas Bird Count
- Professionalisation of science occurred in late 19th C
- Now, science done by amateurs or citizens not regarded as highly as professional science

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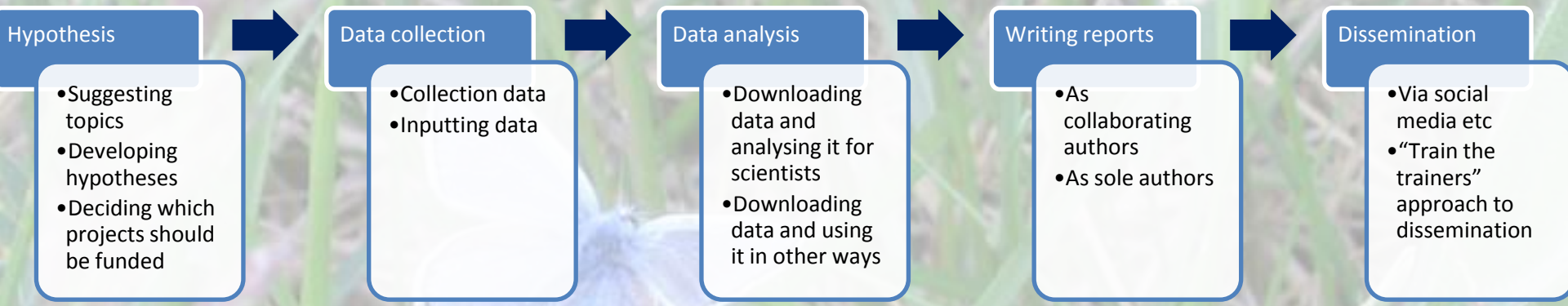
Categorising Citizen Science projects

- Participants can be involved at different stages of the scientific process



- Projects that solely involve people in data collection are sometimes known as crowd sourcing
- In contrast, some projects are designed to maximise the learning that takes place between scientists and the public at all stages of the scientific process

Different participation models

Contributory to co-created

Contributory model – people collect samples and may analyse samples
Collaborative model – people develop explanations, design methods, collect sample, analyse samples and analyse data
Co-created – people involved in all above plus defining questions, gathering information, interpreting data, disseminating conclusions, discussing results

sarah.west@york.ac.uk

Rise in popularity

Millions of people across the world engaged in citizen science projects, varying from Fold.It (computer game predicting 3D structure of proteins) to Galaxy Zoo (categorising images from Hubble).

Huge potential for citizen science biodiversity projects, from phenology and species range mapping to social values of biodiversity.

- Can vary in terms of spatial scale (local → transnational) and breadth of study.

sarah.west@york.ac.uk

Potential benefits of citizen science

- Research questions can be tackled that require large numbers of data collectors
- Data can be collected over large areas
- Detect patterns with large data sets e.g. species ranges
- Can have educational benefits e.g. raised scientific literacy through interaction with scientists, e.g. increased uptake of science at a school in East Midlands through OPAL participation

sarah.west@york.ac.uk

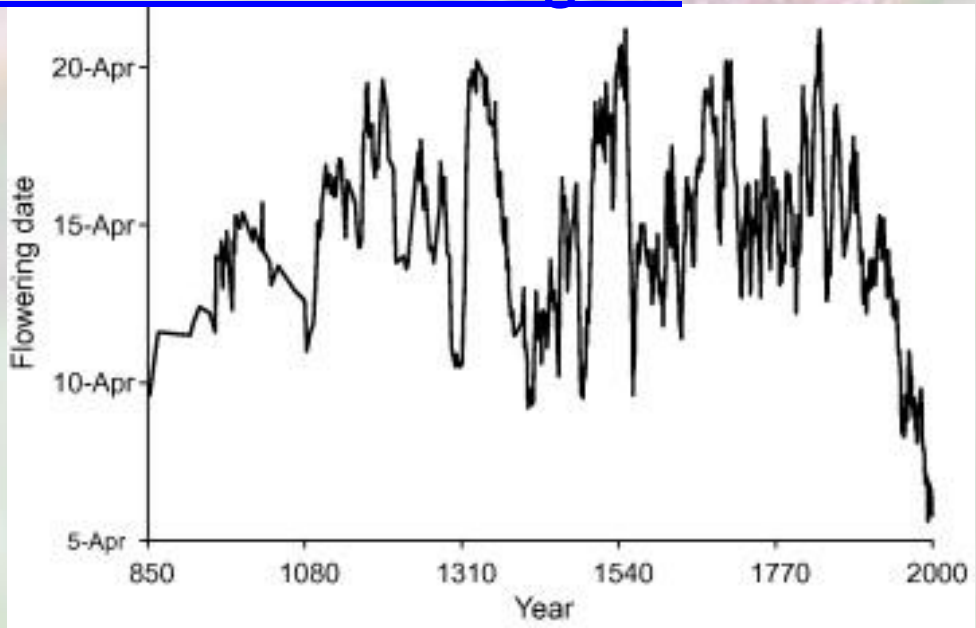
Drawbacks of citizen science

- Large quantities of data, needing screening
- Developing good supporting resources is expensive, requires testing etc.
- Time consuming engaging participants
- Consequently, it's not cheap science!

sarah.west@york.ac.uk

Some specific examples....Phenology

- National Phenology Network (www.usanpn.org) and Project Budburst (budburst.org) in the US. Woodland Trust Nature's Calendar www.naturescalendar.org.uk in the UK



Flowering time of cherry (*Prunus*) in Japan (from Primack et al 2009)

Types of apps

- Recording apps

e.g. Nature's Notebook,
http://ashtag.org/
Leaf watch http://www.ourweboflife.org.uk/
(Conker tree science)

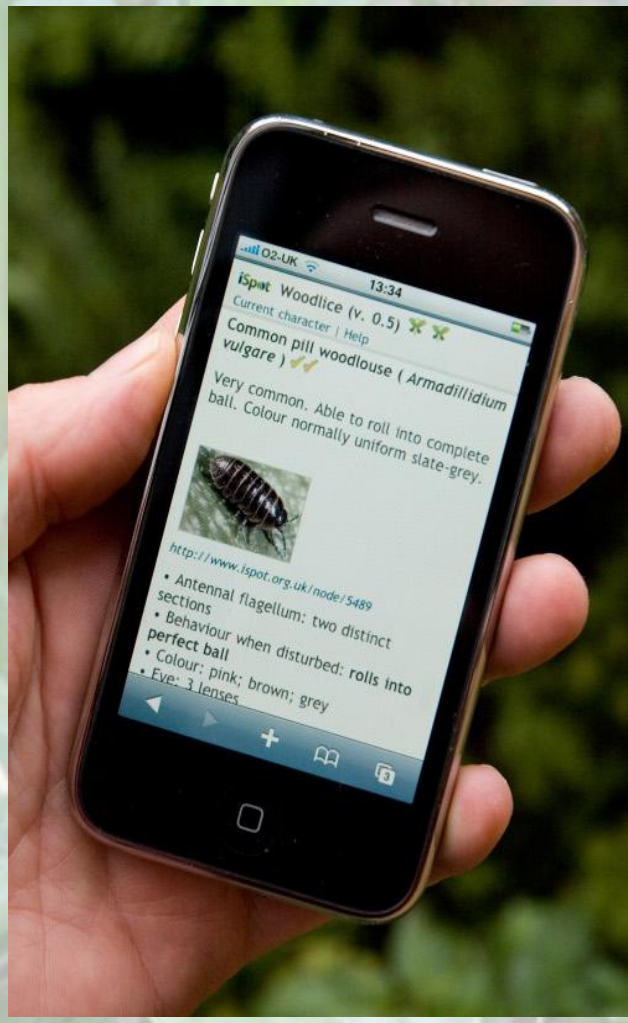
- ID and recording apps

e.g. Plant Tracker
iSpot

Types of apps – the next big thing

Or is it?

- Limited educational benefit
- No satisfaction with correct identification
- No understanding of taxonomy
- An alternative is to use Bayesian keys (see www.iSpot.org.uk and www.keytonature.org.uk/)



The OPAL way

- Network of Community Scientists working with researchers across England to develop surveys
- Surveys designed to be done by Key Stage 3++
- Focus on soil, air and water quality, biodiversity of hedges and gardens, plus climate
- Community Scientists train group leaders and work with groups to deliver the surveys
- Educational benefits, scientific benefits and local site benefits (knowledge about what's there!)

Using surveys to monitor

- Groups across the UK using surveys to monitor sites in terms of:
  - Earthworm diversity and soil texture
  - Lichen diversity and air quality (9 “species” are indicative of different N levels)
  - Pond inverterbrates and water quality (groups chosen have different tolerances to pollution)
  - Hedgerow species and associated invertebrates
  - Garden invertebrates in different micohabitats
  - (Tree health – key pests and diseases)

sarah.west@york.ac.uk

Developing resources to support

- OPAL has created a series of resources to help support those wishing to record wildlife;

Indicia

- Indicia is a toolkit for building wildlife recording websites.
- Allows you to upload records and photographs, verify records, view them on a map and download them, depending on what you want.
- Indicia can be used to build a website from scratch or to add recording pages to an existing website.

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- iRecord is a website built using Indicia for uploading, viewing and verifying wildlife records, and is useful if you don't want to build your own website.
- Anyone can submit records, but it is possible to view and download records submitted in a particular area or by a particular recording scheme or group.
- Through iRecord, records are made available to National Recording Schemes and Local Records Centres.

sarah.west@york.ac.uk

- iSpot is a website aimed at helping people identify anything in nature. Users upload photographs and the large online community help them to identify what they have seen.
- 23,000 users+
- An android app is also available

Brown Damselfly

next »

Observed by **Solipsist** on 28th June 2009

(Added to iSpot on 11th May 2010)

The brown colour is throwing me. Might be a rather muted coloured female Common Blue damselfly, or maybe a female Azure damselfly.

Location: West Stow Heath

Identification

Azure Damselfly (*Coenagrion puella*) by Solipsist at 10:45 am 11/05/10

Confidence: It might be this.

I agree!

Search Encyclopedia of Life for Coenagrion puella

View NBN map for Coenagrion puella

Enallagma cyathigerum by John Bratton at 4:15 pm 11/05/10 *likely ID*

Confidence: I'm as sure as I can be.

Notes: Based on the broad pale stripe on the thorax.

Remove your agreement

ID agreements ( ): 3 people agree with this identification.

Search Encyclopedia of Life for Enallagma cyathigerum

View NBN map for Enallagma cyathigerum

Other observations of *Enallagma cyathigerum*

« more more »

Comments

Identification features

12 May 2010 – RoyW

This recently emerged female damselfly can be identified using a combination of the following features (it can be sexed as a female because the ovipositor is visible under the 10th abdomenal segment at the tip of the abdomen);

1). The broad antehumeral stripes (the broad pale stripe mentioned by John in his identification above).

2). There is only one partial black stripe, or 'spur', on the side of the thorax (all similar *Coenagrion* species, including Azure, have two spurs).

3). There is a spine visible under the 8th abdomen segment (all dragonflies & damselflies have 10 segments to the abdomen - count back from the abdomen tip, ignoring the projections at the end of the 10th segment).

The first two points also apply to males.

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features

13 May 2010 – kitenet

Thanks for that detailed guide Roy, very helpful.

Martin Harvey
Open University - Biodiversity Observatory






Key things to consider when designing a citizen science project

- What data do you want to collect?
- How much do you want to engage citizens?
- How will you verify data?

sarah.west@york.ac.uk



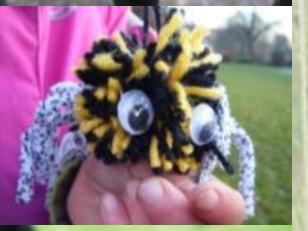



Citizen Science reading/viewing

- Citizen Science DotOrg You Tube (including videos of the PPSR conference August 2012, Portland Oregon
- Abraham Miller-Rushing AJ, Primack RB, and Bonney R, 2012, "The history of public participation in ecological research" Frontiers in Ecology and the Environment,10, 285–290
- Primack RB, Higuchi H, Miller-Rushing AJ, 2009, "The impact of climate change on cherry trees and other species in Japan" Biological Conservation, 142, 9, 1943–1949
- UK Environmental Observation Framework guide to citizen science http://www.ukeof.org.uk/co_citizen.aspx

sarah.west@york.ac.uk






Thank you for listening

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Any questions

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@Sarah_WestSEI