

FROM OBSERVATION TO COMPUTATION?

Employing social media mining and artificial intelligence to mobilize
new citizen science movements.

Stefan Daume @ Scitingly

04. June 2018

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Employing Social Media Mining And Artificial Intelligence To Mobilize New Citizen Science Movements.

Stefan Daume
Scitingly

ECSA Conference 2018
Geneva

04. June 2018



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MOTIVATION

CONCEPTS AND QUESTIONS

Can web crawlers revolutionize ecological monitoring?

Victor Galaz^{1*}, Beatrice Crona^{1,5}, Tim Daw³, Örjan Bodin^{1,4}, Magnus Nyström^{1,2}, and Per Olsson¹

Frontiers in Ecology and the Environment 2009; 7, doi:10.1890/070204

CATASTROPHIC ECOSYSTEM CHANGES



Photo credit: Dr. Jennifer L. Graham, U.S. Geological Survey, Flickr, CC BY 2.0

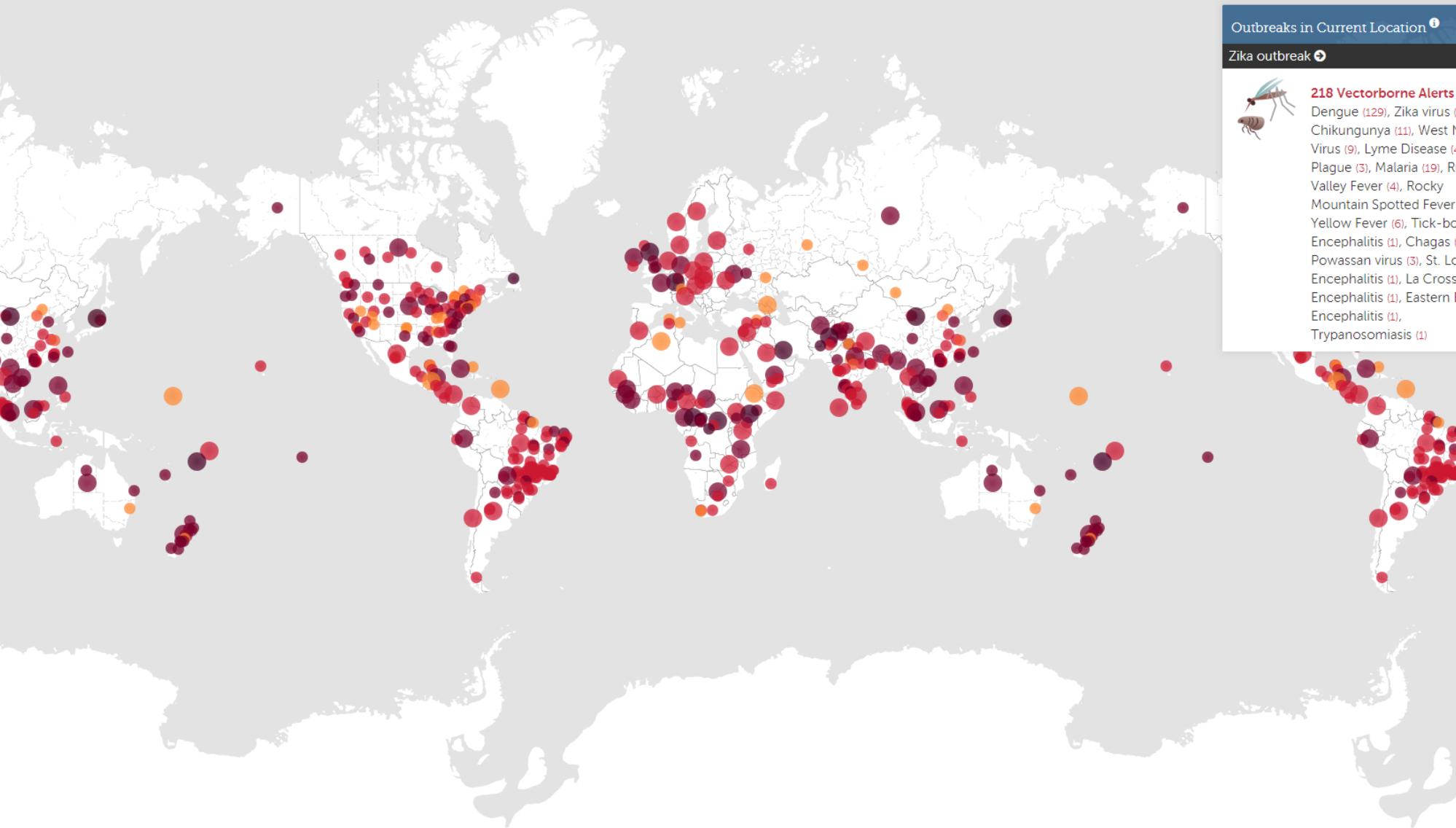
CATASTROPHIC ECOSYSTEM CHANGES

EARLIER WARNINGS THROUGH
OPPORTUNISTIC, INFORMAL
SOURCES?

Photo credit: Dr. Jennifer L. Graham, U.S. Geological Survey, Flickr, CC BY 2.0

**INFORMAL SOURCES ARE ALREADY USED IN
SIMILAR DOMAINS**

EPIDEMIC DISEASE MONITORING

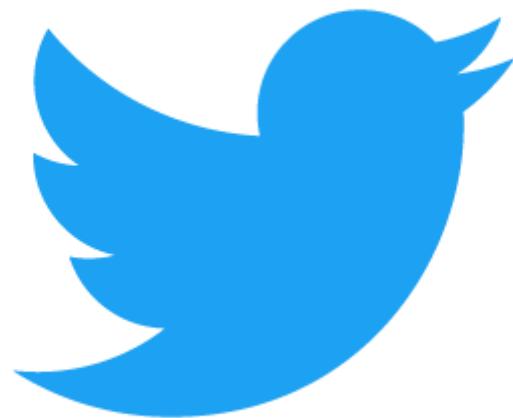


FRAMING THE RESEARCH

Which social media?

Which ecological problems?

CHOICE: TWITTER



CHOICE: INVASIVE ALIEN SPECIES



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DATA COLLECTION

ECOVEILLANCE PLATFORM

The screenshot shows a web browser window for the Ecoveillance platform at www.ecoveillance.org/. The interface is designed for ecological monitoring using social media data.

Header: The header includes the Ecoveillance logo, a search bar, and links for Blog, Twitter, User: admin, and Logout.

Navigation: The main navigation menu at the top has links for Home, My Projects, Manage categories, Categorise, and Browse data.

Content Area:

- Section 1: Twitter meets Citizen Science**

Ecoveillance mines social media to detect early warnings for potentially negative ecological changes.

The current version aggregates Tweets relating to invasive alien species, which are indicators and drivers of catastrophic ecosystem shifts with significant economic and health impacts.

Ecoveillance is developed as a publicly accessible platform, that enables stakeholders in ecological monitoring as well as any interested person to review the information aggregated by the platform and help in the assessment of this information.

You can support this effort by helping with the classification of Tweets. Open user registration is planned for 2016, upon completion of the first phase of the Ecoveillance research project.
- Section 2: Data Visualization**

A detailed chart titled "Selected project: Asian carp monitor" displays tweet frequency over time. The chart shows a sharp peak in activity around March 2012, with a secondary smaller peak in June 2012. The Y-axis represents the number of tweets, ranging from 0 to 1000. The X-axis shows dates from January 2012 to July 2012. The legend indicates three categories: Asian carp, Blue carp, and Common carp.

Footer:

Powered by [Seam](#) 2.2.2.Final and [RichFaces](#). Generated by seam-gen.
Conversation: id = 76, temporary - Ajax4jsf Log (Ctrl+Shift+D) - [Debug console](#) - [Terminate session](#)

**SO, WHAT WERE THE
RESULTS?**

SAMPLE TWEETS



EalingCouncil @EalingCouncil



Please keep children and animals away from hairy caterpillars and their nests in oak trees. This will help avoid avoid itching skin rashes and other health problems caused by oak processionary moth caterpillars. soci.in/qX6KM

10:00 AM - May 19, 2018

5 See EalingCouncil's other Tweets

SAMPLE TWEETS



Home Turf Project
@HomeTurfProject



First time I saw the oak processionary
in action today. Quite impressive
phenomenon!

10:50 PM - May 17, 2018



See Home Turf Project's other T...

SAMPLE TWEETS



Melissa Roberts
@smilingassassin



How cute is this baby grey #squirrel in @ErddigNT country park
today also saw my first comma #butterfly of the year and
another speckled wood @savebutterflies @Natures_Voice
@North_Wales_WT @LifeinNW @AMAZINGNATURE

4:38 PM - May 18, 2018

♡ 7 See Melissa Roberts's other Tweets

SUMMARY OF RESULTS

- Tweets are a rich source of **primary biodiversity observations** in general ([Daume, 2016](#)).
- **Singular observations** of invasive species prove valuable.
- **Distinctive public perceptions** can be extracted.

**MOBILISE COMMUNITIES
NOT DATA!**



Lindsey Kuper
@lindsey



Saw this beautiful iridescent green bug today. Anyone know what it is? flickr.com/photos/lindsey...

05:04 - 1 Jul 2014



06/30/2014: Seen in Dunn Woods today

Explore Lindsey Kuper's 1970 photos on Flickr!

flickr.com

1 See Lindsey Kuper's other Tweets





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Allison Kaptur
@akaptur



Replying to @lindsey

@lindsey no, but a google search-by-image might? Also, neat bug!

05:07 - 1 Jul 2014

See Allison Kaptur's other Tweets





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Ben Britttain
@Brittain_Ben



@akaptur @lindsey That's a Tiger Beetle!

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05:27 - 1 Jul 2014

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Andrew
@ndr_qef



Replying to @lindsey

@lindsey @Brittain_Ben @akaptur Indeed. (Number of spots not actually guaranteed; your critter happens to sport eight spots.)

05:52 - 1 Jul 2014

1 See Andrew's other Tweets



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05:52 - 1 Jul 2014

1 See Andrew's other Tweets



Lindsey Kuper
@lindsey



Replies to @ndr_qef
@ndr_qef @Brittain_Ben @akaptur Here's another with eight! www4.uwm.edu/fieldstation/n... Article edited: en.wikipedia.org/w/index.php?ti... \o/

06:24 - 1 Jul 2014

1 See Lindsey Kuper's other Tweets



- These Twitter conversations are **embryonic citizen science communities** (Daume & Galaz, 2016).
- Biodiversity data is **collected, shared, reviewed, verified and annotated**.
- And then **forgotten**.

**SOCIALLY COMPUTED DATA OF HIGH
QUALITY!**

**FORMALISATION OF INTERACTIONS IS
REQUIRED**

AUTOMATIC FORMALISATION OF SOCIAL COMPUTATIONS

- Express these interactions with a **social calculus** (Robertson et al, 2014).
- Automate the discovery and formal representation of these conversations.

HOW CAN THIS BE APPLIED?

- To assess the reliability of environmental observations sourced from Twitter.
- To compare with and assess other environmental data sources.
- To provide seed data and communities for specific projects.

ECOVEILLANCE APPLICATION SCENARIO

1. Seed observation data with Twitter searches
2. Find micro-communities
3. Store observation data
4. Alert original communities and
5. ... invite communities for **digital curation** of new data
6. ... invite communities for “analog” data collection

THANK YOU!

<https://sdaume.github.io/2018-ECSA-Social-Computation>

<https://sdaume.github.io/2018-ECSA-Social-Computation/handouts>

COLOPHON

“From observation to computation? - Employing social media mining and artificial intelligence to mobilize new citizen science movements.” by *Stefan Daume*

Presented at [ECSA Conference 2018](#) on 04. June 2018.

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PRESENTATION DETAILS

Author/Affiliation: Stefan Daume, Scitingly

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APPENDIX

Social Media Landscape 2017



FredCavazza.net

Source: <https://fredcavazza.net/2017/04/19/social-media-landscape-2017/>

PROPERTIES: TWITTER



- Public
- Non-reciprocal
- Information-push network
- Real-time
- Low contribution hurdle
- Open API
- Large volume

PROPERTIES: INVASIVE ALIEN SPECIES

- Drivers and indicators of ecosystem change
- Ecological, economic and security significance
- Recognizable by non-experts
- Often notable and discrete events
- Subject of “traditional” ecological monitoring

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EXPLORED SAMPLE IAS SPECIES

Eastern grey squirrel



Wikimedia, Birdphotos.com, CC BY 3.0

Oak processionary



Wikimedia, Kleuske, CC BY-SA 3.0

Emerald ash borer



Wikimedia, Forest Service, USDA