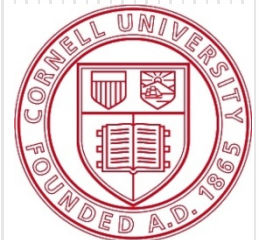# Citizen Science in Disaster and Conflict Resilience?

Keith G. Tidball & Marianne Krasny

Cornell University

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CIVIC ECOLOGY LAB

www.civicecology.org

"Ecologically speaking, if the city is dead, the ecological sensibilities of the inhabitants of the city will also be dead." NE Heller, 2010, ESA Meetings

Caveat: "…given its origins in ecology, it is not surprising that most resilience scholars have historically been interested in empirical analyses of non-urban areas (e.g., shallow lakes, production forests, and small-scale agriculture, see Berkes and Folke 1998; Gunderson and Holling 2002; Berkes et al. 2003), and have devoted less attention to the **specifically human and social elements of human-dominated systems**, such as cities" (Ernstson et al., 2010 *Ambio*).

What *are* the important human and social elements of systems that have been perturbed by a large scale crisis like war or a natural disaster?

© Balkan Analysis, Christopher Deliso

Tree planting in Macedonia

Photo- http://agwired.com/2007/01/19/2800/

Fisheries management in the Iraqi marshes

Photo- USDA FS Living Memorials
http://www.livingmemorialsproject.net/about.htm
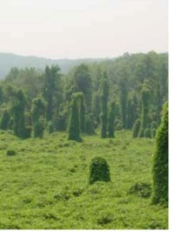
Memorial Gardening Post 9/11 NYC

Greening Responses: Urgent biophilia and Post-Crisis CBNRM

"…when humans faced with a disaster…seek out doses of contact and engagement with nature to further their efforts to summon and demonstrate resilience in the face of a crisis, they exemplify an *urgent biophilia*… The relationships human-nature interactions have to other components within interdependent systems at many different scales may be one critical source of resilience after a catastrophe" (Tidball, 2011-Forthcoming).

Lower 9th Ward, New Orleans
after Hurricane Katrina, 2005
Source: Google Maps

Tennessee St

MY MARK, JACK & BUCK +
2314 TREE IN FRONT
TENNESSEE. ST.
LAURA . MCCANN
MY HOME 2005

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Keith Tidball

How might we integrate concepts from citizen science* with recent scholarship and practice aimed at fostering community capacity to buffer the impacts of disaster?

CIVIC ECOLOGY

How (and why) might commencing citizen science activities both prior to and after large scale crises contribute to social-ecological system resilience in situations of human vulnerability?

Shifts in approaches to post-disaster & post-conflict response

Forests need human security as much as human security needs forests.

Including the environmental dimensions of vulnerability in our understanding of human security would help to focus public attention, policy-makers and funds on the long-term value of forest conservation and sustainable forest management.

--International Institute for Sustainable Development report Forests, Natural Disasters, and Human Security.

Two important shifts as Best Management Practices:

1. asset-based participation among affected populations, focused on ***strengths***, ***opportunities*** and ***assets*** rather than exclusively deficits, is required to identify acceptable or desirable assistance.

2. acknowledgement of the necessity to account for (usually perception-driven) ***self-reinforcing growth trends***, or positive ***feedback loops.***

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The Study

Hypothesis- CS could build capacity to mitigate disaster and conflict by reinforcing desirable social and environmental trends and feedbacks, and by convening multiple forms of knowledge and data collection over broad geographic areas.

Methods

- Surveyed citizen science (CS) activities in post- disaster and post-conflict contexts

- Evaluated CS activities in light of aforementioned shifts in approaches to post-crisis response as well as SES resilience theory

- Developed scenarios for application of CS in disaster and conflict contexts

Results

- Few examples of citizen science in post-disaster and post-conflict contexts

- Existing examples demonstrated strong elements of asset based participation and reportedly contributed to perception driven self-reinforcing feed back loops

- CS in these contexts arouses larger scale feedbacks in human-nature interdependent relationships

Examples – TVA Coal Fly Ash Disaster

Images Courtesy of http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=36352

Through the data collection efforts of citizens who had become voluntary affiliates of local environmental groups, the TVA disaster was better documented, leading to greater government accountability.

The TVA coal fly ash disaster marked a turning point for environmental reporting and environmental activism. For the first time, the media had sampling results from environmental organizations almost right away. Robert F. Kennedy Jr.'s Riverkeepers, especially, were very active in gathering samples and getting them to university and government toxicology labs." -- Bill Kovarik http://www.sej.org/publications/disasters/citizens-journalist-and-citizens-scientific-redefine-disaster-story

Examples - Mesopotamia Marshes Southern Iraq

Iraqi biologists have enlisted Marsh Arabs to help them take ecological measures of marsh restoration and thus participate in research to restore the wetland systems (http://www.natureiraq.org/Eng/porj_current_nationalpark.html).

The NGO Bird Life cooperated with Iraqi biologists to conduct winter surveys of Key Biodiversity Areas in 65 sites across Iraq (http://www.birdlife.org/news/news/2009/04/nature_iraq_surveys.html).

Local Marsh Arabs helped scientists collect water samples
Photo- Duke University

Photo- Dana Smillie
Science 25 February 2005:
Vol. 307. no. 5713, pp. 1186 - 1189

What makes these examples different than typical bird citizen science or similar programs is that their initiation is part of wider efforts to recover from large scale disaster or war. In these and other cases, *the benefits of doing citizen science are measured by citizens in terms of enhancing the likelihood of recovery of their lives and landscapes.*

Resilience?

- Challenge of finding *suitable social mechanisms that help confer resilience* on SES (Berkes and Folke 1998).

- To maintain function in the face of perturbance, SES need to be able to *recognize feedback*, and therefore *require "mechanisms by which information from the environment can be received, processed, and interpreted"* (Berkes and Folke 1998, p 21-22).

- CS, through becoming integrated into asset-based and participatory approaches to risk assessment and disaster response, and by fostering learning among participants in adaptive co-management, might become *one social mechanism that can shorten feedbacks which inform stakeholders about the effectiveness of their management actions.*

- CS part of efforts to *transform undesirable feedback loops* commonly found in post-conflict and post-disaster settings, in which violence and loss of infrastructure lead to lack of meaningful employment and educational opportunities, thus *creating further violence and degradation of the environment.*

Conclusion

Citizen science has potential to confer resilience and build capacity to mitigate disaster and conflict in three important ways:

• **through facilitating local knowledge creation, ownership, and participation;**

• **by initiating and reinforcing desirable feedbacks;**

• **by amassing multiple forms of knowledge and data collection over broad geographic areas.**

For more details, see:

(1) Tidball, K. G. & M. E. Krasny (forthcoming- 2011) What Role for Citizen Science in Disaster and Conflict Recovery and Resilience? In Dickinson & Bonney, Eds., *Citizen Science: Public Collaboration in Environmental Research*. Ithaca, NY: Cornell University Press.

(2) Tidball, KG and ME Krasny (2011, under review) Recognizing a Role for Citizen Science in Disaster and Conflict Recovery. *Disasters: The Journal of Disaster Studies, Policy and Management*.

Photo- http://volcanoes.usgs.gov/ash/water/index.html

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Background & Context –CEL & Resilience

- Cornell University Civic Ecology Lab founded in 2008
- Civic Ecology study of interactions, including feedbacks, among four components of a social-ecological system:
  - community-based environmental stewardship (civic ecology practice);
  - education and learning situated in these practices (civic ecology education);
  - the people and institutions involved; and
  - the ecosystem services produced by the people, their stewardship, and educational practices.
- trans-disciplinary perspectives in social-ecological systems resilience, environmental education, social learning, and urban ecology.

Nature and Human Security Theme

- Within the Civic Ecology Lab, the Nature and Human Security theme explores interactions between humans and nature in the aftermath of natural disasters and war.

- …how these interactions relate to social-ecological system resilience, or in other words, how humans and their interactions with nature are related to a system's ability to bounce back after being disturbed.

- Thus far, most promising aspect of resilience in this exploration is feedbacks that confer or catalyze resilience in SES through human-nature interaction.

  - Self-organizing greening in red zones (forthcoming book)
  - Parks & People initiatives
  - Environmental peacemaking