Citizen Science in Disaster Risk Management Workshop: summary report

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EXECUTIVE SUMMARY

In November 2015, the International Centre of Excellence: Community Resilience in Wellington conducted a workshop on Citizen Science in Disaster Risk Management. This workshop aimed to bring together interested parties from across agencies, community groups, scientists, software developers and educators to collectively explore the development, management and utilisation of citizen science projects in the context of Disaster Risk Management, and start the first of many discussions in a new 'Citizen Science Network'. Speakers covered topics including ethics, participation, community based approaches and technologies, as well as providing examples from Otago Museum, GeoNet, MetService, and Rotary. Through a series of breakout sessions, key areas for development and research were identified by participants, under the themes 'motivations for organising and participating in citizen science', 'understanding the technicalities of citizen science', and 'designing a framework and website for citizen science'. This report contains a brief summary of notes taken throughout the talks and the breakout sessions, to provide a resource for ongoing conversations around the need for a citizen science framework or web-based platform to assist people in the development and conduct of citizen science initiatives.

KEYWORDS

Citizen science, ethics, participation, community, participatory approaches.

INTRODUCTION

Citizen Science is a rapidly emerging area of both science and community based development, planning, and resilience building, with objectives of such programmes ranging from the desire to use 'citizen science' to enhance the scientific understanding and knowledge of communities and develop an interest in science (as outlined in the Nation of Curious Minds)[1], through to the development of citizen science partnership programmes to work with communities to identify environmental or risk issues and work together to find solutions. In the field of Disaster Risk Management, citizen science is rapidly growing as a way to help communities build resilience and prepare for disasters, through the co-production of knowledge while identifying hazards and risks, through to the development of solutions and analysis of response and recovery plans and procedures. Due to the recent growth of citizen science in Disaster Risk Management, there is a need to start a dialogue with communities, scientists, and other involved organisations about the key issues around the development and conduct of citizen science programmes. Such issues range from the ethics of citizen science, the motivations, the effective use of citizen science, funding, appropriate technologies, and identifying the community needs, to name but a few.

To help initiate this dialogue and develop a network of people engaged in, or interested in, citizen science, the International Centre of Excellence (ICoE): Community Resilience Wellington conducted the workshop 'Citizen Science in Disaster Risk Management' on 11th November 2015 at Wellington Regional Emergency Management Office (WREMO). The ICoE is one of a network of Centres of Excellence launched by the Integrated Research on Disaster Risk programme (IRDR) of the United Nations International Strategy for Disaster Reduction (UN-ISDR) and the International Social Science Council (ICSU). The Joint Centre for Disaster Research at Massey University/GNS Science, and WREMO, are coordinating this region-wide ICoE to answer the question 'How does a community make itself resilient to future disasters?' Membership of the ICoE is open to all practitioners and researchers and benefits from engaging with the ICoE include opportunities to highlight your research or practice experience in this international network, being able to directly inform and contribute to best practice within the Wellington Region, and helping to build and integrate capacity locally and nationally across New Zealand.

The aim of the 2015 ICoE workshop on Citizen Science in Disaster Risk Management was to bring together individuals from across a range of agencies, community groups, scientists, software developers and educators to collectively explore the development, management and utilization of citizen science projects in the context of Disaster Risk management, and start the first of many discussion in a new Citizen Science network. Other partners involved in this workshop included Otago Museum, GeoNet, Rotary, NIWA, Victoria University, MetService, and Otago University. Forty-one people attended from across New Zealand (see Appendix 1 for a full list of attendees), in response to the flyer included in Appendix 2. The day was structured around a series of talks focusing on examples from Otago Museum, GeoNet, and Rotary, followed by talks on key issues in conducting citizen science including: ethics, participation, community based approaches, and the role of technologies. This was followed by three breakout sessions to focus discussions and garner perspectives from

[1] A Nation of Curious Minds (2014), Ministry of Business, Innovation and Employment. http://www.curiousminds.nz/about/article/9/about-curious-minds

participants: 1) Motivations for organising and participating in citizen science; 2) Understanding the technicalities and challenges of citizen science; and 3) Designing a framework and website for citizen science. The full programme can be seen in Appendix 3.

This report is a brief summary of the discussions at this workshop, and in the following sections we include notes from each of the morning session talks, and a summary of the three break-out sessions. In Appendix 4 we also include the complete list of benefits and challenges for sciences/scientists, and citizens/peoples/communities, to being involved in a citizen science programme, as identified by participants in break out Session 1. Finally in Appendix 5, we also include some links to associated publications as raised by participants and speakers throughout the day.

We hope that this brief summary report will help to further conversations across the citizen science community about how to effectively conduct citizen science, and whether there is a need for a framework or web-based platform for citizen science to assist individuals and organisations in the development of programmes.

Morning Session 1: 9.30am–10.10am: What is Citizen Science?

Presentations by four Citizen Science practitioners

PARTICIPATORY SCIENCE PLATFORM

Craig Grant – Director of Science Engagement, Otago Museum

- Citizen Science efforts at the Otago Museum built on the platform of the 'Nation of Curious Minds'[1] (Ministry of Business, Innovation and Employment, and the Ministry of Education) and the 'Science in Society'[2] (National Science Challenges) initiatives.
- The Participatory Science Platform (PSP) has three pilot regions (Otago, Taranaki and South Auckland), and is aimed at integrating action in science by including community grass roots and inspiring young people into science.
- At Otago Museum (host organisation) there is a partnership with Ngai Tahu, University of Otago, Otago Polytechnic.
- Otago Museums offers:
  - connections to scientists/technical expertise
  - funding (up to $1000 seed funding to develop plans, and up to $20,000 to develop projects)
  - mentoring and project management advice
  - facilitating 'communities of interest'
- Key issues
  - Community in the driving seat
    - ➢ Meaningful role in the scientific process (not data slaves)
  - Sweet spot = community desire and scientifically interesting
- Challenges
  - Takes time, passion and strong collaboration between community and science
  - Syncing timetables
  - Data systems – simplicity<-> integrity
- Strengths of museums
  - Natural and extensive community hub
  - Non-threatening, neutral setting for research and community interactions
  - Skilled communicators
  - Fits the museum mandate of championing culture, nature and science

[1] A Nation of Curious Minds (2014), Ministry of Business, Innovation and Employment. http://www.curiousminds.nz/about/article/9/about-curious-minds

[2] Science in Society (2015), Ministry of Education. http://www.education.govt.nz/ministry-of-education/specific-initiatives/science-in-society-plan/

DISCOVERING THE IMPACT OF GEOLOGICAL HAZARDS

Kevin Fenaughty, GeoNet Geohazards Information Manager

- Historical account of first efforts to communicate earthquake events – James Hector in 1865, using the telegraph network – a quick way to gather information felt throughout New Zealand. From 1900s onwards, paper reporting was carried out by postmasters and lighthouse keepers, which offered good geographical spread of data.
- Issues with paper descriptions include:
  - the subjectivity of the descriptions that were used
  - low volume of responses
  - slow response
  - memory of details fade
  - postage costs
- Improvements – development of the Modified Mercalli Scale
  - 12 degrees of impact
  - Issue: the first scale was not relevant for all parts of the world
  - Data was collected by reporters, spread evenly across New Zealand, however this didn't work because people lost interest/died or there were too many in one particular region.
- From 2004, felt reports could be lodged online
  - Much bigger audience
  - Auto derivation of MM
  - Quicker
  - Responses were still subjective
- From 2015 – GeoNet mobile app is being launched
- GeoNet is considering reporting of landslides and other hazards (ashfall, tsunami) using a similar online method.

CHIP-IN: YOUR NEIGHBOURHOOD, YOUR NEED. DEVELOPING COMMUNITY RESILIENCE THROUGH COMMUNITY PROJECTS

Tom Morton, Rotary

- Rotary has developed an initiative to build preparedness and awareness of tsunami hazards in Orewa, Auckland.
- Chip-In = **C**an **H**elp **I**f **P**ossible, **I**f **N**eeded
- A team of Rotarians (young and old plus assistants) interviewed 94 people in Orewa earlier this year. They asked people about their awareness of tsunami and storm surge in the community. The results showed that people would wait to be told what to do if there was an event in future.
- The Chip-In project was designed to build awareness, and harness community action in developing community-based projects.
- This project has helped people identify the risks that may affect them and their families in future, and raised awareness about the key actions people should take to protect themselves (e.g. including moving to high ground following an earthquake).

CROWD-SOURCING FLOOD LEVELS IN POST-EARTHQUAKE CHRISTCHURCH

Daniel Collins, NIWA

- Following the Christchurch earthquakes, the community became more receptive to the sciences of natural hazards, and more connected to their community and environment.
- In March 2014, extensive flooding of parts of Christchurch occurred following a tropical depression to the east of Canterbury. The daytime rise in floodwaters, coupled with widespread ownership of smart phones, resulted in many photos of the flooding appearing on mainstream and social media.
- NIWA publicised a request for flood photos, asking people to note the location and time of the photo being taken. Real-time interaction with social media users ensued. More than 600 photos were recorded and examined, and a map of flood inundation was created based on this data.
- This was a very successful initiative, and everyone who provided an image was thanked afterwards.
- In contrast, similar efforts to collect images following a flood event in Dunedin were less successful, possibly due to the time of day (evening), and the less widespread nature of the impact.
- In conclusion:
    1. The widespread availability of a measuring tool (a camera phone) and simple instructions can allow the public to gather useful data.
    2. Prior natural disasters and public discourse around science can prime the public to engage in citizen science if requested.
    3. The framing and timing of the request for citizen science are important, but could use research
    4. Mainstream media coverage is vital for widespread rapid engagement.
    5. Data quality is ensured by analysing photos professionally.
    6. Engagement with the public builds confidence in science.
    7. To advance citizen science we must learn from both successes and failures to identify the necessary elements of successful programmes.

Morning Session 2: 10.50am–11.40am: Challenges and Opportunities for Citizen Science in New Zealand

Presentations by four Citizen Science researchers

ETHICS AND CITIZEN SCIENCE

David Johnston – Joint Centre for Disaster Research/GNS Science

- Citizen Science (also known as crowd science, crowd-sourced science, civic science, or networked science) supports and enables the public in becoming active participants in scientific research rather than just observers and/or recipients.
- Ethic considerations in undertaking citizen science projects:
  - Human vs biological subjects of research – much easier to conduct non-human citizen science activities from an ethics standpoint.
  - Partnerships with researchers – the ethical approval from their institution can be used (in terms of informed consent, etc), and will cover the volunteers in collecting the data.
  - Training of volunteers – it is important to inform volunteers about participant anonymity issues, and consent issues where people can refuse to take part.
  - So for community efforts that don't have access/awareness/understanding of ethics – partnerships with researchers is the best way forward.
  - Researchers accessing online data – if it is online, in the public domain, but there are important ethical issues to consider, such as blotting out people's identities from images from the internet, particularly when they are presenting their results at a conference or elsewhere.
  - Duty of care to respect the communities we work in. There are ethical constraints and protocols that we must be aware of.
  - Collective data aggregate form – no identities.
  - Anonymised
  - Challenges around interdisciplinary approaches to research – need to educate some that haven't been involved.
  - Best thing is if you are unsure, you should talk to someone who knows.
  - It isn't good enough to say you didn't know. If you are dealing with humans, then you need to use ethical practices.

UNPACKING THE PARTICIPATORY DIMENSION OF CITIZEN SCIENCE IN DISASTER RISK MANAGEMENT

JC Guillard – The University of Auckland

- Saxena (1998) – 'Participation is a voluntary process by which people influence or control the decisions that affect them'
- Arnstein 'Ladder of Citizen Participation' (1969) – involvement in decision-making for communities – ranging from very top-down 'manipulation' (at the bottom rung of the ladder) to bottom-up 'citizen control' at the top of the ladder.
- In the practice of community based disaster risk reduction, participation is often seen as an outcome.
- Participation efforts undertaken by JC and others were described, in terms of the various genuine and skewed processes. A photo was presented as an example of a skewed process where one person (the facilitator) was lecturing to a crowd sitting down, with men (in chairs) and women (sitting on the ground) in separate places, with the presenter talking to the men more so than the women. It presents a very biased view of the power in this situation.
- Participation is almost seen as an outcome now, with most research proposals requiring token mention of DRR or community participation as a matter of course.
- In some places the 'tyranny of participation' – scheduling DRR outreach by NGOs to fit with their own schedules, where people who are meant to participate are often working all day in farms, e.g. some NGOs run community meetings by recruiting participants by paying them to be there. Where is the power? The attitudes and behaviours of the facilitators (and participants) are important in developing community participation, trust and effective communication.
- Facilitators can manipulate the participants. It needs to be run by the locals for the locals. The role of the facilitator is to stimulate conversation and discussion.
- Funding agencies require engagement with communities, but they are effectively profiting from this process.
- Other key issues with participation:
    - Process is more important than the outcome
    - Empowerment vs control – how do you measure this, over what timeframes, very challenging to understand
    - Downward vs upward accountability
    - Whose science, for whom?
    - Facilitation (being behind, supporting) vs 'facipulation' (controlling, stepping in).

COMMUNITY BASED DISASTER RISK REDUCTION AND CLIMATE CHANGE ADAPTATION (CDBRR)

Kate Crowley – NIWA

One of the biggest challenges facing risk assessment for DRR is the availability of relevant data. However, there are multiple agencies who facilitated the collection of data including community based organisations that carry out community based risk assessments around the world. Communities assess the hazards they face including their vulnerabilities and capacities. CBDRR is founded in participatory rural appraisal and in general local civil society organisations, researchers and NGOs apply techniques that are based on a generic approach. In essence, they will create a community action group (representative of that particular community), which will together carry out a risk assessment, for example developing local hazard and risk maps. During this process they also identify the capacities they have to prepare for future disasters and the gaps.

In essence this is citizen science. The assessments carried out usually contribute towards a local action plan for disaster management. However this is also a data collection process which can be used for a variety of local to national scale assessments. For example, an NGO called CAFOD, partnered with UCL, and with Aon Benfield Re Insurance to explore the possibility of using community derived risk assessment data in a national risk mapping and modelling tool. The project was funded by the UK Natural and Environmental Research Council (NERC) for six months. During this time, using CBDRR reports from local CSOs they were able to develop vulnerability indicators, and analyse these alongside flood hazard maps to identify at risk communities in Cambodia.

Challenges included every community taking slightly different approaches, and different communities were at various stages in the process. It demonstrated that there was a need for CBDRR standards, and training for CSO/INGO staff in collecting and managing this community derived data. For citizen science is raises issues around data collection quality and long term management and ownership of that data.

Examples and further reading:

- Knowledge Exchange Network paper

  http://www.odi.org/events/3929-knowledge-technology-science-community-disaster-resilience
- Dialogues for disaster anticipation and resilience

  http://dialoguesforresilience.tumblr.com/
- Guidelines for how practitioners can engage with academic researchers.

  http://www.ukcds.org.uk/resources/integrating-science-into-humanitarian-and-development-planning

Contact: Kate.crowley@NIWA.co.nz

CITIZEN WEATHER OBSERVING

Peter Kreft – MetService

- National Weather Services have received information from citizens for a long time – from those trained as voluntary weather observers who make regular observations, but also spontaneously from members of the general public in response to an event.
- Weather observation data received from trained voluntary weather observers are well curated because trained volunteers use the WMO observation code.
- Storm chasing; chaseable storms in New Zealand are infrequent occurrences.
- Topography doesn't lend itself to expansive views of storms (unlike the mid-west of the US).
- Last decade has seen a large and rapidly-growing number of weather observations from citizens, providing richer information about smaller-scale weather events.
- Websites that crowd-source citizen weather observations are growing rapidly in content and popularity – largely in western countries, but increasingly in other parts of the world as well.
- Similar technologies used by citizen weather observers are also being implemented in vehicle fleets, with very large proprietary datasets being assembled.
- Weather forecasters are conscious of the importance of validating opportunistic citizen weather observations before using them in decision-making.

Break Out Session 1: Motivations for citizen science

Convenors: Kate Crowley and David Johnston

INTRODUCTION

This session encouraged constructive discussions on the benefits and challenges of citizen science for science/scientists, and for citizens/peoples/communities. The aim was to identify key areas that enable sustainable, accountable and useful citizen science and gaps or challenges that exist that require further work or avoidance.

The participants were split into four smaller mixed groups and asked to consider:

- The benefits for science/scientists?
- The benefits for citizens/people/communities?
- The challenges for science/scientists?
- The challenges for citizens/people/communities?

BENEFITS FOR SCIENCE/SCIENTISTS

Participants identified a wide range of benefits for science and scientists in engaging with and/or applying a citizen science approach to research. This diversity is illustrated in Figure 1 which highlights that CS can improve citizen's buy-in to science and builds trust between science and the public. Importantly the participants suggested that citizen science increases the availability of data and the validity of results because the research is 'in context' and grounded in the real world. Participants also noted that CS can improve the public's understanding of science and specifically for natural hazards management improve people's risk awareness and acceptance of risk.

"Acceptable" Risk = acceptance to whom? – Community needs to understand risk in order to decide. This process is part of such as conversation"

As one participant noted, this acceptance and understanding can help decision makers and improve communities support for risk reduction.

"A community that's already engaged and informed is easier for policy makers to consult with meaningfully".

However, amongst the discussion there was a note warning that citizen science may not always improve science or scientific reputation.

"Making science ordinary/everyday/demystified/less romantic– no wait – maybe we should put this as an disadvantage"

Figure 1: Benefits for science/scientists.

BENEFITS FOR CITIZENS/PEOPLE/COMMUNITIES

The benefits for citizens and communities focussed around the opportunity to gain ‘a place’ in the discussion; to enable traditional values and cultures to be appreciated and considered within science. It is important that people are involved in the “process of setting priorities”. Participants also indicated that it was an opportunity for citizens to “ask questions about what interests me or about what I don’t understand”. In contrast to people being able to transfer knowledge to and from science, participants also noted that it provided an environment for intergenerational conversations and a sharing of collective wisdom.

Figure 2: Benefits for citizens and communities.

CHALLENGES FOR SCIENCE/SCIENTISTS

Participants identified that the challenges for science and scientists mainly relate to time, willingness, a professional acceptance of citizen science as science and methodology.

In terms of time and willingness, participants noted that some scientists may feel that citizen science is not 'real' science and that they do not want to waste their time:

"But this is not what I am meant to do in science. I want to do science"

Others felt that scientists often do not know 'how to engage' or 'evoke interest' in order 'to do' citizen science. There was also a concern that "What works in our community may not transfer to another/different cultures/contexts" therefore having knock-on impacts on the potential replicability, validity and robustness of the research.

Figure 3: Challenges for science/scientists

CHALLENGES FOR CITIZENS/PEOPLE/COMMUNITIES

Participants were relatively focussed in discussions on the challenges for citizens and communities. The discussion raised three key themes:

- Trust, including who to trust when receiving information or sharing information;
- Time, including the value of giving their time and what would they gain?
- Concerns of understanding, both looking ‘silly’ and being considered as unintelligent by the scientists.

Interestingly, a topic that is not clear in Figure 4 is knowing where to start if the citizen or community have an idea or topic that they wish to research. This relates to transparency, accountability and trust in scientific institutes.

Figure 4: Challenges for citizens and communities.

Break Out Session 2: Flip Book Challenge Workshop

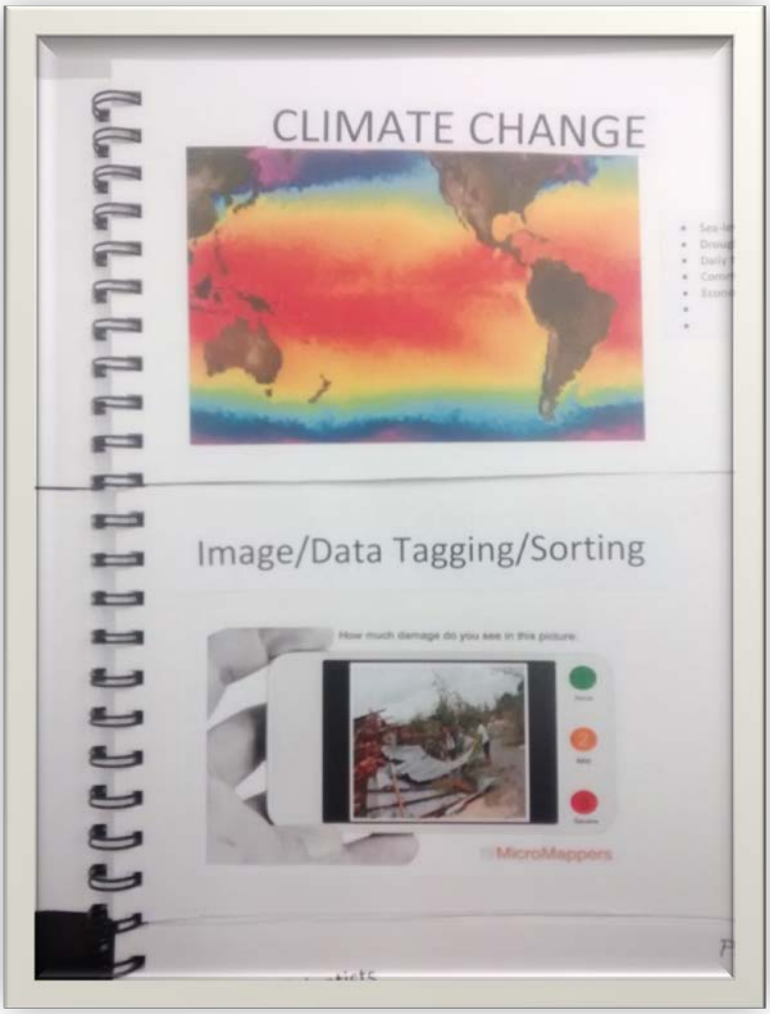
Convenors: Abi Beatson and Emily Lambie

INTRODUCTION

The workshop focused on how current and future research into natural hazards could incorporate and engage with citizen science methods and practices.

Participants were provided with combination 'flip books' to facilitate group activity and discussion. Each table (with around six to eight participants per table) was provided with one A5 book that contained two sets of combination flip cards relating to natural hazards (e.g. volcanic activity, flooding, extreme winds etc.) and citizen science methods and practices (surveys, taking photographs or samples, mobile apps etc.).

Each of the flip cards were designed to be flipped over to provide the opportunity to 'mix and match' a wide selection of natural hazards with citizen science methods and practices. An example of a flip book combination is below:



The number of combinations provided by the 'flip books' exceeded one hundred and in doing so gave participants a comprehensive overview of the opportunities for science researchers to incorporate and engage citizen science initiatives in natural hazards research.

The table below represents both the natural hazards and citizen science methods represented in the flipbooks:

Natural Hazards	Citizen Science Methods
Volcanic Activity	Taking Samples
Earthquake	Sensors
Flooding	Taking Photographs
Extreme Wind	Citizen Surveys
Climate Change	Image/Data Tagging
Pandemic	Mobile Apps

During the workshop the participants were asked to focus their group discussion around the following three questions:

- What combinations would appeal to, and benefit, citizens?
- What combinations would benefit or progress current or future natural hazards research?
- What are the potential challenges?

Groups were given the opportunity to report back to the wider participants with one or two citizen science initiatives that resonated within their groups and some of these combination ideas included:

- The use of mobile apps to report on community needs during a pandemic event and track 'hotspots' of emerging disease.
- Citizen participation in the collection of ashfall samples after volcanic activity.
- Community participation in the contribution of photographic evidence of flood damage to improve predictive models of localised flooding.

Overall we found the workshop to be a success in that it facilitated significant discussion around the number of opportunities afforded by citizen science initiatives in the field of natural hazards research. At the end of the workshop it was suggested that the Flip Books be developed into a scoring matrix to evaluate and prioritise the number of opportunities afforded by citizen science initiatives for natural hazards research. Furthermore, it was agreed that the Flip Books should also be used as a tool to engage citizens in project choice and design from the outset.

Break Out Session 3: Designing a Framework for Citizen Science

Convenors – Caroline Orchiston and Emma Hudson-Doyle

INTRODUCTION

As part of the Resilience to Nature's Challenges (RNC) research programme around Cultural Resilience, we are developing a Citizen Science project on individual and community response to tsunami warnings. A core task for this is to investigate the usefulness of a Citizen Science framework. Since the RNC is a very collaborative programme, with strong emphasis on co-production of knowledge, we thought it would be appropriate to ask for input into this process from a citizen science perspective, via this Citizen Science in Disaster Risk Management workshop. Through this break out session, we thus asked participants to first consider what they thought to be the critical elements of such a framework, and secondly how an associated online platform or website should be designed. For both of these questions we asked participants to consider the process of developing such a framework and/or web-based platform, as well as the design and content itself. We report below a brief summary of the key elements raised by participants.

PART 1: CRITICAL ELEMENTS OF A FRAMEWORK: WHAT IS NEEDED/USEFUL TO RESEARCHERS, AND CITIZEN SCIENTISTS

In the first part of this break out session, each group was asked to discuss for 15 minutes the key elements and issues that they thought should be included in a framework or set of guidelines for developing and conducting citizen science programmes. This included specific guidelines, resources, the structure of a framework, and whether such guidance or framework is actually needed, how it should be developed, and what form it should take. Below we list the main elements and points raised by each group.

Group 1

- Clarity of objectives:
  - Who sets the objectives/Agenda?
- Who does what? When/Where/How/Why?
- Mutually agreed expectations (expectations match-up between stakeholders)
  - Outcomes, work input (time/resource/funding)
  - Motivations
- "The hook" – facilitating interest/trust
- Feedback loops

Group 2

- Research Perspective
  - Think about how your project is …
    - ➢ Valuable to the audience and relevant – e.g. school, iwi, church group, youth group, service club, sports club, neighbourhood
  - This will build your relationship

- Think about how you will engage. It needs to be appropriate for the audience
  - Scientist and audience – The nature of the relationship (between the needs to be of the nature of a partnership)
- Setting clear objectives and realistic expectations/outcomes

Group 3

- 'Ask the right question' – problem statement, issue, objectives – define good outcomes
  - Why would a citizen want to participate? What's in it for them?
  - Partnerships to establish – councils, NGOs etc.
  - Practical resources, tools
  - Funding mechanisms
  - 'How to' for citizen-initiated projects
  - 'How to' for scientist-initiated projects
  - Sustainability: funding, resources
  - Funding arrangements experts – pro bono opportunities – dynamic
  - Process vs results. Value of process
  - Who has already done this?
    - Best practice case studies
  - Additional stakeholders – who?
  - Skills, leadership requirements for people running project
  - Impact assessment
  - What is citizen science?!
    - Crowd – sourcing?
    - Gap in perception?
  - Ethics
  - ROI: clarification for funders

Group 4

- Exit strategy
- Wider stakeholders analysis…
- Measure outcomes – how will we do this?
  - Not just quantitative
  - Multiple perspectives
- How much capacity required, over how long is needed to support the community we're engaging with?
- Stakeholder and power mapping?
- Defining the scope of the project
  - Limitations size, target community
- What does success look like? And for who?
- Entry point – engagement opportunity for all to contribute and design
- Managing expectations
- Ethics procedures/cultural sensitivity

Group 5

- Are there similar projects you can draw from and collaborate with?
- Making sure project is representative of all involved
- What are your objectives?
  - Specific set of questions
  - Citizen involvement from start
- How will you engage people?
- Who are your audiences?
- What tools will you use?
- How will you ensure efficacy?
- How will you measure your responses/outcomes?
- What is in it for participants?
- How will you involve citizens in the design of your programme?
- How will you ensure sustainability?
- How will you feedback, tracking progress and results?

PART 2: HOW COULD A WEB PLATFORM/WEBSITE LOOK, IN TERMS OF THE NEEDS OF BOTH SCIENTISTS AND CITIZENS? THE FOLLOWING SECTION OUTLINES THE IDEAS FROM EACH GROUP.

In the second part of this break out session, participants were asked to discuss for 15 minutes and consider what elements should be included in a website or online resource for citizen science, whether such a resource was necessary, and how it would relate to a framework or guidelines as discussed in part 1 above. Below we list the elements raised by each group.

Group 1

- Community owned and driven = sustainable long-term research
- Web platform that enables communities (geographic communities etc.) to suggest research projects, vote on which matter to them and then receive funding to research
  - Facilitated by scientists/orgs
  - Platform would also function as a story sharing/lesson learning tool
- On known hazards and risks
  - Hazards linked to science organisations
  - With ideas for research from both communities and scientists
- Checklist to prompt scientists to think about key elements of participatory science
- Citizen science webpage where people can search for projects and receive clear info on engaging

Group 2

- Our science
  - Community involvement from the conceptual stage
- High-level endorsement/support
- "Scaffolding" – e.g. local ➔National
- Media coverage and promotion – participatory video
- Strong networks built between practitioners, sharing experiences
- Activities that channel into ongoing involvement
- Common/accessible sharing of result and data
  - Not just a database
- System of evaluation and monitoring that is meaningful to citizens and scientists

Group 3

- Community Science
  - Fact
  - Everywhere
  - Communicated media
  - Ownership
  - Knowledge (Indigenous Culture)
  - Education
  - Sustainability, adaptable, living process
  - Holistic
  - Spiritual
  - Faith
  - Research
  - Honest
  - Observation
  - Limited/closed info
  - Privacy/respect
  - Inclusive
  - Inclusive
  - Availability
  - Freedom
  - Connectedness
  - Cosmos
  - Time investment
  - Debate – Humility/empathy and understanding
  - Ethical

- Presented a Māori-focussed model for creating a Citizen Science platform (see Figure 5)
  - Te Aio – Peace
  - Aroma – Love
  - Te Koa – Joy
  - Pono – Truth
  - Mahaki – Humble
  - Maungarongo – Peace
  - Manangaranga – Education
  - Whakangawari – Gentleness
  - Pono Arora – Strong of Heart
  - Wairuatanga – Spirit
  - Whakapono – Faith
  - Rangahau – Study
  - Papai – Goodness

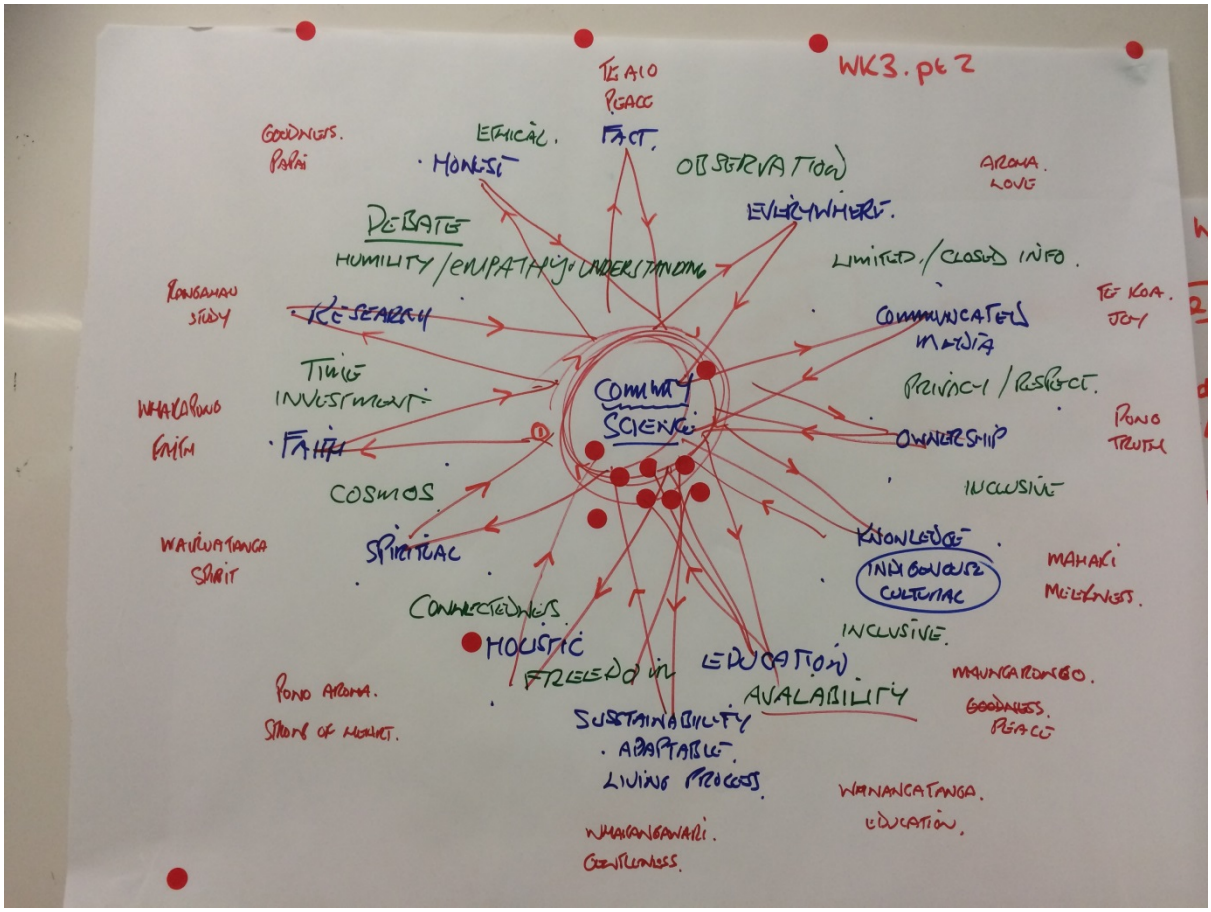


Figure 5: The Māori-focused model for creating a Citizen Science platform.

Group 4

- Idea-sharing platforms
  - Disaster (Science) meet up group
  - Citizen science ideas website with links to interested/active citizens and scientists
  - Sharing experiences – successes and failures (websites and workshop)
  - Legislation groups – make it a more recognized science activity
  - Citizen science ideas website with links to interested/active citizens and scientists
  - Reflections on processes
  - Supporting teachers (existing and new initiatives)
  - Citizens science idea of the week (voted for by citizens) – website? Museum?
  - National level platforms
  - CORE for citizen science
  - Funders/donors re-sharing information

Group 5

- Facilitate Citizen Science in New Zealand
- 0800CITSCI
  - How to add value?
  - How to get more people involved
  - Mechanisms for scaling up projects
  - How do we develop a programme for people without internet, etc. are included?
  - Don't leave anyone behind
  - CitSci 'super users' to help citizen groups develop a project
  - Crowd source what public want to know = ask public!!
  - Matchmaking – citizens to scientists
  - Awards and comp. 'The year of citizen science'
  - Putting the 'science' into citizen projects
  - Programme to target 'vulnerable' populations
  - Seed funding
  - Tools to engage that are not digital
  - Curriculum-based citizen science 'Citizenship Citizen Science"
  - National service – organisation partner

APPENDICES

APPENDIX 1: FULL LIST OF ATTENDEES AT THE WORKSHOP

Name	Affiliation
Peter Wood	
Sam Ridley	Greater Wellington
Jo Bailey	Massey University
Alan Kwok	Massey University
Aasha Pancha	Victoria University
Craig Grant	Otago Museum
Marion Gadsby	Environment Canterbury
Peter Kreft	MetService
David Middleton	Kestrel
Mayor Wade-Brown	Mayor's office-WCC
Aaron Packard	350.org
Holly Griffin	New Zealand Red Cross
Bruce Pepperell	Wellington Region Emergency Management Office
Victoria Metcalf	Office of the Prime Minister’s Chief Science Advisor
Raj Prasanna	Massey University
Justin Cope	Environment Canterbury
Kevin Fenaughty	GeoNet
Kaya Yamabe	EQC
Joseph Stone	EQC
Jacinta Syme	Ministry of Business, Innovation & Employment
Joe McLeod	Te Piringa O Te Awakairangi
Catherine Pinal	GNS Science
Kate Boersen	Hawke's Bay Regional Council
Anne Bardsley	Office of the Prime Minister’s Chief Science Advisor
Caroline Little	GeoNet
Graham Leonard	GNS Science
Katherine Hore	University of Auckland
Gary Lewis	President of the Rotary Club – Petone
Russ Van Dissen	GNS Science
Nancy Brown	Massey University
Rio Yonson	Victoria University
Gilles Seve	MBIE

Name	Affiliation
Others (organisers/invited speakers)	
Emma Hudson-Doyle	JCDR/Massey
David Johnston	JCDR/Massey
Emily Lambie	JCDR
Dan Neely	WREMO
Abi Beatson	Victoria University
Caroline Orchiston	University of Otago
JC Gaillard	University of Auckland
Kate Crowley	NIWA
Tom Morton	Rotary
Sally Potter	GNS Science
Jacqui Bridges	MetService and MetraWeather
Councillor Margaret Willard	Hutt City Council
Daniel Collins	NIWA
Louise Parkin	Student in Disaster Philanthropy

APPENDIX 2: WORKSHOP FLYER

Citizen Science in Disaster Risk Management: Workshop

Wednesday 11th November: 9 am to 4 pm.
Networking and refreshments available from 4 pm

Wellington Region Emergency Management Office,
2 Turnbull Street, Wellington.

Are you interested in running a Citizen Science program, would like to know more about Citizen Science, or have experience you would like to share with others? If so, the IRDR International Centre of Excellence: Community Resilience (ICoE) would like to invite you to our Citizen Science in Disaster Risk Management workshop.

Citizen Science (also known as crowd science, crowd-sourced science, civic science, or networked science) supports and enables the public in becoming active participants in scientific research rather than just observers and/or recipients. Citizen Science provides the researchers and organisations with exciting possibilities to collate, analyse and visually reproduce this data.

Drawing on existing research, international collaborations, and knowledge from existing programmes this workshop will develop the framework for a web-based platform to share resources, examples, and information on topics such as the ethics and logistics of Citizen Science, to enhance and support the engagement of agencies with Citizen Science initiatives. Bringing together a range of agencies, community groups, scientists, software developers and educators we will collectively explore the development, management and utilization of citizen science projects in the context of Disaster Risk Management, and start the first of many discussions in a new 'Citizen Science Network'.

This workshop is being run by the ICoE: Community Resilience in Wellington, and a number of other partners including GNS Science, NIWA, Rotary, Te Papa, Massey U, Otago U, Victoria U, Metservice, EQC, Red Cross, ECLab.

Registration for the workshop is free; however participation will be limited to 50 participants – please register by emailing Daryl Barton (Email: d.barton@gns.cri.nz) and indicate if you have any dietary requirements. **RSVPs must be received by 29th October.**

What is the ICoE : Community Resilience Wellington?

This ICoE is one of a network of Centres of Excellence launched by the Integrated Research on Disaster Risk programme (IRDR) of the United Nations International Strategy for Disaster Reduction (UN-ISDR) and the International Social Science Council (ICSU). The Joint Centre for Disaster Research at Massey University/GNS Science, and the Wellington Region Emergency Management Office, are coordinating this region-wide ICoE to answer the question "How does a community make itself resilient to future disasters?" Membership of the ICoE is open to all practitioners and researchers and benefits from engaging with the ICoE include opportunities to highlight your research or practice experience in this international network, being able to directly inform and contribute to best practice within the Wellington Region, and helping to build and integrate capacity locally and nationally across NZ.

For further information about the ICoE please visit:
http://www.getprepared.org.nz/excellence
or
http://www.massey.ac.nz/massey/learning/departments/school-of-psychology/research/disaster-research/research-projects/icoc/icoc_home.cfm

IRDR ICoE
Integrated Research on Disaster Risk
Wellington International Centre of Excellence

APPENDIX 3: WORKSHOP PROGRAMME

Citizen Science in Disaster Risk Management: Workshop

Wednesday 11th November 2015, WREMO, 2 Turnbull Street, Wellington

(Programme v.4, for participants, last edited 11th November 2015)

Time	Activity	Presenter/Facilitator(s)
8:40–9:00 am	Participants arrive/registration	
9:00–9:10	Introduction to the day	David Johnston
9:10–9:20	Introduction to WREMO/ICoE	Dan Neely
9:20–9:30	Icebreaker activity	Dan Neely
9:30–10:10	Series of 10 minute talks on 'what is citizen science' with a focus on examples Talks: • Craig Grant – Otago Museum • Kevin Fenaughty– GeoNet • Tom Morton – Rotary	David Johnston
10:10–10:30	Summing up: Q&A, general discussion, review	David Johnston and Caroline Orchiston
10:30–10:50	**Morning tea**	
10:50–11:40	Series of 10 minute talks on challenges/logistics/ethics etc. • David Johnston – ethics • JC Gaillard (15 min.)– Participation and citizen science/ethics • Kate Crowley – Community Based Disaster Risk Reduction and citizen science • Peter Kreft – technologies and citizen science	Caroline Orchiston
11:40–12:00	Summing up: Q&A, general discussion, review	Kate Crowley and Caroline Orchiston
12:00–12:45	**Lunch**	
12:45–1:40	Break out session 1: Motivations for organising and participating in Citizen Science	David Johnston and Kate Crowley
1:40–1:45	**Brief comfort break**	
1:45–2:40	Break out session 2: Understanding the technicalities and challenges of citizen science	Abi Beatson and Emily Lambie
2:40–3:00	**Afternoon tea**	
3:00–3:50	Break out session 3: Designing a framework and website for citizen science	Caroline Orchiston and Emma Hudson-Doyle
3:50–4:00 pm	**Close/closing comments**	David Johnston
From 4 pm	**Networking: drinks and nibbles**	

APPENDIX 4: LIST OF NOTES FROM BREAK OUT SESSION 1

BENEFITS FOR SCIENCE/SCIENTIST

- Grounded in reality
- Local knowledge
- Relevancy
- Tick box for funding
- Kudos – What we do as scientists has value/relevance/profile
- Stimulate interest/careers in science
- Curious minds
- Close to reality
- Opens dialogue
- Making a difference – being part of something
- Opportunity for applied science
- Feel good antidote. Reinvigorates “cynical scientists”
- Opportunity to build relationships with communities, agencies and organisations
- Keep us real/relevant
- Knowledge transfer
- Getting data that’s quickly lost e.g. flood heights, storm sewage
- Incorporate cultural history/knowledge
- Increased credibility and relevance of research – outcome
- Demystify and building trust in science
- Greater understanding of complexities of process
- Lots of tea and biscuits
- Improve outcomes/science
- Dynamic
- Making science ordinary/everyday/demystified/less romantic/sed – no wait – maybe we should put this as disadvantages
- Learning a different language “policy” “community”
- Facilitates public buy-in
- Could quicken process
- Builds conduits for pursing information quickly in the future – relationships med in on going way
- Build skills in communicating your science effectively
- Commercialisation opportunities – scalability
- Facilities cross-sector partnership
- More data – allows larger-scale projects
- More ideas
- Free data and ideas
- Awareness of science as a future career
- Keep data live

- Buy-in in science
- Quick wins (rather than waiting years for academic journals to be published!)
- Creativity
- Stimulate science into practice
- Fun and satisfying
- Covering wide geographic area
- "Acceptable" Risk = acceptance to whom? – community needs to understand risk in order to decide. This process is part of such as conversation
- Builds trust with the community if they're involved
- Building a support base for your science
- Fast and different data types
- Diversity
- Co-production of research
- Communication is part of science – improve communication skills
- Better understanding of the context →design of research become context – specific
- Job satisfaction
- Supports real world application of research
- A community that's already engaged and informed is easier for policy makers to consult with meaningfully
- If engage Māori and Matauranga may get longer history of events
- What is big data?
- Big data
- Recognition of different sciences
- Grounding
- Sustainability

BENEFITS FOR CITIZENS/PEOPLE COMMUNITIES

- Facilities networks
- Engaging and building curious minds
- Build relationships within the community to develop a common purpose and facilitate working together on solving our issues
- Building trust – building relationships
- E.g. the group below the poverty line? (the system may be broken)
- Opportunity to ask questions about what interests me or about what I don't understand
- Ability to divert agenda to benefit one group – 'cheating the system'
- Provides a focus for community activity
- Community values represented in what is studied and how
- Builds social capital and license
- Measuring success/failures of community projects i.e. Restoration projects
- Door opening flow on effects to wider community
- Buy in ownership, being part of
- Certainty of community status e.g. what is there

- Empowerment. Knowledge
- Trust of understanding science/scientists
- Involves people in the process of setting priorities
- Fun and education
- Shared experience other people see/feel/do the same think e.g. earthquakes
- Engagement – satisfaction of being part of something, being heard, making a difference
- Stimulates intergenerational conversations (schools – parents – grandparents)
- Mechanism to hand down traditional knowledge/wisdom/customs
- Inter-generational activity
- Informed decision making
- Greater preparedness
- Better understanding of science
- Role and relevance for lay scientists
- Opportunity to contribute (even if you are usually a quiet one)
- Building critical thinkers
- Enhances public profile – media
- Collective wisdom
- Resources to get things done – pooling resources
- Cost benefit
- Build sense of community – shared experiences – contagious agents within community encourage others to get involved
- Utilising community abilities
- Confidence of showing what we know
- Communication e.g. media with government

CHALLENGES FOR SCIENCE/SCIENTIST

- Organisational culture – ability to "donate" time – (contracting with community)
- Time in helping set up projects
- Community investment (time) – 'abandoning the community'
- Sustaining the energy of the community
- What is the goal/objective?
- Not knowing how to engage – invoking interest
- Engaging early and changing methods and outcomes
- Getting scientifically useful data
- Accommodating and collaborating but maintaining rigour
- Challenge in overcoming need for academic rigour/terminology
- What works in the community may not transfer to another different cultures/contexts
- Explaining terms in clear way, jargon but not dumbing down 'simple as it can be, not simpler'
- Fear of/dislike of setting aside my agenda if it doesn't match the communities
- Learning to listen

- “Scientific methods” – citizen ‘science’ vs scientists ‘science’
- Accountability (upwards and downwards)
- Mixing mythologies
- Verification of information
- Letting community know the value of what they give you significance of data
- Ensuring the findings get used and are applied and don’t get forgotten
- Scientists are trained to justify/defend
- Power relationships
- Ownership
- Capturing intangible data
- Facilitation skills/leadership skills
- Citizen leadership
- Attention seekers making stuff up – vandals!
- Science in places with beliefs that aren’t compatible e.g. practice vs science
- Rejection of science conspiracy theorists
- Respecting/managing world views and bias
- Knowing what options and methods are available
- Losing knowledge of local sciences and practices. Losing control of cultural knowledge of local history practices that have worked for centuries
- Understanding (indigenous, cultural, science) context
- Willingness to accept unexpected outcomes
- Time – “But this is not what I am meant to do in science. I want to do science”
- Having the time and EHOA acknowledged by the scientific assessment process (PBRF etc.)
- Mentality shifts “but do we need to listen to them and change our plans? We just want to do our science”
- Identifying entry points in community
- Timing (events and interest are fleeting)
- Making it fun! (and interesting)
- Getting the user experience right
- Keeping it simple and manageable
- Fear of losing control
- Fear of getting it wrong (and people knowing)
- Fear of difficult questions

CHALLENGES FOR CITIZENS/PEOPLES/COMMUNITIES

- Access to technology
- Legality of sharing social science data restricts access and sharing
- Privacy
- Self interest vs. community interest
- Power imbalance
- Empowerment to act to save a life without fear of the law/council – make a decision to act positively
- Being taken seriously
- Life
- If I tell you about the flood hazard on my property, will it affect my insurance/property value (I'll send a picture of my neighbours place though)
- Maintaining momentum with respect to other priorities
- Cost and time (resources)
- More immediate timeframe vs those science teams
- Being "battled back" by an initial response to a scientist… can lead to cynicism
- Feel unknowledgeable
- Community division?
- Keeping an open mind
- New technology training requirement
- Mentoring and support
- Access
- Decreasing trust in science
- "Who do I trust?' when I receive info/share info
- Uncertainty in what science is or means
- Trust
- Interest
- Is it relevant to me?
- Relevance (personal or community)
- Defining/knowing what's in it for me? (especially young adults)
- Science vs beliefs (e.g. creationism)
- Taking the time
- Knowing who to contact if they have a citizen science idea
- Knowing the right person/scientist/org to talk to
- Knowing about the project to start with – awareness
- Keeping on doing it – especially if I don't hear back about the value of my contribution
- Not knowing that what they are seeing is 'data' that's needed
- Transparency involvement in the whole (analysis, etc.) sustainable process
- Awareness of work going on
- Wider community knowledge transfer
- Entrenched views
- Willingness to accept unexpected outcomes

- Being acknowledged as being intelligent
- Fear of language/jargon
- Roles and responsibilities ownership
- I might not want to know
- Will it waste my time? What's the value? Is it a priority for me?
- Fear of looking silly if I ask a dumb question
- Resources
- Funding
- Language barriers
- Cultural norms and values preventing sharing of info and data
- Culture: it's not how it's done here ….
- Standing out/doing things differently from other people

APPENDIX 5: LINKS TO DOCUMENTS REFERRED TO BY SPEAKERS

RIA (2013) Disaster Risk Communication: Dialogues for Reducing Disaster Risk. An Integrated Research on Disaster Risk, Risk Interpretation and Action programme Briefing Note.

- **Abstract:** How do scientists, practitioners and people at risk make decisions, individually and collectively? Social theory, psychology and learning theory have all addressed this question but somewhat independently. This has led to a number of discontinuities in the analysis of risk communication and perception and gaps in research and practitioner activity (and funding). The result is a number of unanswered questions:
  - Can placing learning in the centre of science and policy lead to a paradigm shift for understanding and acting on resilience and transformation? Can learning theory (including social learning) connect with action research and knowledge exchange work to create a paradigm shift for risk management – one built on knowledge and learning processes and perception?
  - What are the practical obstacles to a more flexible and knowledge rich humanitarian and development sector and professional practice? How do people's decisions, perhaps due to social norms and perceived or actual constraints on their freedom of choice, diverge from evaluations of risk? How can we better theorise and research the relationships between organisational and social structures on the one hand and individual agency on the other to better understand individual and social learning and action in risk management organisations including humanitarian and development agencies?
  - How much emphasis should be placed on risk forecasting versus communication? If the step change in risk avoidance is to come from risk communication why is this consistently underfunded compared to hazard modelling? Are the right questions being asked?

- Beginning to address these questions is helped by considering two overarching concerns that reflect the challenges and scope for communicating between science, policy and practice communities, reflect the vested interests inherent in each group and the norms and values that shape dialogue and priority setting. Improving communication on risk is not about improving the coherence of messages. Rather it is about each group being very clear about its motivations for producing knowledge, including career and organisational imperatives.

- Available at: http://www.irdrinternational.org/wp-content/uploads/2013/04/RIA-Workshop-Report_May-16-17-2013.pdf

Lynne D. Roberts (2015) Ethical Issues in Conducting Qualitative Research in Online Communities, Qualitative Research in Psychology, 12:3, 314-325

- **Abstract:** Increasingly, psychologists are extending their research to include online methods of data collection. Psychologists' use of qualitative data obtained or generated online for research purposes poses unique challenges because of the "traceability" of quotes, often sensitive content of data and potential impact on both individuals and online communities. In this article, working within a framework that goes beyond "procedural ethics" to examine "ethics in practice," ethical issues associated with conducting qualitative research within online communities are identified. These include tensions over public/private space, authorship versus human research participants, informed consent, anonymity and pseudonymity, covert research, deceptive research identities, reactions to being researched, and the quality of data obtained. Prior to conducting qualitative research in online communities, researchers have an ethical obligation to identify and weigh possible risks and benefits to both the community and community members. Sensitivity to the specific online community and continued ethical consideration throughout the conduct and reporting of the research are required.

- Available at: http://dx.doi.org/10.1080/14780887.2015.1008909

Blundell (2015) Here's looking at ya. Listener. 8th October 2015

- **Byline:** Counting birds, collecting water samples and stargazing are all ways Kiwis are participating in the global citizen science trend.

- Available at: http://www.listener.co.nz/current-affairs/science/heres-looking-at-ya/

Duncan et al. (2014) Integrating science into humanitarian and development planning and practice to enhance community resilience. Executive summary

- **Description:** A set of Guidelines on 'Integrating science into humanitarian and development planning and practice to enhance community resilience' has been developed by Melanie Duncan at University College London in collaboration with a number of contributors. The guidelines are designed to encourage humanitarian and development non-governmental organisation (NGO) practitioners to think about the types of scientific information and expertise they may need, how to access and use them, and how to ensure that they are applied in an ethical and accountable manner.

- Both the Executive Summary and the Full Guidelines are available at: www.ukcds.org.uk/resources/integrating-science-into-humanitarian-and-development-planning

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