Vanuatu

Participatory methods of incorporating scientific with traditional knowledge for volcanic hazard management on Ambae Island

Location:	Ambae Island
Date:	2001
Sector focus:	Natural hazard preparedness & warning
Spatial focus:	Island communities

Bibliographical reference

Shane J. Cronin, David Gaylord, Douglas Charley, Brent V. Alloway, Sandrine Wallez, Job W. Esau, *Participatory methods of incorporating scientific with traditional knowledge for volcanic hazard management on Ambae Island, Vanuatu*, *Bulletin of Volcanology* 66 (2004), pp. 652-668.

Abstract

A team of international volcanologists, local government officials, and community representatives worked together on this Pacific island to develop a warning system for volcanic eruption as well as shelter and evacuation plans. Ambae island is the nation of Vanuatu's largest active volcano. Some 9,500 inhabitants live beneath a lake perched at 1,340 m in the volcano's summit caldera. Scientific and local knowledge was combined in gender segregated as well as combined community meetings. Care was taken to build confidence and trust. These measures including ritual gift giving and welcoming speeches customary in island society. The inclusion of a high ranking chief from a neighboring island as a technical officer and a local woman as a facilitator were key confidence building measures. Classic methods of Participatory Rural Appraisal (PRA) were employed (see below), and are nicely reviewed in the journal paper (pp. 655-6).

Other hazards were identified besides mudflows and gas emission associated with volcanic eruption. These included a large cyclone with a frequency of 15 years and smaller ones every 2-3 years; large landslides (90 year frequency); earthquake (90 yrs.); drought (10 yrs.); annual floods; frequent malaria and diarrhea.

Sub-group mapping exercises, subsequently presented to the plenary, revealed the distribution of population and potential safe areas in the case of cyclone related floods, eruption induced mudflows and gas emissions. Particularly dangerous valleys were identified. Discussions also revealed past difficulties with warnings of cyclone and volcanic eruption.

The outcome was the establishment of a disaster committee. At follow up meetings a warning and evacuation plan was developed.

This case should be of interest in many parts of the world, and not just isolated small islands. The culturally sensitive and patient process of combining external specialist knowledge with in depth local knowledge is superb, and the empowerment resulting is a good example of effective implementation.

Technical description

Hazard/risk type: Volcanic eruption and cyclone

Type of assessment: Natural hazard identification and analysis; vulnerability (exposure) mapping; organizational/ communicative capacity analysis.

CRA process

Collection and digestion of background data. Community based action planning sessions.

Methods used: Timelines, table comparing changing village situation over 20 years, storytelling, seasonal calendar, daily activity timetable, transect recording, mapping of areas exposed to hazards and mapping safe areas, diagramming community organization and decision making, charting and diagramming traditional warning and disaster management methods, ranking emergency management needs, community disaster management action planning.

Was livelihood analysis used? Yes, but only to the extent that community mapping included agricultural fields and paths connecting them to settlements. Livelihood security was not part of the assessment from a functional point of view, and livelihood location – in the strict spatial sense – was the only aspect integrated into the volcano hazard planning.

Was external specialist knowledge introduced? Yes: scientific knowledge of process of lahar formation from volcanoes with crater lakes was combined with local oral history of past lahar flows. A detailed French/ English topographic map was simplified and translated into the local language as part of the community based disaster planning exercise.

Vulnerability analysis

Vulnerability was treated in this project in a limited way as identical with spatial exposure. Risk mapping was a key tool. However, nuances of vulnerability according to age, gender, and wealth were not featured. In a more egalitarian, small scale island society this may not have affected the value of the outcome as much as it would in another context.

Capacity analysis

Resources available: Financial: UNESCO South Pacific Office funding with other support from New Zealand aid and development agency (NZAID) and the South Pacific Applied Geoscience Commission (SOPAC).[1] Individual international researchers also had foundation support. Human resources: involvement of national, provincial, and local government officials. Local institutional resources: hierarchical chieftanship system linked with local churches and women's groups.

Limitations to capacity: Financial/ material: no telephones on the island and lack of money for maintenance of radio connections – thus limiting availability of cyclone warning. Institutional: Hierarchical local social organization and political competition meant that information did not necessarily flow quickly and evenly in the community. Women were often excluded from decision making.

Action planning and implementation

What actions were actually planned? Community volcanic eruption and lahar response plan.

Were all actions actually carried out? Yes. All maps produced by the project were posted in a room in a church, and they served as the basis of on-going work dynamized by the newly-formed community disaster committee.

Have these actions turned out to be sustainable? The authors (writing two years later) express doubts without intermittent follow up visits.

Were there any unanticipated additional benefits of the actions? Increased visibility of women's contribution to the community and their knowledge.

Were there any unanticipated negative consequences of the actions? None.

Limitations on action/ sustainability of actions: Isolation and distance makes follow up visits difficult and costly. There is also a natural decay of perceived urgency as the years continue to elapse since the last eruption (1994).

Indicators

No lahar flows or eruptions have tested the system put in place so far (September 2005).

Contextual notes

Existence/ role of prior or contemporaneous conflict? None.

Role of displacement/ relocation? None.

Role of prior disaster & prior recovery attempts? There had been an eruption of the volcano in 1994, so the hazard was reasonable vivid and fresh in people's minds.

Significant historical, geographic, economic, political, or cultural issues that influenced this instance of CRA and its consequences? The social organization is quite hierarchical. This both has advantages and disadvantages for decision making and warning systems. Geographical isolation and low income present challenges to systems that require external inputs of information or technical components (e.g. ICT, radios, etc.).

Strategic notes

How has this practice of CRA influenced change in policy and practice at the national level? N.A.

How has this practice of CRA influenced change in policy and practice at local level? Disaster planning, warning, and decision making changed. The focus was narrow, so that although cyclone and malaria both came up in community discussion groups, no measures for strengthening houses against wind or managing the habitat of mosquitoes resulted. The project may have laid down the foundation for such similar actions, but did not initiate them.

How has this practice of CRA influenced the level of organization and solidarity in the locality where it was carried out? The work was done in a way that reinforced the authority of the traditional leaders.

Less divided along class, gender, age, ethnic lines? Because of the culturally sensitive way this work was carried out, traditional male chiefs and assistant chiefs were supported and the existing

political system reinforced. Thus gender divisions were probably very little affected although there is more awareness of women's knowledge.

More divided along these lines? No.

Are the people living in this area more able to speak out on issues that concern them? National plans for ocean evacuation by boat in the case of a large volcanic eruption were criticized in group discussions because community maps revealed that the proposed pick up point could be isolated by mudflows and floods. An alternative wharf location was suggested.

Have new civil society organizations been created directly or indirectly because of this practice of CRA? An on-going community disaster committee was formed.

Lessons learned

- It is feasible to integrate highly technical expertise into a CRA process.
- Local social institutions are very valuable in providing an environment in which CRA leads to action.

Keywords

Volcanic eruption, lahar, cyclone, community mapping, gender, traditional hierarchy, early warning, evacuation, combination of scientific and local knowledge, participatory rural appraisal

Resource person(s)

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[1] http://www.sopac.org/tiki/tiki-index.php .

Vanuatu

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Location: Ambae Island

Date of update: 29 February 2008

Background

A team of international volcanologists, village elders and local government representatives developed a volcano hazard map and early warning system with Participatory Action Research (PAR) methods in island workshop from 1999-2003. An atmosphere of trust and mutual respect was established for local and traditional knowledge of Mount Manaro and outside specialist knowledge that provided a hazard map as a complement to knowledge of danger signs (for example, migration of birds off the island, unusual insect and animal behaviour, die-off of vegetation and changes in lake color). A warning and evacuation plan was made, and committees were formed to maintain awareness of the eruption hazard.

Update Time Frame, Mode of Follow Up & Confidence Level

On 26 November, 2005, the volcano erupted, and the warning system and action plan were put to a real test nearly seven years since project inception. Update information was collected by the original case study co-author and contact, New Zealand volcanologist Shane Cronin, who supplemented a written follow up report with emails in 2007. Confidence level is very high.

Sustainability

Committees have been maintained to the extent that within two days a successful evacuation could be mounted on the basis of local resources.

Actions implemented

Two days after seeing black smoke coming from the volcano crater the committee was activated and evacuation begun. Within eight days some 3,300 of the island's approximately 10,000 inhabitants evacuated to zones earlier agreed on the basis of community and specialist mapping to be safer – at the two ends of the island (each having ports and an airstrip). Emergency response plans implemented included actions and responsibilities agreed to in advance by the residents leaving danger zones and those who were to be their hosts.

Welfare/security results

This locally-based hazard response was accomplished with little cost and negative health and social impacts on the evacuees and host communities. "Welfare was regulated by Nakamal chiefs of the host communities. … Despite high levels of tension, overcrowding, inadequate facilities and poor sanitation, there was little unrest in the camps. Food and supplies were donated throughout the evacuation period by major Vanuatu NGOs, church groups and businesses, as well as by the Penema Province communities of Pentecost, Santo and Vila. The Red Cross deployed personnel and resources to help with managing welfare and supplying water" (Cronin et al. unpublished).

Replication of method/approach

Similar methods were used on islands around greater Vanuatu and eventually provided input to the central national volcanic warning system (the Vanuatu Volcanic Alert level System – VVAL) as well as to the process of developing a Penema Province Disaster Plan.

Lessons learned/open questions

1. A blend or even fusion of local and external specialist knowledge can be highly effective in providing the basis for local action and self-protection. In this case, the plan developed locally with outside specialist input was effective.

2. The PAR process can establish new institutions and enhance older ones in such a way that risk awareness is raised in a sustainable way. Islanders had not experienced a large eruption for 100 years until 2005. Nevertheless, the process begun in 2001 was effective in raising awareness in such a way that people were able to respond to the warning and evacuation system actively and rapidly.

3. Since workshops involved only 3-8% of residents (depending on specific venue) and were age and gender segregated, how much more knowledge and volcano hazard influenced cultural practice might there still be untapped?

4. To what degree does the PAR and action planning process incorporate skill building for improvisation in the face of uncertainty and gaps in both Western scientific knowledge and local knowledge? In this case the interactions of steam, island formation in the crater lake, rising crater lake water level, and rainfall were too complex to predict lahar and mudflow hazard with certainty. Local experience did not reach back far enough to include details of deadly lahars and mudflows in 1870 and 1914.

5. As there had been a long history of mistrust of Western scientific warnings (peaking in 1995 when residents misread externally provided hazard map), really how deep does the apparently newly established mutual respect and trust go? How sustainable is the system beyond this one trial? If volcanic impacts ever affect the "green" or safer ends of the island, is there an adequate plan for further evacuation? The case study authors refer to the 2005 event as a "beneficial false alarm" to the extent that the danger was less than expected. Is there not a down side to even "partially false" alarms in terms of credibility and community cooperation?

6. To what extent can this work be the basis for multi-hazard local mobilization and planning for cyclone hazard, local ocean oil or toxic spill that would endanger the coasts, or mass casualty event such as air disaster at one of the air strips?

Keywords

Volcano hazard, hazard mapping, evacuation planning, local government, traditional knowledge, warning system.

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