

TOURIST SECTOR PERCEPTIONS OF NATURAL HAZARDS IN A SMALL ISLAND DEVELOPING STATE: A PRELIMINARY STUDY AND RECOMMENDATIONS FOR AN AWARENESS STRATEGY IN VANUATU.

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Abstract

Tourism is a popular catalyst for socio-economic development in many Small Island Developing States (SIDS). However, exposure to damaging natural hazards in these nations exacerbates the tourism industry's intrinsic vulnerabilities. The reliance of SIDS on the income-multiplying benefits of tourism make the sustainability of the industry imperative, but the vulnerability of tourism to natural hazards endangers this sustainability. The perception of natural hazards held by tourism managers may influence the adoption of appropriate mitigation and preparedness measures and thus, decrease vulnerability and increase sustainability. Accordingly, this paper presents the method and findings of a pilot study into the accuracy of natural hazard perceptions held by members of the tourism industry in Tanna, an island in the South West Pacific SIDS of Vanuatu. The study finds that perceptions are generally accurate within the industry. However, there is scope for improvement in the prevalence of accurate perceptions. It is recommended that this be achieved through the development and implementation of a comprehensive natural hazards awareness strategy, details of the format and structure of such a strategy are detailed within.

Keywords: Natural hazards; perception; Small Island Developing States; tourism; vulnerability.

INTRODUCTION

In the foreword to the World Tourism Organisation publication 'Tourism in the least developed countries', the Secretary-General of UNCTAD (United Nations Conference on Trade and Development) states that service industries, in particular tourism, are increasingly being seen as "the most viable option for the sustainable economic and social development of the least developed countries" (Ricùpero, 2001:3). This is particularly true in Small Island Developing States (SIDS) whose limited natural resource bases generate a dependency on the services sector for economic stability and finance generation (Hall and Page, 1996). Despite the increasing reliance of many SIDS and other developing countries on international

tourism, what little literature is available on disaster management in tourism is restricted to studies of larger, more developed nations (for example Murphy and Bayley, 1989; Burby and Wagner, 1996; Faulkner and Vikulov, 2001; Huang and Min, 2002). This is a paradox since SIDS have some of the highest exposure levels to natural hazards globally; at least 13 of the 25 most disaster-prone countries are SIDS (UN, 1994). Since the terrorist attacks of September 11th 2001, it is possible that the tide is turning, with increased interest in security issues particularly within the airline sector. However, this trend does not extend to the field of natural hazards, despite previous natural hazard occurrences that have resulted in considerable damage; in some cases devastation of nations' tourism industries (Murphy and Bayley, 1989; SPDRP, 1997; Huang and Min, 2002) and the fact that all tourism destinations are likely to experience some kind of disaster at some point in their evolution (Faulkner, 2001).

The tourism industry is highly vulnerable to disaster and/or the effects of disaster. This includes vulnerability of both physical infrastructure and intangible elements such as destination image and reputation. Tourism's vulnerability is a function of a number of the industry's characteristics including: its diversity and reliance on a great number of different organisations; its global nature; its competitiveness; issues of seasonality; complex damage and recovery; and the unfamiliarity of tourists with local hazards and protective actions (Murphy and Bailey, 1989; Durocher 1994; Burby and Wagner, 1996). The Vanuatu government is keen to encourage the development of the tourism industry as a vehicle for socio-economic growth, stating that,

“tourism by far poses the single greatest potential for opportunities creation ... having a positive multiplier effect on the country's economic and social development” (Government of Vanuatu, 2001:3)

Located in the South West Pacific, Vanuatu is 2300km northeast of Sydney (Australia) (see Figure 1) it possesses extensive beaches, waterfalls, coral reefs and a year round temperature range of 20-30°C. Tourism in the islands has been steadily increasing in the last 30 years. During the period 1990 to 2000 visitor numbers increased from 35,000 to 57,000 (WTO, 2001).

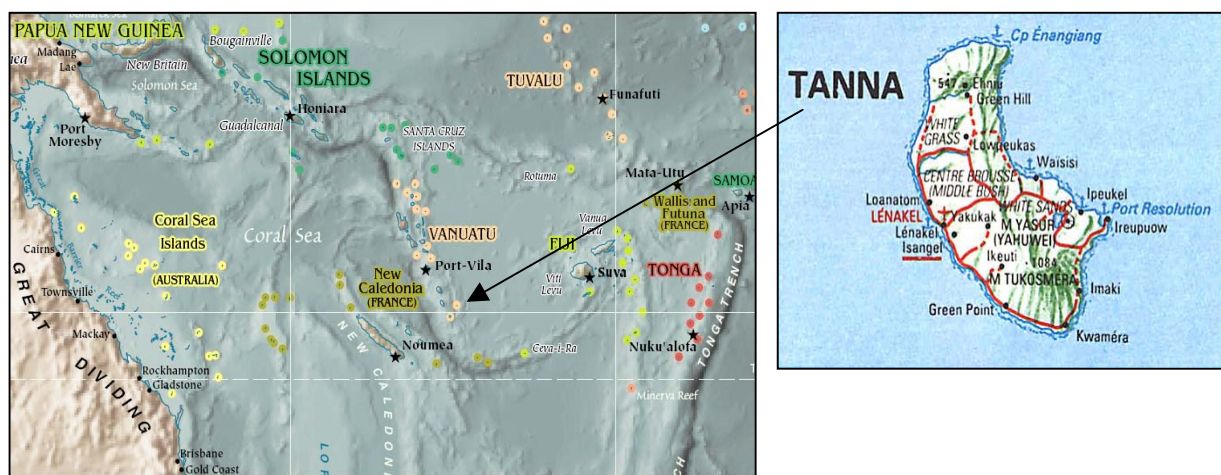


Figure 1 Map showing location of Vanuatu and Tanna Island.

However, Vanuatu has been described as the most disaster-prone country in the South Pacific (Vanuatu National Disaster Management Office, 2001). The geographic setting and geologic history of the region accounts for the nine active volcanoes found on Vanuatu and the frequent occurrence of earthquakes. Tectonic activity around the rim of the Pacific means that Vanuatu is also exposed to tsunamis. Tropical Cyclones affect the islands as a result of their geographical position. In addition, the country is also affected by mass movements, sea-level rise and drought. Such natural hazard events commonly evolve into disasters as a result of the high level of vulnerability exhibited by Vanuatu. This is because Vanuatu is heavily influenced by characteristics common to SIDS, such as geographic isolation, small physical size, high population densities, limited institutional capacity and weak economies (UN, 1994a).

Tanna Island is one of Vanuatu's principle tourism destinations, hosting a small tourism industry composed of nine operational resorts, a further two under construction and one temporarily closed following landslide damage. Capacity varies from resorts capable of accommodating ten guests to larger resorts able to host up to 25 guests. In total, Tanna has approximately 100 tourist beds. Resorts are predominantly constructed in traditional Tannese style using local natural materials (Figure 2a). Some resorts are of semi-traditional construction style, combining the traditional bamboo and palm leaf style with concrete flooring. Two resorts on the island are constructed using modern or western materials such as concrete and corrugated steel (see Figure 2b). Tourism is based around the attraction of Mt. Yasur, one of the world's most easily accessible active volcanoes and the most frequently visited in Vanuatu (Vanuatu Tourism Office, undated; Wallez, 2001). Tourists are able to access the summit of the volcano and stand on the crater's rim to observe the eruptions. Additional attractions to the island include villages that have rejected a modern lifestyle and live in the traditional 'Kastom' style, and the John Frum religious cult (O'Bryne and Harcombe, 1999).



Figure 2a Friendly Bungalows, White Sands.



Figure 2b Uma Guesthouse, Lenakel.

This study looks at the tourism industry in Tanna, in particular the accuracy of the perception of natural hazards held by individuals involved in the tourism industry.

Perception was selected as an area of study as it has been found to be influential in the adoption of mitigation and preparedness measures for natural hazards (Miletti, 1980; Plapp, 2001). Research has demonstrated that among a number of managerial characteristics, the risk perception of tourist managers shows the highest correlation with extent of disaster planning (Drabek, 1994). Higher risk perceptions result in the implementation of more disaster planning and it is therefore important that perceptions are accurate to ensure the adoption of appropriate levels of planning, mitigation and preparedness.

Methods

The study focuses on the perceived and actual likelihood of damaging hazards occurring. Damaging hazards are defined by this study as those that result in destruction or severe damage to a season's crop and/or significant damage to the structural integrity of traditional and/or colonial buildings. Data on perceived likelihood was collected using social surveys in the form of face-to-face questionnaires, supported by intensive semi-structured interviews. Questionnaire respondents were asked to select the likelihood of a number of damaging natural hazard types occurring. Likelihoods were defined using a Likert scale ranging from extremely likely, likely, not sure, unlikely to extremely unlikely. The phrase 'likelihood of damaging event' was selected as individuals often consider potential damage when thinking about hazards, and so are in fact thinking about risk, as risk is related to the likelihood of harm (Sjöberg, 2000) or damage from hazard events. The aim of this research was to obtain information on the perceived *likelihood* of a damaging event and not the *degree* of damage. Interviews were designed to obtain in-depth information regarding preparedness, experience of natural hazards, and tourism on Tanna. The interviewees were a mixture of Ni-Vanuatu (Vanuatu nationals) (58%) and ex-patriots from Australia, New Caledonia and the United Kingdom (42%). The majority of respondents were male (75%). All respondents were resort owners or managers, some fulfilling both roles. The majority of interviewees were aged between 30 and 49 years (67%). 25% of respondents were aged over 50 and 8% were aged 16-29. The majority of interviewees (88%) are permanent residents on Tanna; the remaining interviewees live permanently in Port Vila.

The actual likelihood of damaging hazard occurrence was identified using a simple semi-probabilistic approach, covering each of the hazards to which Tanna is exposed. The recurrence interval (in years) of damaging events were identified. Assessments were based on historical data of previous hazard occurrences found in international databases (NEIC Earthquake database, The Tsunami Laboratory, NOAA tsunami database and the New Zealand National Institute of Water and Atmospheric Research Cyclone database). For some hazards, specifically mass movements and droughts, no database of occurrences exists. In these instances the actual likelihood of damaging hazard occurrence was identified following a review of soil types and topography and analysis of some limited previous data on droughts in Tanna. The actual likelihood of damaging sea-level rise was identified on the basis of predictions of sea-level rise made by the Inter-Governmental Panel on Climate Change (IPCC, 2001), local estimates by Phillips (2001), data on the coastal topography of Tanna (Moli, undated) and rates of tectonic uplift (Chen et al, 1995).

Volcanic hazards were assessed using an existing survey of the socio-economic impact of volcanic hazards on Tanna (Wallez, 2001) and a volcanic hazard map of Mt. Yasur (Robin and Monzier, 1996).

Quantitative recurrence intervals were converted into qualitative statements of likelihood using the scale below (Table 1) based on government planning cycles and Ni-Vanuatu life expectancy. Conversion was necessary to facilitate comparison of actual likelihood and perceived likelihood as reported in questionnaires. A justifiable criticism of this conversion is that qualitative terms such as used above are subjective and may be interpreted differently by the researcher and respondents. However, this project represents a preliminary study designed to investigate knowledge and represents a valuable first step towards understanding sustainability of the tourism industry of Vanuatu. Therefore, we consider the value of the findings to out-weigh issues associated with the methodological approach. The actual likelihood of damaging natural hazard occurrence on Tanna identified by semi-probabilistic hazard assessments is shown in Table 2.

Table 1 Conversion scale for Recurrence Interval and Qualitative descriptor of likelihood

Recurrence Interval (years)	Likelihood	Justification
Less than or equal to 5	Extremely Likely	This timeframe has been selected as Government plans are renewed on a 5 yearly basis.
5-35	Likely	Events will occur at least twice within the lifetime of an average Ni-Vanuatu; such frequencies of occurrence can be described as likely.
36-70	Unlikely	Events will occur once within an average Ni-Vanuatu's lifetime. An event that occurs just once in your lifetime can be considered as unlikely
Equal to or greater than 71	Extremely Unlikely	Events may not occur within the lifetime of an average Ni-Vanuatu and so can be considered as extremely unlikely

Table 2 Actual likelihood of damaging natural hazard events on Tanna, Vanuatu

Hazard	Definition of damaging	Actual likelihood (conversion from semi - probabilistic assessment)
Volcanic Ash Cloud	The loss of the majority of a season's crop, significant structural damage to traditional housing and weakening or collapse of the roofs of colonial structures (Wallez, 2001)	Extremely Unlikely
Pyroclastic Flow	The destruction of a season's crop, traditional and colonial structures (Wallez, 2001)	Extremely Unlikely
Volcanic Earthquake	The loss of a season's crop and significant structural damage to traditional and colonial housing (Wallez, 2001)	Extremely Unlikely
Tectonic Earthquake	Earthquakes of moment magnitude greater than or equal to 6.0 (occurring within an epicentral distance of 50km from Mt. Yasur) (NEIC, 2002; 2003)	Extremely Likely
Drought	The loss of a season's crop (Vanuatu Meteorological Service, 2001) associated with the El Niño	Extremely likely-likely
Mass	The loss of a season's crop and/or significant damage to	Likely

Movements	traditional housing (Moli, undated)	
Tsunami	Tsunami with vertical run-up height greater than or equal to 4m (Soloviev, 1978 in Alexander, 1993)	Unlikely
Sea-level rise	The permanent inundation of land to a distance greater than or equal to the current location of island infrastructure (Moli, undated; IPCC, 2001; Phillips, 2001)	Unlikely

Although Vanuatu experiences an average 2.6 tropical cyclones per year (Government of Vanuatu, 2001) these do not all meet the criteria of damaging set by this study. This study found Tanna to experience damaging tropical cyclones every 5.9 years. The study found that large areas of Tanna were prone to slope failure that could result in mass movements. Since mass movements are often secondary hazards triggered by events such as earthquakes, volcanic activity and heavy rain, we identify mass movements as likely. Sea level rise is identified as unlikely. It is important to note that the phenomenon of sea-level rise occurring in Vanuatu is not disputed. However, at the current rate of change, damage will not be evident for some time and so is classed as unlikely within the parameters of this study. Tsunami is also identified as unlikely. Due to a lack of local data it was only possible to calculate the recurrence interval of damaging tsunami for Vanuatu as a nation and not for individual islands. Although the national recurrence interval of damaging tsunami is 35 years, identifying the hazard as likely, it is probable that the recurrence interval of damaging tsunami in individual islands is greater and accordingly, a damaging tsunami in Tanna was identified as unlikely.

Damaging volcanic hazards such as pyroclastic flows and extensive ash fall were found to be extremely unlikely. Although Mt. Yasur is continuously active, its activity tends to be of a low-moderate level. A high activity level is required for extreme damage, as defined in this study, to be caused. Activity of this kind has been described as “not very likely” (Robin and Monzier, 1995:1) and accordingly, has been identified as extremely unlikely. However, the chronic effects of acid rain and light ash can have a detrimental effect on crop yield and quality if events occur during flowering and fruiting season.

Results

The wide spread of responses to questions of ‘likelihood’ of damaging occurrence for each hazard has meant that in no cases have a majority ($\geq 50\%$) of respondents selected a single likelihood. As actual likelihood is, in all but one case, identified as a single likelihood, it is probable that the majority of respondents will hold other, ‘inaccurate’ perceptions. A line is drawn between likely and unlikely, with perceptions on the correct ‘side’ of the line judged as accurate. This can be justified if we assume that slight inaccuracies (for example a likely response when the actual probability is identified as extremely likely) demonstrate respondents to be in the right ‘neck of the woods’. For this preliminary study this is sufficient to gain an overview of perceptual accuracy. Table 3 summarises the results in terms of accuracy of perception. Later discussion reviews the implications of slight over or underestimations of hazard by tourism managers.

Table 3 Accuracy of perception for each hazard type considered

Hazard	Percentage of respondents				
	Overestimate	Accurate	Underestimate	Not Sure	Missing
Ash Cloud	65	35	N/A	0	0
Pyroclastic Flow	25	60	N/A	10	5
Volcanic Earthquake	55	30	N/A	10	5
Tectonic Earthquake	N/A	40	35	20	5
Tsunami	35	60	N/A	15	0
Floods and Rain from a Cyclone	N/A	80	15	5	0
Strong Winds from a Cyclone	N/A	85	10	0	0
Mass Movement	N/A	57.5	37.5	5	0
Sea-level Rise	30	50	N/A	20	0
Drought	N/A	55	25	10	10

In most cases the majority of respondents accurately perceived the likelihood of damaging hazard events. In some resorts, this is reflected in the adoption of appropriate actions. These include (1) preparedness (for example, emergency kits including water, food, and torches or evacuation kits containing important documentation such as passports and insurance documents) and, (2) mitigation to reduce hazard impacts (for example, the fitting of effective cyclone shutters and anchoring structures). However, even in cases where accurate perceptions were predominant, there is room for improvement to increase the sustainability of the industry.

For only three hazards is the percentage of accurate perceptions less than 50%. Volcanic hazards: ash clouds and volcanic tremors were both overestimated by 65% and 55% respectively. The significant overestimation of damaging ash clouds (by 65% of respondents) may be attributable to the definition of damaging employed in this study. Damaging ash clouds were defined as acute events resulting in the loss of the majority of a season's crop, significant structural damage to traditional housing and weakening or collapse of the roofs of colonial buildings. Interviews indicated that respondents defined damaging ash clouds differently, ash clouds may cause less extensive damage, perhaps the loss of some crops in a limited geographical area. Such ash clouds are not uncommon and if this modified definition of damaging is used, (chronic) damaging ash clouds can be assessed to be likely. With this definition, the perceptions of respondents can be seen to possess a higher degree of accuracy.

The overestimation of the likelihood of damaging volcanic earthquakes may be attributable to confusion between this hazard and small tectonic earthquakes. Individuals believe they are experiencing the former when in fact, they are, experiencing the latter. Respondents may also overestimate the likelihood of damaging volcanic earthquakes because of their experience of the tremors. Volcanic earthquakes rarely exceed 4 - 5MW and are spatially confined to a small area around Mt Yasur. However, such volcanic earthquakes can feel quite large underfoot giving a misleading sense of magnitude. There is little evidence of action being taken to mitigate against the hazards, despite the general overestimation of their likelihood. It is worth pointing out that the chronic effects of volcanic hazards such as corrosive acid rain and abrasive ash should be mitigated against in future development plans.

Tectonic earthquakes are the hazard most underestimated by the tourism industry in Tanna. A significant influencing factor is probably the long period of large magnitude, seismic 'quiescence' immediately around Tanna. Personal communication with a government employee indicated a perception that earthquakes are likely in Port Vila but not in Tanna (pers comm. 2002), a comment influenced by the recent earthquake in the capital. Such underestimation may contribute to several resorts' reliance on the presumed earthquake resistance of traditional structures as described in interviews, rather than the implementation of additional measures such as anchoring. Some research has explored the differential impact of seismic shaking upon traditional and semi-traditional construction styles and techniques and their relative values (Tezcau and Ipek, 1996; Coburn and Spence, 2002). The 2002 earthquake in Port Vila demonstrated that some concrete structures sustained significant structural damage (Shorten, 2002), but the level of damage in traditional structures was unclear due to the dominance of concrete structures. It is reasonable to suggest that as a result of the lightweight natural materials used in traditional buildings, morbidity and mortality following structural failure would be far less than that caused by the failure of concrete structures. Also earthquakes have always occurred in Vanuatu, and as a result, it is likely structural design will have evolved over time to ensure traditional buildings are more resilient. However, the relatively shorter recurrence interval of cyclones means the design of traditional buildings is more likely driven by cyclones than earthquakes. Interviewees commented that traditional structures would be easy and cheap to rebuild if they were to fail, and this is doubtless an objective of their design. The resilience of more recent mixed style and modern structures is untested on Tanna. If such designs are favoured in development plans and subsequently prove to be more prone to failure than traditional constructions, it could jeopardise tourism's sustainability through negative media coverage and expensive recovery and rehabilitation (Durocher, 1994).

Results show cyclones are the hazard perceived to be most likely: eight of the eleven interviewees stated cyclones were the hazard most likely to occur and do damage on Tanna. Consequently, it is for this hazard that many resorts focus their mitigation and preparedness activities. Interviewees appeared, in general, well prepared for cyclone related hazards and many commented on areas in which they

planned to improve their cyclone preparations. Such improvements included better shutter systems, limited set back and construction of cyclone shelters. Overestimated perceptions may be expected to result in over-preparedness and potentially inappropriate allocation of resources to the detriment of other hazards. There is no indication that this occurs in the case of cyclone related hazards. Overestimation of cyclone hazards may have contributed to high levels of mitigation and preparedness, increasing the sustainability of the industry in the event of cyclones. The preparations may contribute to general hazard awareness. Many preparedness measures are generic and can be applied to other emergency situations. However, the focus on cyclone related hazards could lead to 'tunnel vision' and a failure to implement generic preparedness in other situations or leads to a sense of complacency (Patton et al, 1998; Johnson et al, 1999).

Drought is another hazard accurately perceived as extremely likely to likely. It can be assumed that drought will affect the availability of potable water for tourists and also the availability of locally grown food and produce. This reduced availability may increase the need for the importation of goods for tourists, increasing business overheads. Only one resort commented that it intended to install water storage facilities, and this was intended for use in the event of a cyclone so would not provide sufficient supplies during a prolonged drought. These examples suggest that accurate perceptions do not guarantee appropriate levels of preparedness and mitigation. Similar observations were made by Houghton et al (1999) in relation to perception of volcanic hazards and preparedness activities. As such accurate perceptions do not guarantee the sustainability of tourism.

Large proportions of respondents were unsure of the likelihood of damaging earthquakes (20%), sea-level rise (20%) and tsunami (15%) occurring. 'Not sure' responses may indicate that individuals have not considered the likelihood of the hazard and so are unlikely to have employed appropriate mitigation measures. Tourists represented the largest proportion of not sure responses, indicating their unfamiliarity with the hazard types that may occur in Vanuatu. To reduce tourist vulnerability, tourism managers need to have accurate perceptions of hazards to ensure the implementation of effectively prioritised, appropriate preparations to develop a safe and resilient destination.

Awareness Strategy

The errors in perceptual accuracy highlight the need for a campaign to raise awareness. Also, the shortcomings in disaster mitigation and preparedness identified here support the call for a comprehensive strategy to increase the resilience and sustainability of tourism. The design of an awareness strategy needs careful consideration. Discrepancies between the perceived and actual likelihood of damaging natural hazards occurring should not be expected to disappear in the presence of new, accurate data (Slovic et al, 1982; Slovic, 1987). Initial beliefs influence how new information is interpreted: for example, information compatible with initial beliefs is accepted whilst contrary evidence tends to be deemed unreliable and inaccurate (Slovic, 1987; Mileti, 1999). To encourage positive interpretation of awareness messages, the use of persuasive communication

techniques can be applied to hazard awareness strategies (Mileti, 1999; Enders, 2001).

Persuasive Communication

A number of independent or input variables constitute persuasive communications to produce attitude or behavioural changes, which are viewed as the dependent or output variable (McGuire, 1985 in Mulilis, 1998). Mulilis (1998) suggests five classes of 'input communication variables' involved in persuasive communications:

1. *Source of the communication* – credibility, trustworthiness, attractiveness, liking, similarity, power
2. *Message characteristics* – style, clarity, forcefulness, speed, ordering, amount of material, repetition, number of arguments, extremity of position
3. *Channel variables* – media type (such as television, radio, newspapers, face-to-face communication), verbal versus non-verbal communication, context of channel
4. *Receiver variables* – age, intelligence, gender, self-esteem, level of active participation, incentives for participation
5. *Target or destination variables* – attitudes versus behaviour, decay of induced change, delayed-action effects, resistance to persuasion

(Mulilis, 1998:1) This framework forms the basis of the following suggestions for the development of an awareness strategy.

Target Population

It is necessary to define the strategy's target population. An inclusive option is to target the general public. However, this requires the treatment of the public as a homogenous group (Mileti, 1999). Such a generic approach is cheaper and easier than more specific, targeted approaches but may be less effective as 'receiver variables' are not considered. Although this research has been focused on resort owners and managers, it is recommended that an awareness strategy have a wider focus to include all individuals involved in tourism, from government officials to market gardeners and taxi drivers. This will facilitate industry specific messages, but may also have positive effects on awareness within the general public, as information is spread between local peer networks.

Strategy Aims and Objectives

The aims of this strategy are to increase the prevalence of accurate perceptions and implementation of appropriate mitigation and preparedness measures. In addition, interviews demonstrated that issues such as 'ownership' of risk and recognition of the wider impacts of hazards need to be addressed. Ni-Vanuatu resort owners and managers often relied on government, and sometimes, foreign government to finance and support recovery whilst ex-patriot resort owners and managers tended to rely more on themselves or insurance policies. Personalisation of hazards is imperative if messages regarding mitigation actions are to be accepted and acted upon. The wider impacts of hazards must also be understood. Durocher (1994) notes the importance of seeing the 'big-picture' and that damage outside resorts, for

example to island infrastructure, can have serious implications for the industry. These implications must be grasped and plans developed to mitigate them.

Debate is required of the most appropriate objectives to achieve these aims. A single generic campaign could be implemented but the variety of hazards on Tanna could make this confusing and ineffective. Hazards should be prioritised on the basis of those most likely and most underestimated. According to these criteria, earthquakes and mass movements should be the priority hazards, with remaining hazards tackled in succession. An alternative approach could be a series of hazard-specific campaigns, with the order of presentation based on a prioritisation of hazards. This approach would need to be supplemented with generic advice on recovery and rehabilitation. Alternatively, a themed approach could be adopted, based on the stages of the disaster-cycle, prioritising hazards within each stage.

Strategy Format

Once the aims, objectives and target population have been identified these factors can inform how the communication is achieved in terms of source, structure, content and style of delivery, ensuring the strategy is appropriate and effective.

Information sources can be categorised into three groups: authorities, news media, and peers (Mileti, 1999). Data arising from interviews with tourism managers found the news media or government to be the most trusted source of information (Méheux, 2004), reflecting Mileti's (1999) proposition that official sources are the most credible. The news media was also reported to be the most effective vehicle for receiving information. During interviews however, the impression was formed that several interviewees were talking about awareness related to short-term preparations and warnings, rather than long-term preparations to enable structural and corporate planning and adjustment. Taking this fact into consideration, business associations were found to be the next most effective way to receive information, echoing the findings of Burby and Wagner (1996) whose research suggested that tourism management would "look favourably on a proactive role by industry associations" (Burby and Wagner, 1996:57) to increase awareness of hazards.

Available data does not suggest the most appropriate structure for communication to take although interviewees rejected leaflets and posters as an effective measure. Other more suitable measures may include interactive workshops coordinated or supported by business associations. Interactive approaches intend to facilitate information exchange and are supported by the US National Research Council (National Research Council, 1988). In this case workshops would be used to spread information, and develop best practice within the industry.

An additional long-term option is the creation of a museum/information centre within the planned tourism complex to be developed at Lenekel. This museum could provide information and education on the natural hazards and culture of Tanna or the wider Tafea province, raising awareness of local residents, particularly school children. The venture could also attract tourists, diversifying the industry on Tanna, which was highlighted by interviewees as an aid to sustainability and increased

success of tourism. A similar initiative was established in Boulder, USA and included an interactive exhibition about flooding. The museum was a success; attracting local residents and educated tourists, it also led to the creation of similar museums in other cities (Mileti, 1999).

The effectiveness of an awareness strategy can be influenced by the characteristics of the message to be communicated. The message must be concise and clear (Mululis, 1998). Too much information can confuse recipients, resulting in the retention of limited and fragmented information. For this reason it is important that the aim and content of the strategy are clear. If a series or themed approach is adopted, the message must remain consistent and be presented in an appropriate order based on prioritisation of hazards or theme position in the disaster cycle.

Information type must also be considered. The four main types are: (1) scientific information based on technical data; (2) practical instructions; (3) portrayal strategies and; (4) fear appeals (Mileti, 1999). It is recommended that this strategy use a combination of these. Scientific data can be used to educate recipients about the actual likelihood (probability) of a hazard occurring. It is important that information is presented in a manner that is easily understood, as the majority of individuals do not retain this type of information easily. Studies have shown that a scientific understanding of the hazard is not essential for the adoption of positive adaptive actions (Mileti, 1999). Also important is an acknowledgement of inherent uncertainty in predictions and estimation, to ensure the public are not reliant on predictions which contain uncertainty.

Practical instructions can be used to provide advice of both mitigation and preparedness measures (Gregory et al, 1997). In providing instructions care must be taken to avoid confusion between hazard preparations. Portrayal strategies can be used to describe the benefits to tourism of employing the advocated preparedness and mitigation measures. Fear appeals involve the description of potential negative effects of both hazards and the failure to adopt recommended measures. Gregory et al (1997) suggest that clear information should be disseminated about what could happen in specific hazards. This is necessary to

create a well-informed public and trigger implementation of adaptive actions, perhaps through the use of case studies of previous local and international hazard impacts on tourism.

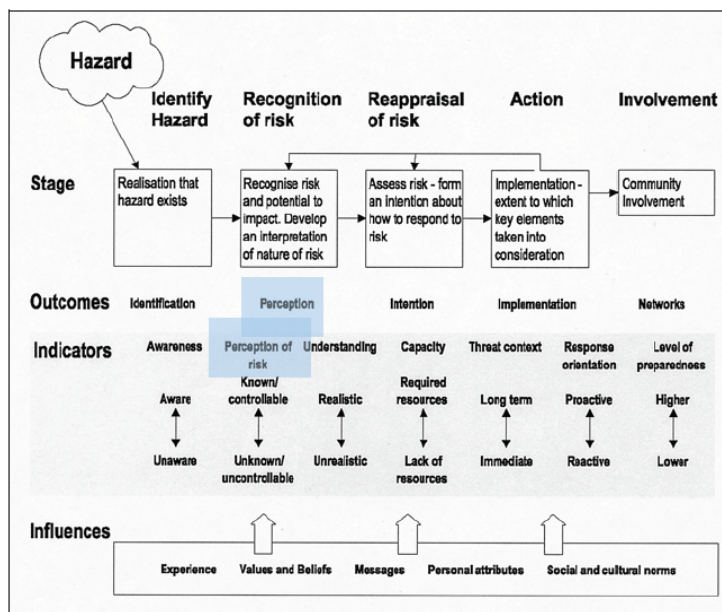


Figure 3 Enders (2001) Factors controlling community awareness and preparedness in emergencies.

Comprehensive approach

The above recommendations are based on the research of risk perception, which is just one of many influences on the way people respond to and prepare for hazards. Figure 3 demonstrates the complexity of factors affecting preparedness.

Enders (2001) suggests all variables involved in the behaviour change process should be measured, proposing a holistic framework for investigating emergency awareness and preparedness with six factors of study: hazard knowledge; attitudes to risk; previous experience of emergencies; exposure to awareness raising; ability to mitigate/prepare/respond; and demographic characteristics. Study of this wide range of factors would represent a significant volume of work, but would supplement the findings of this preliminary research on perception and provide a comprehensive basis for the design of strategies to increase disaster resilience and tourism sustainability.

Conclusions and Recommendations

The perception of the likelihood of damaging natural hazards within the tourism industry on Tanna is found to be generally accurate to overestimated depending on the specific hazard type. This has led to the implementation of a number of preparedness and mitigation measures. There are improvements that could be made to increase the adequacy of mitigation and preparedness measures and in turn increase the sustainability of the tourism industry on Tanna.

Significantly, accurate perceptions do not appear to guarantee the implementation of adequate mitigation and preparedness measures. It is recommended that a comprehensive strategy be designed and implemented to increase awareness of hazards and the actual likelihood of damaging occurrence. This strategy should also encourage the “ownership” of hazard mitigation to increase the adoption of appropriate mitigation and preparedness. Members of the tourism industry on Tanna support the design and implementation of such a strategy.

Recommendations for the format and structure of this strategy are as follows:

1. Information should be sourced from government and news media,
2. Strategy should be channelled through the news media and business association (for example the Tafea Tourism Council or Vanuatu Hotel and Resort Association),
3. Priority hazards should be earthquakes, mass movements and water pollution,
4. Strategy should be structured in a hazard series format or themed format based on the disaster cycle, prioritising hazards within themes,
5. Information should be delivered as a combination of scientific data, practical instructions, portrayal strategies and fear appeals.

Additional recommendations to inform this strategy and ensure its effectiveness are as follows:

6. Wider study of all factors affecting awareness and preparedness to inform strategy,
7. Thorough investigation of Tanna's natural hazards to develop hazard maps and zoning,
8. Testing current preparedness and mitigation using hazard maps and structural safety tests,
9. Land use planning and control,
10. Implementation of formalised disaster and recovery planning

It is recommended that study be made in the areas recommended above. Perhaps the most important is the detailed study of Tanna's natural hazards to develop comprehensive hazard maps. Such research would have valuable benefits both for the sustainable development of tourism, but also for the general population of Tanna, informing future development of safe locations and the necessary mitigation measures to be taken in particular locations.

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