

MANAGING RISK AND ALLURE AT VOLCANOES IN HAWAII: HOW CLOSE IS TOO CLOSE?

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Abstract: Volcanoes and other sites of dynamic natural processes have long attracted tourists, but they can also be dangerous sites that risk the health and well-being of visitors. This study examines tourist perceptions of risk and enjoyment in volcanic areas on Hawaii Island. Specifically this study involved interviews with tourists within and outside Hawai Volcanoes National Park to gauge their sense of safety at volcanic sites as well as their satisfaction with the tourism experience. The study found that despite frequent injuries and even fatalities near the volcano, there is both a high level of tourist satisfaction as well as a low level of perceived risk. The success of tourism in this area can be attributed to the fact that the tourist areas can be divided into different “*riskscapes*” where, due to different rules and government jurisdictions, tourists can self-select either activities that get them closer to the riskier features or keep them in safer viewing zones.

Key words: geotourism, risk, riskscape, safety, volcanoes, Hawaii

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As tourist attractions, volcanoes and other sites of dynamic natural processes present a unique blend of both allure and risk. These sites act as magnets for tourists and can be the principle drivers for economic development in the communities that surround them (Bernie, 2010; Cooper & Cooper, 2010). Sites of dynamic natural processes are attractive, in part, because of their awesome power and unpredictability which inevitably results in significant risks for visitors. While awesome displays of nature attract tourists, when tourists are actually harmed or travel infrastructure is disrupted visitor numbers and spending can drop (Hall & Lew, 2009). Therefore, like with other forms of tourism such as adventure tourism and theme parks, there is a thin margin for successfully attracting tourists. An attraction must be risky enough to appear exciting but not so risky so that potential tourists perceive the attraction to be a serious threat to their lives or health. Unlike theme parks, zip lines, and other constructed tourism sites, natural attractions like volcanoes are different in that the phenomena itself cannot be controlled. Instead, tourism managers and policy makers near volcanoes must employ spatial strategies to manage *where* tourists can be. Tourist areas have to be delineated that place tourists in spaces that are close enough to experience the awesome spectacle of a dynamic natural process, but not in spaces where they will experience the hazards of that process.

While this article focuses on a case study of volcano tourism in Hawaii, we contend that our study can inform the work of academics, tourism operators, planners and policy makers that study and manage tourism at other risky sites of dynamic natural processes such as other volcanoes, glaciers, rivers, seashores, and canyons. As demonstrated by the case of Rwanda, the development of a tourism industry around a site of volcanism can be a powerful impetus for economic recovery and vitality even if the tourism in the volcanic area is directed toward other attractions that are in vicinity. In and around Rwanda's National Park of Volcanoes (NPV), also called Parc of Virunga, tourism directed at viewing mountain gorillas near the volcano funds infrastructure improvements that benefit local community members as well as tourists. It also has produced, through the multiplier effect, benefits for local agricultural producers as well as funding for nature conservation strategies (Farasani et al., 2011; Laws, 2011; Ntaganda, 2012; Smith, 2011). These benefits, however, could be put at risk if the safety of visitors is compromised by volcanic activity. In the case of tourism near volcanoes in places like Rwanda, Washington State USA, Iceland, Italy and Hawaii planners and managers must deal with a fundamental question similar to what managers at other sites must deal with: how can we bring tourists close enough to a dangerous natural phenomenon to ensure they enjoy the experience, but not so close that they feel unsafe? As with other destinations, answering this question around volcanic areas in Hawaii is complicated by the fact that multiple government agencies are in charge of the land surrounding the attraction and also by the fact that there are different segments of the tourist market that desire different experiences and are willing to take on different levels of risk. In this article we present the findings of our research on tourist perceptions of safety and visitor satisfaction at volcanic sites on Hawaii Island (also referred to as the "*Big Island*"). First however, we will more specifically address the risks and the motivations for this kind of tourism.

HAZARDS AND RISKS OF VOLCANO TOURISM

Volcanoes and their eruptions can result in a wide range of health impacts, arguably more varied than in any other kind of natural disaster, and continual eruptions may endanger local inhabitants as well as tourists (Cooper & Cooper, 2010; Erfurt-Cooper, 2009; Lane et al., 2003; Sheth et al., 2010; Haynes et al., 2007). Along with increased lava flow, these health concerns may contribute heavily to a decrease in overall tourism in the area (Zouzias et al., 2007; Easterling, 1997). Cuts and grazes from falls on

sharp volcanic rocks, in addition to respiratory and eye irritation, are cited as the most common injuries associated with the volcanoes and experienced by volcano tourists and volcano tourism employees (Heggie et al., 2008). A small number of deaths of visitors to volcanic areas have been reported in different parts of the world following exposures to sulfur dioxide; they occur most often when hiking to active lava flows, or as a result of not following clearly posted warnings (Hansell et al., 2006; Haynes et al., 2008). At some volcano tourism locations around the world, warnings are not worded clearly enough, or in enough of the languages commonly spoken by tourists to a destination, leaving those tourists vulnerable to accidents and exposure to hazards (Bird et al., 2010). Specifically at Hawaii Volcanoes National Park, most injuries result from tourists not being adequately prepared for hiking, such as not wearing appropriate footwear or carrying enough water, or from lack of experience in hiking (Heggie & Heggie, 2007). The most common illnesses encountered by the lava hikers were dehydration, respiratory irritation, and headaches or migraines; while the most common injuries consisted of scrapes, cuts, and blisters caused by difficult hiking over lava (Heggie & Heggie, 2007).

MOTIVATIONS FOR VOLCANO TOURISM

Given this list of risks, why are volcanoes such popular attractions? As gohawaii.com (a popular Hawaii tourism website) states, visitors to the volcanoes on the Big Island are drawn by the promise of *“a chance to witness the primal process of creation and destruction make this park one of the most popular visitor attraction in Hawaii and a sacred place for Native Hawaiians”* (gohawaii.com, 2013). There is a quasi-religious motivation as tourists are compelled to experience sites of creation and destruction both awe-inspiring and extraordinary (Hall & Lew, 2009). George Applegate, head of the Hawaii Island Visitors Bureau, noted that the primary reason people come to Hawaii Island is *“to be inspired”* and that the volcano is a big part of that (personal communication, 2013). Some researchers have theorized that much of this motivation is unconscious and triggered by word-of-mouth accounts from others’ experiences (Martin, 2010). Artists, photographers and documentary filmmakers have also frequently been inspired by active volcanoes and share that inspiration through their media (USGS 2012, Dixon et al., 2012). As Dixon et al note, it may not be the actual eruptions that motivate tourists to visit but instead, *“It is while ‘waiting’ for the eruption, which sometimes does not happen, that observers are presented with the complexity of natural disasters, as well as the challenges faced by those who predict natural hazards”* (2012). Also, rather than waiting for an eruption or, watching an active one in awe, many tourists cite other recreational activities including hiking, camping, and climbing as their motivations to visit an active volcano (Cooper & Cooper 2010; Heggie, 2010; Siciliano-Rosen, 2009).

VOLCANO TOURISM IN HAWAII

While there are different motivations for tourists to visit volcanoes the end result is that volcano tourism is a vital part of Hawaii’s tourism economy. Across the state of Hawaii tourism accounts for a large portion of the economy and Hawaii Island’s volcanoes are among the most visited sites. Over 7.6 million visitors came to the state of Hawaii in 2012 accounting for one third of the annual \$29 billion in revenue for the state (Hawaii Tourism Authority, State of Hawaii Department of Business, Economic Development and Tourism). While much of this tourism activity focuses on the heavily developed Oahu Island, the Big Island still receives a large number of tourists. With its black-sand beaches and rocky terrain, and a famously rainy windward side, the Big Island attracts less of the *“sun and sand”* tourist market than do Oahu, Kauai and Maui. Unlike the other islands in the chain, however, the Big Island is the island with a currently erupting volcano. At present the island hosts three volcanoes which the US Geological Survey categorizes as active: Hualalai,

Mauna Loa and Kilauea. Kilauea on the southern part of the island has been erupting continuously since 1983 and is located within the boundaries of Hawaii Volcanoes National Park. The national park drew 1.43 million visitors in 2012 (National Park Service) which is close to the listed amount of annual visitors to the Big Island of 1.48 million in 2012 (Hawaii Tourism Authority).¹

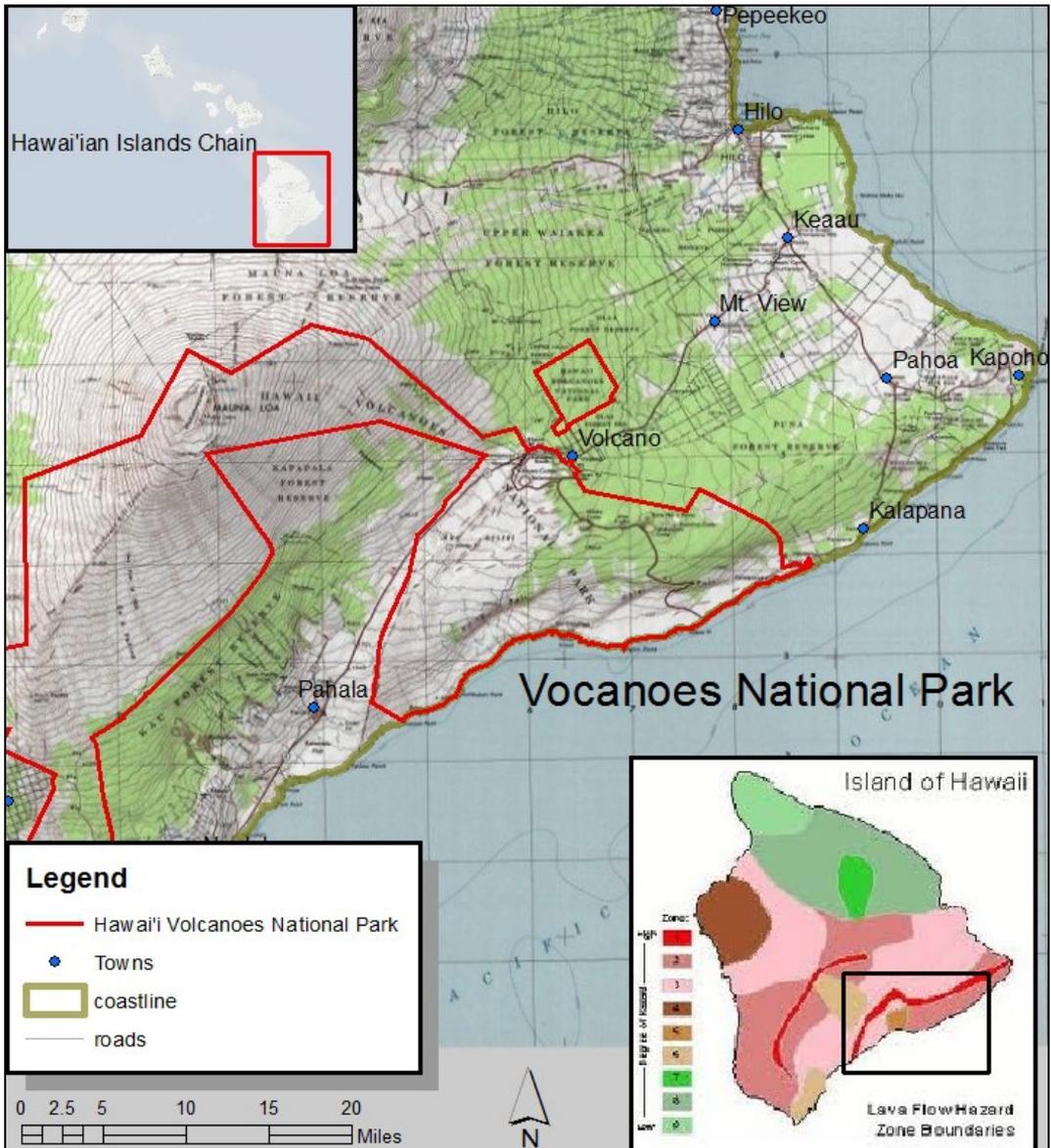


Figure 1. Map of Hawaii Volcanoes National Park and Surrounding Area
The deeper red areas of hazard map represent the most hazardous areas (Source: Michael Cook)

As shown in Figure 1, the national park is not the only place on the island to witness volcanic eruptions and the landscapes recently affected by them. While the

¹ It should be noted that this is the total number of visitors to Hawaii Volcano National Park including tourists, residents and repeat visitors.

summit of Kilauea is inside the park boundary (and as of 2013 was still releasing quite a bit of steam and gases) most recent active lava flows have come from Pu`u O`o Crater, which is a vent outside of the national park boundary near the town of Kalapana.

These flows lay on private land (and land monitored by the County of Hawaii) and these are the best places in 2013 for tourists to view running lava. These sites are less monitored than sites within the national park and individuals can get closer to active lava flows. Individuals and small tourism outfits offer their services as guides to tourists who want assistance getting right up to the lava flows in these areas (One tourism operator is known as “*Poke-a-Stick Lava Tours*” which promises just that: allowing tourists to get close enough to poke the lava with a stick). The majority of tourists to the Kalapana area, however, attempt to view the flows by parking at the “*County Viewing Area*” and taking a 1 kilometer walk to a better viewing spot or going on their own along an approximately 5 kilometer path near the ocean from Uncle Robert’s Market in the town of Kalapana. The latter option is considered more risky since it is unmonitored and also requires that tourists walk along lava benches (unstable land formations created by lava entering the ocean that are prone to collapse). The viewing area, however, also has its own risks. It is only monitored on some days and only from 4pm to 10pm. During the week prior to our interviews in 2013, one tourist had visited the viewing area when no staff was present and disappeared. The tourist has never been found and is presumed dead. This was followed two months later by another confirmed fatality at the viewing area.

RESEARCH METHODS

To better understand how tourism operators, planners, and researchers can manage tourism operations near sites of dynamic natural processes we conducted a study of tourist perceptions of risks and tourist satisfaction at volcanic attractions on the Big Island of Hawaii in the spring of 2013. The primary method used was interviews with tourists. We approached tourists at random and asked if they would be willing to conduct a short interview with us and answer our questions. The majority of interviews were done in English (70), but five were conducted in Japanese. There was nearly a balance in the gender of the respondents: 38 females and 37 males.

Our interviews were structured by a common list of open-ended qualitative questions, demographic questions, and Likert Scale questions. The Likert Scale employed choices ranging from 1 to 7, 1 for (Strongly Disagree) and 7 for (Strongly Agree) about different aspects of their visit. These questions, aimed at gathering qualitative information by volcano visitors, examined perceptions of personal safety at the viewing areas as well as queried tourists’ attitudes about whether the experience met, exceeded, or fell below their expectations. We also asked questions regarding how tourists learned about the Hawaiian volcanoes and whether they had visited other volcanoes. The demographic questions analyzed the tourists’ places of origin, education and income level, age, where they were staying on island, and the number of people traveling with them. A total of 75 interviews were conducted at multiple locations within two major areas of volcano tourism on the Big Island of Hawaii; namely Volcanoes National Park and Kalapana. Inside Volcanoes National Park we conducted interviews at several gathering and viewing locations including the Jagger Geology Museum, the National Park Visitors Center, and the Caldera Viewing area. The Kalapana locations for data collection were at the County Viewing Area and at Uncle Robert’s Night Market in the town of Kalapana.

RESEARCH RESULTS

While our study focused on tourists’ satisfaction with the volcano experience and their perceptions of risk there are a few other factors that bear mentioning.

First, according to our study, tourists heard about the volcano from a fairly even variety of sources. Approximately 15% of interviewees learned about the volcanoes through media while 14% of people got to know about the volcano through internet and 15% from print sources such as books, magazines, brochures, or other advertisements. In addition, the data shows that another 15% of the tourists questioned learned about volcanoes by word-of-mouth from a family member, a friend, or someone in their tour group. 13% discovered the volcano through school or college courses. Lastly, only 9% of the tourists we interviewed mentioned they learned about the volcano through tour companies, tour guides, or tour guidebooks (Figure 2). A surprisingly large number of respondents (just over 50%) had visited other volcanoes. Interviewees reported visiting volcanoes in Washington State USA, Iceland, Japan, New Zealand, Yellowstone USA, Italy, Nicaragua and Costa Rica. As far as income, 7% of the study participants reported an annual income of less than \$25,000. 10% reported income between \$25,000-\$50,000. 25% reported income from \$50,000-\$75,000. 23% declared income between \$75,000-\$100,000. 14% made from \$100,000-\$200,000 per year, and 20% reported an income greater than \$200,000.

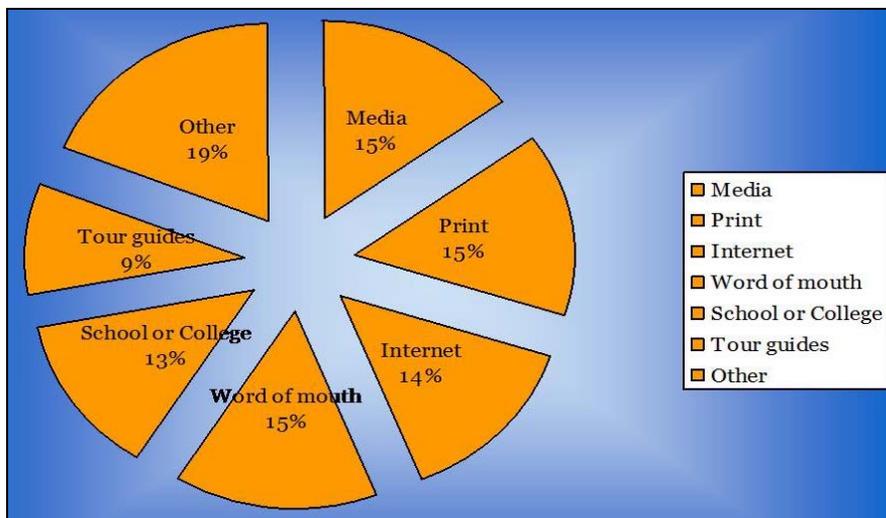


Figure 2.How did people learn about the volcano?

While seeing the volcano was a primary motivation for visiting Hawaii Island for most of the interviewees they also spent time doing other activities on island that impacted the local economy. Approximately 33% of the tourists surveyed noted going to the beach and/or participating in other ocean activities such as swimming with dolphins, snorkeling, surfing, swimming, whale watching, diving, and sunbathing. 25% engaged in nature activities such as hiking, camping, zip lines, and biking. 16% of the tourists surveyed also stated they had gone on driving tours around the island and mentioned sightseeing activities such as visiting coffee plantations, botanical gardens, farmers' markets, the zoo, Kealakekua Bay, Mauna Kea, and Waipio Valley. Additionally, a small percentage (6%) of the tourists surveyed reported going on a helicopter tour.

As for the main subject of our research, we found that, overall, tourists reported having a rewarding experience at the volcanic sites and they did not feel unsafe. More specifically, on the Likert Scale question "*I enjoyed visiting the volcano / lava viewing area*" the most popular response was "*strongly agree*". On the Likert Scale question "*I would recommend a trip to see the volcano to others*" the average on the scale of 1 to 7 (with 7 being strongly agree, 1 being strongly disagree and 4 being

“neutral/don’t know”) was 6.38 with a standard deviation of .148. While this is non-parametric data and so averages should be looked at skeptically it still speaks to the fact that respondents overwhelmingly strongly agreed they would recommend the experience to others.

For the Likert Scale question “*My experience visiting the volcano met or exceeded my expectations*” the response was not as overwhelmingly affirmative, but still positive with an average of 5.58 with a standard deviation of .187. There were several qualitative responses offered by people who were disappointed with the experience. The most common response was that they thought they could get closer to the caldera or to the lava flow and see it better. Some also complained that they thought they should be able to drive closer to the lava flow and some complained about not being able to drive around the whole caldera at the national park (which is currently partially closed due to high sulfur emissions from the summit). Others thought the caldera would be bigger.

When asked about safety concerns, most respondents did not report any. For the Likert Scale question, “*I felt unsafe at some point during my visit*” (1 being “strongly disagree,” 7 “strongly agree” and 4 being “neutral/don’t know”) the most common response was 1. The average for this question was 1.79 with a standard deviation of .197. Therefore it could be said that the overall level of concern over safety was fairly low. There was an interesting pattern, however, in that older respondents appeared to have more safety concerns than younger travelers. To examine this relationship more fully we conducted a Kruskal-Wallis test to test the relationship between the age of the tourist and whether she/he felt safe viewing the volcano. The test resulted in a significant relationship with a p-value of 0.050 ($\alpha=0.050$). In other words, we found that there is a correlation between a tourist’s age and feeling unsafe while visiting the volcanic sites.

CONCLUSIONS

Given the economic importance of tourism at sites of dynamic natural processes around the world, it is important for tourists, planners, researchers and managers to carefully analyze the risks and rewards of this kind of tourism. This example from volcano tourism in Hawaii can help inform efforts by tourism managers to walk the precarious line between getting tourists close enough to a dangerous natural phenomenon that they enjoy the experience, but not so close that they feel unsafe. Based on our research results that visitors overwhelmingly simultaneously feel safe and enjoy the experience we claim that the model of tourism around volcanic landscapes in Hawaii is a successful example of how this can be done. The division of the volcanic landscape between Volcanoes National Park and non-federal lands was not planned -at least it certainly is not the result of human decision making. Many of the lava flows in the Kalapana area have occurred since the 1980s, well after the boundaries of the National Park were established (Pele the volcano goddess, it is said, goes where she wants to go). Despite the fact that the different jurisdictions were not planned, the situation results in some unexpected benefits for tourism on the island.

Essentially the mosaic of different jurisdictions in the volcanic areas of the island allows for a varied landscape of risk or “*riskscape*” (Morello-Frosch and Shenassa 2006). The restrictions and safety precautions within the national park, for instance are more stringent than those outside the park. In this way tourists can select where to go based on their own acceptable level of perceived risk and measure that against their desire to get closer to what they want to see. This means that tourists who desire a safer experience, such as older tourists and families, can view the volcano inside the national park where stronger safety precautions are in place. This is very important as our study indicated that this older segment of the tourist market makes up a large portion of the tourists that visit the volcano. On the other hand, the more adventurous segments of the

tourism market that may feel disappointed in this safer experience can still have the option to explore other, riskier opportunities.

It is important to note that this model of varied risk exposure does not eliminate risk. It does not even minimize it. People can and do sustain injuries, sometimes fatal ones, while visiting the volcanic attractions in Hawaii. However, this model allows individual tourists to select the amount of risk they feel comfortable taking. This may be one reason why deaths and injuries, when they do occur, do not substantially affect tourism numbers to the volcanic attractions in Hawaii. It is widely recognized locally, and by tourists through the interpretive programs given by Park Service personnel, that the volcano CAN be experienced in relative safety and that most injuries and deaths occur when tourists choose to do high-risk activities in certain high risk spaces (i.e. walking on a lava bench to poke flowing lava with a stick).

Having a varied riskscape around these sites of dynamic natural activities like volcanoes, when coupled with appropriate education strategies to inform visitors of the risks, can be a successful model for getting the most out of these tourism sites in terms of both economic benefit and the quality of tourism experiences. While the distribution of land jurisdictions near the volcano in Hawaii is somewhat accidental, other locations doing similar forms of tourism would do well to imitate Hawaii's example of having different tourist options based on different levels of acceptable risk. This will enable host communities and tourism enterprises to benefit more by simultaneously catering to multiple segments of the tourism market.

Aknowlegments

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