Indigenous Knowledge & Disaster Risk Reduction

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According to the World Risk Index, six out of ten of the world's ten highest disaster risk countries are located in the Asia-Pacific Region (Hiwasaki, Luna, Syamsidik & Shaw, 2014). Asian-Pacific communities are extremely vulnerable to disasters, which are caused by natural hazards including earthquakes, tsunamis, cyclones, droughts, landslides, and floods. Studies have shown that disasters disproportionally affect marginalized populations (Mercer, Suchet-Pearson, Kelman & Lloyd, 2008). According to Mercer et al. (2008), people are marginalized in three ways: "geographically, because they live in hazard-prone areas; socially, because they are poor; and politically because their voice is disregarded" (p.173). Indigenous People in the Asia-Pacific region are acutely vulnerable to natural disasters: they meet each criteria of marginalization.

Yet despite these challenges, Indigenous People have historically shown their ingenuity and resilience through their ability to cope in adverse situations. Numerous studies (Mercer et al. 2008; Walshe & Nunn, 2012; Kelman, Gaillard & Mercer, 2013; Hiwasaki et al., 2014) demonstrate that indigenous knowledge and local practices have mitigated risks associated with natural disasters. The purpose of this integrated literature review is to investigate *if* indigenous knowledge has been adequately incorporated into international and national disaster risk reduction strategies in the Asia-Pacific Region. In addition to exploring this topic, I will also reflect on the role of social workers with regards to the knowledge integration process.

Addressing the topic of indigenous knowledge and disaster risk reduction directly relates to SOWK 673 course objectives. For instance, one of the course objectives is to "examine the scope and nature of international social development theory and practice from a historic perspective, focusing on North-South development polarities and politics" (Ismael, 2014a). Disaster risk reduction is an international social development practice, which is impacted by our (the Western world's) colonial history. For example, Mercer, Dominey-Howes, Kelman & Lloyd (2007) explain that our colonial history and ignorance of the 'other' has contributed to an increased divide between them (the developing world) and us (the Western world). In consequence, knowledge sharing practices between the Indigenous People and global scientists has been inhibited. Indigenous People do not trust global scientists and global scientists often underestimate – if not dismiss – the value of indigenous knowledge (Cadag & Gaillard, 2012).

This is problematic since research has shown (Mercer et al. 2008; Walshe & Nunn, 2012; Kelman, Gaillard & Mercer, 2013; Hiwasaki et al., 2014) that disaster risk reduction strategies can benefit from integrating indigenous knowledge into disaster risk reduction practices. Current disaster risk reduction strategies include top-down approaches that involve power discrepancies between the Global North and South. The majority of these initiatives are led by the North and administered to the South, functioning from the charity model, which inhibits the South's self-sufficiency (Hiwasaki et al., 2014).

Methodology

As I alluded to above, my research question is: has indigenous knowledge been integrated into disaster risk reduction strategies in the Asia-Pacific Region? To answer this question, I searched the University of Calgary's Unified Search Interface, commonly known as *Summon*. On November 18, 2014, I typed the following key words into the *Summon* search engine: indigenous knowledge, disaster risk reduction, and Asia-Pacific. The database located 8, 731 articles that fit my search criteria. In order to narrow my search, I decided to only include peer-reviewed journal articles that were recently published (2000-2014) and offered the full text online. With these adjustments, my search located 154 articles that fit the above criteria. From here, I excluded articles that did not contain the words - indigenous knowledge, integration, or disaster risk reduction – in their abstracts. I was left with 10 articles, which directly addressed my research question.

As I read the articles I noticed that a number of them discussed the United Nations initiatives, which address indigenous knowledge and disaster risk reduction. This peaked my curiosity and prompted me to run a general search on *Google* in order to access some of the policy documents. Using the same search terminology as above, I was able to locate 320, 000 results. Due to the time constraints of this assignment and the initial reason for my search, I only included the two policy documents - developed by the United Nations International Strategy for Disaster Risk Reduction – which directly addressed my topic.

Integrative Literature Review: Initial Observations

As stated above, the majority of the academic literature referenced the United Nations' International Strategy for Disaster Risk Reduction (UNISDR) either directly

in their main arguments for incorporating indigenous knowledge into disaster risk reduction practices or indirectly through their list of references. I suspect that a number of these articles were written as result of UNISDR initiatives, which advocate for "systematic documentation of indigenous knowledge on disaster risk reduction in traditional communities" (UNISDR, 2008b, p. 17). This argument is plausible, considering that the majority of my articles were published after 2008 – the year that the UNISDR released a number of documents, which recommended that indigenous knowledge be incorporated into disaster risk reduction. Similarly, I noticed that the same authors wrote a number of the articles. These authors were also provided credit in the United Nations (2008a; 2008b) documents and appear to be the experts in this field.

All of the articles (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman, Gaillard & Mercer, 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer, Kelman, Taranis & Suchet-Pearson, 2010; UNISDR, 2008a; UNISDR, 2008b) were in favour of incorporating indigenous knowledge into disaster risk reduction. The authors argue that incorporating indigenous knowledge into disaster risk reduction encourages the participation of the affected community and empowers them to take on leadership roles in disaster risk reduction activities (Label, 2013; Mercer et al., 2007; Cadag & Gaillard, 2012; UNISDR, 2008a). The articles (UNISDR, 2008a; Lambert, 2014; UNISDR, 2008b) also state that indigenous knowledge can be adapted and used in different communities experiencing similar hazards, for example floods. Lastly, the authors suggest that indigenous knowledge can help

improve project implementation by providing information that is relevant to the local context (UNISDR, 2008a; Kelman et al., 2012; Mercer et al., 2007; Hiwasaki et al., 2014).

Contextual Synthesis & Integration of the Literature

One of the main components of this assignment is to critically examine the literature/ method (disaster risk reduction) based on four dimensions of context: international social development and international social welfare, theory and practice, central measures of assessment, and globalization (Ismael, 2014b). I plan to address these contexts in the following subheadings.

International Social Development and International Social Welfare

Disaster risk reduction is intrinsically linked to international social development and international social welfare. For example, Mercer & Gaillard (2012) convey that throughout history, the Global North has developed disaster policies to assist the Global South in poverty-related issues "due to their alleged inability to cope alone" (p. 97). Increasingly, relief and aid are supplied to communities experiencing hardship instead of promoting the practice of self-sufficiency (Mercer et al., 2007). To improve the community's social welfare, development agencies and disaster risk reduction programs have the social responsibility to foster and support local attempts at self-sufficiency prior to and in the wake of disaster (Mercer et al., 2007). For instance, development agencies should encourage local food preservation techniques rather than increase the community's dependence on external assistance and food handouts.

Supporting self-sufficiency is important given that research has shown that indigenous knowledge has, on numerous occasions, successfully mitigated risks associated with natural disasters (UNISDR, 2008a; Label, 2013; Walshe & Nunn, 2012; Lambert 2014; Mercer et al., 2007). For example, on October 8, 2005, the Kashmir earthquake severely impacted Northern India. Sources state that more than half a million people were affected by the earthquake and about 90, 000 households were impacted in the Kashmir Region (UNISDR, 2008a). Indigenous construction techniques including the Taq system and the Dhajji-Dewari system were reported to have saved the lives of many (UNISDR, 2008a).

In the Taq system, "large pieces of wood or timber are used as horizontal runners embedded into the masonry walls" (UNISDR, 2008a, p. 18). These runners keep the building together and prevent the spreading and cracking of masonry. Likewise, in the Dhajji-Dewari system, timber frames are used to confine masonry into small parcels. In the wake of the Kashmir earthquake, the buildings that survived were the ones that applied traditional knowledge using the Taq or Dhajji-Dewari system (UNISDR, 2008a). This example clearly demonstrates the advantages of utilizing traditional building techniques over modern technologies in household construction. Post-disaster relief programs should capitalize on traditional knowledge, which has been tested over time and is conducive to the local environment. These practices promote community self-sufficiency and validate traditional wisdom.

Similarly, in another region of India (Rajasthan) a flood displaced over 50, 000 people in August 2006 (UNISDR, 2008a). SEED, an international development

agency, arrived shortly after the flood to assess the damages. SEED's action plan included a participatory approach that involved the community's cooperation in building traditional structures or homes. These structures were chosen because they were suited to local skills, had virtually no ecological or carbon footprint, and could withstand local weather patterns (UNISDR, 2008a). By including the community in the decision making process, with regards to the site, design, and construction, the participants felt involved and took ownership of the process. Community participation also cut costs and promoted the transfer of knowledge and skills among community members. This ensured the sustainability of the approach and promoted its replication in other areas that were also affected by the flood (UNISDR, 2008a). All of the articles (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) emphasize the importance of community participation in disaster risk reduction approaches.

As mentioned previously, disasters disproportionately affect the most vulnerable. Thus, one of the roles of international development agencies is to reinforce the community's ability to cope with natural disaster by reducing their vulnerabilities (Gaillard & Mercer, 2013). Too often disaster risk reduction approaches neglect social, economic, and political vulnerabilities and instead focus on the physical risks. Mercer et al. (2008) explain that this due to the reluctance of governing bodies to address power imbalances or structural problems within the society. In consequence, most disaster risk reduction approaches are paternalistic in

nature and adhere to the status quo. The authors (Mercer et al., 2008; Hiwasaki et al. 2014; Lambert, 2014; Cadag & Gaillard, 2013) state that participatory practices can empower the community and give voice to vulnerable populations. By involving them in the planning process, the disaster risk reduction programs will reflect the local context and the community's needs. When the affected community is involved in the policy creation process, they are also more likely to comply with the government's demands.

For example, in Papua New Guinea a local disaster official informed the community that they needed to move their settlement to higher ground after a particularly bad flood (Mercer et al., 2008). The villagers agreed to the demand at the time. However, subsequent visits demonstrated that the community had no intention to move. The river represented their livelihood; they used it for fishing, agriculture, and water supply. The settlement was also closely located to social services, including medical facilities. Lastly, the people had historically lived in this area and had an emotional attachment to the land (Mercer et al., 2008). The official's top-down approach and subsequent solution clearly did not take into account these factors and therefore did not reflect the community's needs. Mercer et al. (2007) utilize this example to demonstrate the value of incorporating bottom-up, community-based, participatory solutions to disaster risk reduction.

Theory & Practice

The articles (Mercer et al. 2008; Gaillard & Mercer, 2012; Mercer et al., 2010) demonstrate that disaster paradigms frame disaster risk reductions approaches. For example, the hazard paradigm asserts that "disasters result from extreme and rare

natural hazards, [where] the affected people fail to 'adjust' because their perception of risk associated to these natural events is insufficient" (Gaillard & Mercer, 2012, p.94). Policy makers who follow the hazard paradigm implement national risk reduction strategies that rely on command-and-control and top-down frameworks, which emphasize scientific knowledge and government intervention at the expense of local actions (Gaillard & Mercer, 2012). In many of these countries, disaster risk reduction programs are handled by the military and natural disasters are treated like enemies that need to be fought and conquered. In these situations, the physical aspects of the disaster are taken care of but the underlying social, economic, and political vulnerabilities are left untouched (Gaillard & Mercer, 2012).

By contrast, the vulnerability paradigm states that disasters disproportionately affect marginalized people, who do not have the resources or means of protection, which is available to others with power (Gaillard & Mercer, 2012). Practitioners who follow the vulnerability paradigm believe in bottom-up frameworks, which empower the affected community to influence policy and disaster risk reduction practices. The vulnerability paradigm came into prominence within the last few years. This is attributed to the introduction of the United Nations' Hydro Framework for Action, which focuses on incorporating indigenous knowledge into disaster risk reduction practices (Gaillard & Mercer, 2014).

Similarly, Mercer et al. (2008) discusses the differences between the dominant paradigm and the radical approach. The dominant paradigm states that disasters are natural events, which are not preventable. By contrast, the radical approach understands disasters as socio-economic and political in origin as opposed to

limiting them to natural causes (Mercer et al., 2008). Here, vulnerabilities are viewed as the byproduct of a cumulative set of decisions made over time. The radical approach aligns with the vulnerability paradigm, just as the dominant paradigm is similar to the hazard paradigm. The authors (Mercer et al., 2010; Gaillard & Mercer, 2012; Mercer et al., 2007; Kelman et al., 2012: Cadag & Gaillard, 2012) favour the vulnerability paradigm and state that effective disaster risk reduction approaches need to include both bottom-up and top-down strategies, which integrate indigenous knowledge with scientific knowledge.

All of the articles (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) focus on integrating indigenous knowledge and scientific knowledge into disaster risk reduction practices. For instance, the UNISDR (2008b) document states that "the rapid pace of change in climatic context over the past few decades has outpaced the ability of local coping systems to adapt through a process of testing and changing in a practice continuum" (p. 8). Essentially, communities are facing new starting points and their former coping mechanisms are no longer viable (UNISDR, 2008b, p. 8). In these situations, scientific knowledge and technology can be utilized to decrease the community's vulnerability. Likewise, indigenous knowledge can be adapted and applied from one community to another. This strategy is particularly effective when the second community has only recently been subject to a natural hazard– for example a flood – and has yet to developed a coping mechanism.

Many of the articles acknowledge that traditional coping mechanisms are still effective in reducing the impacts of natural disasters despite climate change; however, the authors demonstrate that indigenous coping strategies can be improved with integration of scientific knowledge and vice versa (Label, 2013; Gaillard & Mercer, 2013; Kelman et al., 2012). For example, in Papua New Guinea villagers identified vulnerable housing as a major risk factor for landslides and floods. With a facilitator, the villagers matched "indigenous knowledge - such as the use of brush materials - with scientific knowledge – such as the use of alternative modern materials – [and] employed both… to mitigate against this risk factor" (Mercer et al., 2010, p. 231). Mercer et al. (2010) provides a framework on how to integrate indigenous knowledge and scientific knowledge into disaster risk reduction.

There are four steps in Mercer et al.'s (2010) methodological framework. The first step is to initiate with the community and establish a relationship built on confidence and trust (Mercer et al., 2010; Cadag & Gaillard, 2012). The second step is to assess the community's vulnerabilities in respect to natural hazards (Cadag & Gaillard, 2012). This can be achieved through a community situation analysis, where timelines, maps, calendars, and transect walks are employed to facilitate a discussion with the community about risk. These activities provide essential baseline data regarding the physical and social aspects of the environment, which is paramount to understanding the community's vulnerabilities (Mercer et al., 2010). A community situation analysis "can take anywhere from a few days to a few weeks to ensure that sufficient data is collected" (Mercer et al., 2010, p. 226).

In the data collection process, the community is asked to identify both extrinsic and intrinsic factors, which impact the community's ability to cope with natural hazards. In this analysis, the extrinsic factors are categorized as 'causes' and the intrinsic factors are viewed as 'effects' (Mercer et al., 2010). Mercer et al. (2010) employs a 'cause and effect tree' to demonstrate the linkages between extrinsic and intrinsic factors. For example, globalization is labeled as an extrinsic factor because the community has no control over it. By contrast, farming patterns are labeled as intrinsic factors since they can be shaped or changed by the community.

Using globalization as an example, Mercer et al. (2010) demonstrate how farming patterns were changed with the introduction of cash crops. Cash crops have been proven to increase the community's vulnerability because they create a dependency on the global market, which can be unstable. Mercer et al. (2007) also explain that cash crops have affected inter-village and inter-island trade in Small Island Developing States (SIDS). Historically, SIDS have relied on local trade relations to provide essential support during times of hardship (Mercer et al., 2007, p. 251). Globalization and by extension, cash crops, have essentially diminished these relations - increasing the community's vulnerability to risk. According to Mercer et al. (2010), intrinsic factors (such as farming patterns) need to be prioritized in order to establish which factors contribute most to the community's vulnerabilities with reference to natural disasters. To accomplish this task, pair-wise ranking was utilized. Pair-wise ranking is essentially a comparative process, where two intrinsic factors are weighed and measured against each other in order

to establish which one has a greater impact on the community's vulnerability (Mercer et al., 2010).

The third step in Mercer et al.'s (2010) methodological framework is to identify indigenous and scientific strategies, which can reduce the community's vulnerabilities. Similar to the previous task, this step employs participatory techniques. Through process of 'guided discovery' the community is asked to break into small groups and identify solutions to potential problems by drawing upon local knowledge and past experience in addition to scientific strategies which address environmental hazards (Mercer et al., 2010; Mercer et al., 2008). Groups will be asked to consider land-use planning, building methods, environmental and food strategies, and social linkages in their discussions (Mercer et al., 2010). When this process is complete, the community members will come together and triangulate their data. With the assistance of the associated stakeholders, they will establish and identify strategies - which they may not have previously considered – with respect to disaster risk reduction.

The final step of methodological framework is to develop an integrated strategy or a comprehensive action plan (Cadag & Gaillard, 2012). Using the strategies identified in the previous step, the community and stakeholders will come together to evaluate these strategies based on four factors: sustainability, cost, equitability, and stability (Mercer et al., 2010). The first factor, sustainability, addresses how the proposed strategies will be maintained over time and if they will be useful with regards to the changing environment. Cost is also considered; the identified strategies should incorporate local resources, which are cost-effective.

With reference to equitability, the decision-makers must implement a strategy that is accessible to all of the community members - not just the privileged (Mercer et al., 2010). Finally, the stability factor considers how the proposed solution(s) will be implemented. Ideally, the solution(s) will cause minimal disturbance to the environment, social structure, and livelihoods of the community.

According to Mercer et al. (2010), involving the community in this decision-making process is integral to its' success. Case studies in the Philippines have demonstrated that both the community and stakeholders believe that incorporating indigenous knowledge into disaster risk reduction strategies strengthens the community's resiliency (Cadag & Gaillard; 2012).

Central Measures of Assessment

All of the articles (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) assess the importance of integrating indigenous knowledge into disaster risk reduction strategies based on relevant case studies and field research. For example, Cadag & Gaillard (2012) interviewed Indigenous People in the Philippines in order to evaluate the use of Participatory Three-Dimensional Mapping (P3DM) - a tool for integrating local knowledge into disaster risk reduction strategies. P3DM is an interactive tool, which "basically comprises the building of stand-alone scaled relief maps made of locally available material (e.g. cartons and paper), which are overlapped with thematic layers of geographical information" (Cadag & Gaillard, 2012, p. 101). Building a three-dimensional map is a collaborative learning

experience that stimulates the exchange of knowledge between Indigenous People and global scientists. The advantages of using P3DM are that it is easy to set-up, cost-effective, and more importantly, accessible to all. Illiteracy, for example, is a challenge that is overcome by the use of Participatory Three-Dimensional Mapping. The disadvantages of this strategy are that it is unfamiliar to many and therefore requires an outside facilitator (Cadag & Gaillard, 2012; Kelman et al., 2012).

Cadag & Gaillard (2012) explain that the effectiveness and sustainability of the P3DM project was put through rigorous testing with the onset of the September 2009 cyclones, which brought server flooding to the areas of Ondoy and Pepeng. Fortunately no one was killed. The municipal Vice Mayor reflected on the P3DM process and stated: "the project helped me as a leader because during the time of calamity, I was able to apply what I learned in ensuring the safety of the people such as identifying evacuation centers and finding solutions to the problems and needs of my people" (Cadag & Gaillard, 2012, p. 108). Following Mercer et al.'s (2010) methodological framework, P3DM was used in the second and third stages of the model to facilitate a discussion between the community and stakeholders regarding local vulnerabilities and possible disaster risk reduction strategies. The result of these conversations was a comprehensive action plan, which Cadag & Gaillard (2012) perceive as a success due to the Vice Mayor's comments.

Similarly, Mercer et al. (2010) evaluated their methodological framework based on its success in Papua New Guinea. Instead of quoting people's responses to the project, the authors (Mercer et al., 2010) included qualitative observations in their article. For instance, the authors went into great detail on how they introduced

the project to the community and then described how the community reacted to this information. Through the steps in the methodological framework, local examples were provided, which allowed for the reader to evaluate the project's success based on the end results. A number of the articles (Label, 2013; Walshe & Nunn, 2012; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) followed this form of assessment – they provided case examples, which demonstrated the merits of integrating indigenous knowledge into disaster risk reduction approaches and left the reader to evaluate this method based on the success rate of their prior examples.

Globalization

The majority of the articles (Label, 2013; Walshe & Nunn, 2012; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) described the impact of globalization on disaster risk reduction approaches. For example, the authors (UNISDR, 2008b; Mercer et al., 2007) link global patterns of consumption to increased carbon emissions, which directly impacts climate change and increase the onset of natural hazards – particularly in developing nations. Likewise, with introduction of the global market, developing nations have changed their traditional farming patterns, which are proven to be more resilient and sustainable than high-yield cash crops (Label, 2013; Mercer et al., 2007).

Label (2013) explains that in Northern China farmers are acutely vulnerable to natural disasters due to the prolonged midseason dry spells in the lower Mekong

basin. Many of these farmers are growing crops that are not native to their local area. Yet, despite knowing that local varieties demonstrate greater resilience to climatic hazards, farmers are reluctant to switch back to traditional farming techniques due to the global demand for their high-yield products. In these circumstances, farmers are forced to find off-farm income sources to supplement yield losses (Label, 2013). By contrast, farmers who use local varieties have sustained their livelihoods, despite the reduced profitability. This example demonstrates how globalization has impacted farming traditions and increased the community's vulnerability to natural hazards.

A number of the articles (Gaillard & Mercer, 2013; Walshe & Nunn, 2012; Kelman et al., 2012; UNISDR 2008a; UNISDR, 2008b) mentioned the impact of modernization on Indigenous populations. For instance, Walsh & Nunn (2012) disclose that during their two-week field research in Pentecost Island, Vanuatu, they noticed the far-reaching impact of modernization with regards to traditional knowledge loss. This was particularly apparent in the younger generations who were more connected to the outside world and "were ignorant, even scornful" of indigenous customs (Walsh & Nunn, 2012, p. 189). Likewise, Mercer et al. (2007) explain how foreign aid relief has minimized the importance of indigenous coping strategies and self-reliance, which has also contributed to the loss of traditional knowledge.

The introduction of modern materials has increased the community's vulnerability to natural hazards in countries like Papua New Guinea (Kelman et al., 2012). In Papua New Guinea, the villagers conveyed that their houses were more

vulnerable to natural hazards because of the use of modern materials that represent wealth and status, but are not conducive to the local environment (Kelman et al., 2012). Kelman et al. (2012) explain that traditional houses in the Baliau Region are built "with steeply-sloping roofs, reducing potential for collapse and fire due to a volcanic ash" (p. 97). Local materials are used to reinforce the roof to improve its' wind resistance. With the introduction of modern materials, iron sheeting has been incorporated into the building construction, particularly for roofs. Although iron is more resistant to fire hazards, the volcanic ash does not slide off the roof as easily, which often results in the building's collapse (Kelman et al., 2012). In addition, iron sheets blown off with strong winds: this can be lethal if the iron strikes a villager. Due to all of these reasons, the villagers recognize the importance of converting back to traditional housing structures.

Lastly, the articles mention international development initiatives such as the United Nations International Strategy for Disaster Risk Reduction (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b). This is significant because it demonstrates how globalization is affecting national strategies, which impact local individuals. For example, the UNISDR initiatives have validated indigenous knowledge practices and have highlighted their use in disaster risk reduction approaches. As a result, more countries are incorporating indigenous knowledge into their planning and practices. This is, in my opinion, one of the positive aspects of globalization.

Method Potential

As mentioned above, the authors (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) support the integration of indigenous knowledge into disaster risk reduction strategies because it empowers the community and improves project implementation. Likewise, indigenous knowledge can be adapted and applied to other regions of the world, which are experiencing similar hazards (UNISDR, 2008b). Label (2013) provides caution with regards to the transfer of indigenous practices, by highlighting that indigenous knowledge is locally bound, biased and sometimes simply inaccurate. Despite these concerns, the UNISDR (2008a; 2008b) promotes the integration of indigenous knowledge into disaster risk reduction practices by providing numerous examples of where it has been successfully implemented and assessed.

The scope of the practice – of knowledge integration – is broad and far-reaching. The UNISDR's involvement demonstrates that this is international practice, which is applied on a national and local level. The articles establish that the strength of this practice is that it is collaborative in nature, incorporating both top-down and bottom-up approaches. From the top-down perspective, strong leadership is required to guide the knowledge integration process, and to engage and connect with the community (Mercer et al., 2007, p. 253). Similarly, the bottom-up perspective requires the community's participation in knowledge acquisition and planning with regards to disaster risk reduction. Mercer et al. (2007) state that the "recognition of traditional coping mechanisms alongside culturally compatible

Western strategies can only contribute to enhancing the capacity of rural indigenous communities to mitigate, prepare for and recover from environmental hazards" (p. 253). Only then will disaster risk reduction practices effectively address indigenous vulnerabilities (Mercer et al., 2007, p. 253).

Social Work & Disaster Risk Reduction

Social work is a profession that is known for its intervention strategies, which promote and protect the wellbeing of vulnerable people with regards to natural or man-made disasters (Ali, Hatta & Azman, 2013). Historically, social workers have focused on disaster relief; however, social work skills lend well to disaster risk reduction. In light of the UNISDR's recent initiatives, social workers have the unique opportunity to promote themselves in disaster risk reduction approaches. For example, social workers are trained to be culturally sensitive. They orient themselves from a social justice perspective and advocate for human rights. These qualities make social workers attractive to community development organizations that are looking to engage with local communities. Social workers could, for example, act as a broker between the community and stakeholders. They could also engage in capacity building programs or advocate for the integration of indigenous knowledge into disaster risk reduction practices. Although this paper is not primarily focused on tying together relevant social work skills to disaster risk reduction techniques I do believe that it is important to acknowledge the role that social workers can bring to indigenous knowledge integration.

Conclusion

After reading the articles (Label, 2013; Walshe & Nunn, 2012; Gaillard & Mercer, 2013; Kelman et al., 2012; Lambert, 2014; Mercer et al., 2007; Hiwasaki et al. 2014; Mercer et al., 2008; Cadag & Gaillard, 2012; Mercer et al., 2010; UNISDR, 2008a; UNISDR, 2008b) I can appreciate the importance of incorporating indigenous knowledge into disaster risk reduction strategies. I also acknowledge the necessity to integrate bottom-up and top-down strategies with respect to international development. I find that as profession, social work often highlights the significance of bottom-up strategies sometimes at the expense of top-down initiatives. What I learned from the articles (Mercer et al., 2007; UNISDR, 2008b; Kelman et al., 2012) is that successful strategies incorporate both perspectives. Top-down approaches are needed with regards to strong leadership, just as bottom-up practices are required to engage the participation of the affected community: only then will disaster risk reduction strategies be effective.

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