

A Comprehensive Natural Hazard Mitigation Strategy should be the basis for Sustainable Development

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Natural adjustments of earth invoked by nature can be hazardous for human beings who have encroached upon areas of earth reserved by nature for natural processes of change. Human beings live at the interface between the atmosphere driven by solar power and earth's upper mantle where convections result in changes in the earth's tectonic plates. As communities have grown, become settled, and come to value aspects of nature, their vulnerability to natural processes of change has increased.

Physical exposure of human beings and the vulnerability of their properties to disasters have been partly shaped by patterns of settlement. Beneficial climatic and soil conditions that have spurred human activities are associated with hazard-prone landscapes. Both volcanic slopes and floodplains historically have attracted human activities.

Where settlement patterns have contributed to shape risk types, new forces such as demographic growth and increased, rapid urbanisation processes act as dynamic pressures which contribute to increasing community's vulnerability to natural hazards.

Natural hazards present the need for communities to identify natural hazard areas, assess their vulnerability to such hazards and to analyse the associated risks.

Many changes in the environment tailored to satisfy community's needs bring benefits to the community, but they also incur risks.

A community's vulnerability to natural hazards is determined by physical, social, economical, and environmental factors, which can increase the susceptibility of that community to the impact of natural hazards. The community's risk is the probability of harmful consequences, or expected losses resulting from interactions between natural or human-induced hazards and its vulnerable conditions to those hazards.

Assessing a particular hazard risk in a community includes the population and property distribution in the hazard area, the frequency of the hazard event and susceptibility of the area, structures, infrastructures, and disaster preparedness of the community, its coping capacity; this type of risk analysis can generate estimates of the potential damages to the community that would incur due to a hazard event in a specific region, and can also be used as the basis for holistic, hazard mitigation measures, enhancing the community's resilience.

A resilient community potentially exposed to natural hazards has the capability to adapt by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which a community is capable of organising itself so as to increase its capacity for learning from past disasters, including from those of other communities, for better future protection, and to continually analyse and modernise hazard mitigation measures according to possible changes in natural hazard patterns, and thus, making it resilient against future hazard-induced disasters. This can be achieved sensibly by developing, adopting and implementing a natural hazard, mitigation concept.

The post-disaster rebuilding phase provides the best opportunity to introduce hazard mitigation measures into sustainable development planning. Local government should be required by federal and state governments to develop and adopt a comprehensive, hazard mitigation plan, which sets forth the general, long-term policies on how the community's future development should occur. Local plans should anticipate and provide for future land use needs, addressing natural hazards, agricultural lands, transportation, coastal and natural resources, etc. All implementing measures should be consistent with and carry out comprehensive plan policies. A comprehensive land use plan should combine an inventory of existing hazardous conditions within a community, general objectives, policies, implementing ordinances and regulations. For example, a local government may conduct an inventory of steep slope areas within his community, where there are potential landslide hazard areas. Next, the local government may develop a policy which states that development on areas identified as posing a high risk for landslide shall be prohibited unless a geologic assessment of the particular site reveals that no hazardous condition exists or appropriate safeguards are identified to reduce the risk posed by the hazard. Finally, the local government must adopt land use regulations (e.g. zoning or subdivision regulations) or other measures to implement the policy to prohibit development in this hazard area.

In the wake of the tragic Asian tsunami on 26th December 2004, it has been recognised that there is an urgent need to improve the integration of scientific knowledge of natural hazards into the management of early warning technologies. Robust communication lines between the global scientific community, federal, state and community governments must be established and strengthened to ensure effectiveness. The scientific community could be represented by an international science panel, whose purpose would be to assess natural hazards and to advise governments on potential, natural hazards likely to have high global or regional, adverse impact. Such a science panel could cooperate with international observation organisations such as NASA's Earth Observation or the United Nation's World Meteorological Office.

Natural hazard mitigation must be an essential requisite for sustainable development. The growth in severe disasters resulting from the inefficiency of communities to cope with natural hazards poses a real threat to both sustainable development and poverty reduction efforts. Vulnerability to re-occurring disasters can lead to a community's rise in poverty, as funds earmarked for other purposes are redirected into relief, reconstruction and rebuilding efforts. Therefore, political commitment and social acceptance of the value of hazard mitigation are necessary to increase sustainability, and with that, resilience of communities against natural and human-induced hazards. Communities will become resilient when they integrate adaptive and risk management processes into sustainable development concepts. This includes the need to protect livelihood against risk and uncertainty from global environmental changes.

Society should take advantage of the natural hazard mitigation processes nature provides, using the natural mitigation provided by healthy and resilient ecosystems. Dunes, barrier islands, mangrove forests, and coastal wetlands are natural shock absorbers that protect against coastal storms. Wetlands, floodplains, and forests are sponges that absorb floodwaters; open space, greenways, and riparian - riverside parks - serve as habitat for wildlife, protect streams from pollutants, help maintain water temperatures, and keep people and development away from the highest-risk floodplains; trees can drastically reduce storm water management costs. On the other hand, environmental degradation compounds the actual impacts of natural hazards, limits a community's capacity to cope with those impacts, and lowers the overall natural resilience to hazard impacts, increasing the overall vulnerability to impacts.

One new aspect of the renewable energy community in the aftermath of the tragic Asian tsunami is to develop partnerships with a practical framework to assist with immediate to long-term disaster relief, community rebuilding and resilience, by improving awareness and knowledge of affordable reliable and environmentally friendly energy sources, such as renewable energy and energy efficiency technologies.

As mentioned in the first paragraph of this paper, community's vulnerability to natural processes of change has increased. It is very important that the renewable energy community do not adopt a short-sighted view on this issue, one in which renewable energy might be perceived as the sole solution for community resilience. A holistic, natural hazard, mitigation strategy will need to be the result of appropriate hazard mitigation concepts, addressing sensibly all the identified natural hazards within a community, considering provision for natural hazard pattern changes, adopting appropriate hazard mitigation policies and implementing hazard mitigation measures based on such policies; this strategy should consider the intrinsic mitigation properties of healthy ecosystems and integrate renewable energy and energy efficient technologies. Therefore, the renewable energy community would be wise in recognising this truth and to consider provision for the education of local governments and population located in natural hazard-prone regions in authentic, natural hazard, mitigation concepts (of which a few have been mentioned in this paper) from which sustainable, resilient communities (sustainable developments) can be developed. In this context, strong communities are sustainable, resilient communities based on a comprehensive, natural hazard, mitigation strategy.