Toward Geohazard – Sensitive Human Settlements: A Framework for Analysis, Planning and Policy Making[1]

Ernesto M. Serote[2]

I. Introduction

During the last decade and a half we have seen a number of major calamities that have taken thousands of lives and destroyed properties of unknown worth. Among the more memorable of these are the Luzon earthquake of 1990, followed the year after by the eruption of Mt. Pinatubo. Not long after came the Ormoc tragedy. Not to be outdone, Mt. Mayon erupted in 1993. For about a decade there was a relative respite. Then during the last 3 years another cluster of destructive events came in succession, namely the flooding and landslides in northern Quezon and Aurora in 2004, the Southern Leyte landslides in 2005, and the encore performance of Mt. Mayon in early 2006. Toward the end of 2006, two super typhoons unloaded enough rains to mobilize lahar deposits on the slopes of Mt. Mayon that covered hundreds of homes under thick mud and boulders in a few Albay towns downslope. There are many more natural phenomena that have occurred in the past and are likely to happen again in the future. These are listed in the next section of this paper.

These events of the recent past are undoubtedly more destructive than those that occurred in the distant past. This is because in recent years far more people have put themselves in harm's way through no fault of their own. In some cases, settlements happened to locate in high-risk areas due to lack of information; in most cases the affected people simply have no choice.

Official response to these destructive events has been essentially reactive. It is true that there exists a vertical network of disaster coordinating councils organized at all levels of administration from the national down to the barangay level. These disaster coordinating councils however, are activated only during the occurrence of events. Invariably they assist the affected population to cope with the impact of the event. The only proactive thing that these disaster coordinating bodies are doing is that they are being trained to prepare for the next occurrence of the event and when it does they can count on the use of the mandatory allocation from the budget of every local government unit for their financial requirements.

Voluntary organizations such as the Red Cross and the Center for Disaster Preparedness are going one step further by teaching disaster preparedness directly

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[2] Professor, School of Urban and Regional Planning, University of the Philippines, Diliman, Quezon City

to communities and barangays. These efforts are done on a limited pilot scale but the principles and practices learned from these limited engagements are slowly being disseminated in various forums like this one.

This forum is in response to the growing clamor for a more proactive approach to disaster management. Mainstreaming disaster management in local development planning is recognized by many as one such proactive approach. Around this theme the paper of Dr. Luna revolves. It deals with how communities can prepare themselves when calamity strikes on site, right where they are.

One further step toward taking a proactive stance is a preemptive or preventive one, that is, locating or siting settlements properly. More than empowering people to deal with disasters it might be a lot better to get them out of harm's way. This can be achieved through risk-sensitive land use planning and zoning which is the subject of Dr. Reyes' paper. Under present practice zoning power is exclusively given to cities and municipalities. Inasmuch as settlement planning and policy making is more than local concern, this paper looks into settlement planning from both the national and local perspectives. Of course, our effort to develop risk-sensitive settlement planning can only go as far as current state of knowledge about the geohazards that threaten our existing and future settlements will allow. How much is really known about these hazards? Who are in possession of this information and how is this knowledge being communicated to the segments of the population who will be affected by future hazard events? These, and related questions, are addressed by the paper of Dr. Aurelio, with particular reference to landslides and flooding.

This paper is exploratory in character. It raises questions and identifies issues, both substantive and procedural, which will hopefully provoke further research. Because its primary interest is in the proper location of settlements, it shall focus on the settlement component of the national and local land use policy areas.

There are two main parts of this paper. The first part seeks to develop a framework for determining and explaining the existence of settlements that are exposed to geohazard risks. The second part reviews existing settlement policies and planning practices as to their sensitivity to geohazards with a view to identifying possible areas of improvement.

II. Geohazards and Vulnerability of Settlements

By accident of geography, the Philippines is exposed to many natural phenomena that pose varying degrees of risk to different sectors of the population (Table 1).

Vulnerability of existing settlements is primarily determined by the degree to which individual settlements are exposed to one or a combination of these hazards. What areas are prone to each of these phenomena? Are these areas mapped? Where are existing settlements located in relation to the known hazard areas? Are

the vulnerability maps prepared at a scale large enough for communities to use? How literate are Filipinos in the use of maps? These are fundamental questions that seek immediate answers in order to get on with the agenda of keeping present and future settlements out of harm's way. But the current situation as far as geohazard and vulnerability mapping is concerned is not yet all that encouraging.

Table 1
Taxonomy of Natural Hazards
in the Philippines

Triggering Phenomena	**Associated Events**
Earthquakes	Ground shaking Ground rupture Liquefaction Landslides Tsunami
Volcanic Eruption	Lava flows Pyroclastic flows Base surges Tephra falls Volcanic gases Earthquakes Fissuring Tsunami Landslides Debris avalanche Lahars Seiches
Climatic Changes	Storm surges Landslides Floods Drought Tropical cyclones Tidal fluctuation Sea level rise

Sources: DOST-PHIVOLCS, 1994
NEDA-NLUC, 2002

To be sure, most if not all possible geohazards are already known. But this knowledge is confined to the scientific community. Most geohazard maps are embodied in scientific and technical papers presented in conferences hee and abroad. Vulnerability maps which depict the position of existing settlements relative to the location of specific hazards are even more scarce. The few

examples that exist are the products of donor-driven pilot studies buried in project reports which are never disseminated in public nor replicated in other parts of the country.

Another problem related to maps is the scale in which these are prepared. Most hazard and vulnerability maps are so small scale that they are practically of no use at local or community levels. For example, the maps showing the permanent danger zones around active volcanoes prepared by the Philippine Institute of Volcanology and Seismology are featured prominently in the texts of the national and regional physical framework plans. At the municipal level however where land use regulation is effectively carried out, none of the cities and municipalities affected have utilized this information in their comprehensive land use plans and zoning ordinances. This is due ostensibly to the technical difficulty of translating features in small-scale maps into precise boundaries on the ground.

A third problem is that the company of the map-literate among our citizenry is precious small.

More than physical exposure

Often it is not physical proximity alone that defines vulnerability of existing settlements. Equally important determinants are:

1. The current state of knowledge about each specific hazard;
2. How this knowledge is communicated to potential users; and
3. The social, economic, political and other constraints that come in the way to effective utilization of the information by the concerned users.

Current state of knowledge

Each of the phenomena listed in Table 1 has occurred at some point in the past affecting certain areas in the country. These phenomena are bound to occur repeatedly at various intervals of time and degrees of intensity technically called "return period". Much of this information is already in the possession of the scientific community. To the credit of the scientific community, it continues to make studies and in-depth investigations even with limited resources. What is being done to disseminate this information among the segments of the population who are likely to be affected by future hazard events? Are these efforts adequate? This should be a subject deserving of closer scrutiny.

Communication bottlenecks

There are a number of factors that limit the effectiveness of communication from the generator of information to the intended user. One factor is the nature of the information itself. Most scientific information is presented in technical jargon that is comprehensible only to those who belong to the specific scientific circles. This

observation applies to both texts and maps. Clearly there is a need to translate scientific literature into popular language. Also, hazard or vulnerability maps should be prepared at a scale that is usable at the community level. But who will do it? A second factor is the character of the intended user. Outside of the scientific community, the possible audience for geohazard information includes policy makers and planners from the government, property developers from the private sector, own-home builders, and voluntary groups. Each of these potential users of geohazard information have their own interests and agenda. Depending on the perceived impact on their interests they tend to manipulate, distort, suppress or otherwise misuse the scientific information. A third factor is the media of communication used. Are the tri-media of print, radio and television being utilized with full awareness of the relative reach of each medium? Are the cyberspace and informal channels being resorted to as well? Finally, the information is usually made available by the scientific community only after the occurrence of the event presumably to explain the cause or causes and illustrate the consequences of the event with a view to making everyone concerned better prepared for the next event. Can the information be disseminated before the event instead I order to avert disasters?

Constraints to information users

As discussed earlier, scientific information that is seemingly value free can be manipulated by specific users to suit their interests and agenda. The following illustrations are proto-typical but similarities in the real world are not hard to find.

Case 1. Local government policy makers. Government policy makers are faced with the dilemma of balancing conflicting interests. But often they exhibit an aversion to geohazard information especially when this is presented in map form. Due to their mortal fear of scaring away potential investors in their own jurisdiction they would rather keep the information away from the public.

Case 2. Planners. Planners have pretensions of being neutral scientific professionals. In reality they have no power to defy the wishes of their clients whether these be government officials or private developers. At best planners can only hope that their next client is enlightened enough to listen to professional advice that is supported by scientific and technical bases.

Case 3. Property owners or developers. It is from this sector that the most spirited, even violent reaction to any new information on geohazards usually comes. The objections from this sector usually make it difficult for zoning officers to faithfully enforce risk-sensitive zoning ordinances. Due to the relatively large scale of their projects however some developers can be made to comply with environmental safeguards through the Environmental Impact Assessment system.

Case 4. Own-home builders. These consist of small lot owners and the property-less. Small lot owners build on the only lot they got whether or not they are aware

of geohazards that threaten their place. At the very least, if they have to move they can trade their lot for whatever it is worth.

The property-less are worse off because they absolutely have no choice. The only space available for them to set up their abode are the marginal lands subject to all sorts of hazards. In the urban areas these marginal lands consist of river banks and esteros, garbage dumps, traffic islands, under bridges, and the like. In rural areas the property-less settle themselves in open-access areas of the public domain such as foreshore lands along the sea or lake shores, the very steep slopes, and accreted lands and islets by the mouth of major rivers. To marginalized households like these who are exposed to life's hazards of all kinds any information on geohazards would sound almost like an obscenity.

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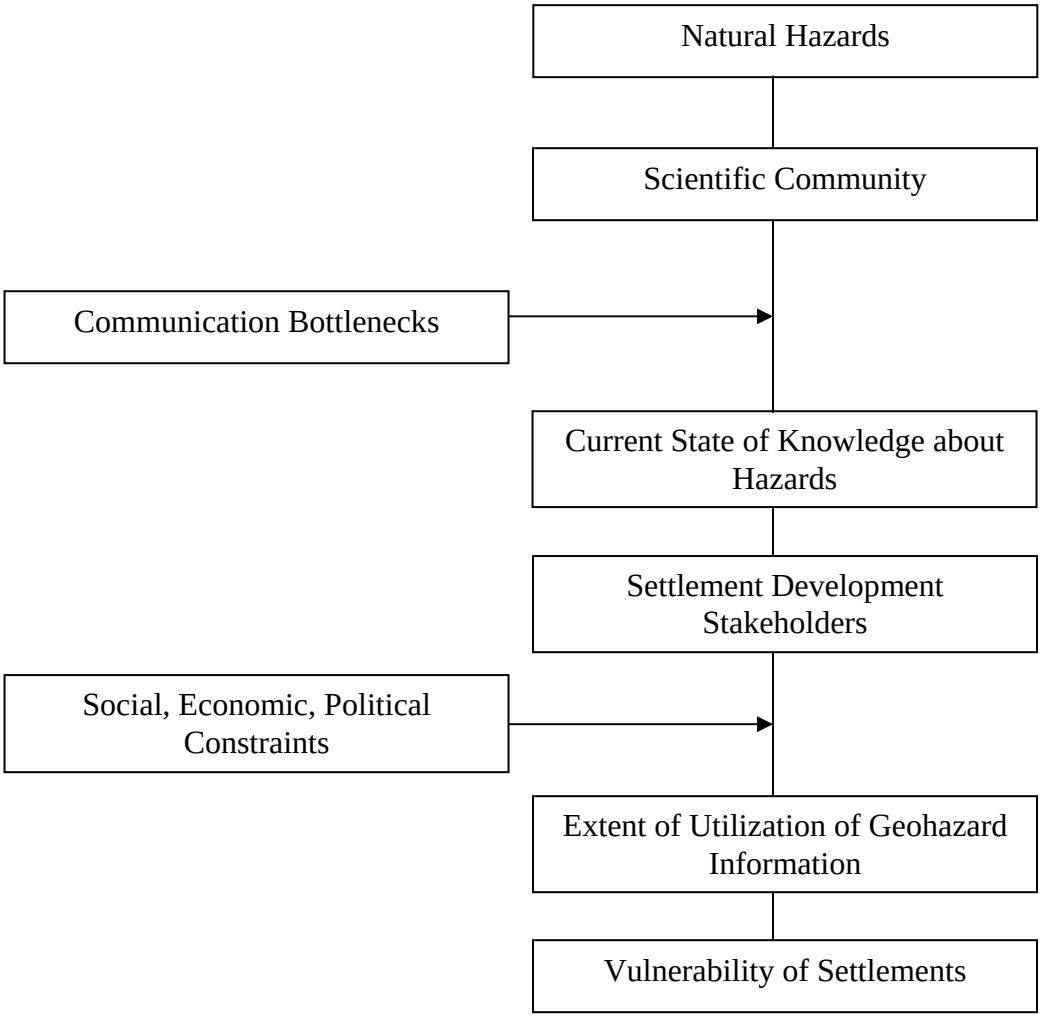
Case 5. Voluntary sectors. Environmental groups are assiduous users of geohazard information. They often use this information to push their advocacies. Another type of voluntary groups are those engaged in direct provision of housing or providing assistance in house construction. It is not known however to what extent this latter group utilizes geohazard information in their volunteer work.

In summary, the analysis of vulnerability of existing settlements to geohazards should take into account the current state of knowledge about the specific hazard as communicated by the scientific community or generating agency to the public or potential users, as well as the extent of utilization of the information by stakeholders who are involved in settlement planning, policy making and development as filtered through their own interests and agenda. (Figure 1 illustrates the conceptual framework.)

In short, why are some settlements vulnerable to geohazards? It may be due to lack of or inadequate knowledge about the specific hazard, or else the explanation could be traced to the way critical decision makers faithfully utilized the information or chose to ignore, hide, manipulate it to suit their own interests. In some cases, however, people put themselves in harm's way simply because they have no choice.

There are two critical actors that intervene in the utilization of geohazard information for the development of settlements that are less vulnerable or at least sensitive to geohazards: the generators of the information represented by the scientific community and the users of such information namely, stakeholders who are involved in settlement planning and development. Obviously these critical actors are the target of policy intervention in establishing geohazard-sensitive human settlements. Presumably, the former who are politically neutral are easier to deal with than the latter who are more intractable.

Figure 1
Vulnerability of Settlements to Geohazards
(Conceptual Framework)



III. Possible Policy Interventions

Toward establishing settlements that are out of harm's way, critical points of intervention must be identified. As pointed out in the preceding section of this paper, the first critical intervention point is in the generation of information. The second point is what to do with existing settlements that are found to be vulnerable to geohazards. The third point is how to prevent future disasters through proper land use planning and zoning at the local level and a sound settlement policy at the national level.

More Detailed Geohazard Mapping

Probably the most common reason why some existing settlements are exposed to geohazards is the lack of adequate information on the existence and location of specific hazards.

To be more precise, the information on these hazards was not disseminated to the public. It has a limited circulation confined to the scientific community and among consultants who occasionally are able to get access to technical information in connection with specific projects. Furthermore, the information is not user-friendly and the maps are not useful at the local and community levels.

The current effort of the Mines and Geosciences Bureau on geohazard mapping is a huge step to reverse the current situation. However, for obvious reasons, the coverage of the project is limited both in subject and geographical area.

There is a need to expand the mapping coverage to all known hazards in all areas of the country. In areas deemed to be under high probability of exposure large-scale maps will have to be prepared. Certainly the cost of this project will be staggering. But it is worth investing in. Perhaps private capital could be attracted to this activity. After all property developers will stand to benefit immensely from the project output.

The value of large-scale hazard maps in local land use planning and zoning cannot be over-stated. Among other difficulties, the availability of large-scale maps will reduce the contentious issues pertaining to delineation of precise boundaries of land use zoning regulation districts. Community-level disaster management and preparedness planning will also have an added data input that will aid in the identification of appropriate responses.

What to do with Vulnerable Settlements

The “Urban Development and Housing Act” (RA 7279) has placed high priority to settlements located in hazardous, environmentally constrained areas as targets for relocation or resettlement. What has been the record of compliance with this provision of law is a good area for evaluation research. Offhand, it seems that the implementation is hampered by a number of factors such as the difficulty of finding relocation sites. The law itself advocates in-city relocation but most local governments are land short and the national government is selling away its land holdings to the private sector. Invariably, the resettlement sites for urban relocates are found in faraway suburban areas because these are the ones that government agencies can afford. Compounding the difficulty is the fact that most of the families affected are the property-less who are least able to afford the cost of commuting to far away resettlement sites much less to pay the high rent in inner city redevelopment areas. For this type of clientele, public rental housing may be an option worth looking into.

In the case of vulnerable settlements that cannot be relocated for whatever reason, disaster preparedness planning and management along the lines being advocated in the paper of Dr. Luna will be required at both the community and city levels.

A more problematic case pertains to vulnerable settlements in non-urban areas which are probably more numerous than their urban counterparts. At present there is no law similar to the UDHA to protect them. Presumably, they are covered by the land use plans of their host municipalities. Otherwise, the inherent police power of the LGU could be used to deal with them. However, local chief executives are constrained by the fear of driving away potential investors so they tend to play down the existence of hazard-prone areas within their jurisdiction. Moreover, moving people is always a sensitive issue in local politics. Furthermore, LGUs outside the metropolis are resource short particularly in terms of land for public housing.

A soft approach to relocation is one that is voluntary. Concerned LGUs must make an effort to attract more residents to the existing urban centers. After all, poblaciones are traditionally well chosen sites for permanent settlements. Due to the concentration of public and private investments in the urban area it is less vulnerable to various types of hazards. Another advantage of urban residents is the possible shift in their livelihood from that of natural resource extraction to one that is not so dependent on working the land. This approach can be packaged with the slogan “urbanization as liberation”.

Preventing Future Disasters

Following through the slogan “urbanization as liberation”, municipal level land use planning and zoning may be encouraged to promote larger and more compact urban centers. Depending on the specific geohazards that will potentially affect certain parts of the municipality these should be considered as one of the protected areas with appropriate restrictions enforced through the zoning ordinance. Again the value of large-scale maps cannot be over-emphasized. With protected ares properly identified and precisely delineated appropriate protected area policies can be put in place. Correspondingly, the other land use policy areas of settlements, production and infrastructure can be properly located.

At the national level the policy on settlements is encapsulated in the slogan “national dispersion through regional concentration”. This calls for strategies to promote and develop large metropolitan areas in the regions to serve as counter-magnets to Metro Manila. Within the regions, these large metropolitan areas will consolidate public and private investments to facilitate access by the population to jobs and urban services. Hopefully, this will wean away settlements that are exposed to various geohazards from over-dependence on natural resorce extraction and provide an attractive option for vulnerable groups to voluntarily relocate themselves in the urban areas.

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