

Facing the Unpredictable Tropical Cyclone Induced Disasters

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Tropical cyclones (TCs), accompanying intense winds and torrential precipitation, are one of the most devastating weather phenomena in the world. Despite their wide variety of crucial effects on earth system, TC-triggered hazards (e.g. landslides, debris flows, and floods) severely devastate infrastructure, agriculture, and residents living in human society. A surprising fact is that the TC-induced disasters are ranked second by the World Meteorological Organization in terms of the loss of human life. How it comes? We now equipped the most advanced and superior models and deployed the most intensive and extensive observation networks for preventing natural disasters. However, the damage is getting worse. To disassemble the cause of those unaffordable damages, its origin, forecasting capability, and disaster management should be uncovered and inspected for sustainable development. As for the origin, some may attribute the global warming is the assassin for the catastrophic damages. It may be true, but also questionable. Even without global warming, it is always possible to appear the record-breaking events due to the limited record length. Meanwhile, the interval of the extremes only can be expected, but not be guaranteed in statistics. In fact, the damages originate from the population increase and urbanization. One can expect the devastating weather phenomena occurring in unoccupied region can't be called 'disaster'. With the growing population and urbanization, the demand of forecasting capability and disaster management should be raised, at least proportional to population. Otherwise, the human society (e.g. city, village) is getting vulnerable intrinsically.

As for the forecasting capability, we did a significant progress in modeling work and advance to understand more inside the earth system. However, the progress of forecasting capability with respect of accuracy and precision is still slow. As Kerr (2007) published a paper in Science, there is no detectable progress for river-level forecasting during the past 2 decades. Although some may state that there are a number of successful cases around the world, it still can't be regarded a convincing argument, compared to the number of failure cases and the recent increase of damages. At least, the progress of forecasting capability can't meet the urgent demand of human society with population growth. It can be optimistically expected to make a significant step in the future. However, the governments don't have time to wait the near-perfect forecast. They are enforced to do something or make a decision before or close to the TC invasions. For government, the TC likes an eagle hovering on the sky, searching the weak prey and speedily diving to hit. In such circumstance, to build up the protective covering for eagle's attack is important. In this perspective, disaster management should be emphasized.

Disaster management can be recognized by the three components: disaster prevention, reduction, and mitigation. Mitigation focuses to recover or alleviate the affected entity (hardware and software of infrastructures). Mitigation is important for developing countries, because the serious destructions usually deteriorate the society with low resilience in developing countries and drop into the vicious cycle. Reduction emphasizes on the rescue in a very short time. It is a serious challenge to examine the capability of government response and integration. Compared to the previous two components, disaster prevention is recognized as the root of minimizing the hazard damages. Well-prepared prevention can effectively reduce the cost

spent in reduction and mitigation. However, it is not an easy task when compensating the risk assessment and the limited budget. Moreover, the unknown uncertainties and indirect effects sometimes are the excuses to trim off the comprehensive prevention. One feasible approach is to set the clear safety standard, like insurance. Notably, since population growth and forecasting capability are important factors for disaster management, the safety standard of prevention should be updated in accordance with the population and forecasting capability. Government should be responsible for the TC-induced hazards below the safety standard. Clarifying the rights and obligations based on the safety standard is helpful to reach the consensus between government and citizens. Doing so, the disaster prevention on this basis is relatively robust and assessable.

For the disaster prevention planning, the concepts of multi-discipline communication and open access are important. For example, the TC invasion may induce landslides in hills slopes and the massive sediments may be triggered by torrential rainfall in forms of mud or debris-flows. Such high turbidity flood may reduce the reservoir capacity and obstruct the water supply system. Moreover, the flood may also inundate the farms and cities in downstream. The hazard consequence is complicated and involves multidiscipline knowledge. Forming the platform for multi-discipline communication is important. Meanwhile, the open access is particularly important to maximize the utilization and speed up the distribution. The free-available databases and relevant studies can aid the developing countries significantly. This is also the aim and scope of this journal, Journal of Geography & Natural Disaster and the values of multi-discipline communication and open access are the main concerns that OMICS Group promoted and highlighted.

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