Integrated (Total) Disaster Risk Management: The Way forward

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I admit to some responsibility for introducing the term "TDRM" to Asia. I have been castigating myself ever since because I probably should not have used the word "total", although it is not a bad term. I more often refer to it as "holistic", or "integrated" or "comprehensive", and all of those, I think, are better terms. I like the word "integrated" best now, but we have gone ahead with the TDRM. It has gained some acceptance in Asia and, therefore, I understand the reluctance to try to change it at this point.

What I will try to do in this presentation is to run through how we got to where we are and how to go forward from here. I wrote "the way forward" on this title page because it was the title I was given, but I am not sure that I know "the" way forward. I know some things which ought to be done, and this may be perhaps "a" way forward, but certainly by no means is it "the" answer to our problems or "the" way forward.

The evolution of disaster risk management

Societies generally began seeking to reduce disaster risk with structural measures: dykes, dams, levees, etc. And this effort started very long ago. The dykes that protect Hanoi from the Red River, for example, are four to five hundred years old. That led soon after to ad hoc responses, because the structural measures would sometimes fail and the authorities would quickly establish a committee or commission to respond to the disaster that would result. As soon as the disaster was over, the dike would be repaired, the committee would be disbanded, and no more would be done about disasters until the next disaster occurred. We went on in this fashion for many years–in many countries, in fact, until only about a dozen years ago.

Earlier, Mr. Moriyasu said that the ability to do predictions might organize possible responses. And, in fact, that's exactly what happened. As technology enabled us to monitor volcanic activity and predict eruptions, to map the paths of cyclones and predict landfall, we were able to take some pre-emptive action–to conduct evacuations, for example, before the hazard struck. This was the start of well-organized responses, and led directly to the establishment of permanent national disaster management agencies to replace the short-lived ad hoc committees that had managed disasters previously. These agencies have many names–National Disaster Management Office in Cambodia, NDCC in the Philippines, BAKORNAS in Indonesia – but were established with a common purpose: to meet the immediate emergency needs of victims or potential victims of disasters.

The establishment of these agencies led to the strengthening of preparedness measures, including needs assessment (which we will discuss tomorrow), stockpiles, improvement of coordination mechanisms, improvement of communications, preparedness planning, and so on.

Soon thereafter, we recognized, nevertheless, that vulnerability to disasters was increasing, and so there has been a major emphasis in the past several years on strengthening community resilience – what is commonly called community based disaster management (CBDM). CBDM activities include organizing flood prone communities to plan how they will protect themselves against flood disasters, flood "proofing", and livelihood protection. Flood proofing, which has been done in northern Bangladesh and now in the Mekong Delta region of Vietnam, involves constructing earthen mounds to raise entire homesteads – the house, the vegetable garden,

livestock pen, grain stores, latrine and water well–above flood level. The households (or small clusters of households) and their important assets are safe from floods as long as they plan properly. Livelihood protection includes, for example, providing fishnets and fish-hooks to farmers who normally farm, but can earn their living during the flood season because they are provided an alternative.

Integrated disaster risk management components

In an integrated disaster risk management approach, all of these activities – from structural interventions that reduce hazards to CBDM that reduces vulnerability–come together. And disaster risk management introduces some new elements, as well. I will not mention everything that must be included in integrated disaster risk management, but will try to touch on the main components of an integrated flood disaster risk management approach, as an example:

Policy and organization are critical to successful implementation of TDRM (or IDRM). National authorities must clearly state the objective – to reduce disaster risk throughout society by factoring it into all our development activities – and support efforts to achieve that objective by allocating appropriate resources and assigning responsibility throughout the system. Countries must also organize the flow of information amongst government agencies and between government and the people, so that each agency and individual has the information necessary to make informed choices about how and where to build, for example.

Climate forecasts are a critical starting point for information flow. Great advances have been made recently in respect to forecasting hydro-meteorological events, particularly medium (up to one month) and long-term (one to three-month) forecasts. Various models have also been developed for modeling the impact of very long-term (25 to 75 years) climate change on particular areas.

Forecast applications. Medium and long-term climate forecasts, if properly disseminated and in an appropriate format, can greatly help farmers reduce their losses during extreme climate events such as floods and droughts (and increase their yields during normal periods), and can also assist in water resource planning activities, health planning, fishing activities, etc. Very long-term climate change models can assist in land use planning.

River flow monitoring. Our capacity to monitor river flow and predict river discharge is increasing all the time. China has recently installed three new river gauges on the upper reaches of the Mekong River, for example, that will help the Mekong River Commission better understand and forecast river discharge. Just in the past few months, Bangladesh has significantly increased its knowledge of river discharge on the Ganges, enabling that government to predict floods many days earlier than previously.

Flood mapping to help model where flood waters will actually flow, and to what depth, is an on-going and very expensive process. Recently, there have been efforts to involve communities in monitoring flood waters on a regular basis and in feeding that information back to the national authorities as a way of reducing costs and increasing participation in the flood mapping and modeling process.

Early warning The best warning system is one that also warns of normal, which we almost never do. It is the system that is in place permanently, that provides useful information year in and year out, that is trusted and understood by the local community, and that also disseminates emergency

early warning when required. In Indonesia last week, I was reminded that although they have flood warning systems on a number of rivers in Indonesia, only one–on the Brantas River – has successfully led to timely evacuation before a flood event. And the reason that the Brantas River Flood Warning System works is because the Brantas River system is used throughout the year to collect, analyze and disseminate information on the allocation of water for irrigation. Everyone knows it is there and they understand what the messages mean. It is a routine and trusted system, and that it is a useful thing to build upon for warning of riverine floods.

Watershed management Forestry, water resource management, urbanization, housing, agriculture, aquaculture, etc. within a single watershed cannot be considered independently from each other, but must be integrated into an overall river basin plan. Japan has led the way in this regard, establishing a specific River Basin Commission for each river in the country, no matter how small.

Urban planning and zoning are not issues that have generally been considered in respect to flood disaster management in many countries of Asia, but these issues have been mentioned repeatedly in the presentations made by others today. I would just add that human settlements must be viewed not only from the perspective of their vulnerability, but also from the perspective of the hazards that they present or that they exacerbate.

Building codes and code enforcement In most countries of Asia, building codes apply only to engineered structures, and not to individual homes, which I will mention in a moment. The codes that apply to engineered structures are often quite adequate, though sometimes they are not. In either case, codes have to be upgraded constantly as new information becomes available – particularly from modeling water runoff – and that is a major challenge. The greatest challenge, however, is in respect to enforcement of the building codes, particularly in those countries where corruption is endemic. Turkey, which is seismically very active, has begun taking a novel approach to address this problem of building code enforcement. Turkey has decided to outsource to private firms the responsibility for approving designs and inspecting construction practices. The private firms are insured, their employees are bonded, and the firm is financially responsible for any collapse of the structure within twenty years from the time of the construction. So the design and construction supervision firm has a vested interest to make sure that the building has been designed and constructed properly. This approach also provides an incentive – greater employment opportunities with private firms – for those engineering and architectural students who are presently choosing such courses as Modern Office Design over Seismic Design and Engineering due to their perception that the former offer greater employment prospects upon graduation

Housing design and finance Since individual houses are not usually covered under the building codes in Asia, it is necessary for us to find alternative ways to encourage and facilitate individual home builders to use disaster-resistant designs, materials and techniques in the construction of their homes. We need to publicize these, making people aware of what appropriate designs are. Probably, there also needs to be some incentive policies, some financial incentives that would assist people, particularly poor people or first-time home owners, to incorporate those features into their home. Earlier I mentioned flood "proofing" as an approach to reduce flood vulnerability in rural areas. I believe that governments should provide a reasonable subsidy to home builders – either through a grant or subsidized sale of particular materials (e.g., concrete stilts for raising homes in Cambodia, geo-textiles for securing raised earthen mounds in Vietnam, etc.), through reduced interest rates, or through a grant/loan combination – to incorporate such measures into their homes, at least for all new construction. Households forming all over Asia

find the way somehow to build their home the first time. They may not build to the standard we wish, but they are building it to a standard acceptable to them. Prof. Arya, from Rookrie University in India, estimated that the difference between a building to a normal standard and a building to a seismically resistance standard is a difference of 4 to 8 percent in total cost. I am looking for a 4 to 8 percent solution, wherein we leave up to each family to arrange the first 100 percent but find a way of encouraging and enabling them to put in the additional 4 to 8 percent through some sort of reduced interest rate on their loan or some partial grant or partial reduction in their loan, depending on income level. There are solutions if we approach it to an imaginative way.

Response preparedness planning is certainly a good part of integrated disaster risk management. This, in fact, is the focus of most of you assembled at this workshop, so I will not waste your time by repeating what you already know very well.

Insurance makes sense because it shares the risk which remains, but only after the risk has been reduced to some acceptable level; otherwise the premium is going to be so high that nobody could pay it. But if we can do all of these other things I mentioned above, then the risk will be acceptable and the remaining risk can be shared amongst the broader population and everybody is better off.

Looking forward

During the past half-century, from the 1950s until now, we have seen losses from hydro-meteorological events increase ten-fold as floods, storms and droughts have all worsened, both in frequency and in severity. Unfortunately, the view forward is as alarming as the view backward. There are at least four major trends that are virtually certain to increase our disaster risk in the coming years, and they feed on and contribute to each other in a vicious cyclical way:

Water scarcity is an increasing concern, and one which will have many negative results. This problem is most pronounced in India and China, but is also serious in many other countries of Asia. Water tables in some of the major grain-producing regions of northern China are falling at the rate of about one-and-a-half meters per year. Water tables throughout India are falling at the rate of one to three meters per year and, by 2015, per capita water availability in India is likely to be only 25 to 50 percent of what it was in the year 2000. The Government of India has initiated many programs to conserve water and to use it more effectively, but these in total will not be sufficient to change the 2015 forecast of extreme water scarcity. The implications for agriculture – which currently accounts for approximately 80 percent of water usage–and for migration are enormous. Even as we meet, we are witnessing the migration of millions of people from India's most drought-affected states.

Migration and urbanization are occurring at a rate unprecedented in the history of humanity. Between the year 2000 and 2015, the world population will increase by about 1.1 billion. During that same period, however, there will be little growth (perhaps 100 million) in rural populations, while urban growth will be about ten times that amount, due more to migration into the cities than to the number of people born in cities. Less than ten percent of the total urban growth will take place in the world 20 largest cities, and about 25 percent will take place in medium-sized cities (those with present populations of 5 to 10 million). More than 45 percent of urban growth will occur in what are today small cities, having present populations of one million or less. Those cities, unfortunately, have the least capacity to deal effectively with their population increase. They have the least capacity for urban planning, the least-developed health and

emergency response services, the least-developed drainage and sewage, and so forth. Disasters will strike these small cities especially hard, but some large cities will also suffer as excessive water extraction causes further subsidence and makes them more vulnerable to flooding and to sea-level rise.

Environmental degradation is also increasing disaster risk. Inadequately controlled logging and devastating forest fires have resulted in accelerated water runoff which is causing the excessive silting of rivers and has increased flooding and landslide risk. Similarly, the destruction of mangrove forests has increased the risk of storm surge for many coastal communities. Drainage in a number of strategic river deltas has been impeded by the expansion of agricultural activities into wetlands areas, prolonging the floods throughout those deltas.

Climate variability and change may be of greatest concern. It appears that, although climate change – permanent or very long-term difference in temperature or precipitation–is a relatively slow process, the actual process of long-term climate change is causing greater variability in our current climate. That is, we are already experiencing, and will increasingly experience, extreme climate events–El Nino and La Nina – and these will become both more frequent and more severe. This, in turn, strongly suggests more frequent and severe storms, more frequent and severe floods, and more frequent and severe droughts now and in the immediate future. Over the longer term – 50 to 100 years (and some climatologists say even less) – climate change will require major changes in our agricultural patterns and practices, and resultant sea-level rise will imperil our coastal communities, including some of our major cities.

Taking a broader perspective

The title of this presentation is Total or Integrated Disaster Risk Management. The critical words are not really "total" or "integrated", though both are very important. But, the critical words are "disaster risk". There is a tendency to look at what we have done to ourselves and what we continue to do to ourselves and conclude that the problem is our increased vulnerability to disasters. We mentioned that disaster risk is going to get worse due to climate change and variability, which is increasing, and due to increasing water scarcity, urbanization, and environmental degradation. We all seem to accept that these things are givens, and that we have to adapt to them; that is, that we must develop programmes to reduce our vulnerability. But the issue is not simply disaster "vulnerability". The issue is "disaster risk", because disaster risk, in fact, is a combination of hazard and vulnerability. Of course we must reduce our vulnerability, but we must also do all we can to reduce the hazards if we are to achieve truly sustainable development. At the very least, we must seek ways to make sure that our "development" efforts do not actually increase our hazards. And that means that we must start looking at our current development efforts from a somewhat wider perspective. For example:

Urban settlements and housing We are allowing people to build houses on steep slopes even though we know that they are therefore vulnerable to landslides, probably because we acknowledge that those people are willing to accept their increased vulnerability by living there. We fail to recognize, however, that building houses on those steep slopes actually **increases the hazard** of landslides and flash floods because that kind of "development" increases the rate of water runoff. That increases the risk of a landslip disaster for the settlement at the foot of the hill and the risk of a flood disaster for the agricultural community down-river. That is a development issue. There is tremendous pressure to provide adequate land for housing; the challenge is how to do this in a way that does not increase vulnerability and does not increase hazards. Japan has met this challenge by allowing construction in the upper reaches of a watershed, for example, but

requiring the construction of water retention pits to offset the increased runoff. That is a developmentally sustainable approach.

Agriculture and aquaculture "development" programmes often take into account their vulnerability to floods, and measures to reduce flood vulnerability are often incorporated into the project. Rarely, though, is the agriculture or aquaculture project assessed from the perspective of the increase it may cause to the flood hazard. Much of the flooding that affects large areas of the Mekong Delta, however, is now seen as being caused by reduced drainage as a result of the expansion of agricultural activities into wetland areas that previously served an important drainage function. That is, the **flood hazard has been increased.** Another hazard, storm surge, has been increased by the destruction of mangrove forests to expand aquaculture activities.

Road construction standards are generally set to protect the road from being damaged or destroyed by a 20-year or 50 year flood, depending on the road's importance. That is, the vulnerability of the road is given important consideration. But **the increased hazard** that the road may pose is rarely considered, while throughout Asia roads are constructed that impede water flow and cause deeper flood and more prolonged floods. The Mekong River Commission told me that they did a study recently that showed a certain road was impeding water flow through three channels and causing the annual flooding of about 6,000 hectares of rice fields. The MRC study further showed that if the road's 100-meter spans across the channels were increased to 300 meters, the rice fields would be saved from flooding and the production from those fields would compensate for the increased cost of the wider spans in about seven years. Designing the road to that standard originally, of course, would have been most cost-effective, but it would have required that our planners thought not only in terms of "vulnerability" but also in terms of "hazard".

Logging activities present another example of how our current thinking is too narrow. Logging enterprises typically present plans to national governments that show how they intend to engage in sustainable logging, how they intend to replant, how many jobs they will create and how much revenue will be generated for the government. But, no one is looking at how much silting will be caused in the river. How much is that going to cost (or benefit) downstream agricultural communities? Those calculations have not been done. So, we have no way of countering the very good arguments – solid, sound economic arguments–put forward by a logging farm. Even if they adhere to their plan, we might still have a problem of **increased hazard** – and often the loggers do not adhere to their plan.

School design and construction, like road design and construction, typically factors in vulnerability to floods and designs the schools to be raised above flood level. This often assures that the schools will not be destroyed by the floods but, unless other design modifications are made, it increases the likelihood that the school will be damaged by the flood victims. If the school is above flood level but the rest of the community is not, then the school is likely to serve as a refuge for people displaced by the flood. Instead of accommodating 300 to 400 students for six hours a day, the school may have to accommodate 1,000 people for 24 hours a day for as long as two weeks. Those people will cook, eat, drink and perform bodily functions at the school, whether the school provides appropriate facilities or not. A holistic disaster risk management design would suggest that a wider verandah (so that cooking can be done outside the classrooms), an increased number of toilets, and a water source (both also above flood level and accessible from the school) are essential elements in such a school.

Mainstreaming disaster reduction into development.

The examples I just mentioned strongly suggest that a holistic disaster risk management approach is necessary to achieve sustainable development. If we continue to increase hazards while promoting development we will eventually see those development gains wiped out by ever larger and more frequent disasters. China has estimated that, between 1992 and 2001, disasters caused average economic losses of 3.8 percent of GDP per year. In some South Pacific countries, a single disaster will cause damage that is actually in excess of the country's total annual GDP. But disasters are even more pernicious than that, repeatedly striking the poorest communities in Asia and thwarting governments' efforts to reduce poverty in their countries.

If we look, for example, at poor areas in India, we see a direct correlation between poverty and disaster risk. India ranks each of its 32 states on a Human Development Index (HDI) which measures income, access to education, access to health care, and so on – but the most critical indicator is relative poverty. The six lowest ranked states on the human development index are exactly the six most disaster prone states. That is, number 32 is the most disaster-affected state in all of India, number 31 is the second-most disaster-affected state, and so forth. I suspect the same correlation prevails in almost every other nation in Asia.

I must say that you have done a marvelous job in the last ten to twelve years in preserving lives. Thailand has seen an increase of the number of disasters such as floods and storms, but an actual decrease in loss of life. Vietnam is the same way, and so is Bangladesh. But, economic losses continue to be enormous and, because they keep striking the same people – the same poor people–over and over again, those people have virtually no chance of getting out of poverty unless we deal with their disaster vulnerability and unless we stop creating hazards for them.

By focusing so exclusively on disaster preparedness and the development of national disaster response agencies, we in the international disaster management field have, to some extent, distracted governments from dealing with the underlying problems. I liken disaster response agencies to pharmaceutical firms. Pharmaceutical firms identify a disease that affects many people. They then spend a great deal of money on research and development to find a treatment for that disease. (Note: not a cure but a treatment. If you want to seek a cure for a disease, send a donation to the National Cancer Foundation, or the American Diabetes Society, or some such organization; pharmaceutical firms are not very interested in cures.) The ideal treatment, from the pharmaceutical company's point of view, is one that you will take every day of your life. And the pharmaceutical firm will try to help you make that a very, very long life. The pharmaceutical firm does this to generate capital; they repeatedly provide the drug and the patient repeatedly gives them money.

Disaster response agencies are not so different. Instead of a disease, we have a disaster. Instead of spending money on research and development of a drug, we spend money to establish stockpiles of equipment – shelter materials, blankets, food, mobile hospitals, communications, equipment, etc. – which are our form of treatment. We respond repeatedly to the same victims, sometimes as often as several times a year, year after year. We do this to generate capital – not cash capital, but political capital. We expect, in return for our life-saving assistance, that people will vote for our political party or, in the case of international donors, have a favorable impression of our country. And usually they do; this is a political reality of life.

Is such a situation hopeless? I think not. We have achieved some progress. Just in the last few years, mitigation has certainly been given a much higher profile in Asia. Bangladesh has

established the Ministry of Disaster Management. Thailand has established the post of Directorate General for Disaster Mitigation and Management within the Ministry of Home Affairs, clearly a post that is responsible for more than simply disaster response. Indonesia has established a Disaster Mitigation Unit within BAKORNAS, the national disaster coordination agency. India has moved the responsibility for disaster management from the Ministry of Agriculture into the Ministry of Home Affairs and has placed much more emphasis on disaster reduction.

We have also seen some recognition among international development agencies, particularly from ADB and the World Bank, for the need to take a more holistic approach to disaster management. We have also seen support from some of the bilateral donors as well, particularly the British Overseas Development Agency and the Dutch Government, both of which have started looking very carefully at what they can do to help meet the broader disaster mitigation needs. AUSAID is also doing this, and disaster reduction pretty much underlines all of their development aid programmes. Even within UNDP, just last Friday, we were successful, finally, in changing the World Vulnerability Report to now be called "Development and Disaster Risk: A Global Report". That's a very different emphasis; instead of focusing strictly on vulnerability, we have now made our major report something broader than that.

A way forward

Much remains to be done. Risk reduction's higher profile has so far been unmatched by a commitment of resources. I mentioned that Bangladesh has established the Ministry of Disaster Management, but still 93-94% of its resources are focused on disaster response. BAKORNAS has a Disaster Mitigation Unit, but it has been assigned only 3 people out of a total of 80 staff. My own former agency, OFDA, spends 85% of its money on disaster response, and almost 15% is spent on disaster preparedness. Perhaps 1% could be considered to be targeted at disaster risk management in a broader sense than preparedness and response. So, the emphasis is still clearly on treatment rather than cure. As Mr. Nishikawa pointed out in his presentation this morning, disasters are greatest in Asia, the economic losses are the greatest, and the threat to sustainable development is clearest. As Dr. Sakakibara mentioned, disaster risk identification needs some imagination. Imagination is indeed required. Also, we need to coordinate and advocate better.

The challenge we face now is how to convince the development agencies of the need to integrate disaster risk management into the national planning process.

Convincing you is not sufficient. You don't control the money. You don't make any decisions on national development planning. But, we do have to convince you to be something more than national disaster response agencies. You must become disaster risk management agencies. That is not an easy thing. A different set of skills has to be involved. To do both of these – to convince the development agencies and to help you become risk management agencies–we need to mobilize required resources. I need to convince donors and you need to convince donors that this is indeed where the money should be spent. You have to convince your national planning agency and the Ministry of Finance. We have to develop the necessary capacities, and it is not simply a matter of money.

In order to convince the national planning agencies, we should also try to convince the legislators and parliamentarians. These are folks who tend to be around much longer than any single administration. Administrations seem to change, with some notable exceptions, every two to

eight years, whereas people in the parliament–in the upper house or lower house–often tend to be around for 20-30 years. They are also worried about getting re-elected, of course, and they care most about the specific needs of their constituencies. But, because they plan to be around longer than the current administration, they typically have a much longer term view of what is in the best interest of the nation.

What appeals to those people – national planners and legislators–is good, solid, social and economic information, something that they can base a decision upon. And that means that we have to identify and quantify the socio-economic impacts of disasters. The figures that have been presented to date have been based on damage assessments. Assessments count how many houses or how many hectares of paddies were destroyed. That's the damage. However, when the paddy fields are destroyed, it is not simply the loss of the crop. It is the milling industries that also suffer. The transport industries suffer and many other industries suffer. The entire economy of the market town is affected. Unless we measure that, we really have no way of showing the people who manage the money what, in fact, the impact of the disaster really is in economic terms. Further, if governments have targets for poverty reduction, for example, we need to show that, indeed, repetitive disasters are making it actually impossible for the government to reach those targets. Then, they might be convinced.

So, we have to introduce the methodology to develop that information. It's not easy, but it has been done in the Caribbean. We have to introduce to Asia the methodology for doing those social economic assessments, which we plan to do sometime this year with ESCAP. We have to implement some studies, some pilot studies, to try out the methodology. Then, we have to present the findings and what the implications of those findings are to the national planning agencies and the development agencies–the Ministry of Agriculture, the Ministry of Fisheries and the Ministries of Forests and so on.

And we must also monitor the disaster impact on target groups, initially to identify the relationship between disaster risk and poverty, and then over and over again to see if we are making a difference. A lot of countries are doing various kinds of household surveys, but none of them actually contain any questions that would illicit information on the disaster risk of the respondents. So, we have no way correlating poverty and disaster risk. But, by simply making some slight modifications to the ongoing surveys I think we can do that.

We have to support organizational roles for disaster response agencies. I mentioned before various things that governments are doing–i.e., the way of building roads and schools, lack of proper urbanization, shelters improperly built and so on – that create floods. The public works department, however, is not going recognize this and to come up with solutions by themselves. Somebody has to help direct them. Here's an example: Indonesia had an earthquake in Bengkulu just 18 months ago. Typically, of course, schools fell down. Not too many other buildings. Schools and public buildings tend to collapse in earthquakes in Indonesia because of the construction standards. So, a group from the Institute of Technology in Bandung (ITB), and some other colleagues, made eight trips to Bengkulu over the next several months to show how things should be reconstructed. They trained carpenters and masons, village leaders, engineers, the Governor himself. They pointed out all of the issues related to seismically sound construction and how to do it right. Then, ADB, before their new disaster mitigation policy was established, funded a programme of school construction in Benkulu to rebuild following the earthquake. Then, one of the ITB team went back there and photographed the construction process. And the local contractors, carpenters and masons were doing all the same things that they had done the first time, before the schools fell down. They said that they had got the building plan from the

department of public works, but the plans lacked detail, showing little more than the dimensions of the building. And the additional resources – the five percent more that constructing to a seismically appropriate standard would require – was not provided. Time is money, and when the carpenters and masons started doing what they were shown by the ITB team, the contractor stopped them, saying "You don't get paid for doing that, you get paid for building according to the plan." But the plan was not adequate. Plans have to be different depending on where you are constructing, in what seismic zone. But, unless the Ministry of Geophysics coordinates with the Ministry of Education, and the Ministry of Education coordinates with the Ministry of Public Works, there is no way that they will come to the realization of what standard makes most sense in what seismic zone.

Somebody has to be thinking about such issues. We need people specifically concerned about risk to identify the issues and to bring together the technical agencies to seek an appropriate solution. You are the ones who have the experience and knowledge to know what needs to be done down there and what agencies need to be involved in making that happen. It requires different skills: planning, coordination, identification and advocacy skills, and so on. We have to augment training for disaster management agencies to include development planning/training, identifying risks and coordinating, to make sure, for example, that geologists who prepare seismic fault maps get together with the public works people and with the education people so that schools are constructed properly. Let's not create disasters. We have to manage the disaster risk in totality.

Thank you.