What Japan has learned from the Great Eastern Japan Disaster of 2011*

What can be Recommended to the Rest of the Countries with Similar Threats to Minimize the Severest Damages from Earthquake and Tsunami

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Preface

This report contains a summary of the report, which I and a team of a researcher and students at our research center and graduate school have prepared for the study of the Great Eastern Japan Disaster in conjunction with the research conducted with United Nations ECE PPP Bureau and UN ISDR. The report is being analyzed and evaluated by the UN regulations before it becomes final in 2013. This summary will highlight the major points of our research conducted in 2011 through 2012. Thus, it is not intended to be a comprehensive in nature.

I Disaster and Key Learning from the Great Eastern Japan Disaster

1 Disaster

What has happened on March 11, 2011 was a sad tragedy for Japan, especially northeastern Japan.

Around 2:46 pm, March 11, 2011, Magnitude 9.0 earthquake shook the eastern Japan. This was the largest earthquake in Japanese history, and even in Tokyo—more than 500 kilometers away from the epicenter—urban functions were paralyzed. But the severest damage and death came from the tsunamis following the earthquake.

A total of more than 560 square kilometers (138,600 acres) were effected, and the tsunami at one point reached the height of almost 40 meters. In this earthquake virtually all the fatalities were caused by the tsunami. Only less than 5% were killed by injuries caused by collapsed structures by the earthquake. Even though there may be a discussion that some or many people might had been trapped in/under the
collapse and then killed by the water.

Municipalities are the first in the list to secure the lives and support citizens. However, some municipalities totally lost their functions, and many lost their lives. In Otsuchi town, officials gather in the front yard of the town hall for meeting on disaster reaction. Tsunami wiped the town hall, killing 1/4 of management-class officials, including the Mayor.

In Rikuzentakata, many young officials were killed, leaving heavy loads of works to the city top officials. The director of disaster management of the city only had two files as all of his record and information on public services, which he has been keeping after the earthquake. All the information until March 11 was lost, and newly installed shelves were still empty. The city was struggling to retrieve the records. The director stated that the city had lost residents' record, and still could not track all the survivors. In addition, they only had tax-record as of Fiscal Year 2009 (end of March 2010), which they reported to prefectural government. Since the earthquake occurred in the very end of FY2010, most individuals had not filed their tax records, and even the entities which they kept the companies' and employees' records have lost all the records. Not knowing how many survivors were remaining within the city, would be willing to come back to the city nor how much taxes they would pay, were they not able to draw a future plan of the city.

While local government officials' duties have multiplied during disaster response/reaction, no prefectural governments or national government could respond to these local governments' situation in the earliest stage. This was because the failure of disaster response system. The system is designed that municipal government under the damage bears a primary responsibility to rescue and protect citizens' life and property, but never assumed the loss of government head or paralysis of local government functions. Thus, no system sufficiently supported to fulfill the HR demands, especially in middle to long term.

Not only municipal functions, but other functions of the towns were also lost. Most local business and commercial districts were hit by the Tsunami and banks, supermarkets, gas stands and the others were destroyed. Because most people lost places to work or shop, even those who did not get their house flooded, were hardly able to support their lives.
However it was not altogether a disaster story........

The early warning technology for the railways worked well. There was no derailment of the train. Since the 2004 Mid-Niigata Pref. Earthquake, ¥50-60B has been invested in earthquake disaster prevention measures. Within the JR East area, earthquake measurement equipment has been improved and increased, and the time from early tremor detection, to electric supply cut has been reduced from 3 to 2 seconds. Seismographs at 62 locations were upgraded to the latest models in 2005. New seismographs were installed at 28 coastal locations in 2006. By 2009 all carriages of the Tohoku Shinkasen were fitted with an early earthquake warning system.

While towns were destroyed almost totally, only around 3 per cent of the overall population living in the towns lost their lives. Most children survived in Kamaishi City. Participatory disaster education for elementary school children (with teachers) worked very successfully. Children followed the saying “Tsunami Tendenko”, literally means, ‘in a tsunami, flee separately.

2 Disaster will Strike More Often with Global Weather Change

Unfortunately, the disasters will happen. It was fourth significant tsunami disaster in 107 years in Tohoku. It will happen more often with ongoing global weather change.

The global news coverage reports irregular occurrences of natural disaster around the world. Our society must be prepared to face such disasters.

With the industrialization of the global economy in the 18th Century provided the wealth to the world. However, this form of the global economic system is meeting its challenge, “Un – Sustainability of the Global Conditions”. The speed and frequency of disasters are getting more significant. The world should prepare for the future disasters from the experiences such of Great Eastern Japan Disaster.

Neither this article nor UNECE report will cover one other very important disaster of Great Eastern Japan Disaster, which is the Fukushima nuclear accident in detail. After 2 years of learning of nuclear power issues, Japanese intellects question one issue. Why the scientists around the world did preceded building nuclear power plants without the exit strategy? Slow switch process maybe one
thing but without knowing how to solve the used nuclear wastes is the most
damaging scientific brander of the development. Such immature preparation of the
development may have caused Tokyo Electric not having the redundant water
cooling system or secondary water/motor system, which could prevented the disaster.
This is Most Regrettable. Fukushima will be wasted land for the citizens for over
50 or maybe 100 years.

3 Why the Damages were so severe and the Recovery is So Slow in Japan

After 2 years of learning from the disaster, one could conclude that in Japan’s
case, there was no national plan for the national disaster. Japan should have
learned from the Hanshin/Awaji earthquake 15 years prior to the 2011. Many of
the national ministries and prefectural and local governments have their own
disaster plans. However, there was no national coordination and disaster plan to
face such massive disaster of March 2011. Japan is known around the world
having its detail plan of many issues. National disaster was not of those. Let me
list the others, which caused such damages and delayed the recovery efforts.

- No national plan
- No national emergency management office adequate to handle the massive
disaster
- No direct order/control and network systems from prime minister to
ministers to governors and mayors
- No adequate training at national, regional and local for major disasters
- Not enough adequate data/information gathering system
- Not enough disaster announcement equipment/system

The sectionalism of Japan’s public system may have added to the problem for
such unpreparedness. When interviewed, many ministries and government agencies
have responded by saying, “our ministry had this plan and our government agency
had our own plan. But there is no coordination among all to generate better results
for the citizens in Tohoku.

Since Japan is a democracy, elected officials should naturally play a role in
determining which policy options will be turned into reality in accordance with the
national interest. For almost 50 years, the Liberal Democratic Party (“LDP”)
controlled the government through its majority in the lower house of the Diet. The LDP’s rule was broken when the Democratic Party of Japan (“DPJ”) obtained a majority in the 2009 general election. Under the LDP administration, policy issues were handled rather smoothly between the politicians and the career bureaucracy, often with the latter taking the lead in setting the agenda and implementing policies once the appropriate laws were passed by the legislature. Individual ministries also had the final word on most matters within their jurisdictional domains (tatewari gyosei), making decision-making on cross-cutting issues extremely difficult and time consuming. The DPJ tried to establish a national strategy office under the Prime Minister as a way to bring ultimate policy decision-making under one roof but this exercise ended in failure. The DPJ also made “oust the bureaucrats” (datsu kanryo) from policy making as one of its main campaign slogans, as a way to bring more democratic accountability to the legislative process. In the aftermath of the 3.11 disaster, the DPJ found it nearly impossible to work without the full cooperation of the bureaucracy.

As stated earlier, in Japan, ministries with their jurisdictions stipulated in the establishment of laws and bureaucrats in their own right wield policy primacy, and ministers have less power in formulating policy. There is a tendency that the ministers transform themselves into representatives of their ministries' interests and positions, regardless of their opinions as Diet members prior to assuming their portfolios. The bureaucracy is very powerful and as noted above there are attempts (but few successes) in dissolving sectionalism, for example, through improving ministerial coordination under the direction of Prime Minister, regardless of each ministries jurisdiction. Overall the existence of sectionalism creates difficulties for Japanese governments to effectuate appropriate change in policies and systems and in responding to changing situations swiftly: ministries are the primary actors, and they often put too much emphasis on past records.

4 Study of Foreign Case, “FEMA in the US”

In 1979, when Three Mile Island (TMI) nuclear accident happened, President Carter has established the FEMA – Federal Emergency Management Agency to coordinate the recovery effort from the biggest nuclear accident of the US. Like it is
in Japan, the emergency management in the US was the responsibility of the state and local governments. It still is so for smaller emergency issues. TMI was in a massive size, which the state of Pennsylvania alone could not handle the disaster. FEMA attempt was to coordinate major disasters, which required the national involvement. The following are the strengths of US FEMA organization.

1) They are a national organization responsible for natural and other disasters, which is directly under the command of the President of United States.
2) It has the national plan for the emergency management for the US.
3) The head of organization is a qualified and experienced in emergency management.
4) It has enough offices and staff to cover any disaster, which may occur within the territories of the US.
5) It has enough budget and experienced staff to manage the post recovery efforts of major disasters.
6) It has the EMI – Emergency Management Institute to train and produce EM experts for the US and regional/local governments.
7) It has the programs to coordinate its efforts with other national, regional, local Governments as well as any other public and private organizations.

II Key Recommendation to Japan and the Countries with Similar Disaster Threats

Key Recommendation 1: National Emergency Management Organization

The University of Tokyo team of seismologists announced that the 7.0 mag. earthquake hitting Tokyo area in 4 years has 70% chance of occurring. Other areas (Tokai – Shizuoka to Nagoya and Nankai – Kinki – Wakayama – Osaka – Shikoku) in Japan on the Pacific side have higher percentage. Japan with frequent earthquake and tsunami must have better central control of emergency management.

There is a national emergency management (EM) office within the Cabinet Office, which is manned by less than 60 employees on loan from other ministries of Land Transport Infrastructure and Local governments, etc. Like other countries, EM is mainly a responsibility of local governments according to Japan’s law and with small
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disasters: it works well for minor disaster management. This time, however many local governments lost their functions. There are self defense force (national), Police (prefectures) and Fire Rescue (national & local), which can work when such disaster hit in Japan. There is however, a very limited coordination among those involved in EM in Japan nationwide.

The following are the recommendations for Japan based on the studies conducted at PPP Graduate School of Toyo University. The study makes these recommendations from the study of US FEMA – Federal Emergency Management Agency operation and from a PPP conceptual thinking.

Concept of Japan Emergency Management Agency – “JEMA”
1) There should be one unified command system for national, prefecture and local governments (cities, towns and villages) in case of a major disaster determined by the prime minister
2) Establishment of Comprehensive National EM –emergency management Plan by JEMA and other governments involved (national, regional and local) and others will have their own plans.
3) Director of the agency should not be a politician but an expert in EM supported by major political parties
4) The EM and command system must have no sectionalism/vertical command system but horizontal command throughout the national (government, self defense force, fire and police), prefectural and local governments
5) Clear responsibility on all levels defined
6) Prepare appropriate budget for the operation and recovery fund
7) Establish EM Training Center (EMTC) under the agency in coordination with Self Defense Force, Fire, and Police Operations and train the emergency managers at all levels
8) The agency can be created without hiring new employees. They can be sent from other national offices. USFEMA was established this way. FEMA gathered the professionals from other departments involved in emergency management. In Japan, there are regional offices of central ministries such as MOLTI local offices (approx. 9,000 officials nationwide), which are involved building infrastructure, roads, waterways, rivers, etc. and equipped by needed
machines, helicopter, data base and so on. They are involved in the recovery of built infrastructure, mainly road systems in case of emergency management and other disasters. There are 9 regional offices of MOLTI. A small portion of the regional offices of MOLTI can be utilized for JEMA offices throughout the country. The head office of JEMA should be located in Tokyo area and sub-head office should be located in off Tokyo, maybe Kansai area just in case of Tokyo being hit by a major disaster.

9) Each local government appoints 2–5 emergency managers (depend on populations) and trained at EMTC. Within 1 year, there could be a minimum of 3600 and possible 5000 (1800 local governments in Japan) local government EM specialists, who can share the responsibilities under the JEMA command.

The establishment of such division within the public organizations will enable them to formulate effective plans based on their high-level future visions, policies and schemes, identify external capabilities required for executing plans in consideration of the conditions unique to the individual public organizations, ensure the consistency of procurement activities comprehensively and broadly, and perform project management responsibly.

**Key Recommendation 2: Remote Logistic Support Center**

There was a mayor in a small city inland of the coast lines (Sanriku) of Tohoku with 32,000 people. The mayor was elected in 2002 and with the study of the past history of the region, this mayor decided that his city can be a backup logistic support center for those coastal areas in case of major tsunami. In the last 100 years, Sanriku region was hit three times by major tsunamis. His city is 20 – 30 kilometers inland west from the coast and has road access to those areas. The region’s major economic area is 20 – 30 kilometers west from his city. Thus, his city is located in the middle of the major economic region and the coastal area. He discussed his ideas with the citizens of his city and they agreed with the concept of back up rescue logistic operation. He then called on the city leaders of the coastal area, prefecture government, self defense force of Tohoku, Fire/Police rescue and the citizens to drill for possible disaster from tsunami. He did it twice before 2011.

On March 12, a day after, he had over 5,000 rescue crews from the self defense
force, police/fire rescue and other local governments, business and volunteer groups at his city. He dispatched his staff to those coastal areas in the night of March 11 and in the morning of March 12, he knew more than anyone about the conditions of those coastal areas. By the noon time of March 12, there were foods, water, blanket and other supplies delivered to those severe hit areas. Nobody asked but they were there.

His city hall was also damaged by the earthquake and had to be closed. The mayor has asked a shopping center with an empty space to locate the portion of his city hall functions to the shopping center. His city’s sport ground became the base for self defense and police/fire rescue forces. Gymnasiums became the lodging area for those and citizen volunteers. No residents complained.

Mayor Honda is not trained expert in emergency management or remote backup logistic support center operations. He thought what he could do and prepared his city for it.

The disasters and tsunami can hit any coastal area with earthquakes around the world. The example of Tohno City with backup logistic support center operation can be practiced around the world in the recovery and rescue period. Mayor Honda proved it is very effective.

One must raise a concern that there was a considerable lack of coordination between different levels of governments. Decentralization policies have been putting incredible amount of responsibilities to local governments, but in a massive disaster case, norm of decentralization did not work in many occasions. Through the interviewing the officials in the national government, we have discovered that the national government was reluctant to provide a mechanism for distribution of human resources to devastated municipalities.

**Key Recommendation 3: Better Infrastructure**

Building safer and more resilient infrastructure is a key element in disaster risk reduction. A particularly important aspect of resilience is adaptation: the ability to cope with natural disasters. Disaster risk reduction is about much more than just emergency management — on the contrary, to be fully effective it must be integrated into all sectors of development and cover both measures to avoid disasters and
measures to mitigate damage when they do occur. This is especially critical in this region which over many centuries is the most vulnerable to tsunamis.

Global attention to disaster risk reduction has risen steadily in recent years. The Hyogo Framework for Action on disaster risk reduction is an especially important landmark in efforts to assist nations and communities in becoming more resilient to disasters and in better coping with hazards that threaten development. The Japanese Government is probably the world’s leader in disaster risk mitigation strategies and a model for other countries. The risk mitigation strategies were indeed highly effective notably in the case of roads and rail. However, we must recognize that 40 meter (120 feet) tsunami is not something any city not country can be ready for. Higher ground living and better designed community must be added to this concern.

**Key Recommendation 4: “Tendenko” Escape with Own Decision**

A famous saying in the region, in fact, “Tendenko,” meaning ‘run separately and do not worry about the others,’ saved many lives, especially of youth. In Kamaishi City, while many schools are flooded by tsunami, more than 99% of elementary and junior high school students were saved—it is said that that 100 per cent of the students under schools’ supervision were saved, and those who lost their lives, were not under such supervision at the time of tragedy. This was because the City and Gunma University had been holding the education programs to teach students how to react in large earthquakes and tsunami alert for the last three years. Their educational programs were based on the lessons from past earthquakes and tsunamis.

**Key Recommendation 5: Better Information/Data Control**

On the other hand, there is an elementary school in Ishinomaki City, Miyagi that lost 74 children out of 108. This school was marked “safe” in the City’s Tsunami Hazard Map, supposedly functioning as a refuge for local residents. However, on March 11, this school's two floors building were totally flooded. The principal, who was away from the school on that day, admitted that the school had drilled once every year on how to escape from the school building to the outside playground, but never drilled on how to escape from a tsunami. The school’s Crisis Management
manual only stated "flee to higher ground," when the tsunami was expected to occur, and never specified where to go. Only after 40 minutes, did the vice principal and 10 teachers decided to go to a higher ground near Shin-Kitakami Bridge, and soon after they started to evacuate, most students and teachers were swallowed by tsunami. In this case, failure of tsunami Hazard Map and lack of training led to this tragedy.

Another ‘hardware’ failure was the misinformation of tsunami alert. Immediately after the earthquake, the Japan Meteorological Agency (JMA) announced that the Magnitude of the earthquake was 7.9—it took several days for the Agency to correct the figure to Mw 9.0—and tsunami alert was 6 meters, when actually it was over 10 meters. According to the Mayor of Minami Sanriku town, Mr. Jin Sato, this misinformation was due to the lack of capability of JMA’s observation and alert system. This system automatically predicted the tsunami height of 6 meters if the earthquake was Mw 8. The tsunami of 6 meters was equivalent to the tsunami caused by the Chilean Earthquake in 1960, and since a breakwater had been built after the tsunami, many people, including Mayor Sato himself did not consider the tsunami as dangerous as it actually was. Mayor Sato continues: “if the first alert announced Mw 9.0, and predicted tsunami height would be 10 meters plus, many citizens might have escaped and been saved.” The government announced that they have changed warnings not to give false sense of security to audience, especially in the earliest alert.

Hardware (civil infrastructures, seismic alert system, hazard map etc.) has limitations. And worse, even if JMA announces the seismic intensity and tsunami alert, these alerts are not tied to action-based principals. Many people do not know how to react to these alerts. Thus, it is important to teach people about the limitations, and teach and train based on these principals.

Key Recommendation 6: Use of Renewable Energy and Biomass

One option in exploring other options to nuclear power is the use of biomass, which can be taken from the vast but unexploited forests of Japan. Toyo University and PPP Graduate School are promoting one biomass industry to be developed in Japan in long term and in Tohoku (northeastern Japan) in short term. First, Tohoku
is reported having over 20 year volume of debris from tsunami. The debris can be
processed and burned to covert them to electricity. Second, Tohoku develops biomass,
namely wood chips/pellets industry using vast area of Tohoku, which are covered by
forest. 67% of the land areas of Japan are covered by forest, more so in Tohoku.
Third, after the debris are taken cared, wood chips/pellets produced in Tohoku can
be used to generate electricity for Tohoku. Fourth, after the start in Tohoku, Japan
can develop other forested areas with wood chips/pellets industry to create jobs,
convert to renewable energy and make Japan a resource nation rather than
depending on foreign oil, coal and gas.

Other natural energy sources, such as solar and wind are fine renewable natural
resources to generate the electricity but they do not produce employment after they
are installed, which Tohoku needs. Renewable abundant forest woods can create
lasting employment in Tohoku.

Europe and the North America have found biomass from trees and other natural
materials. 100 million tons of wood pellets are produced every year worldwide.
Japan produces 60,000 ton per year (0.06%) for boilers and pellet stoves. Biomass
requires cutting trees, transfer to the factory, replant trees, factory needs workers,
the products must be shipped to power plant, etc. With high RPS (Renewable
Portfolio Standard) – percentage of renewable materials used to generate electricity
are 20% in EU and 10% average for US states. Japan's RPS is set at 1.14% presently.
If it can be raised to 5%, Japan's 67% of forest can be the source of economic
activities and support the energy needs for the country.

At the same time, the wood pellet industry requires jobs. The ratio of the jobs by
wood pellet factory and the tree replanting are 1 to 3. If the factory requires 100 jobs
then the tree replanting requires 300. Transporting the products to the power plant
and other related jobs can also create another 100 jobs. Tohoku can generate these
jobs for those who lost jobs by major tsunami hits in the region. Japan produces
0.06% of the world total wood pellet productions. Tohoku can start and Japan can
follow. Only several of nuclear power plants out of 55 plants are under operation in
Japan. It may be very difficult to restart all those power plants in Japan. Japan may
not be able to rely on the future power needs from nuclear, which counts approx.
30%. There will be limit to how much more fossil power generation can be built in
the country. There should be more solar, wind, and other more sustainable power generation in Japan. Japan can utilize the 67% of the country covering forest to generate additional power for the country.

Biomass also can contribute toward more environmentally controlled and more sustainable power generation system not only for Japan but also for other developing nations in Asia, which are growing very rapidly and trying to use more traditional fossil power for the growth. Japan can show the leadership in developing more sustainable power generation and thus helping other nations to follow so that they may not have to use those environmentally sensitive forests for growth.

Japan’s government debt, at over 225% of GDP at the end of 2010, was already the world’s highest before the earthquake, tsunami and nuclear disaster hit one month ago. While that debt is 90% owned domestically and financed by Japan’s high savings rate, it will constrain what the government is able to spend on reconstruction.

In Closing

This report discussed the un-sustainable nature of the global economic order, which became one of the causes of our uncertain future. No question that our technological advancement is supporting the economic prosperity of our world. However, we must ask, “can we continue this pass?” This report challenges to those who think we can do better. How can we make our world more sustainable? How can we utilize our technology for the creation of the sustainable society? Can nuclear and fossil fuel create a sustainable society, shell and natural gas? Unless we can solve this issue, our generation will be leaving the biggest burden to our future generations

The report is intended to support the future actions of the countries in the world to consider against disasters and tsunami but not intended to offend the actions and measures taken by the country of Japan, which were very significant.

* A large portion of this article quoted the draft of UNECE report. However, this article includes some personal opinions which do not represent or reflect the views of abovementioned organizations.