Multi-Location Recovery Planning in Japan

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Abstract

The Great East Japan Earthquake and Tsunami of March 11, 2011 was Japan's first multi-location disaster event in modern times resulting in over 16,000 deaths, severe economic and physical damage in Iwate, Miyagi and Fukushima prefectures and the release of radioactive material from a damaged nuclear reactor. This article examines how Japan has structured its recovery planning from this multi-location event. Three themes dominate the plans: ensuring safety, rebuilding lives, and expansion of technology and natural resource based industry. After one-year, all major infrastructure systems are working, debris disposal remains a challenge, and funding has begun to address housing, land use, economic, and safety needs. A mixed model of municipal and prefecture based proposals with central ministry oversight has emerged and the creation of a central government recovery agency. A partial strategy for the nuclear accident has emerged, but challenges remain for long-term stability.

Key Words
Risk reduction, Recovery, Governance, Multi-location Disaster, Nuclear Accident, Land-Use Planning, Tsunami, Tohoku

1.O Introduction

All large-scale disaster events present complex challenges in shaping a recovery strategy. Central governments must determine what is best for the survivors, for the region as an impacted economic area, and at times for the country as a whole. Prefectures (provincial governments) need to determine how to address needs of municipalities and people living outside of city limits. Municipal governments try and restart basic services, address safety needs, and help to get people working again. The survivors struggle to address loss of family, jobs, and community ties. This occurs in the historical context of the country and socio-economic context of the impacted region (Alesch and Siembieda 2011).

The Great East Japan Earthquake and Tsunami of March 2011 (known as 3/11) was Japan's first multi-location disaster event in modern times resulting in over 16,000 deaths, 330,000 destroyed or heavily damaged houses, severe damage to 32 coastal cities in three prefectures, and a release of radioactive material from a damaged nuclear plant.1 Ninety five percent of the deaths were tsunami related, and there were no

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reported deaths due to radiation exposure. Table 1 provides a listing of selected damage indicators. Its intensity on the Japanese Meteorological Agency (JMA scale of 1-7) was 7 in Kurihara and Miyagi prefectures and 6 in 8 other prefectures. The tsunami that followed the seismic event and its aftershocks occurred over 530 km of coastline with a run-up level of 10m and above, the highest one in Ayasato Bay of 40m breaks record of the Meiji Sanriku Tsunami in 1896.2 Figure 1 shows the spatial extent of the tsunami inundation, and Figure 2 shows the primary towns in Iwate, Miyagi and Fukushima prefectures damaged by the earthquake and tsunami. Within Figure 2 is the chart of casualties and destroyed and heavily damaged buildings by municipality.

TABLE 1 Selected Casualty and Damages Categories

	Iwate Prefecture	Miyagi Prefecture	Fukushima Prefecture
Death/Missing [1)]	5,989	11,250	1,989
Building Damage [1)]	24,739	222,081	83,557
Inundation Area [2)] (building Infrastructure land use %)	58 Km^2 (37%)	327 Km^2 (23%)	112 Km2 (13%)
Economy Loss [3)]	257.3 billion (JPY)	7.39 trillion (JPY)	NA
Coastal Area Capital Loss Rate [4)]	47.3%	21.1%	11.9%
Evacuee at maximum [1)]	51,553 (2011,3,15)	320,885 (2011,3,14)	131,665 (2012,3,12)
Current evacuee [5)] (inside/outside Prefecture)	42,771 1,574	127,952 8,494	98,221 8,494

Source: Iwate Prefecture, Miyagi Prefecture, and Fukushima Prefecture documents, Geospatial Information Authority of Japan, Iwate Reconstruction Basic Plan, Miyagi Reconstruction Basic Plan (not inclusive of JR and automobiles), Development Bank of Japan, Reconstruction Agency (2012, Mar 12)

Figure 1 Tohoku Regional Inundation Map, 10 meters Run Up

Source: AIR Worldwide by permission

Figure 2 Tohoku Region Damage and Causalities

	Death: Missing	Building Damage
Hirono	0	26
Kuji	4	277
Noda	38	479
Fudai	1	0
Tanohata	29	270
Iwaizumi	7	200
Miyako	531	4,675
Yamada	761	3,167
Otsuchi	1,286	3,717
Kamaishi	1,048	3,641
Ofunato	425	3,629
Rikuzentakata	1,848	3,341
Iwate	5,989	24,739
Kesennuma	1,368	11,034
Minamisanriku	875	3,311
Ishinomaki	3,761	33,378
Onagawa	931	3,261
Higashi-Matsushima	1,113	10,996
Matsushima	2	1,783
Rifu	46	921
Shiogama	32	4,470
Shichigahama	75	1,303
Tagajo	189	4,942
Sendai	730	124,608
Natori	967	3,904
Iwanuma	183	2,165
Watari	269	3,308
Yamamoto	690	3,292
Miyagi	11,250	222,081
Shinchi	114	566
Soma	458	1,760
Minamisoma	638	6,738
Namie	184	614
Futaba	54	83
Okuma	43	30
Tomioka	73	0
Naraha	33	50
Hirono	3	unknown
Iwaki	347	37,501
Fukushima	1,989	83,557
3 Pref.	19,228	330,377
Japan	19,294	359,226

Source: Compiled by H. Chen,

1.1 The Main Questions

How then did the three levels of government move forward to develop their recovery strategy? What are the components of the strategy? How well is it working after one year? This exploration in how Japan has fashioned its recovery strategy directs itself in part to the issue of centralization and decentralization in planning (Siembieda et al., 2012). Do the efficiencies of centralized systems outweigh the tendency of decentralization to be more diverse in addressing planning issues, or do decentralized approaches provide more humanistic outcomes simply because they are diverse and reflective of cultural variation?

1.2 Content of Sections

Section 2 describes the shaping of central government policy. Section 3 examines some aspects of the voluntary sector. Section 4 summarizes salient aspects of the prefecture and municipal recovery plans. Section 5 the outcomes of the first round of central government funding to the municipalities and prefectures. Section 6 provides a conclusion and discussion in terms of future actions based on the present strategy and the RA model.

1.3 Nuclear damage

Not since Chernobyl was there a nuclear accident like this. Reactors 1 and 4 of the Tokyo Electric Power Company (TEPCO) plant the Fukushima 1 plant had accidents related to their fuel cooling systems. Reactor 1 had a meltdown and spilled contaminated water into the Pacific Ocean and dispersed radioactive materials into the surrounding area that was mostly farmland and ocean.[3] The fact that there was an earthquake and then a tsunami in this area did not come as a surprise. The Japan National Earthquake Council's 2010 Annual Report stated that there was a 99% probability of an estimated 7.5 Mw event in the next 30 years in this area (Japanese Headquarters for Earthquake Research Promotion 2010).

This accident was classified as a 7, the highest level, on the international nuclear accident scale. This led to a temporary 30-kilometer evacuation area of around the reactor. Sixty thousand people were then cut off from their houses, work and fields. The temporary evacuation zone was later reduced to 20 km and has been declared by the central government as a restricted zone for the indefinite future. After one year residents along the zones edge have been allowed to visit their homes for short periods.

The ripple effect of this nuclear accident is extensive. The Prime Minister requested that all the 54 nuclear reactors in the country be shut down and inspected. All the companies compiled the central governments request and conducted inspections. No plant has been restarted, although requests have been made to do so prior to annual

increased summer demand for power. Shutting down of all the plants has called into question the nation's overall energy policy.

The restricted zone creates particular recovery challenges for recovery for land use, resettlement, livelihood, and health. Mayors of Namie, Futaba and Okuma towns in Fukushima prefecture have proposed new creation of "temporary towns" in adjacent cities, and the major of wishes to merge his town with that of the next town (Kyodo, 2012). Because the restricted zone is likely to span at least one generation, this form of resettlement becomes a permanent population shift within the region. Requests are being made to the government to exempt the residents of Namie Town for life from paying any medical costs. Figure 7 shows the locations of these towns that are partially included in the restricted nuclear zone.

1.4 A region with multiple municipalities

This is a multiple location disaster with major impact in three prefectures (total population 5.67 million) containing over two hundred municipalities, only three have populations of more than 100,000. Prior to 3/11 the region was loosing population and faced economic challenges in many business sectors. The recovery challenge is not one of restoration of prior buildings and infrastructure, but how to address the population decline, radiation exposure, and loss of employment in many towns. Fishing, a major employer in small coastal towns has begun a slow recovery as boats are replaced and fishing areas reestablished. The development planning challenge, as recognized by the Reconstruction Design Council Report (2011) is how to bring this region forward during a period of rethinking Japan's future.

2.0 Shaping of Central Government Policy

The central government has shaped its recovery policy in three phases: the Disaster Headquarters period, (months 1-3); the Recovery Headquarters (months 4-10); and the Reconstruction Agency (month 11 onward). While a Disaster Headquarters was established in the Office of the Prime Minister on 3/11 there also was an effort to provide a broader strategy for recovery. After three months there was a report to the Prime Minister laying out seven principles that link the recovery of the region to the nations economic well being (Reconstruction Design Council 2011).[4] The report sets out the concept of "disaster reduction" as a central tenant in reconstruction planning and includes "people-oriented measures" as well as structural (hard built) measures. The local people then become part of disaster reduction process, not separate from it. This is a form of collective action to reduce vulnerability. Also called for is a "New Public Commons" where a wide range of actors could the included in the reconstruction process. This is an attempt to broaden the decision-making base for recovery, something learned from the Great Hanshin Awaji (Kobe) Earthquake experience of 1995. The Report calls for reconstruction planning to utilize a strategy of multiple defenses rather than lines of defense (the existing approach) and to place this concept into the Building Standards Act. If placed in the law it would then require local governments to make plans in such a manner.

A fundamental principle is that the main actors should the municipalities themselves. The role of the national government is to set overall policy, provide a vision, and provide financial, human resources and knowledge as needed. The national government, it is suggested, shall take prime responsibility for resolution of the nuclear accident at the TEPCO Daiichi reactor. Most of what this Report suggests has become reality, through the dual-level governance model finally put in place. This duality is not one of equal influence as the ministries set the rules by which the municipalities are required to follow. This report was given to Prime Minister Kan in month three (June) and by month nine (September) Mr. Noda (from the same party) became Prime Minister. During this time there was a Disaster Headquarters in charge of the recovery effort.

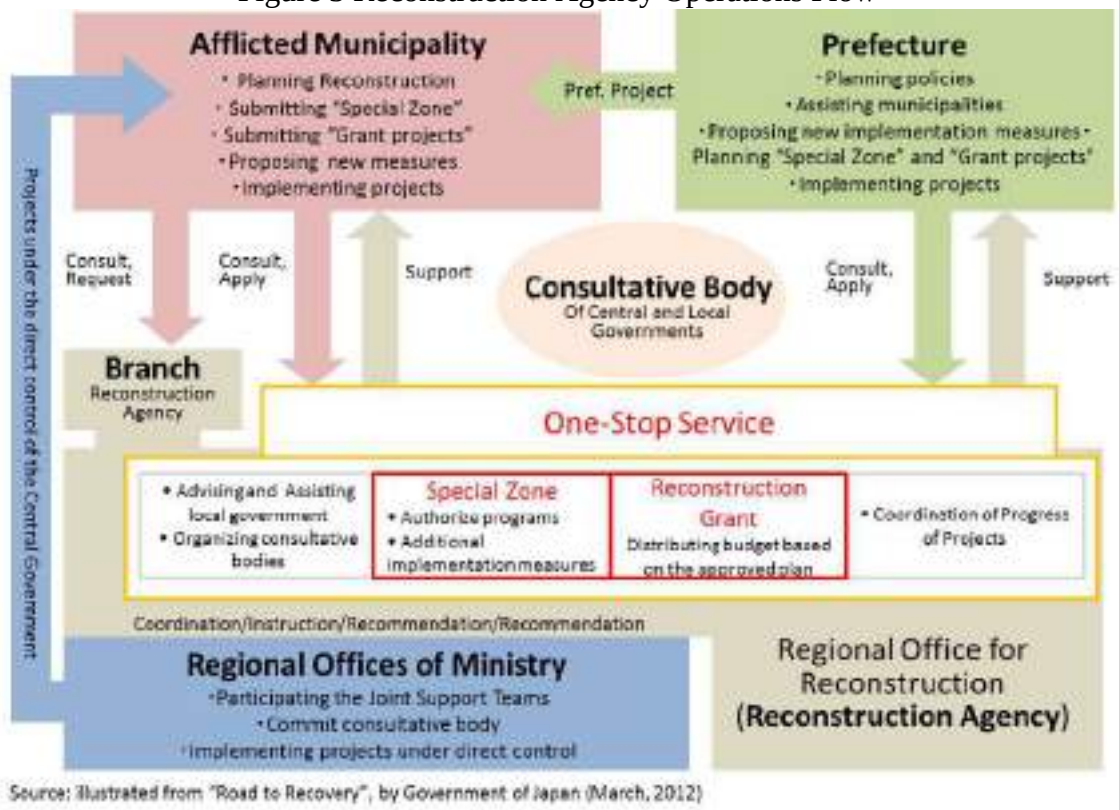
Four months after the event the Disaster Headquarters issued a “Basic Guidelines” document setting out the central government strategy to implement the Basic Act on Great East Japan Earthquake Reconstruction (Law No. 76, 2011). This strategy closely followed the Design Council Report, and also sets down economic sector objectives for Fukushima prefecture where the nuclear accident occurred. Also mentioned, but in no great detail are the issues of an ageing population, the need to rebuild with a generational focus in mind and a recognition that gender issues need attention. The Basic Guidelines forms the basis for what was to become the next phase: a new central government Reconstruction Agency (RA) that began its work February 11, 2012, eleven months after the event. The RAs primary functions are to approve the Creation of Special Economic Zones at the prefecture level (for all cities), to administer grant applications from municipalities and prefectures, to provide technical and consulting support and most important for implementation, to coordinate the actions of the various ministries through which reconstruction funds will flow. A "private-sector investment promotion special zone" in Miyagi Prefecture and a "public health, medical service and social welfare special zone" in Iwate Prefecture was approved within 10 days of application and a special external business committee activity was created to craft a regional economic expansion scheme for the region. Table 2 provides a Time Line of Main Events during the first year.

Table 2 Time Table of the Main 3/11 Events

Mar 11, 2011 14:46	Earthquake Occurred
15:14	Establishment of Headquarters for emergency disaster control
17:15	Establishment of Nuclear Emergency Response Headquarters
Mar 11	Application of Disaster Relief Act
Mar 12	Designation of Extreme Severe Disaster
Mar 12	Application of Act on Support for Livelihood Recovery of Disaster Victims
Mar 13	Designation of Specified Disaster
Mar 17	Establishment of Special Headquarters for Measures to Assist the Disaster Victims Lives
Jun 24	Enforcement of the Basic Act on Reconstruction of Great East Japan Earthquake
Jun 24	Establishment of Reconstruction Headquarters in response to Great East Japan Earthquake
Jul 25	Approval of the 2nd Supplementary Budget of FY2011 (1.9988 Trillion JPY)
Jul 29	The Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake
Aug 11	Iwate Prefecture Great East Japan Earthquake and Tsunami Reconstruction Plan
Oct 19	Miyagi Prefecture Earthquake Disaster Recovery Plan
Nov 20	Approval of the 3rd Supplementary Budget of FY2011 (12.1025 Trillion JPY)
Dec 26	Enforcement of the Special Recovery Zone Act of Great East Japan Earthquake
Dec 28	Plan for Revitalization in Fukushima Prefecture
Feb 9, **2012**	Recognition of the first recovery promotion plan
Feb 2	4th Supplementary Budget
Feb 10	Establishment of Reconstruction Agency
Mar 2	Announcement of the 1st round recovery subsidy possible amount

The RA is headquartered in Tokyo with regional field office in the three prefectures. This model is different from that used in Indonesia and in New Zealand where the central government's recovery agency was located in the impacted region. The RAs general workflow structure is shown in Figure 3. Japan generally uses a toshikeikaku (top down) model more than a machizukuri (bottom-up) model of planning due to the central government being more comfortable with large infrastructure projects (Edgington 2010). It is not clear how the Consultative Body shown in this figure operates or to what extent it provides input to the process. It does however; recognize the political need for such a unit.

Figure 3 Reconstruction Agency Operations Flow



Source: Illustrated from "Road to Recovery", by Government of Japan (March, 2012)

2.1 Framework for Land Use Planning

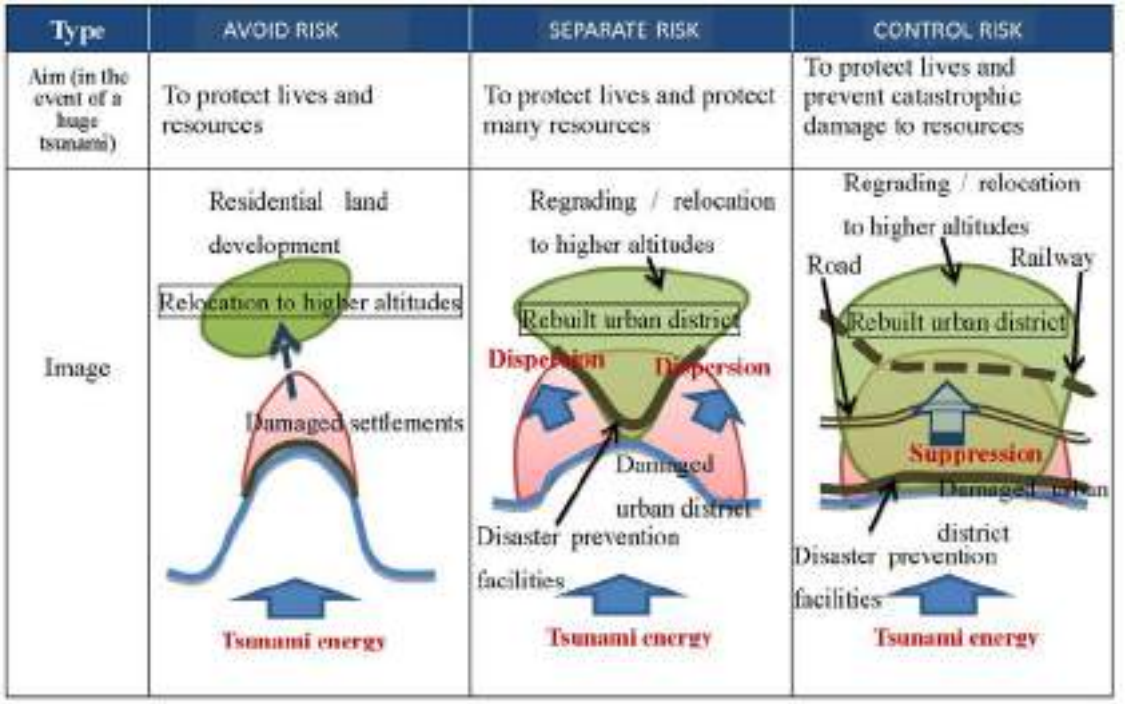
The main land use planning issues are shown in Table 3. For towns closely surrounded by steep hillside reuse of existing sites, if safe, is the preference. Relocation of critical facilities such as hospitals, government offices, and schools is needed and will require years to complete. Some cities, such as Rikuzentakata, lost all of their public buildings and require entire new visions of where to locate the new facilities and how to make them safe. Cities that experience subsidence and liquefaction need to apply both technical strategies for reuse and relocation strategies. In Fukushima the decontamination of land and buildings and the prevention of further exposure to radiation is the main land use and public safety issues. Salt intrusion on rice fields requires decontamination, and is focused mainly on parts of the Sendai plain.

Table 3 Land Supply Issues in the Tohoku Region

Land Use Issue	**Challenge**
Retention of Useable Land	Providing protection for urban uses
Sites for relocation of urban activities	Availability, location, cost, time to acquire
Subsidence and liquefaction	Technical issues and alternative uses
Decontamination	Radioactivity and salt intrusion

From an examination of the prefecture and municipal plans there three land use strategies emerge to that address safety from tsunami events. These strategies are: Avoid Risk, Separate Risk and Risk Control Through Multiple Defense. They are illustrated in Figure 4

Figure 4 Frameworks for Tsunami Defense



Source: Illustrated from "Iwate Prefecture Great East Japan Earthquake and Tsunami Reconstruction Plan Basic Reconstruction Plan"

To **Avoid Risk,** the areas of highest danger become restricted zones for residential uses and people who lived in such zones are relocated or use limited to specified non-residential activities. These areas can be used for non-residential purposes. The strategy establishes the separation of uses concept, not popular in Japan where there are few controls on building in hazard prone locations. This strategy is being considered in various municipalities and imposed to 20 km in the cities adjacent to Daiichi nuclear power station in Fukushima prefecture. To **Separate Risk,** that some land areas are restricted, while other area are elevated and still other areas serve to divert tsunami inundation in designated directions. To **Control Risk,** means multiple defenses are part of the preferred solution (e.g. sea walls, levees, elevated roadways, and elevated land areas that lessen the tsunami inundation at various locations). These strategies can be used in different locations within a municipality. For example, on the urging of community members the town government of Otsuchi in Iwate prefecture has adopted a variation of this strategy (The Daily Yomiuri 2012).

Each strategy generates its own land use requirements. For example, to **Avoid Risk** requires a relocation plan, the identification of available sites, and the determination of what infrastructure is needed for the new sites and its costs. Existing legislation under Article 39 of the Building Standards law allows a municipality to implement the **Avoid Risk** strategy. To **Separate Risk** requires determining where to elevate land areas, how

to relocate buildings on these sites and how to redirect the tsunami impacts. Where there is subsidence this also requires avoiding such areas for elevation. For the **Control Risk** strategy this means determining heights and locations of multiple defenses and what to allow in each area that lies within the different defense zones.
Related to each of these strategies is the policy on the height of sea walls or levee (dykes) defense areas. The central government supports the construction of Level 1 defenses designed to protect against 100-year events. The exact height of any sea wall or levee is determined through tsunami simulation modeling that takes into account data from the 3/11 events. The government has chosen to support a third worst historic event height as the level 1 baseline. Data on such events go back as far as the year 869 in some townships. In most area the height allowed will be increased over present levels. In Iwate prefecture this means as high as14.5-meter sea walls, and increase of nearly 8 meters in some communities (The Daily Yomiuri, 2012).

The central government practice has been to pay 50% of sea wall costs however; now with added grants possible from the Reconstruction Agency this can be raised to 100% of the cost. Level 2 defenses are those heights derived from a 1,000-year event. If the municipality with the support of the prefecture chooses a Level 2 defense, funds for this would not be forthcoming from the central government. Heights between levels 1 and 2 can also be agreed upon. The achievement of level 2 protection can also come about through applying the control risk strategy and elevating roads inland from the sea wall. This variant is proposed by Sendei City, mostly due to the extent of its low lying plain from the ocean to the central areas of the city.

3.0 Voluntary Sector Actions

Voluntary actions are broad ranging and extensive in the Tohoku region. They include continued financial support from businesses to small enterprises, organized non-profits working to improve temporary housing conditions to people spending a week helping out whomever they can. This effort reflects the national spirit of support for the people of Tohoku that is reflected in actions at all levels. Many Japanese universities have ongoing assistance projects to cities such as Kamaishi, Otsuchi and Ofunato. Two of the many efforts in place are discussed in this article.

3.1 NGO efforts

The NGO/NPO sector continues to play and important role in the recovery. NGO/NPO organizations began they efforts in the region five days after the 3/11 earthquake.
In Miyagi prefecture 26,588 volunteers were registered three after the event, and then rose to 91,549 in May 2011 (Sakamoto, 2012, 28). Taking lessons about the coordination challenges with the NGO/NPO sector from the Great Hanshin Earthquake of 1995, major coordination tasks were assigned to the Japan Platform (representing 17 NGOs) working with the local Social Welfare Councils and the Government Disaster Management Headquarters. This arrangement allowed for four party consultations to occur. Four party consultations involve the center government disaster on-site headquarters, the Self Defense Forces, the Prefecture government and the NGO/NPO coordinating representative. This level of coordination was supported by the central government and reflects part of what is called as part the new “public commons”

approach. The NGO/NPO work initially was to provide basic life support services to victims. This quickly expanded to assistance with housing recovery in terms of repairs and communications for those in temporary shelter, to consultation assistance with local government and groups in communities related to recover plans and support services such as improvements to temporary housing and making sure people were visited and cared for on a regular basis.

Prefectures have the responsibility to provide the temporary housing, but the local municipalities are charged with ongoing social service support and some maintenance. Temporary housing (total of 135,944) units is supplied by new construction, government owned units, public housing and private rental housing. It is scattered throughout the prefectures, mostly in clusters of less than 50 units. This presents a challenge communications and support challenge to smaller towns, and an opportunity for continued NGO support services.

3.2 Prefecture to prefecture cooperation and support

As part of the recovery system for the Wenchuan Earthquake of 2008, the Chinese Authority utilized a system of "twining" prefectures governments. This support function to prefecture and city governments was a positive step in rebuilding local government capacity. The Chinese Authority choose and matched (twining) the prefectures and cities. In the case of Japan the Union of Kansai Governments, a seven-member prefecture group (a local public entity created using the Local Government Authority Act for the purposes of pursuing decentralized government in Japan) decided to engage in "twining" on a prefecture-to-prefecture basis, rather than a regional basis. This initiative was voluntary and not central government directed.

The Kansai Union activities included: provision of relief supplies, provision of personnel and the acceptance of refugees. Hyogo prefecture alone houses 1,058 refugees, the largest group coming from Fukushima. This counterpart system worked well as all of the prefectures in the Tohoku region received assistance. Some prefectures such as Hyogo are now development mid and long-term assistance plans. This is in keeping with the Kansai Union's objective of strengthening a decentralize society in Japan. The assignment of the prefectures is shown in Table 4, and illustrated in Figure 5

Table 4 Japan Prefecture "Twining" Assignments

Receiving Prefectures	**Sending Prefectures**
Iwate	Osaka, Wakayama
Miyagi	Hyogo, Tottori, Tokushima
Fukushima	Shiga, Kyoto

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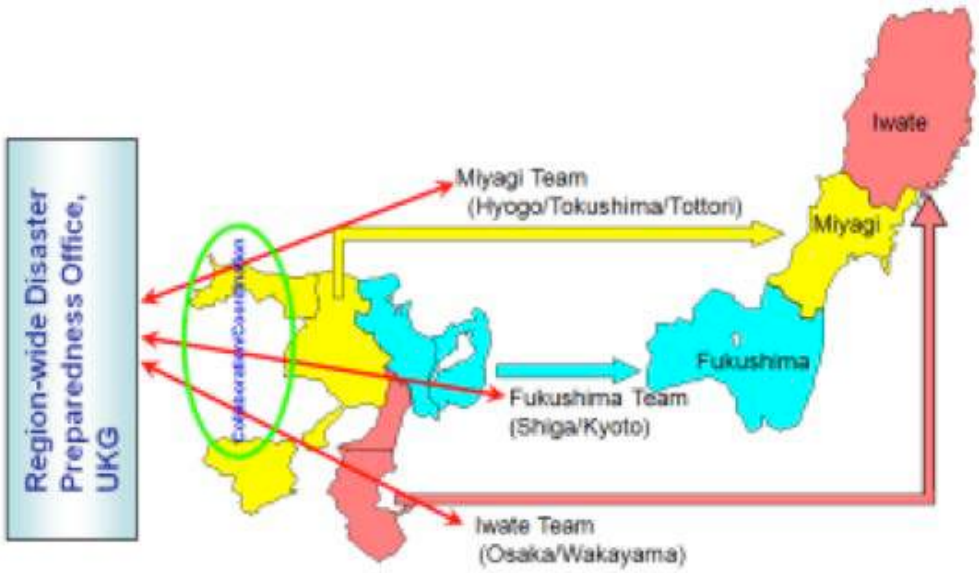
Figure 5 Twining Prefectures in Japan



4.0 RECOVERY PLANS – Initial Version

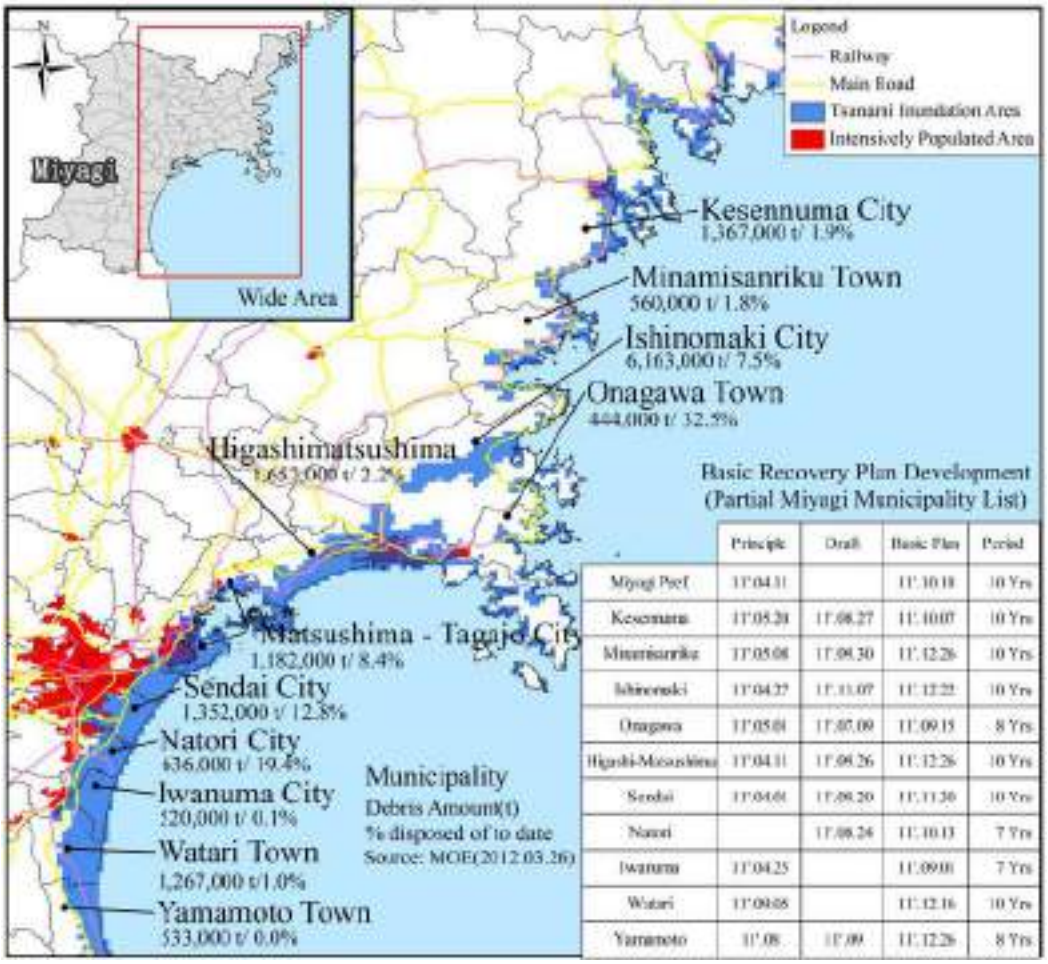
Initial recovery plans are meant as starting points, not as final products. All are subject to revision as is usually the case in large-scale disaster. They provide the basis for continued discussion on the vision for the place and people and a guideline for what to do next.

4.1 Prefectures

Miyagi Prefecture. The prefecture passed the initial recovery plan on October 18th, 2011 seven months after the earthquake and tsunami. The first work group plan meeting began three months after the event. The plan draft was presented to citizens in the north, south and southern part of the prefecture. Six hundred people participated directly and 200 written statements were received during the open public comment period. The plan time frame is 10 years is to be staged in three phases: restoration (3 years), reconstruction (4 years) and development (3 years). Figure 6 shows the prefecture, its main towns, the plan periods and the amount of debris and the % of disposal. Miyagi received assistance from 17 other prefectures, but did not have enough staff to coordinate the effort. This created a coordination challenge in terms of where to allocate staff and support services. It demonstrates the important function that coordination plays in the recovery process.

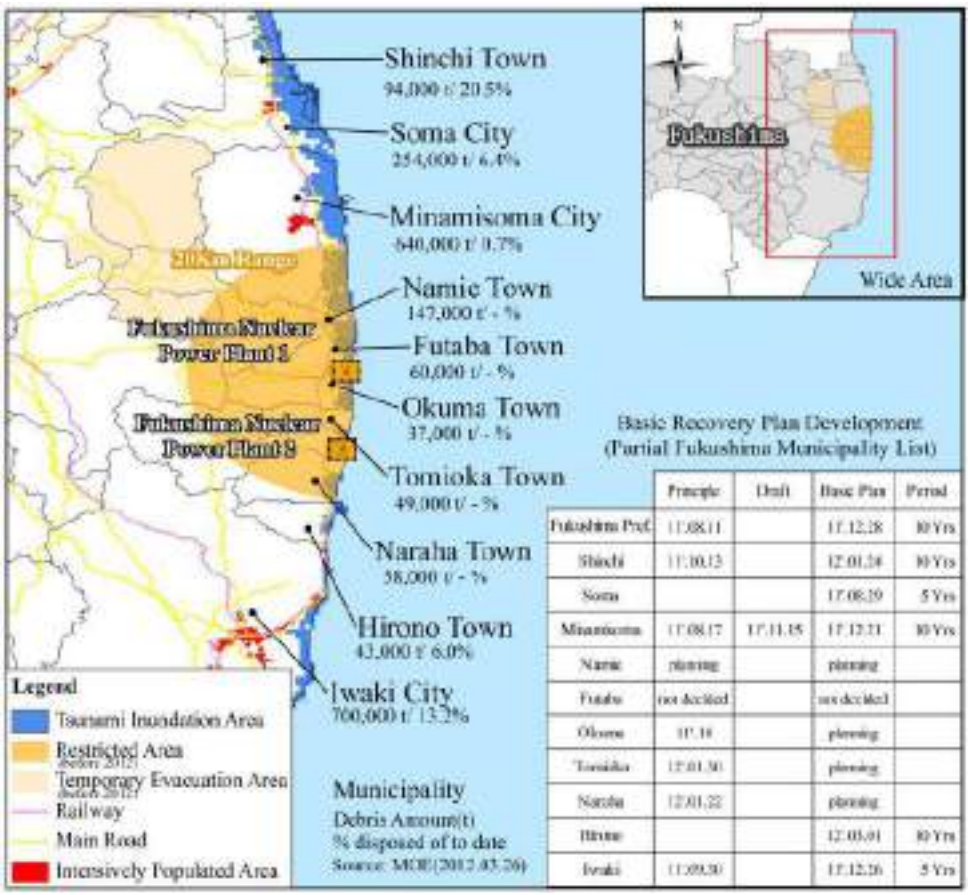
Figure 6 Miyagi Prefecture: Recovery Plans Dates and Disposal Status

Source: Compiled by H. Chen.



Fukushima Prefecture. Is basic vision reflects the unique situation of the nuclear accident at the Tokyo Electric Power Company (Tepco) Daiichi nuclear plant #1. The basic concepts for the vision are: Building a safe, secure and sustainable society free from nuclear power, revitalization that brings together everyone who loves and cares about Fukushima, and a homeland that the prefectures people can all be proud of once again. Certainly this has a strong basis in collective action. See Figure 7 for the towns within the restricted zone. This creates not only a land use distortion, but also eliminates any economic recovery for these communities and their residents. This plan lists 729 proposed projects. This is a very large number and reflects special character of the nuclear accident impact.

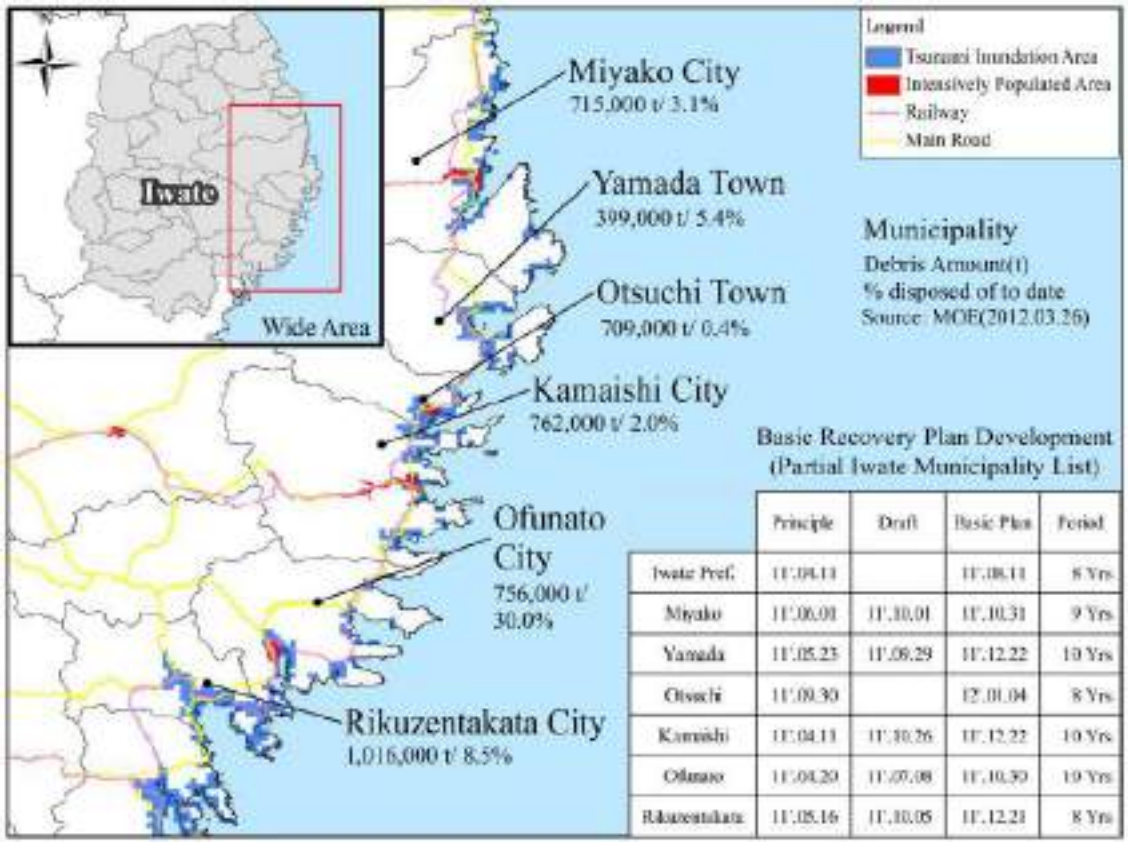
Figure 7 Fukushima Prefecture Plans and Debris Status



Source: Compiled by H. Chen

Iwate Prefecture. The prefecture assembly passed the initial recovery plan in August 11, 2011, just five months after the earthquake and tsunami. The Plan consists of three basic principles: ensuring safety, rebuilding lives, and regenerating industries, and reconstruction to return to a society in which people can safely live and work. In 2009 An Iwate Prefecture Resident Plan was developed and its objectives are incorporated into this recovery plan. The Plan envisions a 7-year period divided into thee phases 2011-2013 where foundational reconstruction is done; 2014-2016 when full-fledged reconstruction is done; and 2017-2018 is a consolidation period for further development. It will use a multi-preventative community planning that appropriately combines coastal protection facilities, community planning, and cultural measures. It expects the government to take a central role in reconstruction efforts as a national project, including nationally run initiatives. See Figure 8 for the main cities, and information on the debris status in these cities.

Figure 8 Iwate Prefecture Recovery Plans and Debris Status



Source: Compile by H. Chen

4.2 Municipal level plan(s)

The municipal recovery plans in the three providences were adopted between July and December 2011, or 4-9 months after the event. All cities in Iwate and Miyagi prefectures have a plan as have 9 of the 10 coastal cities in Fukushima. The plans ranged from 5 to 227 pages in length. A content analysis of the plans was conducted using basic chapter areas to list main content. The plans were consistent in stating the basic principles on which the plan is founded, the basic concepts, and framework. Stating the principles is a fundamental starting point for a Japanese plan and many principles can find support in those of the Disaster Reconstruction Council Report. Reconstruction periods of between 7-10 years are called for. Only 40 percent of the plans contain a list of program of projects to move forward. Such lists likely were being developed as project proposals (discrete actions), as this is the way in which funding is provided by the central government.

The statement of principles and concepts do establish the direction the municipalities wish to take and therefore form the basis for their strategy, and a means by which the local officials can continue a dialogue with the citizens related to the choices and options open to them (such as relocation, job expansion, where to locate public buildings and how to insure safety in the future). The majority of plans are not “road-maps” to action and fall short of what is called for in a recovery plan that can be

quickly become operational (Blakely et al. 2011, p.198). Given the short time period in which the plans were developed, and the uncertainly of the central governments position on the way assistance would be provided (beyond the emergency phase of caring for the victims and providing them temporary shelter). The variation in plan content reflects in part the context of the event for each municipality. Some communities lost municipal personnel and many lost the city halls and other public buildings. These plans are the beginning of a process that will have much iteration in the coming years as critical employment, land use and hazard safety issues are resolved (Olshansky et al., 2012). The plan tone is quite positive and reflects a belief on the nations ability to assist and their own desire for betterment.

4.3 Central government driven approach – general model

In the case of the Hanshin-Awaji earthquake (Kobe earthquake) of 1995 the central government established an Earthquake Recovery Headquarters to coordinate the efforts. There was no Reconstruction Agency but there was a Hanshin-Awaji Reconstruction Committee reporting to the prime minister on construction priorities. The committee was composed of local officials, business leaders and professional experts in city planning and reconstruction. This mechanism provided the guidance needed for central government actions. The Hashin-Awaji Reconstruction Committee took a position that all reconstruction programs are carried out by the prefecture and the municipal governments, thus keeping with a decentralization and a smaller central government policy at the time. This position meant that Kobe City government (that had special city status) and Hyogo prefecture would be in charge of the planning and implementation with the central government ministries providing support expertise and coordination according to their basic service mandates, such as major highways, etc. This policy suited the Japanese ministries that are funded sector by sector and are not experienced in working together in a coordinated manner. Also the legislation directing ministry activities is developed by sector (Transport, Marine, etc.) and makes cross-boundary decision-making difficult to accomplish.

In the Great East Japan Earthquake the prime minister transformed the disaster headquarters function into a reconstruction agency function, something that was rejected by in the Kobe earthquake and the central government also passed legislation to relieve municipalities and individuals from tax burdens. The Tohoku region did not have the municipal strength of Kobe and the vast number of cities required a more integrated tool for coordination of resources and assistance.

5.0 Initial Funding Choices

Examining where the money is spent is a strong indicator of priorities. Living support payments to survivors, relief from social insurance premiums for individual and tax relief for municipalities were but in place within six months. Nearly one year after 3/11 the first round of funding for reconstruction was awarded. It combined recovery grant funds with public funds already in ministry budgets. This reflects a model that relies on the ministries to be supportive of requests from lower government levels. This is part of the system of checks and balances within the Japanese general governance model. Table 5 lists the main project categories. Housing is the largest funding

category, with 44% of the total. This reflects the pressure to move from temporary housing to permanent housing for the large number of survivors. Relocation is the second highest category with 16.9% of the funds. This will be used for acquiring new land sites and preparing them for new construction. It implements the Separate Risk and Control Risk strategies discussed in Section 2.1.

Table 5 (a) Main Recovery Grants By Category, Round 1

Main Project	Municipality	Amount
Fishery Industry and Port Facility Development Project	21	258 (8.5%)
Disaster Prevention Collective Relocation Promotion Project (project fee for expected initial project areas, 5200 household)	12	437 (14.3%)
Disaster Prevention Collective Relocation Promotion Project (survey fee)	15	79 (2.6%)
Disaster Recovery Public Housing Development Project	32	1,356 (44.4%)
Farmland Development Project	16	52.8 (1.7%)
Urban Disaster Prevention Integrative Promotion Project (survey fee and so on)	39	30.0 (1.0%)
Urban Area Liquefaction Countermeasure Project (survey fee)	6	7.9 (0.3%)
Residential Land Sediment Disaster Countermeasure Project	12	324.7 (10.6%)
Total	59	3,053.2

Source: Reconstruction Agency (Mar 2, 2012), Amount: 100 Million JPY; percentage of whole amount

Table 5b First Round Recovery Grants Structure

Category	**Amount**	**% of Total**
Housing	1,356.0	44.4
Relocation	516.0	16.0
Disaster Prevention	362.6	11.9
Industry	310.8	10.2

6.0 Conclusion and discussion

The central government and the people of Japan are united in support of the Tohoku recovery. This is evidenced by the legislature (the Diet) approving $US 129 billion in recovery funding, the purchasing of the initial recovery bonds entirely by people within Japan, and the continued work of the volunteer section to support municipality recovery efforts at all levels. The nuclear accident by itself makes this event unique and the focus of worldwide attention. The ripple effects of the nuclear accident create special challenges in crafting a long-term recovery strategy. This strategy, out of

necessity, must be led by the central government, keeping in mind the wishes of the prefecture citizens. In each city however, the process local decision making that balances safety with efficiency is occurring, This article has not addressed in any detail the needs of those people in temporary housing, how livelihoods are to be restored or if the incentives of the special economic zones are sufficient to yield an expansion of regional employment.

As in all large disasters, the weakness of the place are quickly revealed. In this case, these include many towns with declining populations, a growing elderly population and slow economic expansion. No central strategy to address these issues has come forward to date from the prefectures or the central government. This is the real recovery challenge after the safety issues are properly addressed. The model of projects coming from the municipalities for funding must be supported by a clearer and broader regional strategy they may not come from the central government but from groups such the Union of Kansai Governments that has demonstrated it commitment to regionalism. After one year, the Tohoku region has just begun its journey to recovery, and will need at least a decade to get to where it wishes to be.

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[1] In contemporary terms (the last 100 years) this event was the deadliest in Japan, with over 15,800 deaths 95% tsunami related, and over 3,200 injured. This was not the largest death toll in history for the region, that distinction going to the Meiji-Sanriku earthquake and tsunami of 1896 that has over 27,000 victims.

[2] Run up is the maximum height on land reached by the tsunami wave as it comes ashore. For example, a 40-meter run-up would reach the top floor of a ten -eleven story building at its highest point.

[3] This meltdown was caused by lack of adequate water supply to cool the nuclear fuel rods because all power to the plant was stopped due to falling power lines (weakened by soil failure) and the back-up diesel generators being destroyed by the tsunami that breached the walls of their uncovered storage area.

[4] The Reconstruction Design Council was for created by decision of the Cabinet on April 11, 2011 and on April 14th then Prime Minister Naoto Kan approved and made the request that establish a 15 member Council made up of business, academic and elected officials of national stature.