Recommendations

Building Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –

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Science Council of Japan

Committee on Supporting Reconstruction
after the Great East Japan Earthquake

Sub-Committee on Building Disaster-Resilient Communities

These recommendations compile and publish the results of deliberations of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

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Summary

1 Background of the Recommendations

The Great East Japan Earthquake that occurred on March 11, 2011 off the Pacific Ocean of the Tohoku Region was the 4th largest earthquake recorded in human history. It was a very complex disaster because of an accident that occurred at the Fukushima Daiichi (No. 1) Nuclear Power Station of Tokyo Electric Power Co., Inc. (TEPCO) which was triggered by a total loss of power after seven Tsunamis extending from 30 minutes to 6 hours after the earthquake occurred, thereby resulting in serious amounts of damage.

The human damage and property damage resulting from the Tsunami disaster were both unfathomable, while the disaster also deprived the disaster victims/disaster-stricken areas of both their residences and places to work. Despite having the severe psychological trauma and had their lives inconvenienced by having to live at temporary housing the victims are still proceeding with restoration/reconstruction activities in thereby realizing a permanently safe society. When reconstructed they must be “disaster-resilient” in a multi-faceted sense. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, and with regard to the nuclear power plant accident, completion of its final disposition may require a time span of more than one generation. Many people have been forced to evacuate for an extended period of time, thus establishing a long-term health management system for those who fear having been exposed and decontamination measures in the areas where radioactive materials were deposited are posed as imminent issues.

These various reconstruction challenges thus require the specific provision of desperately needed knowledge to the victims through mobilization in the various fields of science, which is precisely the duty of Science Council of Japan (SCJ). The 21st Term SCJ made the commitment soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October 2011 the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. On November 16, the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up under the said Committee.

The Sub-Committee on Building Disaster-Resilient Communities recommends building communities wherein the effects on residents and local communities, etc. can be reduced to the

fullest extent possible even with the occurrence of natural disasters of the same or a greater level as this one. In addition, the Sub-Committee aimed to make the recommendations helpful to areas other than those stricken by this disaster in thus taking the necessary measures against disasters that are predicted to occur in the near future.

2 Present situation and issues

More than a year has passed since the Great East Japan Earthquake, with efforts toward reconstruction fully progressing in the disaster-stricken areas. The disaster-stricken municipalities extend over 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts). Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged. The municipalities selected 40 appropriate businesses (core businesses) that could be utilized in the reconstruction efforts according to the situation with the disasters and reconstruction plans, and implemented them along with additional businesses that would promote their effectiveness. Efforts to build safer communities have therefore been commenced upon. However, the actual situation with the reconstruction is that it is still at the stage of desk work involving the accuracy of the plans being improved and agreements reached, and with a large number of issues still remaining to be resolved. These recommendations were compiled after discussing the policies that should be enhanced for the moment and from the following seven points of view.

- Creation of disaster-resilient national land
- Building sustainable reconstructed communities
- Measures toward greater utilization of information
- Ideal medical care and nursing
- Mental health care
- Preventive measures to mitigate disasters resulting from potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis
- Organization and dissemination of disaster records

3 Content of the Recommendations

(1) Creation of disaster-resilient national land

The following recommendations are being made as measures to be implemented over the short-term, and with the re-organization of national land infrastructures with improved

resilience to disasters and the necessity of distribution and backing up of the capital functions and private central management functions that are concentrated in Tokyo all taken into account.

[1] Creation of a Disaster Mitigation Agency to succeed the Reconstruction Agency as a permanent agency

[2] National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures

[3] National land management that respects the recuperative power of nature

[4] Structural reinforcement of buildings/facilities and enhancement of disaster evacuation facilities

[5] Strengthening of the software side of countermeasures, including evacuation drills, establishment of fire brigades, and emergency earthquake alarms, etc.

[6] Backing up of the capital/key functions in thereby ensuring continued government functions in the case of disasters (BCP)

(2) Building sustainable reconstructed communities

The disaster-stricken areas have social vulnerabilities such as declining/aging populations, etc. At present the "Basic Reconstruction Plan" formulated by each municipality is based on the idea of maintaining the status quo, despite this actuality having been recognized, and thus involves a variety of issues. The following recommendations are therefore being made.

[1] Formulation of action plans for sustainable reconstruction from a long-term broad perspective

[2] Establishment of community-based "reconstructed community building organizations"

[3] Planning of regional reconstruction strategies that center around public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc.

[4] Coordination of coastal area land use from a broad-based perspective of the over wider area with a focus on natural land use

[5] Re-establishment of "Natural Symbiosis Cities based on the Watershed Landscape" that span coastal areas through to communities, country side forests, and remote mountains

(3) Measures toward greater utilization of information

The following recommendations are being made from the perspective of information and communication and broadcasting with respect to a more disaster-resilient society.

[1] Securing means of conveying information on preparing for disasters and establishing judgment/action guidelines

[2] Promotion of information collection/accumulation and subsequent integration of data

[3] Promotion of measures that ensure the safe keeping of social information assets, including governmental/medical information, etc.

[4] Promotion of training/placement of information professionals

(4) Ideal medical care/nursing/welfare in the disaster-stricken areas

The following recommendations are being made in consideration of not only the importance of how medical care/nursing and social welfare is handled in the case of disasters but also the fact that disasters can seriously affect the vulnerable in particular.

[1] Formation of health, medical care, and welfare organization networks in regions that can provide flexible responses when urgently needed

[2] Establishment of support measures for groups that are vulnerable to disasters

[3] Preparation and enrichment of mental health care

(5) Establishment of victim support system and personnel training

The following recommendations are being made to promote care for the earthquake disaster victims in a comprehensive manner.

[1] Preparation of needs maps concerning the relief of victims and information gathering

[2] Building of nation-wide disaster support networks by municipalities, private organizations, and academic societies, etc.

[3] Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research

(6) Preventive measures to mitigate disasters resulting from the potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis

The following recommendations are being made with the aim of rational use of national land that takes large-scale disaster risks such as earthquakes and Tsunamis, etc. into account.

[1] Formation of disaster risk conscious national land structures

[2] Reinforcement of disaster mitigation measures with regard to the software side

[3] Promotion of research on disasters

(7) Organization and dissemination of disaster records

The following recommendations are being made to restore memories of the lost past, record the disaster-stricken "present", and create/recode the "future" toward reconstruction.

[1] Promotion of creation of an "archive" concerning the Great East Japan Earthquake

(8) Role of government publicity and media organizations

[1] Appropriate news coverage in response to the temporal stages of disasters

[2] Cool-headed news reports and comments based on the sharing of accurate information and sources

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1 Introduction

A year has passed since the Great East Japan Earthquake of March 11, 2011. However, the removal of debris has been slow and the situation not very improved upon to date. As we face the reality that the restoration, which is a prerequisite for reconstruction/regeneration, itself is not progressing as expected we are reminded again of how serious and complicated the unprecedented damage caused by this great earthquake actually was.

Although a full scale comparative study remains a future issue some forms of restoration networks, with the large city of Osaka having played a core role, are considered to have functioned to a significant extent in the case of the Great Hanshin-Awaji Earthquake. In contrast to this, Sendai City, the largest city in the Tohoku Region, was also greatly damaged in the Great East Japan Earthquake. Furthermore, the disaster-stricken areas involve very wide areas and individual problems exist with the situation with damage, etc. in the respective regions, thus making the establishment of restoration/regeneration networks very difficult. In addition, the difference in population dynamics is also significant. The population was rising in both Japan and Hyogo Prefecture/Kobe City at the time of the Great Hanshin-Awaji Earthquake. The population of Kobe City declined by approximately 100,000 persons immediately after the earthquake, but then turned to a rising trend around October the same year, and subsequently returned to the same level as before the earthquake (1,520,000 persons) in 2004 (Kobe city statistics). In contrast to this, and with respect to the various disaster-stricken areas in the Tohoku Region, the population of Iwate/Fukushima Prefectures was already declining during the latter 1990s, and with the total population of those prefectures and Miyagi Prefecture having declined by 2.2% in the latter 2000s (the population of Sendai City has been on a rising trend after the population census).

The number of residents that will have to leave their hometowns to find business or employment opportunities is expected to further increase. In that sense not only simply restoring but also formulating drastic community building plans that provide sound future visions and take the particularities of the respective regions into account is indeed an urgent issue.

The great earthquake has led to a drastic review being required of the conventional ways of science and technology in Japan, or the way politics, economics, and administrations are tied to the advancement of science and technology. Conventional science and technology has basically lacked a sense of respect for the blessings and disasters of nature by simply regarding nature to be subject to human whims.

In ancient Greece human beings were regarded as part of the microcosm in a macrocosm, and their relationship was considered to be integrated. The word “technology” derives from

“techne”, which means human beings attempting to imitate the laws of nature. In addition, in ancient India a reciprocal relationship was assumed to exist between human beings and the greatness of nature (gods maintaining its order), with the rituals of making offerings to the gods being regarded to be a form of technology that priests thoroughly developed to obtain the blessings of nature. Modern Western scientific thought and the industrial revolution, however, have rejected the idea of human beings and nature needing to be an integral part of each other.

The word “sustainability” is growing more and more important as something that urges drastic reconsideration of how technology and human society interact with each other. The phrase “sustainable development” first appeared on the center stage of international society at an Earth Summit held in Rio de Janeiro in 1992. The word “sustainable” and its noun form “sustainability”, in particular, have been in frequent use since then.

During the course of human history the striving to maintain past traditions/cultures has consistently battled with the striving to break with past traditions in thereby creating a new world. Why has sustainability become such a current issue? Modern civilizations have long faced the oncoming crises of population explosions, energy problems, and global environmental destruction that have resulted from modern Western scientific thought and the industrial revolution. Emphasis on the pursuit of material wealth has consistently been placed on innovative knowledge and technology developments rather than succeeding the past, internal self-examinations, and mental cultivation. The fact that we now face a grave situation that requires braking or a course correction in some sense is considered to have been condensed into the issue of sustainability.

Scientific knowledge and technological innovations have taken place through repeated subdivisions and advances, but what is now required is for the barriers of expertise to be crossed in thereby tracking the whereabouts of the crises modern civilization faces and to then aim for sound development through clarifying the divisions of roles with consideration given to the characteristics and limitations of the respective fields.

The above points of view were taken into account when compiling these recommendations on the creation of national land, community building, information infrastructures, medical care and nursing, children being especially vulnerable to disasters, preventive disaster mitigation measures, and the creation and succession of disaster records with regard to the ideal ways of “building disaster-resilient communities” with reconstruction after the Great East Japan Earthquake.

2 The Great East Japan Earthquake and restoration/reconstruction efforts based on the idea of disaster mitigation

More than a year has passed since the Great East Japan Earthquake and reconstruction efforts are now fully in progress in the disaster-stricken areas. Reconstruction plans had already been formulated by December 2011 for the major disaster-stricken prefectures of Iwate, Miyagi, and Fukushima of the disaster-stricken areas. The disaster-stricken municipalities extend over 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts). Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged.

With regard to community building the municipalities selected the most appropriate of 40 businesses (core businesses) that could be utilized in the reconstruction efforts according to the situation with the disasters and reconstruction plans, and implemented them along with additional businesses that would promote their effectiveness. Efforts to build safer communities have therefore been commenced upon <1>.

Reconstruction from this disaster, however, involves particular difficulties when compared to previous earthquake disasters. Restoring the Tsunami-stricken areas, in particular, to their original state does not eliminate the risk of them being struck by further Tsunamis again in the future, and thus the issue involves how to reconstruct them while also securing their future safety. With the disaster-stricken areas, therefore, efforts are being made to reach agreements with the areas concerned as early as possible in thereby proceeding to deal with businesses in promoting reconstruction based on the “idea of disaster mitigation”, as described below.

The idea of “disaster mitigation” emphasized in the course of reconstruction from the Great East Japan Earthquake is being based on the empirical knowledge that the scale of low-frequency large-scale disasters cannot be predicted in advance while the damage resulting from them also cannot be prevented <2>. For use in the high-frequency ordinary disasters “disaster prevention” facilities shall be established, and residential spaces for people located with their utmost safety taken into account. And with low-frequency large-scale disasters people’s safety shall be secured by enabling them to “escape” through securing multi-stage escape routes and evacuation areas in advance, while industrial facilities, etc. shall be established in lowlands with their favorable conditions for being major traffic points and with safety supplemented via use of Tsunami evacuation facilities, etc. These measures constitute the major framework of this idea. Reconstruction of the respective areas needs to be promoted in a concrete manner and be based on the idea that disaster mitigation is appropriate for use in reconstructing regions at risk of the recurrence of large-scale Tsunamis.

At the same time, however, the necessity for medium- to long-term “preventive disaster mitigation” must not be overlooked. The economic and social development of Japan in the 20th century involved scientific and technological progress being used to leverage its economic strength with industries and with the population being concentrated along the Pacific belt zone. However, the rate of food self-sufficiency in Japan is at the lowest level of major industrial countries <3>, and with the rate of timber self-sufficiency also remaining at a low level <4>. In many regions of Japan people lived a life in a good balance with nature for a long time, but which was, however, destroyed by the economic and social development that took place in the 20th century. The Pacific belt zone, however, is also a region in which large-scale earthquakes or Tsunamis have been predicted to occur in the near future. Correcting that excessive concentration and optimizing and allowing for a more moderate distribution and eliminating any redundancy in nation building is thus essential in medium- to long-term disaster mitigation, and which is referred to as “preventive disaster mitigation” in these recommendations.

In areas that suffered radiation contamination due to the Fukushima Daiichi Nuclear Power Plant accident, however, sufficient scientific knowledge that integrates past experience on the effects of radiation on the human body or livestock/agricultural products, etc. should be conveyed to the disaster victims, and then measures that sufficiently take into consideration the wishes of those victims then taken. This should of course result in the government and TEPCO responding to the people that have been forced to rebuild their lives in different areas different in a responsible manner.

3 Issues with building disaster-resilient communities

(1) Issues with creating disaster-resilient national land

The forces of nature are referred to as “natural hazards", and cities, communities, civil engineering structures, and buildings constructed by humans collectively referred to as a “built environment”. People proceed with economic activities and live in this environment, and a “disaster” occurs when the forces of nature strike human-made objects while the objects are not sufficiently resilient to. If they are sufficiently resilient enough when compared to the forces of nature concerned disasters typically do not occur. The creation of “communities resilient to the forces of nature” and thus preventing large disasters from occurring to the furthest extent possible must therefore be the overall goal with the national land and reconstruction efforts.

However, the level of the forces of nature also changes due to climatic changes, and hence disasters cannot completely be eliminated with respect to man-made objects. This was one of the most important lessons we learned from the Great East Japan Earthquake. This then makes the creation of disaster mitigation national land that can protect human lives and keep property damage to a minimum level, even when a disaster odes occur, necessary. As we are currently approaching being a society with a declining population, in particular, the issues must include reducing the use of areas that are at risk of significant damage in the case of disasters, concentrating the use of national land in safer areas, and implementing national land management that makes full use of the recuperative power of nature. Past disaster experience has clarified that the occurrence of disasters not only results in the loss of many human lives but also costs a vast amount for the subsequent restoration/reconstruction. The fact that the cost of disaster prevention measures taken in advance is significantly less therefore should be kept in mind.

(2) Issues with safe and secure land use

Safe and secure disaster-resilient land use will be the basis of the reconstruction plans. The methods of and issues with the creation of reconstructed communities will significantly vary due to the differences in the topographical conditions of the disaster-stricken areas concerned. In addition, the problem of a declining/aging population had already manifested itself in these areas before the earthquake disaster, and with it being a major issue with the feasibility of building sustainable communities there.

[1] Issues with rias coast areas

The Sanriku rias coast areas have experienced the Meiji Sanriku Earthquake Tsunami

(1896), the Showa Sanriku Earthquake Tsunami (1933), and Chile Earthquake (1960), along with four large-scale Tsunamis including the last one, over an approximately 100 year time span. The creation of disaster mitigation conscious multi-layer protection based communities is therefore being emphasized in the reconstruction plans. Concrete measures include the development of disaster prevention facilities such as breakwaters, seawalls, and floodgates, etc., the relocation of existing city areas to higher ground, the elevation and heightening of buildings, and the development of escape routes. The way these measures will be combined will differ depending on the topography, level of damage, and the size of the villages/city areas, but disaster prevention facilities must be developed to a level that ensures protection from the relatively frequent Tsunamis. The situation with land use policies, which utilize Tsunami simulations as reference material, is such that 1) residential land use is prohibited but industrial land use allowed in areas with significant flood height level predictions in the case of a large-scale Tsunami of the size of the Great East Japan Earthquake, although at low-frequency, 2) residential land use is also allowed in areas where no inundations are predicted, and 3) some municipalities allow residential land use after establishing certain regulations while others do not in areas between these extremes.

Reconstruction is making the transition from the planning stage to the concrete business planning stage, with issues at the present stage being as follows.

First, even the Tsunamis occurring at relatively high-frequency are predicted to have significant heights along the Sanriku coast, thus development of prevention facilities such as breakwaters, seawalls, and floodgates, etc. of a significant scale are being planned to cope with the situation. Design issues do exist, however, with how to ensure these large-scale structures remain in harmony with the scenic coastal views, along with maintenance/management issues, after their development takes place.

Secondly, in many cases the disaster victim households wish to relocate their residences to higher ground. This trend is particularly prevalent in the large-scale city areas that were seriously damaged. However, quite a few areas cannot secure sufficient candidate high grounds for relocation to due to their topography. With these areas, therefore, the reconstruction needs to take place on elevated city areas after gaining trust in and reaching an agreement on the safety of the elevated city areas.

Thirdly, there are many relatively small-scale villages, mainly fishing ports, where a declining/aging population can, without exception, be expected to further progress in the future. Collective relocations are currently available to five or more households, and thus many very small-scale relocations to higher ground can take place in a distributed manner,

but which may possibly result in isolation or villages being lost to the relocated areas. Consolidation of small-scale collective relocations therefore remains an issue.

Fourthly, the land use plans for flood prone areas in which industrial land use is being mainly planned require the development of coast protection facilities such as seawalls, etc. as a precondition in thereby ensuring their safety, but from the point of view of industrial reconstruction the situation does not allow for any delay in the completion of those facilities. Construction of temporary facilities has already been commenced upon and the temporary facilities are expected to lead to permanent reconstruction of city areas in a seamless manner and with a certain level of safety being secured.

[2] Issues with alluvial plain areas

In contrast to the above high land areas are not available to escape to on the alluvial plain that extends from the central to southern parts of Miyagi Prefecture. Records only exist for the Jogan-Sanriku Tsunami (869) and Keicho-Sanriku Tsunami (1611), with no large-scale Tsunamis having struck this area in modern history. No reconstruction plans have previously been formulated, with this therefore being the first time. Various ideas are being incorporated into the plans depending on the municipality concerned. The issues involved in them are as follows.

First, land use for disaster mitigation will depend on the location of second-line levees[3] constructed by elevating existing roads. The location and structure of the second-line levees were not necessarily selected from a logical point of view with respect to Tsunami disaster protection, and thus no firm grounds exist for their effectiveness at present.

Secondly, the ground may sink in many areas that are no longer available for residential use because of the second-line levees, and therefore the situation makes appropriate land use difficult, excluding, however, as coastal Tsunami protection forests.

Thirdly, the areas subject to being the destination of collective relocations will be multiply protected by seawalls, Tsunami protection forests, and second-line levees. However, the concrete selection of areas for collective relocations requires that the complicated situation with land-ownership be resolved, and also the difficulty with obtaining appropriate land.

Fourthly, all the municipalities will propose a plan on using the whole coast line for

[3] Second levees constructed behind (inside) the levees. Also referred to as reserve levees or secondary levees. Second-line levees have the role of preventing the flood inundation from expanding and retaining the damage to a minimum level in cases where the first levees (main levees) fail.

disaster protection, nature conservation, and recreation, but their appropriate security and placement across wide areas cannot be guaranteed due to a lack of wide-area plans.

Fifthly, a large number of the historic sites exist in countryside forests, which are located between hilly areas and alluvial plain areas, with policies having been set to mostly preserve their present status. Artificial forests and copses in these areas could be a center for biomass energy production, but the issue remains on how to connect it with measures to supply renewable energy sources.

(3) Issues with securing human resources to engage in reconstruction

The main entities that will engage in the reconstruction are municipalities. However, the human resources of municipalities required in that reconstruction are lacking.

As described above almost all the disaster-stricken municipalities have completed the formulation of reconstruction plans, and thus the reconstruction is proceeding to the final stage of planning various businesses that will then realize the content of those plans. However, the number of businesses involved is enormous. When limited to the hardware side of infrastructure development the number of households that are planning to move to higher ground or inland areas, which are to be the main locations for residential reconstruction, is estimated to be approximately at least 22,000 across approximately 250 areas in the three prefectures of Iwate, Miyagi, and Fukushima <5>. Use as disaster prevention collective relocation promotion projects can be assumed with most of them. Other relevant projects include land readjustment projects, city area elevation projects, road development projects, and park development projects. In addition, the reconstruction of public and welfare facilities, including disaster-stricken schools, hospitals, public halls, gymnasiums, and municipal office buildings, etc., is also needed. Some projects, such as building seawalls, are mainly being implemented by prefectures, while other projects, such as railroad building, are mainly being implemented by the private sector.

Residential reconstruction projects will require far more careful responses in reaching agreements with the land owners and residents than in the past. In some locations where agreements have already been reached some of the disaster victims were left behind, and thus at the business stage responding to those residents is also considered to be necessary. Agreements being reached are based on mutual trust, thus making the existence of municipal officials who can make adjustments over the long-term essential.

Other infrastructure development projects will require officials with specialized knowledge in placing orders for design/construction and holding discussions between the relevant administrative entities, etc.

In addition to infrastructure development projects officials with specialized knowledge will also be needed with respect to the software side of business areas, including living support at temporary housing, welfare and education, and industrial reconstruction, etc., in thereby the reconstruction makes progress. Furthermore, recommendations and issues from the point of view of the people that are rebuilding their lives need to be arranged, which will require the establishment of a concrete system that enables the people concerned to participate in new community building from the conceptual stage.

The administrative scale of the disaster-stricken municipalities, excluding designated cities and core cities, is rather small, and therefore officials with that know-how are lacking in number. In addition, municipal halls were damaged and many officials were also Tsunami victims in some areas.

In order to that the reconstruction proceeds smoothly in the future the number of municipal officials and experts that support these officials will have to be increased. An increased number of dispatch officials from the government and prefectures and the continued long-term dispatch of officials in municipalities where a horizontal support relationship between municipalities is established can be expected to occur. With regard to the dispatch of experts to support officials, further support from the Urban Renaissance Agency and an increased number of dispatch experts from the private sector, mainly private consultants, etc. that have established a mutually trustful relationship with the administrations within a year of the occurrence of the disaster, can also be expected.

(4) Issues with information utilization in building disaster-resilient communities

In addition to public broadcast media such as television and radio, etc. and broadcasts within the jurisdiction of municipalities, etc., the establishment of a system for rapidly disseminating accurate disaster information to individuals through utilization of cellular phones and the internet should be discussed. Emergency earthquake alarms and Tsunami warnings, etc. are currently disseminated through cellular phones. In addition to that, however, the rapid transmission of necessary information in cases requiring evacuation should also be discussed. In addition, resolving communication related technical issues, including securing the reliability of emergency communications in the case of disasters, stabilization of contact means through telephones and cellular phones, etc., is urgently needed. Avoiding congestion with communications is a technical issue but is also caused in part by the activities of individuals using nonessential and non-urgent communications, and thus better social understanding of information technologies is required.

Information on what occurred is invaluable in the case of disasters. The collection and

accumulation of accurate information is also essential in the reconstruction of the disaster-stricken areas. Furthermore, information at the time of a disaster can provide effective guidelines for measures taken in the future, thus making continued collection and accumulation of information very important to society. Information collection from voluntary evacuees of the Great East Japan Earthquake needs to be carried out in a systematic manner. It can be considered essential basic data for the reconstruction, thus making the integration of the various information and management of it an urgent matter. The radiation doses due to the Fukushima Daiichi Nuclear Power Plant accident is important data for future disaster prevention measures, and thus should be permanently stored and made available to experts for analysis.

In addition, administrative agencies in the disaster-stricken areas of the Great East Japan Earthquake have faced difficulty in verifying the safety of and relieving residents, searching for missing people, securing evacuation areas, and carrying out various administrative procedures, etc. due to the loss of administrative documents. Furthermore, paper media medical records were damaged at medical institutions, thereby significantly impacting medical services for the disaster victims. Establishment of a cooperative framework for medical/nursing information and the introduction of wide area medical cooperation via telemedicine, etc., which is a system used to accumulate health information/dispensing information, etc., and electronic medical records are needed.

(5) Issues with ideal medical care/nursing/welfare in the disaster-stricken areas

With respect to what type of and how medical and welfare professionals should provide help in preparing for disasters, protecting human lives, and supporting their physical/mental health and life, the following common factors that can lead to effective support have been identified from the problems that actually arose at the disaster sites and the achievements of disaster support activities by experts to date.

First, disaster support proceeds more smoothly via consistent daily relationships.

Secondly, supporters are expected to be able identify the actual situation, that are chancing every moment while information is limited, identify usable local resources, and exhibit their coordinating functions.

Thirdly, in addition to cooperation between medical and welfare experts a cooperative system for use between experts and the general population also needs to be established.

Fourthly, effective long-term support by experts in the disaster-stricken areas cannot be ensured without the support of external experts.

In addition, issues arising from the point of view of the support systems are as follows.

First, efforts have been made to provide support to the elderly from an early stage, but support for infants is lagging. Providing care for children that lost their parents and families is thus an urgent matter. A support system made up of mental health care expert teams and consisting of infant education counselors, clinical developmental psychologists, clinical psychologists, and school nurses, etc. will need to be established.

Secondly, volunteer support must fit the situation in the disaster-stricken area and the needs of the disaster victims. Continuous effective long-term support requires the relationship between the roles of the disaster victims, communities, administrations, and volunteers to be regularly reviewed according to the temporal stage of the disaster.

Thirdly, the situation and needs of both the victims at evacuation shelters and those remaining in their residences must be identified before formulating careful reconstruction support measures.

(6) Issues with medium- to long-term support for child victims

When considering the victims' lives a year after the earthquake disaster, the secondary damage resulting from emergency evacuations, for example mothers and infants being separated from their fathers and husbands and living in the neighboring prefectures or Tokyo, should not be overlooked. The stress due to family separation is very high with not only adults but also infants. Because of the situation in that children were unable to play outside with their friends nor play with sand adults grew very anxious, the day care staff engaged in day care and education grew stressed out due to overwork, the development of children was delayed, and the rate of the development of their height and weight declined to 1/4 of the year prior to the earthquake disaster (report made by pediatric hospital in Fukushima). Children were considered to be suffering a type of "Psycho-Social Dwarfism[4]" because of the stress they were under.

With junior and senior high school students that were separated from their families and friends and transferred to schools in urban areas the cases of cases of their non-attendance at school increased despite a learning environment being secured due to a sense of isolation and differences in school cultures, interpersonal relationships, and communication styles. Some adults committed suicide due to loneliness after losing their children/spouses <6>. It should be kept in mind that people cannot live alone and must be protected by their families and community ties.

[4] An extreme delay in development when compared to the average development at a specific age due to psychological or social reasons, including 1) smaller body size, 2) language or intellectual delays, or 3) juvenile form (looking much younger).

An important theme is therefore helping infants and children, including junior/senior high school students, regain the situation where they can live with their families and settle down to learning and building a future. Measures that combine securing residences for families to live in and employment for the parents need to be taken in thereby helping them to regain a family life. In doing so efforts should be made to avoid separating family members and allow them live within the communities. Securing healthy lifestyles for the children, who will be the leaders of the communities in the future, and enabling them to play and study at school without any undue worry is also expected.

In addition, at present, or one year after the earthquake disaster, not only children but also adults are increasingly being tormented by exhaustion, helplessness, and desolation, feelings they did not notice in their life after their nerves had been so strained immediately after the earthquake disaster. Because of these circumstances ties between people that are created in their daily lives, at work, and in their communities need to be the basis of their mental support. The role of third parties, including NPO support groups and clinical psychologists, etc., in supplementing the abovementioned ties is also becoming increasingly important. “Life Line” has accomplished certain achievements via its accumulated know-how through telephone mental health counseling. In addition to dispatching supporters to the disaster-stricken areas mental health care can also be provided from outside through utilizing telephones, etc., and hence applying this to disaster-stricken area support is worth discussing. With regard to the mental health care of the disaster victims the fact that personnel closely listening to the feelings of individuals led to the healing of the disaster victims was pointed out from experience gained after the Great Hanshin-Awaji Earthquake. The importance of engaging in the relief activity of closely listening to the feelings of the disaster victims still remains after the current disaster. However, because this disaster was of an unimaginable scale securing a sufficient number of volunteers to engage in this activity has been difficult. In addition, and due to the lack of a system to use in gathering information on the people, areas, and evacuation shelters requiring support, the worry is that the people, areas, and evacuation shelters actually in need have not been provided with support. “Life Line” has accomplished certain achievements via its accumulated know-how through telephone mental health counseling, and thus these activities can be expected to be further disseminated.

This earthquake disaster caused ASD (Acute Stress Disorder) not only in the disaster-stricken areas but also in children and families in other areas nationwide because of mass media reports. Special TV programs that validate the course of reconstruction a year after 3.11 are therefore being broadcast. There have also been cases of PTSD

(Post-Traumatic Stress Disorder) caused by video clips used during TV program announcements <7>. In the Tsunami-stricken areas, in particular, PTSD from the experience of watching their families and friends being swallowed by the water while still alive has been unprecedentedly severe. For this reason quite a few people currently have relapsed PTSD, a year after the earthquake disaster. Improving that symptom will require the establishment of an everyday routine life rhythm, and thus for children that are still infants establishing a relationships with certain adults (fosterers) should be given higher priority than sending a large number of volunteers.

(7) Issues with preventive disaster mitigation measures (to cope with Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis)

The 20th Century involved not only significant scientific and technological progress but also constant wars that were meaningless and tragic to humans. Humans landed on the moon, built mega-cities, developed high-speed computers, and acquired nuclear energy. Countries around the world gained wealth and commerce prospered, with the entire earth now acting in unison. In contrast to this, however, people's activities that were in balance with nature, which was cultivated throughout our long history in not only many countries in the world but also many regions in Japan, were destroyed.

Earthquakes such as the Showa Tonankai Earthquake and Showa Nankai Earthquake, etc. caused great damage to the Japanese Islands around the end of the Pacific War, but for 60 years after these events, and until March 11, 2011, Japan was considered to have been lucky and without having suffered any significant earthquake damage. People may have become rather optimistic during this period. People are being busy making ends meet and living with worries such as their parents' health, their future, and the education of their children, etc. Under such circumstances coping in advance with large-scale earthquakes/Tsunamis, which only actually tend to occur every 100 to several 100 years and really quite rarely, in thereby endeavoring to prevent/mitigate disasters is very difficult. This applies not only to individuals but also to enterprises, municipalities, the government, and other organizations.

For example, there is a possibility that a large-scale earthquake will occur directly beneath Tokyo, with the total amount of subsequent damage being estimated to cost around 112 trillion yen. However, this does not include damage to skyscrapers or the Shinkansen system, and when they are included the amount is said to be 1.5 times the national budget. Even with this having been announced no significant changes seem to have occurred in people's daily activities. The estimated total amount of damage from Tokai/Tonankai/Nankai

Trough earthquakes and Tsunamis has not been published, but unfortunately significant damage resulting in the near future can easily be predicted. As a preventive measure to mitigate disasters correcting excessive concentrations of and optimizing and allowing for a more moderate distribution and redundancy in our nation building is required.

(8) Issues with organization and dissemination of disaster records

Amassing all available memories, records, cases, and knowledge concerning the Great East Japan Earthquake for use in creating a Great East Japan Earthquake archive that can then be shared with both domestic/overseas people and future generations is essential. The memories, records, cases, and knowledge on disasters, from historical disasters through to the Great East Japan Earthquake, collected from various points of views, needs to be used in cross-sectional research mainly in the disaster-stricken areas of this earthquake disaster in thereby promoting clarification of the actual situation with the Great East Japan Earthquake and provision of knowledge that can then be used to contribute to the reconstruction. These efforts are expected to facilitate developments in the field of study of countermeasures against and management of low-frequency large-scale disasters and be utilized in measures for the Tokai/Tonankai/Nankai Trough earthquakes, whose occurrence is of future concern.

4 Recommendations with building disaster-resilient communities

(1) Creation of disaster-resilient national land

The point of view of making use of the lessons learned in the Great East Japan Earthquake in creating disaster-resilient national land has also been addressed in the recommendations of "Towards Reconstruction - Hope beyond the Disaster" made by the Reconstruction Design Council in response to the Great East Japan Earthquake (June 2011) <2>, "Recommendations on Creating Disaster-Resilient National Land" made by the National Land Development Council (July 2011) <8>, and "Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake" made by the government (July 2011) <9>, with the necessity of redeveloping the national land infrastructure in thus making it more resilient to disasters, etc. already having been pointed out. In addition, despite concrete measures having been commenced upon with some facilities, including the strengthening of disaster prevention measures through the reinforcement of seawalls at nuclear power plants nationwide, etc., the people's trust in safety having been secured is far from being adequate.

The vulnerability of the capital functions and private central management functions that are concentrated in Tokyo as well as the necessity of redistributing those functions and backing them up have also been pointed out, and measures already implemented in thereby covering part of those points. With regard to Tsunami disasters the "Act on Establishment of Regions Resistant to Tsunamis" (Act No. 123 of December 14, 2011) was enacted in 2011 to allow regions at risk of Tsunami disasters to take preventive measures that include relocation of buildings to higher ground. However, many topics are still at the stage of being discussed or recommendations made, thus indicating the safety of national land has yet to have been secured. The following recommendations are therefore being made as measures to be taken over the short-term.

[1] Creation of a Disaster Mitigation Agency

Municipalities and managers of major facilities shall estimate the disasters/damage that could be caused by large-scale storms and floods, including river floods, Tsunamis, high tides, and mudslides, etc., and proceed with focused disaster mitigation measures after having thoroughly overviewed them. At the stage when the completion of the reconstruction from the Great East Japan Earthquake is in sight the Reconstruction Agency shall be reorganized into a Disaster Mitigation Agency and function as a permanent control center for consistent disaster/damage estimations, disaster mitigation measures, and disaster reconstruction after a disaster.

[2] National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures

In regions at significant risk, as identified through estimating the disaster/damage, rules for limiting residential land use or taking safety measures with buildings shall be established. As a core measure that ensures safer community building the relocation of schools/hospitals/welfare facilities for the elderly, etc. to safer locations shall be obligated in thus centering cities/villages in safe locations.

[3] Respect for the recuperative power of nature

With national land management, and in consideration of the majority of domestic areas being based on natural land use, various national activities in maintaining natural areas shall be encouraged in thereby gaining greater understanding of natural processes and attaching greater importance to its ideal use with respect for the recuperative power of nature.

[4] Structural reinforcement of buildings/facilities

- Civil engineering structures, including breakwaters, seawalls, levees, dams, railroads, roads, and port facilities, etc., shall be reinforced to the necessary level. The earthquake-proof safety of large-scale factory facilities, including petroleum plants and power generation facilities, etc., shall be improved upon.
- The earthquake resistance of existing civil engineering structures and buildings with inadequate earthquake resistance shall be improved upon in thereby preventing them from collapsing.
- Efforts shall be made to improve the fire resistance of built-up wooden house areas.
- The earthquake resistance of buildings shall be further improved in large cities with concentrated populations in increasing the number of buildings in which people can seek refuge in a disaster.

[5] Strengthening of the software side of countermeasures

Efforts shall be made in the software side of countermeasures, including evacuation drills, establishment of fire brigades, and emergency earthquake alarms, etc.

[6] Backing up of the capital/key functions

The functions of the central management functions of the government and economic activities shall be backed up in areas that are not at risk of simultaneous disasters. Efforts

shall be made to transferring the capital functions from Tokyo, thereby reducing the concentration in Tokyo, and improving the safety of national land. Government facilities, enterprise activities, and important information shall have a reasonable level of redundancy, thereby distributing the risk of them being lost.

(2) Building sustainable reconstructed communities

The disaster-stricken areas are socially vulnerable, such as having declining/aging populations, etc. At present the "Basic Reconstruction Plan" formulated by each municipality is being based on the idea of maintaining the status quo, although with this actuality being recognized, and thus has given rise to a number of issues, including the individual relocation of many villages to higher ground, elevation of low laying areas, and development of second-line levees, etc. The following recommendations are therefore being made.

[1] Formulation of action plans for sustainable reconstruction

A third party organization consisting of community building experts, etc. shall be promptly established to inspect the "Basic Reconstruction Plan" of municipalities from a long-term, broad-based point of view, and create concrete action plans toward "sustainable reconstruction".

[2] Establishment of community-based "reconstructed community building organizations"

The creation of residential and employment environments is important in rapidly reconstructing the disaster victims' daily lives. These are mutually related and cannot be discussed separately. It is even more important that the disaster victims themselves play the major roles in building their reconstructed communities. From this point of view community-based careful "reconstructed community building organizations" need to be set up. Recommendations are therefore being made for the establishment of a system that can be used to secure financial resources and dispatch human resources.

[3] Planning of regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc.

Regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, public halls, and welfare facilities for the elderly, etc., and step-wise reconstruction strategies that takes the

reconstruction of communities into consideration are essential. With this the provisional development of base areas that are centered around public and public-welfare facilities, which can play a core role in communities and to include day-care centers, kindergartens, schools, public halls, hospitals, and welfare facilities, etc., and with population accumulation areas such as public reconstruction housings, etc. being accommodated in their neighborhood should be considered. Making hospitals and welfare facilities for the elderly play a core role in the communities, in particular, is considered to be a good urban area development policy in thereby building communities that anticipate the super aging society. Furthermore, networking these base areas with public transportation means is desirable from the point of view of leading the new urban cities into becoming intensive urban structures, which is considered desirable with the declining/aging society, and which can also lead to the realization of sustainable urban cities.

[4] Coordination of coastal area land use from a broad-based perspective of the wider area

Land use of the destroyed coastal areas needs to be coordinated from a broad-based perspective of the wider area. These particular areas in fall within the Pacific Rim migratory-bird path. Measures that not only restore residential/production bases but also restore the great natural environments and improve the biodiversity are therefore necessary. For this reason recommendations are being made to formulate broad-based coastal area plans and create the driving entity in cooperation between administrations, people, and NPOs.

[5] Formation of "Natural Symbiosis Cities based on the Watershed Landscape"

The disaster-stricken areas have traditionally been formed based on the circulation of watershed areas in remote mountains, country side forests, towns, fields, and beaches. These recommendations are being made to review this relationship, which is disconnect at present, from the point of view of new energy strategies and the sustained maintenance of fishing grounds as a common resource, and make the formation of "Natural Symbiosis Cities based on the Watershed Landscape" a basis for the reconstruction land use plans.

[6] Development of renewable energy policies

These recommendations are being made to position the coastal areas and country side forest areas located to the rear of the disaster-stricken areas as development bases for renewable energy (solar, wind, micro-hydro, biomass, and geothermal) in thereby taking

the lead in the new direction of energy policies in Japan. In addition, establishment of self-sufficient distributed systems, including the introduction of smart grids in anticipation of the introduction of renewable energy, etc., shall be part of the reconstructed community building process.

(3) Measures toward greater utilization of information

[1] Securing means of conveying information on preparing for disasters and establishing judgment/action guidelines

In addition to public broadcasts such as television and radio, etc. and broadcasts within the jurisdiction of municipalities, etc., a system for rapidly disseminating accurate disaster foresight information to individuals through utilization of cellular phones and the internet needs to be created. In addition, resolving communication related technical issues, including securing the reliability of emergency communications in the case of disasters, stabilization of contact means through telephones and cellular phones, etc., is in urgent need. These recommendations are being made in enhancing efforts being made in building a more disaster-resilient society through securing the reliability of disaster foresight and evacuation information, securing a means of and eliminating any disparities in obtaining information, establishing policies for making judgments and performing activities of individuals, and promoting information literacy dissemination activities, etc.

[2] Promotion of information collection/accumulation on disasters and subsequent data integration

Information on a disasters can provide effective guidelines toward measures taken in the future, thus the continued collection and accumulation of information is very important to society. Collecting information on the voluntary evacuees of the Great East Japan Earthquake is essential basic data for use in the reconstruction, thus making the integration of the various information identified at each site and its management an urgent matter. In addition, the radiation doses due to the Fukushima Daiichi Nuclear Power Plant accident is very important data for use in future disaster prevention measures, and should be permanently stored and made available to experts for analysis.

These recommendations are therefore being made in that the government, municipalities, experts on radiation measurements and geographic information systems, etc. and people should cooperate in integrating the measurement data to be analyzed, organized, and then disclosed to the public as common data, and therefore standard data formats and guidelines on further visualization shall be established.

[3] Implementation of measures that ensure the safe keeping of social information assets

In addition to backing up administrative documents, which can be considered to be social information assets, in cooperation with neighboring municipalities the establishment of a back up system in preparing for wide-area disasters through utilizing up-to-date information technologies needs to be discussed together with its institutional aspects. In addition, these recommendations are being made to establish a cooperative framework of medical care/nursing information, the prompt introduction of a wide area medical cooperative system via telemedicine, etc., a system to accumulate health information/dispensing information, etc., and electronic medical records, and then making all those information asset protection measures a basis for disaster-resilient community building.

[4] Promotion of training/placement of information professionals

Building a disaster-resilient society requires human resources that can play a leading role in managing information for use in both organizational responses such as designing administrative information bases, etc. and developing the information literacy of residents. Human resources that are capable of making practical responses through utilization of their knowledge on information management are also expected to be able to resolve each of the abovementioned issues. Municipal officials and volunteers created temporary databases immediately after the Great East Japan Earthquake in response to the need for disaster victim assistance projects, but mutually linking them for reflection in the reconstruction projects will require utilization of the knowledge of technical professionals. The urgent need for that was pointed out at the time of the disaster, but continued information utilization can be disrupted during ordinary times due to the transfer of officials in charge of information systems, etc. In proceeding with disaster-resilient community building professionals to engage in information management within an information society should be trained and positioned for continuous information framework operations and to support information utilization by residents.

(4) Ideal medical care/nursing/welfare in the disaster-stricken areas

The following recommendations are being made in consideration of not only the importance of how to handle medical care/nursing and social welfare in the case of disasters but also the fact that disasters can seriously affect the vulnerable people in particular.

[1] Formation of health, medical care, and welfare organization networks in regions that can provide flexible responses when urgently needed

With regard to what types of support system can be established at the time of the disaster thinking about simulations in response to the potential situations in advance through utilizing regional characteristics (natural environment, type and position of various institutions, and human powers, etc.) with regional health, medical, and welfare institutions playing the main role is considered important. Measures that assume various disaster situations, including the establishment of cross-institutional bases and ideal cooperation, information provision, and information sharing, etc., will need to be discussed. Constantly making the effort to establish well-acquainted relationships with professionals involved in the various health, medical care, and welfare occupations with administrative participation in thus enabling them to take the leading roles and provide coordination in disasters is essential.

[2] Establishment of support measures for groups that are vulnerable to disasters (chronic disease patients, persons with disabilities, children, elderly (living along, or those with reduced daily living functions), and expectant and nursing mothers, etc.)

A cooperation system between medical/welfare professionals and local residents (welfare volunteers, neighborhood self-governing bodies, neighborhood associations, and volunteer organizations) needs to be established for the early commencement of and continued relief methods and aggravation prevention/health support activities for groups that are vulnerable to disasters. Constant identification of disaster-vulnerable groups in the regions will require building moderately linked communities in thereby developing a sense of all being “in the same boat”.

[3] Preparation and enrichment of mental health care

Wide-area mental health care measures according to the level of mental and physical stress need to be developed/improved. First, special care for children who have lost their parents/families or animals/goods that were very valuable to them needs to be provided. Secondly, mental health care by mental health care expert teams consisting of school nurses, infant education counselors, clinical developmental psychologists, clinical psychologists, and school psychologists (cooperation and collaboration) and future disaster prevention education need to be implemented at schools for children of infant and school age. Thirdly, recommendations are being made to develop

residential/educational/nurturing environments and provide financial support through creating a “foster parent system” for orphaned children and a “community evacuation system” for entire families and communities with the government and municipalities cooperating in securing receiving persons/areas.

In addition, preparing for emotional disorders (depression, bipolar disorder, and schizophrenia, etc.) that may be triggered by anxiety with young and middle-aged people that have lost their jobs and stress due to drastic changes in their residential environments with the elderly is important. From the point of view of respecting human life preventive mental health care and an early diagnosis system need to be promptly improved.

(5) Establishment of victim support system and personnel training

[1] Preparation of needs maps concerning the relief of victims and information gathering

Many volunteers were dispatched immediately after the earthquake disaster, but the levels of supporter dispatch varied because the needs of the disaster victims could not be identified. Supporters and an information network that enable both supporters and those in need of support to access supporters/support organizations need to be established. These recommendations are being made with regard to the establishment of information collection “stations” in thereby ensuring support is provided according to the needs through preparing needs map that collate the individual needs of the disaster victims.

[2] Creation of nation-wide networks by municipalities, private organizations, and academic societies, etc.

Nationwide networks need to be established in advance by municipalities, private organizations, and academic societies, etc. in thereby ensuring timely support is provided when needed and according to any changes in the status of the establishment of specialized support systems by external regions/institutions. Prior establishment of regional/institutional partnerships is also important. With constant relationships being established the division of roles/functions can take place more smoothly through identifying matters that need coping with by supporters in the disaster-stricken areas, matters that can be entrusted to external supporters, and matters that can more effectively carried out by external supporters, etc. depending on the content of support at the time of a disaster.

In addition, supporters in the disaster-stricken areas are victims themselves but are still helping others. External specialized support is essential in alleviating the physical and

mental exhaustion of supporters in the disaster-stricken areas and in thus restoring their mental stability. Availability of external specialized support for supporters in the disaster-stricken areas can therefore lead to continued effective and long-term support for people in those disaster-stricken areas.

[3] Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research

Research environments for studying disaster care need to be established in thereby accumulating experience from past disaster support and exploring methodologies for further effective support in an interdisciplinary manner. At the same time, these recommendations are being made to conduct training of disaster care experts at interdisciplinary graduate schools who will have practical skills and be the leaders in disaster support and play the role of being global leaders who are capable of conducting education and research activities on disaster support.

(6) Preventive disaster mitigation measures on the assumption of Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis

The following recommendations are being made with the aim of rational use of national land that takes large-scale disaster risks such as earthquakes and Tsunamis, etc. into account.

[1] Formation of disaster risk conscious national land structures

These recommendations are being made on correcting the excessive concentration of industrial/economic activities in Tokyo and other Pacific Rim areas and revitalizing cities and industries in the Japan Sea Rim areas. Depopulating areas shall lead to more compact cities, thereby making disaster prevention/mitigation measures more efficient. Core infrastructures such as railroad and road networks, etc. shall not only support economic activities in ordinary times but also have sufficient redundancy to cope with predicted disasters and avoid any delay in emergency activities.

[2] Reinforcement of disaster mitigation measures from the software side

While encompassing improved earthquake resistance of civil engineering structures and building structures, these recommendations are being made with regard to the further strengthening of the software side of disaster mitigation measures, including community building that takes escape into account, evacuation drills in ordinary times, establishment of an alarm system for when disasters occur, and disaster prevention education for the people, etc.

[3] Promotion of research on disasters

These recommendations are being made on promoting the identification of the mechanism of large-scale earthquakes/Tsunamis and studies on disaster histories through conducting interdisciplinary research on archived documents, Tsunami deposits, and coastal topographies, and then disclosing the results to the public in an understandable manner.

(7) Organization and dissemination of disaster records

Archiving the records of the disaster-stricken "present", the creation/records of the "future" toward reconstruction, documents for creating a new future through comparing the past as history with the present, records of support/cooperation provided by various regions in Japan and countries around the world, and documents on supporting the disaster-stricken areas and relationships within these areas all have the important meaning of restoring the memories of the lost past and proceeding with the reconstruction. Analyzing and evaluating these records and making use of them in the future reconstruction and disaster prevention/mitigation measures, etc. is an important issue that needs to be assigned to researchers in academic circles. The creation of archives therefore needs to be promoted also from the point of view of academic study.

The importance of the organization and dissemination of disaster records, as the creation and succession of disaster records, was pointed out in the "Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake" made by the government, and hence a number of measures are being implemented in cooperation between the government and the private sector.

In addition, this great earthquake occurred in a highly advanced information society and can be characterized with the existence of various digital information recorded in a variety of formats and from various points of views. Collecting and storing that information, including IT media, etc., is an important issue. SCJ has established a "Subcommittee on IT Media Social Infrastructure and Media Archive of Disasters", with the discussions being on-going.

The Great East Japan Earthquake archive information distributed throughout respective areas, institutions, and individuals will need to be shared in the future, and this should eventually be positioned as an international challenge (across various nations, cultures, and languages). This will require facilitating identifying the records and connecting archives and promoting the establishment of archive systems, including a portal system that enables unified access to the information.

In addition, the archive itself connects the disaster-stricken areas with others, and therefore this should be implemented as a project between industry, the government, and academic circles, and its content should contribute to support for the disaster-stricken areas. Furthermore, inclusion of past histories and historic sites will add the meaning of being a cross-generational challenge (linking the gap between generations), thereby making it a basis for forming a society that will be succeeded to across generations and not forgotten. This will require its fixation as local knowledge and being shared among people.

The following recommendations are being made to restore memories of the lost past, recording the disaster-stricken "present", and creating/recoding the "future" toward reconstruction. In addition, SCJ will also collect academic information on the great earthquake and discuss its storage.

[1] Promotion of creation of an "archive" concerning the Great East Japan Earthquake

The creation of a Great East Japan Earthquake archive shall be promoted basically through supporting the on-going archive creation efforts, facilitating shared use of them, and internationalization (international standards) in cooperation with the relevant ministries and agencies of the government, the National Diet Library, and other archive related institutions, etc. Establishment of a portal system, etc. that enables domestic and overseas access shall be promoted, and discussions shall take place on a legislative and systematic framework for collecting the information and its storage, etc.

In addition to IT media and various data on natural and social phenomenon, which recorded various aspects of the great earthquake, efforts shall be made to identify, collect, and store the variety of social infrastructure information that was not initially subjected to be archived. In doing so discussions shall take place on ICT elemental technologies, including the collection, registration, storage, and representation/analysis methods of the various types of information, etc., and issues with social disclosure and copyright, etc.

The archive will require the establishment of a system to use for its permanent storage and long-term operation, and therefore discussions shall take place in cooperation with the National Diet Library.

(8) Role of government publicity and media organizations

[1] Appropriate news coverage in response to the temporal stages of disasters

Appropriate news coverage in response to the temporal stages of disaster is expected. Priority should be placed on lifeline information in thereby securing "safety" (safety of lives) of the disaster victims also with media coverage in the initial stage immediately

after a disaster. In the case of large-scale disasters such as this one a single organization cannot cover the entire disaster-stricken areas and collect/integrate information. The respective media organizations are therefore very much expected to cooperate in establishing a system to use in integrating/cross-checking and sharing information across the entire disaster-stricken areas.

Establishing an integrated system of all media for promptly transmitting accurate information in cooperation with the administration and volunteers is essential in preventing irresponsible rumors, etc.

[2] Cool-headed news reports and comments based on the sharing of accurate information and sources

Rumors arouse the anxiety of not only the directly affected disaster victims but also the entire public. In the case of the nuclear power plant accident of concern the ways in which the risks associated with health hazards are assessed and disclosed to the public is important in preventing unnecessary confusion domestically. In this respect the respective media organizations are expected to make the effort to avoid competing in gaining scoops or sensational articles/headlines and instead ensuring that accurate information and sources are shared with all types of media and cool-headed news and comments reported using that information.

Research institutions should actively exert their functions as think tanks in ensuring accurate reports are made with science communicators maintaining close contact with the media. A certain amount of accumulated knowledge on risk recognition of people and ways to make communication based on it exists in the field of risk psychology. Assuming that a gap exists in risk recognition between experts on risk assessment and the general public active discussions should take place on ways to report matters in such a way as to minimize the damage caused by harmful rumors in cooperation between the government publicity, media, and research institutions. Accurate and neutral commentary articles on, for example, 1) what level of risk is predicted for the health effects from radiation exposure when compared to other risks (relative risk level), 2) the fact that the risk is continuous and therefore a dichotomy way of thinking such that the existence of health effects depends on whether the value is above or below a specific threshold value is meaningless, and 3) the relationship between the amount of food intake and the risk (radiation dose is shown in becquerel per 1 kg of food, but “consuming 1 kg of spinach” is very unlikely in normal cases), etc. are considered effective in reducing the damage caused by harmful rumors. In addition, actively presenting positive and negative responses

to commentary articles from non-expert general people via newspapers will improve the neutrality and reliability of the commentary.

<Reference>

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<8> Disaster Prevention Land Planning Committee, Basic Policy Section, National Land Council, "Recommendations on Creating Disaster-Resilient National Land – Preparation for Large-Scale Disaster Based on the Idea of Disaster Mitigation", July 26, 2011. *

<9> Reconstruction Headquarters in Response to the Great East Japan Earthquake, "Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake", July 29, 2011.

[5] *: The original was written in Japanese and SCJ provides informal English translation for non-Japanese readers.

<Background Information 1> Progress of deliberations of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 27 Sub-Committee on Building Disaster-Resilient Communities (1st)

- ○ Deliberation matters, future course of action

2012

January 13 Sub-Committee on Building Disaster-Resilient Communities (2nd)

- ○ Issues with building reconstructed communities, symposium series "Protecting life and land from large-scale disasters", etc.

February 3 Sub-Committee on Building Disaster-Resilient Communities (3rd)

- ○ Summarizing policy, etc. of the Sub-Committee on Building Disaster-Resilient Communities

March 2 Sub-Committee on Building Disaster-Resilient Communities (4th)

- ○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities "Building

Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –”