

出國報告（出國類別：國際研討活動）

# 參加「第3屆聯合國世界減災大會」 報告

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## 摘 要

為蒐集瞭解國際減少災害風險行動與東日本大地震災後重建情形，以促進我國都市與建築減災調適技術研究發展，104 年度由本所安全防災組派員參加 2015 年 3 月 14 日至 18 日在日本仙台舉辦的第 3 屆聯合國世界減災大會，汲取世界各國在過去十年間執行「兵庫行動框架」的成果與經驗，以掌握未來十五年國際減災戰略趨勢，本屆會議通過新的「仙台減災框架」，為全世界減少災害風險確立了七大減災目標與四大優先行動。同時瞭解東日本大地震災後四年的防災策略、重建實務經驗與技術發展，以供本所進行氣候變遷與天然災害都市建築減災調適技術研究參考，對我國都市防災與建築安全科技計畫極有幫助。



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## 第一章 緣起與目的

內政部為都市、建築中央主管機關，本所職掌辦理都市防災與建築安全技術有關研究，鑑於都市防災與建築安全對於保障人民生命財產以及經濟影響之重要性，104 年至 107 年執行「都市與建築減災與調適科技精進及整合應用發展計畫」，研究面向包括廣域巨大複合型災害下都市、建築及社區之韌性建構、因應氣候變遷之都市永續發展減災調適技術、高齡少子化社會之都市防災對策，以及相關法規檢討建議等，期能達到提昇國內都市建築防災技術、健全國內防災法規制度、培植防災專業人力及提升國內防災產業發展等多項目標。

而在上述科技計畫項下，為促進我國都市與建築減災調適技術發展，本所 104 年度出國計畫規劃派員參加聯合國國際減災戰略總署（UNISDR）於 2015 年 3 月 14 日至 18 日在日本宮城縣仙台市舉辦的第 3 屆聯合國世界減災大會（the Third World Conference on Disaster Risk Reduction，WCDRR），汲取世界各國在過去十年間執行「兵庫行動框架」的成果與經驗，以掌握未來十五年國際減災戰略趨勢，同時瞭解東日本大地震災後四年的防災策略、重建實務經驗與技術發展，可供我國進行氣候變遷與天然災害都市建築減災調適技術與政策之研究參考，對我國都市防災與建築安全整體研究規劃極有幫助。





## 第二章 考察過程

一、活動名稱：參加「第3屆聯合國世界減災大會（WCDRR）」。

二、活動日期：104年3月13日至3月19日，合計7天（如表2-1）。

表 2-1 本次考察行程表

| 日期              | 活動內容   | 備註           |
|-----------------|--|--------------|
| 第一天<br>3月13日（五） | 1. 路程  | 台北→東京<br>→仙台 |
| 第二天<br>3月14日（六） | 2. 「第3屆聯合國世界減災大會」系列活動之「東北大學復興行動成果展」<br>3. 「第3屆聯合國世界減災大會」公眾論壇之「東日本大震災綜合研討會」   | 仙台           |
| 第三天<br>3月15日（日） | 4. 「第3屆聯合國世界減災大會」系列活動之戶外防災展覽－2015年仙台市政府前廣場大型災害防救演練、仙台勾當台公園防災戶外展覽、國際交流廣場<br>5. 「第3屆聯合國世界減災大會」公眾論壇之「東日本大震災綜合研討會」                                 | 仙台           |
| 第四天<br>3月16日（一） | 6. 「第3屆聯合國世界減災大會」公眾論壇之「韌性對話：後2015年韌性目標（Resilience Dialogue：Bringing Resilience to Scale for Post-2015 Goals）」<br>7. 「第3屆聯合國世界減災大會」系列活動之「女性防災展」 | 仙台           |
| 第五天<br>3月17日（二） | 8. 「第3屆聯合國世界減災大會」系列活動之「防災產業展」  | 仙台港          |

|                 |   |              |
|-----------------|---|--------------|
| 第六天<br>3月18日(三) | 9. 「第3屆聯合國世界減災大會」系列活動之「世界防災展」、「東日本大地震減災重建展」、「東日本311震災紀錄圖書館」、「防災海報展」 | 仙台           |
| 第七天<br>3月19日(四) | 10. 路程  | 仙台→東京<br>→台北 |

### 三、主辦單位：

聯合國國際減災戰略總署 (UNISDR)、日本政府 (內閣府、消防廳、復興廳、國土交通省、WCDRR 仙台市執行委員會)、世界銀行集團 (WBG) 及全球減災重建基金會 (GFDRR)。

### 四、考察內容：

#### (一) 東日本大震災綜合研討會 (東日本大震災綜合論壇、Great East Japan Earthquake Forum)

主題一：「日本防災展望—超越兵庫、仙台框架，展望日本未來的終極防災對策」、主辦單位：日本內閣府。

主題二：「地震、海嘯、土砂災害等天然災害中消防總隊與民眾自主防災的作用」、主辦單位：日本消防廳。

主題三：「東日本大震災之現狀與重建—創造新東北」、主辦單位：日本復興廳。

主題四：「減輕巨型災害風險損失—挽救生命和防止社會經濟活動毀滅性破壞的方法」、主辦單位：日本國土交通省。

#### (二) 「韌性對話：後 2015 年韌性目標 (Resilience Dialogue：Bringing Resilience to Scale for Post-2015 Goals)」公眾論壇

主辦單位：世界銀行集團 (World Bank Group, WBG)、全球減災重建基金會 (The Global Facility for Disaster Reduction and Recovery, GFDRR)。

協辦單位：聯合國國際減災戰略總署（UNISDR）、日本政府。

- (三) 「東北大學復興行動成果展」、「世界防災展」、「東日本大地震減災重建展」、「東日本 311 震災紀錄圖書館」、「防災海報展」、「女性防災展」、「防災產業展」、「戶外防災展覽」

主辦單位：日本政府及 WCDRR 仙台市執行委員會。

協辦單位：聯合國國際減災戰略總署（UNISDR）。

## 五、活動性質：

- (一) 參加聯合國於日本仙台舉辦「第 3 屆世界減災大會（WCDRR）」公眾論壇。
- (二) 參觀聯合國「第 3 屆世界減災大會（WCDRR）」系列防災展覽活動，包括「東北大學復興行動成果展」、「世界防災展」、「東日本大地震減災重建展」、「東日本 311 震災紀錄圖書館」、「防災海報展」、「女性防災展」、「防災產業展」、「戶外防災展覽」等。

## 六、行程遭遇問題與因應做法

- (一) 本屆大會活動分為主要會議及會外活動，其主要會議在仙台國際中心舉辦且限制取得大會認證資格者參加，另於仙台市 12 個場地及仙台港舉辦 350 場公眾論壇及多場防災展覽活動等會外活動，對外開放供各國人士與一般民眾參加。
- (二) 本屆大會主要會議另由行政法人國家災害防救科技中心派員代表我國出席，本所代表雖未獲參與本屆大會主要會議，然基於本所新興都市建築防災技術研究業務考量，此行主要參加開放供各國人士與一般民眾入場之會外活動，並配合研討會相關活動的時間及路程，彈性規劃本次考察行程，共參加 4 場東日本大震災綜合研討會、1 場韌性對話論壇及 8 場防災展覽，盡力蒐集瞭解日本與國際間最新的防災觀念與創新技術資訊。

(三) 國際間基於防災資訊公開共享理念，目前聯合國國際減災戰略總署（UNISDR）、世界銀行全球減災重建基金（GFDRR）、日本各級政府及利益相關團體，均於官方網頁公開所有防災政策、紀錄、報告文件、會議錄影及出版品等檔案，方便各國防災知識傳播與資訊流通，故本次主要會議有關後 2015 年減災框架重要決議，及與本所研究領域相關之重要研討資訊，則自相關官方網頁蒐集以補實本報告內容。

### 第三章 研討會與展覽活動

為蒐集瞭解日本與國際間新興都市建築防災觀念與創新技術發展，本次考察行程參加 4 場東日本大震災綜合研討會、1 場韌性對話論壇及 8 場防災展覽等活動，並自聯合國國際減災戰略總署（UNISDR）、世界銀行全球減災重建基金（GFDRR）、日本各級政府及利益相關方等官方網頁（如附錄一），蒐集相關重要防災資訊，以下分別從「第 3 屆聯合國世界減災大會」、「國際防災合作」、「東日本大地震災後重建－打造更美好的韌性家園」、「日本防災產業技術推展」及「日本女性防災主流化」等五大方面，說明本次參加研討會與展覽活動內容。



圖3-1 防災出版品及資料蒐集

#### 第一節 第 3 屆聯合國世界減災大會

##### 一、聯合國世界減災大會簡介

聯合國世界減災大會每十年召開 1 次，第 1 屆世界減災大會於 1994 年在日本橫濱舉行，決議通過「橫濱宣言」及「橫濱減災行動綱領」，為當時國際減災預防提出五大行動計畫，茲條列如下：

1. 認識瞭解災害預防工作的重要性，從政府推廣普及於大眾
2. 發展風險評估技術
3. 促進媒體、科技、商業及非政府組織進行防災合作

4. 在世界各國間推動一級區域防災合作
5. 將發展中國家納入防災推廣重點

1999 年 12 月，聯合國秘書處成立國際減災戰略總署（The United Nations Office for Disaster Risk Reduction - International Strategy for Disaster Reduction，UNISDR），其任務重點在於協調聯合國減災系統和確保世界各國減災協同合作，落實國際減災戰略之實施。2001 年，聯合國擴大其組織任務，成為確保聯合國系統之區域組織與社會減災活動，兼顧經濟和人道領域的聯合國減災協調系統。

2005 年 1 月，國際減災戰略總署於日本兵庫縣神戶市召開第 2 屆世界減災大會，168 個國家商議通過「兵庫宣言（Hyogo Declaration）」與「兵庫行動框架 2005-2015：建立國家和社區的抗災復原能力（Hyogo Framework for Action 2005-2015：Building the Resilience of Nations and Communities to Disasters）」，簡稱為 HFA」，並由其協助國際間兵庫行動框架之推動、協調整合與監控評估。兵庫行動框架訂立了三大戰略目標與五大行動計畫，茲條列如下：

（一） 三大戰略目標：

1. 將減少災害風險對策更有效地整合納入永續發展政策。
2. 發展強化各層級防災組織，特別是提高社區層級的防災能力。
3. 在災前整備、災中應變及災後重建等不同階段，系統化納入減少災害風險措施。

（二） 五大行動計畫：

1. 優先建立防災體系與政策制度。
2. 災害風險識別、評估、監測並加強早期預警。
3. 在國家社會的每個層面，運用防災技術與知識，打造防災文化，建立韌性能力。
4. 減少潛在的災害風險因素。

5. 強化各個層級的防災準備工作，以提高緊急應變效率。

第3屆世界減災大會於2015年3月14日至18日在日本仙台舉行，由國際減災戰略總署和日本政府共同主辦，主要目的是針對近十年來世界各國執行「兵庫行動框架」的相關成果進行檢討，並通過新的「2015年後減災框架（Post-2015 Framework for Disaster Risk Reduction）」，同時邀請各國政府代表與利益相關方，包括發展機構、技術機構、民間社會團體、學術界與企業界等，分享世界各地區及國家的「兵庫行動框架」執行經驗，討論關鍵的災害風險管理解決方案，幫助世界各國及早建立一個更有效的減災管理措施，以減少巨大災害造成的人員傷亡與經濟衝擊。據聯合國官方統計，世界各國約有2,800名政府代表參加本屆大會，會議期間舉行的公共論壇與會人數超過14萬人次，本屆大會在國際間成功取得共識，各國政府承諾推動防災主流化將成為國家重要政策之一環，讓全球社會經濟安全向前邁進一大步。

## 二、第3屆聯合國世界減災大會

第3屆聯合國世界減災大會分為三個主要部分：政府間會議（Inter-Governmental Segment）、利益相關方會議（Multi-Stakeholder Segment）及會外活動（Side Events）。

（一）政府間會議（Inter-Governmental Segment）：由聯合國會員國代表參加，包括4場全體大會、開幕式和閉幕式，以及5場部長級圓桌會議和3場高級別利益相關方合作夥伴對話，各場次重要會議紀錄均公布於WCDRR官方網頁，且可於聯合國WEB TV觀看影音實錄。

1. 全體大會（Official Plenary Session）：由186個聯合國代表參加，將發表聯合國官方聲明，討論「通過2015年後減災框架（Adoption of a Post-2015 Framework for DRR）」。
2. 部長級圓桌會議（Ministerial Round Table）：議題包括「災後重

建：重建更美好（Reconstructing After Disasters： Building Back Better）」、「減少災害風險的國際合作：支持 2015 年後框架（International Cooperation in Support of a Post-2015 Framework for Disaster Risk Reduction）」、「管理災害風險：克服挑戰（Governing Disaster Risk： Overcoming Challenges）」、「減少城市環境災害風險（Reducing Disaster Risk in Urban Settings）」及「公共投資策略減少災害風險（Public Investment Strategies for Disaster Risk Reduction）」。

3. 政府間高級別利益相關方合作夥伴對話（ High level Multi-Stakeholder Partnership Dialogues）：議題包括「動員婦女領導在減少災害風險（Mobilizing Women's Leadership in Disaster Risk Reduction）」、「風險敏感的投資：公私合作（Risk Sensitive Investment： Public-Private Partnerships）」及「包容性的災害風險管理：政府、社區和團體共同行動（Inclusive Disaster Risk Management： Governments, Communities and Groups Acting Together）」。

（二）利益相關方會議（Multi-Stakeholder Segment）：由聯合國會員國、國際機構、NGO 等代表參加，包括工作會議、論壇、考察訪問和遊覽等行程。工作會議議題包括「現有的行動 2005-2015 年兵庫行動框架的進展：建立抗災能力國家和社區優先（Progress on existing Hyogo Framework of Action 2005-2015： Building the Resilience to Nations and Communities Priorities）」、「新興風險（Emerging Risks）」、「加快實施（Accelerating implementation）」，以及 2 場頒獎典禮。

（三）會外活動（Side Events）：會議期間舉行公共論壇、防災展、海報展等活動，主要目的在提升人們的防災意識，建構國家與社區的抗



災力，並為相關防災知識推廣貢獻力量，此外也分享 2011 年 3 月 11 日東日本大地震的反思與經驗教訓，為本次考察主要規劃行程，茲針對各參加行程概述如下：

1. 公共論壇（Public Forum, Side Events）：

本屆大會期間共舉辦 350 場公共論壇，廣泛討論災害所牽涉之各種層面與議題。依照大會的防災議題分類進行統計，其中涉及能力發展（Capacity Development）課題者計 37 場、公民社會/非政府組織（Civil Society/NGOs）計 42 場、氣候變遷（Climate Change）計 15 場、社區減少災害風險（Community-based DRR）計 28 場、複雜緊急情況（Complex Emergency）計 25 場、關鍵基礎設施（Critical Infrastructure）計 13 場、文化遺產（Cultural Heritage）計 4 場、災害風險管理（Disaster Risk Management）計 50 場、早期預警（Early Warning）計 9 場、減少災害風險之經濟（Economics of DRR）計 13 場、教育及學校安全（Education & School Safety）計 26 場、環境（Environment）計 16 場、糧食安全與農業（Food Security & Agriculture）計 7 場、性別（Gender）計 7 場、地理資訊系統和製圖（GIS & Mapping）計 5 場、治理（Governance）計 40 場、健康和衛生設施（Health & Health Facilities）計 24 場、原住民知識（Indigenous Knowledge）計 5 場、災害資訊管理（Information Management）計 58 場、保險及風險轉移（Insurance & Risk Transfer）計 7 場、媒體防災（Media）計 11 場、公私夥伴關係（Public-private Partnerships）計 34 場、災後恢復（Recovery）計 55 場、風險識別與評估（Risk Identification & Assessment）計 22 場、社會衝擊和韌性（Social Impacts & Resilience）計 32 場、空間技術（Space Technology）計 1 場、結構安全（Structural Safety）計 15 場、城市風險與規劃（Urban Risk & Planning）計 25 場、弱

勢脆弱族群 (Vulnerable Populations) 計 25 場、水資源 (Water) 計 10 場、災害評估技術 (Technological hazards) 計 3 場、巨大災害 (Mega-Disasters) 計 2 場、農村發展 (Rural development) 計 1 場、風險趨勢 (Risk trends) 計 2 場、新興科技 (Science and technology) 計 14 場、安全搬遷 (Relocation) 計 1 場、土地使用規劃 (Land-use planning) 計 1 場、兒童及青少年 (Children and youth) 計 9 場、行動不便者 (Disability) 計 2 場，以及防災整備 (Preparedness) 計 8 場，從上開統計數據得以看出目前國際防災重點課題之所在，前三大主要議題著重於災害資訊管理、災後復原及災害風險管理之探討，其次為政府、非政府組織與公民社會之任務與合作關係。而本次考察主要參加日本政府與 WCDRR 仙台市執行委員會在東北大學百週年紀念館川內萩大廳舉辦的東日本大震災綜合研討會，以及世界銀行集團 (WBG)、全球減災重建基金會 (GFDRR)、聯合國國際減災戰略總署 (UNISDR) 與日本政府共同舉辦的「韌性對話：後 2015 年韌性目標 (Resilience Dialogue : Bringing Resilience to Scale for Post-2015 Goals)」。

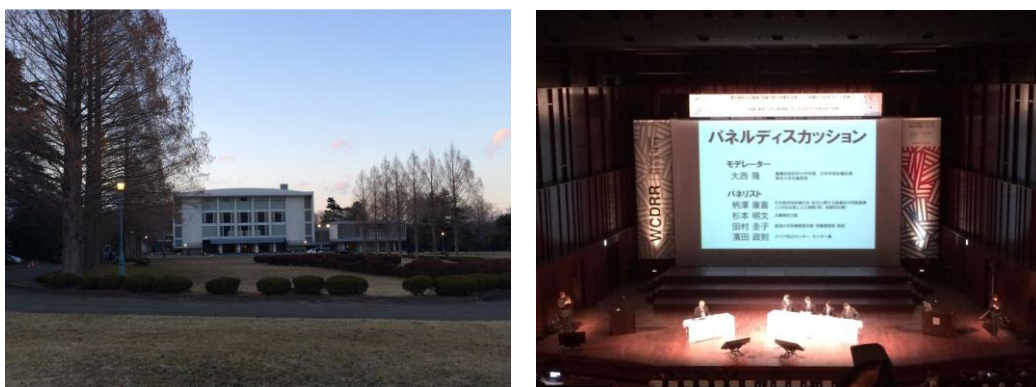


圖3-2 東日本大地震論壇照片

2. 世界防災展：

3 月 14 日至 3 月 18 日在仙市民會館舉行，展示來自世界 200

多個國家、組織和企業機構，最先進的減災策略與技術。



圖3-3 世界防災展照片

### 3. 防災海報展：

3月14日至3月18日在宮城縣民會館舉辦，展示政府組織、國際組織、地方政府、學術/研究機構、非政府組織、企業和社區團體之減災重建活動及研究成果。



圖3-4 防災海報展照片

4. 防災産業展：

3月15日至3月17日在仙台港 Miyagi 展覽中心舉辦一個名為 BOSAI 展的防災產業展，由日本 145 家民間企業展示各種創新減災產品，如抗震隔震技術、避難所設備、海嘯避難路徑指引、防洪減災措施、救災機械車輛等。



圖3-5 防災產業展照片

5. 女性防災展：

3月14日至3月18日在仙台市青葉區141大樓舉辦，由日本政府、NGO及日本婦女從性別平等的角度討論分享減災經驗，並舉辦一系列專題座談進行意見交流。



圖3-6 女性防災展照片

6. 東日本大地震減災重建展：

3月14日至18日在仙台媒體中心舉辦，主要展示青森、岩手、宮城、福島等日本東北受災地區與仙台市的受災情況與重建計畫，並舉辦一系列專題演講，介紹東日本大地震後各地方政府的努力，以及從中獲取的經驗和教訓，參訪者可在40米高的超大空間內透過影像與照片體驗這場大災難的實際規模。



圖3-7 東日本大地震減災重建展照片

#### 7. 戶外防災展覽：

WCDRR 仙台市執行委員會在仙台市政府前廣場與勾當台公園舉辦的戶外展覽。3月15日上午在仙台市政府前廣場舉辦一場大型災害防救演練，此外在勾當台公園舉辦 2015 年仙台防災戶外展覽，展示救災機械車輛、東日本大地震重建主題圖片，設有公私部門的防災宣導攤位與體驗活動，有助於民眾親子防災教育之落實。另設有國際交流廣場，包括世界廚房、JICA 展覽，提供民眾參與國際交流活動的機會。



圖3-8 戶外防災展覽照片

8. 東北大學復興行動成果展：

由日本東北大學於3月14日至3月18日假東北大學百週年紀念館舉辦，展示東北大學災害復興新生研究機構對於東日本大地震復興重建所做的貢獻，包括推動國際災害科學研究、地域醫療重建、環境能源再造、東北漁業復興計畫、放射性汙染物質對策、地域產業復興支援計畫及促進產學合作計畫等八大重要行動成果，另於宮城縣民會館舉辦一系列成果發表會。



圖3-9 東北大學復興行動成果展照片

9. 東日本 311 震災紀錄圖書館：

由仙台市立圖書館展示其陸續收集建立的「311 震災文庫」，完整保存有關東日本 311 地震的各種檔案資料，包括法規、政策、空照圖及相關著作、出版品等。



圖3-10 東日本 311 震災紀錄圖書館照片

三、仙台減災框架（Sendai Framework for Disaster Risk Reduction 2015-2030）

據聯合國統計，過去十年間受氣候環境變遷影響，全球的天然災害共造成 700 多萬人喪生、140 多萬人受傷、23 萬人無家可歸，總體經濟損失高達 13 兆美元，尤其婦女、兒童及弱勢者在災害衝擊影響下更顯脆弱。第 3 屆聯合國世界減災大會總結了世界各國執行「兵庫行動框架」的經驗教訓、災害弱點與未來挑戰，並針對未來 15 年的全球性減災框架取得共



識，通過新的「2015年後減災框架」取代舊的「兵庫行動框架」，正式命名為「仙台減災框架：2015-2030（Sendai Framework for Disaster Risk Reduction 2015-2030）」，同時通過「仙台宣言（Sendai Declaration）」和「利益相關方自願承諾（Stakeholders' voluntary commitments）」（如附錄二），號召世界各國積極投入減災，強化防災基礎建設，提升國家與地方的抗災韌性，此外納入性別、年齡、殘疾與文化等人權觀點，擴大國際合作以協助發展中國家提高防災能力，並設定於2030年底前達成大幅降低全球災害死亡率、減少全球受災人數與降低直接經濟損失等全球性減災目標，成為全世界因應氣候變遷衝擊影響下減少災害永續發展的重要具體措施。「仙台減災框架」未來15年的七大減災目標與四大優先行動如下：

（一） 全球七大減災目標：

1. 2030年前大幅降低全球災害死亡率，力求使2020-2030年全球平均每十萬人死亡率低於2005-2015年水準（Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.）。
2. 2030年前大幅減少全球受災人數，力求使2020-2030十年全球平均每十萬人受災人數低於2005-2015年水準（Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.）
3. 2030年前大幅降低災害直接經濟損失與全球國內生產總值(國內總產值)的比例（Reduce direct disaster economic loss in relation to global gross domestic product（GDP）by 2030.）
4. 2030年前透過提高抗災能力等辦法，大幅減少災害對重要基礎設施的損害，及避免中斷衛生和教育設施等基礎服務。

(Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.)。

5. 2020 年前大幅增加已制訂國家和地方減少災害風險戰略的國家數目 (Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.)。
6. 2030 年前透過國際合作持續支持開發中國家落實本框架減災行動，大幅提高對發展中國家的國際合作水準 (Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.)。
7. 2030 年前大幅增加人民獲得和利用複合災害預警系統，以及災害風險資訊和評估結果的機率。(Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.)。

(二) 四大優先行動計畫：

1. 理解災害風險 (Understanding disaster risk)。
2. 加強災害風險治理，管理災害風險 (Strengthening disaster risk governance to manage disaster risk)。
3. 投資於減少災害風險，提高抗災能力 (Investing in disaster risk reduction for resilience)。
4. 加強備災以作出有效回應，並在恢復、安置和重建中，讓“災區重建得更美好” (Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction.)。

## 第二節 國際防災合作

隨著全球氣候暖化持續加劇暴雨及早災的頻率與強度，將導致世界各國蒙受日益嚴重的經濟損失，過去十年來在兵庫行動框架之推動下，各國韌性減災工作已有進展，但仍有許多減災事項待進行，尤其是發展中國家都市人口迅速成長，大量投資開發建設，推估未來二十年的建設量將超過過去數十年來的建設總量。有鑑於此，防止災害擴大、降低現有風險及彌補潛勢漏洞的重要性大為提升，為此將啟動一項新的國際性的減災框架，在未來十五年內指導各國展開新的災害風險管理工作。

本次考察參加 2014 年 3 月 17 日「韌性對話：後 2015 年韌性目標 (Resilience Dialogue: Bringing Resilience to Scale for Post-2015 Goals)」，由世界銀行集團 (WBG)、全球減災重建基金會 (GFDRR)、國際減災戰略總署 (UNISDR)、歐盟執行委員會 (European Commission)、美國國際開發署 (United States Agency for International Development, USAID) 與日本政府共同舉辦，主要目的在於推廣支持 2015 年後減災框架，討論如何有效地運用資金，擴大且持久地幫助貧困國家有效實行減少災害風險及氣候變遷韌性調適發展，以因應未來可能面臨的巨大災害。

本論壇首先由日本財務省副大臣菅原一秀開幕致詞，說明東日本大地震的經驗教訓，並轉述「日本減少災害風險仙台合作倡議」將提供 40 億美元協助國際推動新減災框架，續由聯合國秘書長防災特別代表 Margareta Wahlström 專題演講，闡述新減災框架的重要性，減災投資可視為災害保險之重要一環。



圖3-11 韌性對話開幕照片

綜合座談邀請基里巴斯共和國總統 Anote Tong、印度總理主任秘書長 P.K. Mishra、聯合國國際開發署署長 Helen Clark、世界銀行集團副總裁兼氣候變遷特使 Rachel Kyte、歐盟執行委員會人道援助市民保護總局局長 Claus Sørensen、美國國際開發署助理署長 Thomas Staal 等各國代表，並由 NHK 資深記者道傳愛子擔任主持人。

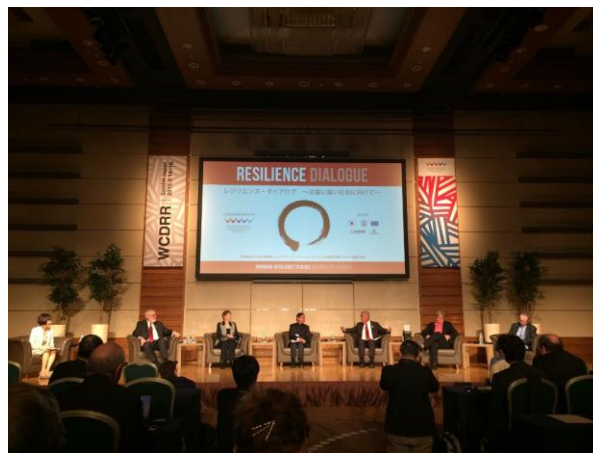


圖3-12 韌性對話綜合座談照片

新減災框架為氣候變遷調適行動提供了關鍵策略與具體方向，是未來永續發展與氣候變遷之間的重要橋樑，沒有減災就沒有永續發展可能性，若民眾在極端事件衝擊中沒有受到保護，生計將遭受破壞，也勢必衝擊影響全球性的經濟發展。過去 10 年來，在兵庫行動框架下已有 120 個國家制定減災法令政策，建立了 85 個國家級減少災害風險平台，且在全球設立

超過 190 個服務據點。然而，國際社會間貧富差距懸殊，對於如何消除一切形式的歧視幫助貧困弱勢，仍存在著巨大的挑戰。此外各國對於國際援助合作方式、技術移轉、二氧化碳排放大國的共同責任（Common But Differentiated Responsibility, CBDR）等意見分歧，尤其對於如何吸引政府企業投資，政府如何促進當地的利益關係方建立包容的合作夥伴關係，積極參與國家減災戰略實施，都將是未來努力重點。

為有效實踐「2015 年後減災框架」，世界銀行集團（WBG）亦參與本屆大會的部長級圓桌會議、多利益相關方會議及公共論壇，聚焦於災後重建的更好、增強國家韌性及推動 2015 年後風險災害管理目標等重要議題，並於會場發布「韌性投資建設（Investing in Resilience）」、「解開韌性的三重紅利（Unlocking the “Triple Dividend” of Resilience）」及「災後恢復框架指南 -2015 仙台（Guide to Developing Disaster Recovery Frameworks-Sendai Conference Version）」等最新報告，其出版品均公布於全球減災重建基金 GFDRR 官方網頁，此外有日本政府與世界銀行集團共同彙編出版「東日本大地震（Mega Disasters）」專案報告，完整收錄東日本大震災的災害狀況、緊急避難措施、災後重建政策與具體行動等資訊。



圖3-13 世界銀行集團出版品

## 一、全球都市韌性運動（Making Cities Resilient Campaign）

聯合國國際減災戰略總署（UNISDR）於 2010 年發起一項「推動韌性都市運動（Making Cities Resilient Campaign）」，其核心精神為「都市安全人人有責」，提出「更多瞭解、明智投資和安全建設」三大原則，並依據「2005-2015 兵庫行動框架：讓國家和社區具有抗災能力」的五個重點，制定『讓都市韌性的十大關鍵要素』及『地方政府自我評估工作』，全球共有兩千多個城市簽署加入這項行動。讓都市韌性的十大關鍵要素如下：

關鍵 1：確保所有政府部門了解其減少災害風險任務。

關鍵 2：政府編列減少災害風險預算。

關鍵 3：充分揭露城市風險資訊，結合市民公眾參與過程，進行韌性城市發展之規劃與決策。

關鍵 4：投資關鍵基礎設施的建設與維護。

關鍵 5：評估所有學校和醫療設施的安全性，並進行耐震補強。

關鍵 6：確保貧民區與非正規發展地區的安全性，應提升到建築法規和都市計畫法的標準。

關鍵 7：落實學校防災教育與社區減少災害風險培訓計畫。

關鍵 8：保護生態系統和天然緩衝區，以減輕洪水災害。

關鍵 9：建立早期預警系統與應變管理能力，並定期舉行公民防災演練。

關鍵 10：任何災難發生後，確保避難中心規劃符合民眾需求，生活物資準備充足，並協助社區組織進行家園重建與生計再造。

聯合國國際減災戰略總署（UNISDR）與全球減災重建基金（GFDRR）於 2012 年共同出版「建設都市韌性能力：原則、工具和實踐（Building urban resilience： principles, tools and practice）」，旨在指導政府及都市計畫從業人員如何將韌性減災概念實際融入都市管理與都市規劃設計之中。為利各國推動發展都市及社區之韌性化，聯合國培訓研究所（UNITAR）與聯

合國國際減災戰略總署（UNISDR）在本屆會議首度發表「降低都市風險：韌性都市行動計畫之建立與實施（Urban Risk Reduction： Developing and Implementing Resilience Action Plans for Cities）」免費線上學習課程，旨在培訓加強政府官員和都市規劃從業人員的執行能力，以建構更安全更有彈性的韌性城市。課程內容分為 7 個部分：

1. 介紹減少災害風險（DRR）概念及當前世界趨勢。
2. 推動都市韌性（MCR）的全球運動與方法。
3. 減少災害風險（DRR）評估分析工具。
4. 推動減少災害風險主流化：
  - （1）將減少災害風險 DRR 納入政府計畫，如治理、融資 DRR、基礎設施建設、適應氣候變化、教育、醫療等。
  - （2）將減少災害風險 DRR 納入政策方案，如建築、土地利用規劃、生態系統、環境、生計等。
5. 韌性都市行動計畫之開發、實施、監測和評估。
6. 擴大韌性都市行動計畫規模：制定戰略計畫。
7. 介紹兵庫行動框架、2015 年後仙台減災框架。

## 二、世界減少災害風險投資

世界銀行集團（World Bank Group，WBG）成立於 1944 年，由國際復興開發銀行（IBRD）、國際開發協會（IDA）、國際金融公司（IFC）、多邊投資擔保機構（MIGA）及國際投資爭端解決中心（ICSID）等五個機構所組成，總部設於美國華盛頓，全球 178 個國家設有辦事處，致力於改善世界各國經濟貧困，支持輔導貧困國家發展建設減災韌性城市，希望在 2030 年前引領世界實現終結極度貧困與促進共享繁榮的兩大目標，是發展中國家獲得資金與技術援助的重要來源。該集團長期關注世界各國健康、環境、社會保護、勞工、城鄉發展、社會發展、基礎建設、外債、經

濟成長、科學技術、性別平等、能源礦產、援助效率、貧困、貿易、教育及金融等社經現況與發展趨勢，主動公布發表各項統計數據、研究報告與年報，並經常舉辦各項論壇與專題講座，所有文件報告資料及活動影像均公布於世界銀行集團官方網頁供國際社會參考。

世界銀行集團旗下設立全球減災重建基金（Global Facility for Disaster Reduction and Recovery, GFDRR），與全世界超過 400 個機構合作，提供捐款、技術援助與人力培訓，並以災害風險管理為核心理念，依據兵庫行動框架（HFA）的指導原則，採取風險識別、風險減少、準備、資金保障和彈性恢復等五大行動，協助世界國家從建設氣候變遷調適能力、強化社區韌性、災害風險融資和保險、創新實驗室、水環境、安全學校及韌性城市等領域進行減災建設，經過十年努力，各國的減災韌性建設已見成效，未來仍有許多工作需要持續努力。

### 三、日本減少災害風險仙台合作倡議

日本首相安倍晉三在第三屆聯合國世界會議減少災害風險的高級別會議發表聲明，提出「日本減少災害風險仙台合作倡議」。為促進世界各國「減少災害風險」主流化，落實「2015-2030 年仙台減災框架」之七大目標與四項優先行動，日本將於 2015 至 2018 年四年期間與聯合國及發展中國家相互合作，提供 40 億美元協助各國推動減少災害風險工作，培育 4 萬名防災領域人才，並在受災害國家努力發揮「重建得更好」之主導作用，結合三種合作方式，包括：

1. 非物質援助，如人力資源開發和機構發展。
2. 提供物資與技術援助，協助減災基礎建設。
3. 促進全球和區域範圍內的合作，協助開發中國家建立抗災社會和抗災社區，打造一個比地震前更好的家園。

此項日本政府開發援助政策（ODA）是依據日本 2015 年 2 月修正通



過「開發協力大綱」，由日本政府（外務省）及日本政府機構（日本國際協力機構，JICA）協助新興國家與發展中國家的國際合作活動，以減少發展中脆弱國家的災害風險，提供人道援助解決貧困問題，確保國際社會的和平、穩定和繁榮為主要目標，官方發展援助方式有二：一為雙邊援助，係由日本政府直接援助發展中國家，又分為貸款性援助與無償資金援助；另為多邊援助，是透過國際組織提供援助。援助項目包括氣候變遷調適（含建設氣候變遷調適的低碳社會）、防災主流化（防災措施和災難恢復支持）、生物多樣性保護（含森林、農田和海洋資源的永續利用）、促進環境安全與永續資源（含健康的飲用水、糧食安全、全民健康、傳染性疾病防治、資源與能源永續）及人口問題（含人口高齡化、社會弱勢群體的安全保障、婦女參與促進性別平、減少貧困、教育等）等課題，並由政府主導成立了國際協力機構（JICA）與日本防災平台（JBP），作為國際合作向外發展之主要窗口。

（一）日本國際協力機構（Japan International Cooperation Agency，JICA）

日本外務省為推動官方發展援助，解決全球性問題，於 2002 年立法成立獨立行政法人日本國際協力機構（JICA），目的在於促進國際合作，以及支持日本和全球社會經濟發展，恢復發展中地區的經濟穩定。主要任務有四：

1. 充分利用日本的經驗和技術，解決發展中國家因應全球化的各種問題、
2. 提供人力資源改進國家政策和體制，支援社會和經濟基礎設施的建設，透過公平的經濟成長改善人民貧困問題、
3. 提供人力資源改善發展中國家治理能力，系統化建立以人民為本的國家政策與制度、
4. 加強社會與民眾的抗災能力，捍衛社會脆弱成員，以實現人類安全。

JICA 成員包括政府、國際組織、非政府組織（NGO）、研究機構和民間企業，主要透過貸款援助、無償援助、派遣志願者、公民參與、國際緊急援助、私營部門的合作、科學和技術合作、援助協調等方式，提供發展中國家人力、金錢與技術等資源，積極推動防災主流化，以因應全球化氣候變遷趨勢影響下發展中國家所面臨的巨大變化。

為加強技術研究和知識共享，旗下設立 JICA 研究所，優先針對和平發展、經濟發展與減貧、環境發展與氣候變遷、援助戰略等四大領域進行研究，相關研究成果與出版品可自 JICA 研究所網頁下載參考。JICA 研究所每年定期舉辦都市地震災害減輕綜合戰略、巨大地震災害減輕綜合戰略、自然災害事前復興計畫、氣候變遷調適水環境向上策進政策、巨災意識啟發等多項國際防災研修課程，協助國際防災專業人才之培訓與養成，可供本所出國考察出國計畫之短期研修課程規劃參考。

## （二）日本防災平台（Japan Bosai Platform，JBP）

為了更有效地向國際社會擴展日本減災技術，由日本國土交通省號召學術界、產業界和政府合作，整合產官學資源制定災害管理合作對話，於 2014 年 6 月 4 日共同成立日本防災平台（JBP），利用日本先進技術與知識協助新興發展中國家進行基礎減災建設，提供民間企業團體參與國際防災合作的管道，共同協助國際防災主流化之推動。

為了讓世界各國認識日本最新進的防減災技術，日本防災平台（JBP）在本屆大會期間舉辦「防災產業產」及相關論壇活動，即希望藉此盛會向世界各國展示其最新防災科技，未來亦將透過「日本減少災害風險仙台合作倡議」朝全球化推廣普及。

### 第三節 東日本大地震災後重建－打造更美好的韌性家園

#### 一、東日本大震災綜合研討會

本次考察行程參加日本政府與 WCDRR 仙台市執行委員會共同舉辦的東日本大震災綜合研討會（東日本大震災綜合論壇、Great East Japan Earthquake Forum），自 104 年 3 月 14 日至 3 月 18 日為期五天，地點假東北大學百週年紀念館川內萩大廳舉行，以「記取東日本大震災的教訓的經驗，運用新興防災思維，展望重建更美好的抗災家園」為主軸，傳達「重建得更好」以及「採取更先進的減災技術達到永續發展目標」的重建概念，與世界分享東日本大地震的經驗和教訓。受限於人力與時間，本次考察行程擇要參加「日本防災展望」、「消防總隊與民眾自主防災的作用」、「東日本大震災之現狀與重建倡議」及「減輕巨型災害風險損失」等 4 個場次，茲說明如下：

#### (一) 日本防災展望－超越兵庫、仙台框架，展望日本未來的終極防災對策

（我が国防災の展望：究極の防災対策を目指して～兵庫から仙台、そして未来へ～）

本論壇為日本內閣府主辦，由日本內閣府大臣松本洋平揭開序幕，日本歷經 1995 阪神淡路大地震、2011 東日本大地震等災害，長期為促進、加強及改善防災因應措施而努力，致力於減少災害風險，並從每次災害中記取經驗與教訓，且重新檢討修訂日本防災政策，會場提供日本內閣府政策統括官出版「日本災害對策（日本の災害對策）」，介紹日本最新的防災體系、防災對策、重建計畫與平時整備工作。

會中同步播放日本首相安倍晉三 3 月 14 日在 WCDRR 高級別會議的聲明演說，日本正積極加強災區海堤、疏散通道、公營住宅高地搬遷等建設，全面推動減少災害風險教育和培訓，支持當地企業發展，與非營利組

織進行防災合作，運用減少災害風險措施提高對婦女、兒童、高齡者與殘疾人士的關注與參與，同時將盡力推動「災區高齡者心理重建關懷」與「促進就業的生活重建」，以加速重建的腳步，也宣示日本將汲取 311 地震寶貴的經驗和教訓，團結一致加快復興重建的步伐，建設一個更為強韌抗災的國家，同時提出「日本減少災害風險仙台合作倡議」，承諾提供 40 億美元以支持 2015 年後減災框架之推動與執行。

其次，由青森縣知事三村申吾、岩手縣知事達增拓也、宮城縣副知事若生正博及福島縣知事內堀雅雄等東日本大地震受災區縣政府代表，逐一說明各受災地區的災害狀況，重建的過程與挑戰，分享民眾參與防災活動等經過。

綜合座談則由東京大學名譽教授日本學術會議會長大西隆擔任主席，與談成員包括日本經濟團體防災聯盟委員會主席兼三井住友海上火災保險株式會社社長柄澤康喜、兵庫縣防災審計杉本明文、新潟大學危機管理本部危機管理室田村圭子教授、亞洲防災中心主任濱田政則等專家學者，從兵庫行動框架的實施經驗中，針對日本及世界各國應該採取哪些措施來達成兵庫框架的實施目標進行討論，認為減災技術在減少災害風險中扮演重要關鍵，而日本企業擁有良好的減災技術，應善加運用相關技術來降低災害損失，也強調企業持續營運計畫（BCP）、企業合作、產業合作、跨地區合作等合作計畫的重要性。

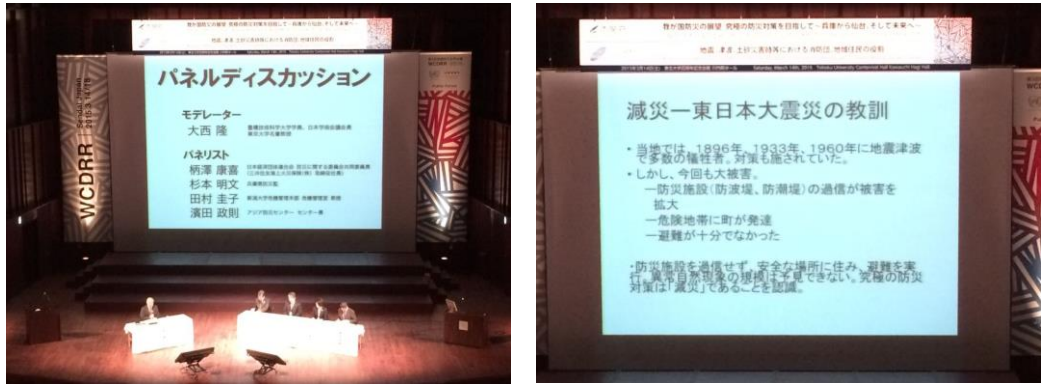


圖3-14 研討會照片

此外，田村圭子教授從受災者生活重建角度提出「復興の教科書」，說明大規模災害的基礎知識，並從受災者與行政單位等不同觀點，陳述大規模災害後如何公平公正且迅速地進行生活重建。最後，呼應 2015 年後減災新框架，認為大家必須體認到國際天然災害風險增加的必然趨勢，提出優化重建制度、透過地方政府落實國際減災合作、提升基層地方政府之減災能力、重視防災教育與人才培訓，以及從災害中學習成長等結論。

## (二) 地震、海嘯、土砂災害等天然災害中消防總隊與民眾自主防災的作用

(地震、津波、土砂災害等における消防団、地域住民の役割)

本場論壇為日本消防廳主辦，共發表 5 個活動案例，由宮城縣南三陸市政廳佐佐木由貴分享「東日本大震災經驗」、福島縣南相馬市消防團團長長澤初南報告「東日本大震災南相馬市情況與消防志願團活動」、岩手縣立大學綜合政策學部一年級生菊池田介紹「釜石東中學校防災活動」、長野縣白馬村堀之內區自主防災組織主席鎌倉宏及三日市場區自主防災組織主席太田史彥分享「長野縣神城斷層地震時之自主防災組織活動」、東京都大島町消防本部次長羽根高明團長報告「颱風 26 號土砂災害大島町消防團活動報告」。日本地震、海嘯、土砂災害等天然災害頻繁，加上少子高齡化社會及民眾跨縣市通勤等社經環境，單靠政府已不容易確保地區的

防災能力，故由當地居民自主防災的重要性大幅增加。



圖3-15 研討會照片

### (三) 東日本大震災之現狀與重建－創造“新東北”

（東日本大震災からの復興の現状と取組～“新しい東北”の創造）

本論壇為日本復興廳主辦，首先由日本復興廳大臣竹下亙開幕主講，介紹日本東日本大地震之重建進度與成果，其次邀請公益財團法人東日本大地震重建援助小組組長青柳光昌、宮城縣東松島市市長阿部秀保、福島縣川内村村長遠藤雄幸、神戶學院大學現代社會學部清原桂子教授、雙葉郡教育長會會長武內敏英、福島大學行政政策學類一年生木村元哉、一般社團法人 WATALIS 理事引地恵、R C F 復興支援協會理事藤沢烈及氣仙沼市針織業代表御手洗瑞子等代表，分享個人在生活重建、重振工商產業的努力過程，另由來自災區的 2 位學生－宮城縣石卷市菅原彩加、福島縣高中生藤陸一向全世界訴說他們的夢想，呼喚遷居外地的民眾能回鄉共同打拼，讓日本民眾及世界各國一起見證更美好的新東北。四年前東日本大地震發生後，世界各地提供許多援助，幫助災區快速重建發展，其目的不僅是為了恢復到災前的狀態，而是建立一個比災前更好更能抗災的社會環境。透過公私部門的合作，人民積極參與政府的重建政策，從民生、經濟、產業、心理照顧、教育等領域發展重建，希望打造建立一個「新東北」。

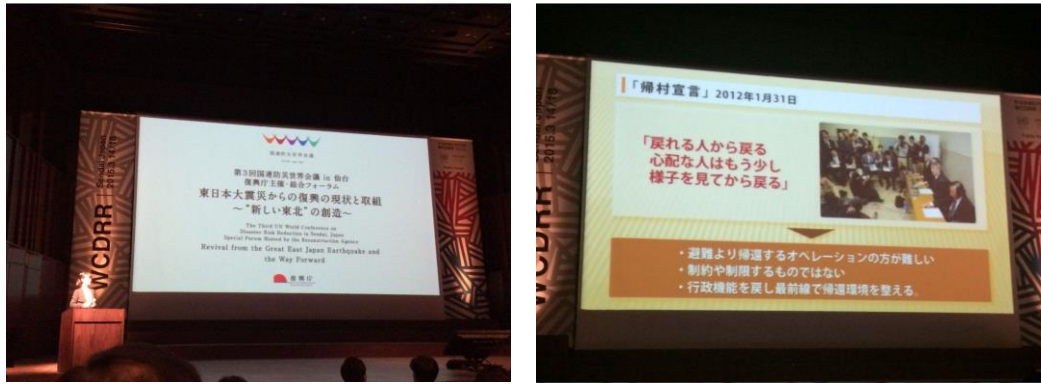


圖3-16 研討會照片

#### (四) 減輕巨型災害風險損失－挽救生命和防止社會經濟活動毀滅性破壞的方法

（激甚化する巨大自然災害にどう立ち向かうか～命を守り、社会経済活動の壊滅的被害を回避するために～）

本場論壇由日本國土交通省、公益社團法人土木學會、日本水論壇（水と災害ハイレベル・パネル）共同舉辦，由國土交通省副大臣北川一成開幕致詞，聯合國水災防治事務總長特使、前韓國國務總理 Han Seung-soo 專題演講「防災主流化」，指出國際減災合作的重要性。由於氣候暖化影響全球各地都有可能遭遇巨大天然災害，必須從曾經發生的巨型災害中，學習如何提高社會經濟、公共建設及建築物的抗災能力，才能挽救更多性命，避免社會經濟活動被毀滅性破壞。各種災害（地震、風災、水災、火山災害）發生之前，運用各種抗震、隔震技術、海堤構造物等措施來預防減少災害損失是必需的，日本目前也針對災害損害情況進行模擬，以進行有效的減災規劃。

關西大學和田惠昭教授專題主講「國土強韌化・迎擊巨大災害」，鑑於水災、風災、海嘯、地震、火山等天然災害的強度與頻率增加，加上高齡少子化社會之抗災能力較低，如遭遇巨大天災時，容易轉變為高度複雜且多樣化的社會經濟災害，因此特別強調事前的災害想定與對策擬訂，以

及思考應如何抑止大都市災害擴大、強化公共設施與如何活化災後社會經濟之重要性。

綜合座談由高知工科大学副校長兼土木學會會長磯部正彥主持，與談成員包括日本國土交通省技監德山日出男、菲律賓公共工程 and 高速公路部秘書長 MR.Rogelio L. Singson、土耳其災害緊急應變部部長 Dr. Fuat Oktay、美國陸軍工兵隊技術總監 MR. Jams C. Dalton、荷蘭環境基礎設施部政策顧問 Mr. Koos Wieriks 等，與談者回顧世界各地經歷的巨型天然災害，例如日本阪神淡路大震災、東日本大震災、菲律賓 Haiyan 颶風、土耳其東部地震、美國 Katrina 颶風、Sandy 颶風等災害，從中吸取經驗及教訓，最後由磯部正彥主席做出總結，由於人們對於巨大災害的記憶十分短暫，人們必須正視巨災的艱鉅挑戰，世界各國必須相互合作與學習，詳細檢討災害風險的各項環節與整體防災系統，將以往的經驗具體轉化提升為防災策略、抗災規定及減災技術，透過積極有效的減災投資與建設，方能強化提高國家、社會與社區抵禦巨災的韌性力。

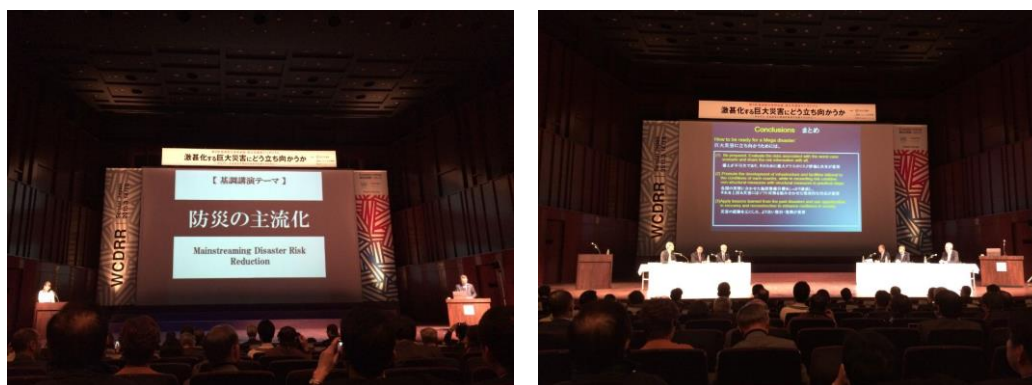


圖3-17 研討會照片

## 二、東日本大地震概要

2011年3月11日14點46分18秒(日本時間)在日本三陸沖牡鹿半島東南東外海130公里附近發生規模9.0地震，並伴隨海嘯與餘震所引發的大規模災害，受災地區集中在東北、北海道、關東等日本東部地區，位



於震央附近的福島縣、岩手縣、宮城縣等沿海地區，因遭受海嘯強烈襲擊受災尤其嚴重，同時發生福島核災事故，根據日本內閣府平成 23 年 6 月 24 日推估建築物、公共設施、基礎建設等總損失高達 16 兆 9 千億日圓，成為日本歷史上傷亡最慘重、經濟損失最嚴重的自然災害。

據日本緊急災害對策本部 2015 年 3 月 9 日統計，在日本全國因東日本大地震而死亡的人數計 1 萬 5,891 人、失蹤者 2,577 人、受傷者 6,152 人，建築物全壞 12 萬 8,291 戶、半壞 27 萬 8,241 戶、局部損壞 75 萬 3,269 戶，在災後一個月內日本警察廳、消防廳及海上保安廳總共營救出 1 萬 9,286 人，目前在公營住宅、臨時住宅、民間住宅及親屬家中的避難人數仍高達 22 萬 8,863 人，臨時住宅 5 萬 3,194 戶均已完工，所有災害情報及防災對策制度等歷史資料與最新消息，均詳細公布於日本內閣府防災情報網。

### 三、日本防災政策

日本一直致力於減少災害風險，促進、加強及改善防災因應措施，歷經 1995 阪神淡路大地震、2011 東日本大地震，從每次災害中記取經驗與教訓，重新檢討強化日本的防災政策，日本內閣府出版「日本災害對策」詳細說明日本防災體系的整體架構與運作方式，分為日本防災體制、災害對策、國民防災活動與國際防災協力等四大部分，重要內容如下：

#### (一) 防災體制

##### 1. 災害對策基本法：

包括災害對策之基本理念、政府機關之相互關係與權責、民眾責任、防災組織、防災計畫、災害對策之推動、受災者保護對策、財政金融措施、緊急災害之發布等。

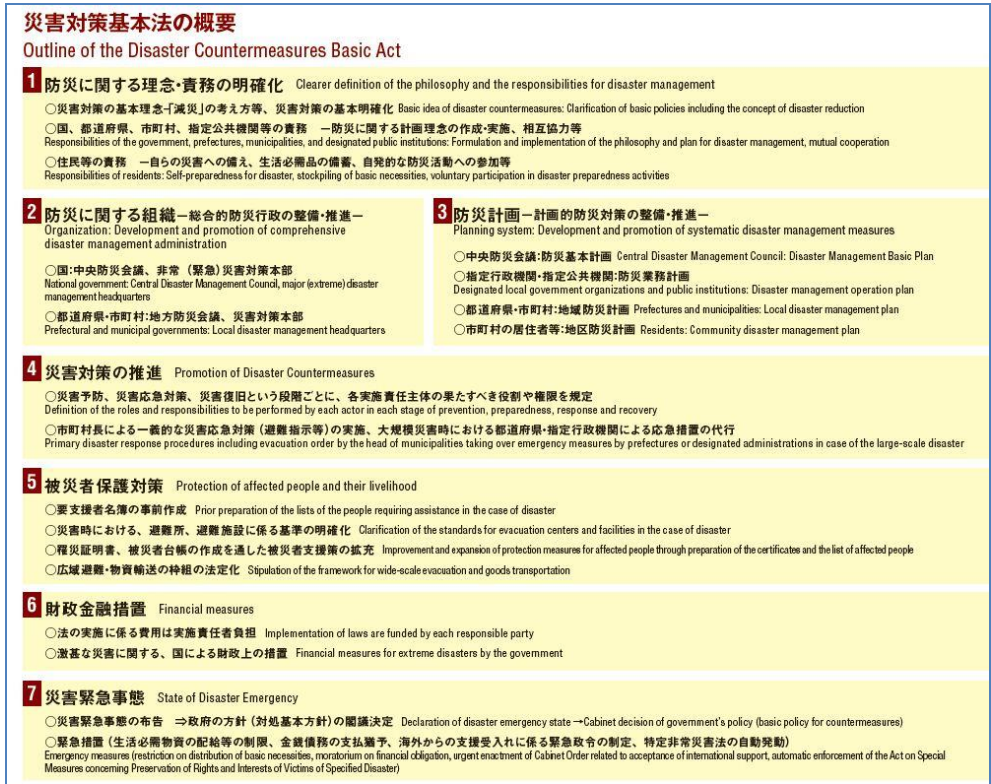


図3-18 日本災害対策基本法概要

2. 内閣府防災組織、中央防災会議組織。

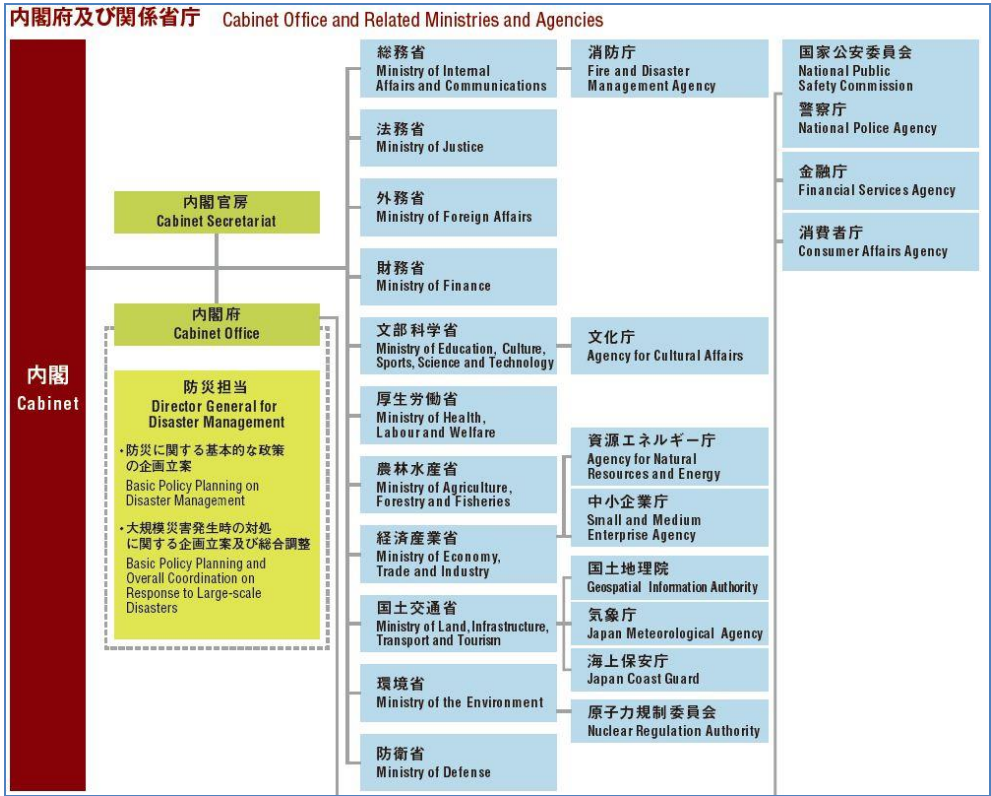


図3-19 日本内閣府防災組織図

### 3. 防災計畫：

分為防災基本計畫、防災業務計畫、地域防災計畫及地區防災計畫等。其中，防災基本計畫又分為自然災害對策（含地震、海嘯、風水害、火山災害、雪害）與事故災害對策（含海上、航空、鐵道、道路、核災、危險物品、大規模火災及林野火災）。在具體行動措施方面，依災害時間序分為災害預防之事前對策、災害應急對策及災後復原復興對策等。

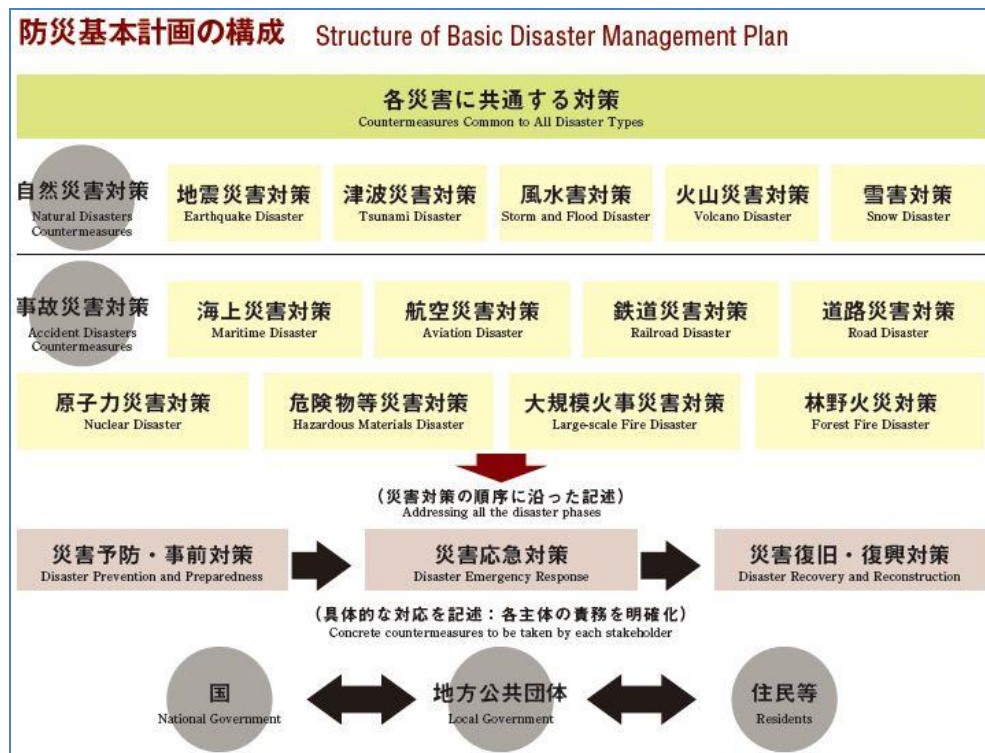


圖3-20 日本防災基本計畫組成

### 4. 災害發生時之應對：分為災害應急對策概要、廣域支援體制，以及災害發生時國家與地方公共團體及民眾間的互助關係。

日本國土交通省東北地方整備局出版「東日本大震災初期指揮心得(英文版：LEADING THE FIRST RESPONSE TO LARGE-SCALE NATURAL DISASTERS)」，其內容記載東日本大震災後各地方政府災後緊急處置所累積的種種經驗，以時間序的方式條列各項行動措施，分為災後一小時內、一天內及一周內的應採取的緊急應變行動。



圖3-21 日本政府間災後緊急聯絡機制

## (二) 災害對策現況

### 1. 事前防災投資：

日本已邁向高齡少子化社會，如未來在首都圈遭遇巨大天災時，勢必演變為複雜且多元的連環災害，因此，日本政府與學者相當重視事前的災害想定與對策擬訂，在災害想定方面，擬定有大規模地震災害想定（南海廣域型地震、中部近畿圈直下型地震、首都直下型地震、日本海溝千島海溝周邊海溝型地震）與首都圈廣域淹水想定等，進而思考研擬災害擴大抑止、設施強化及災後快速重建之對應策略。

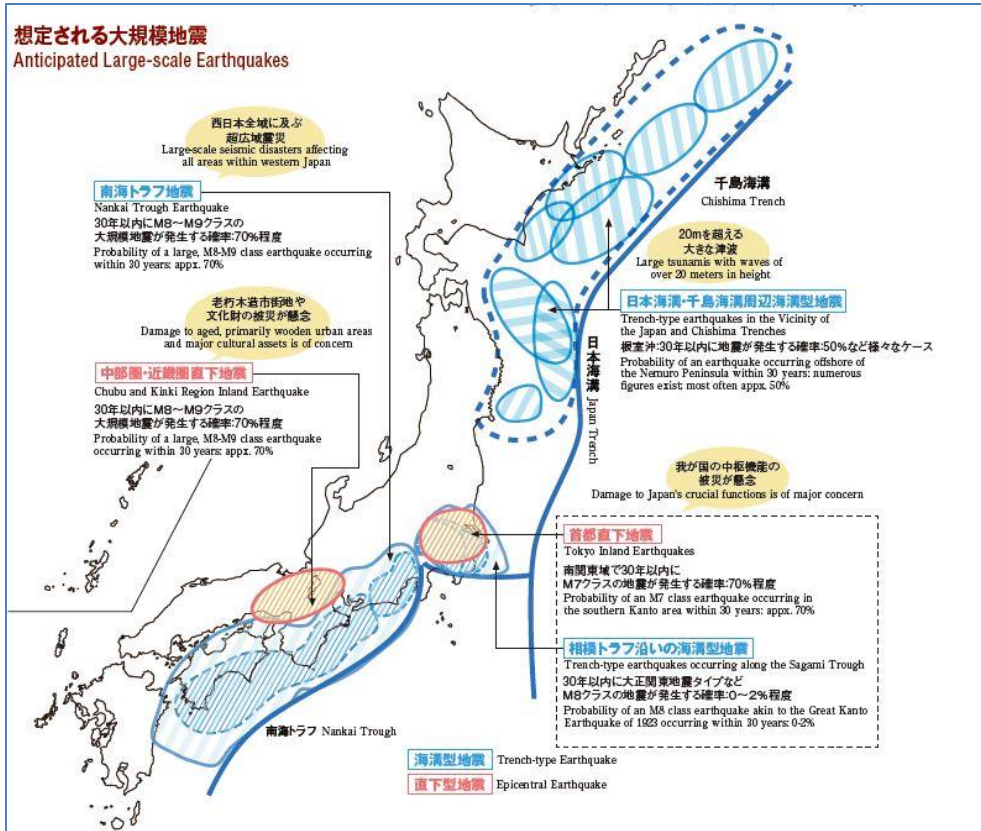


図3-22 日本大規模地震災害想定

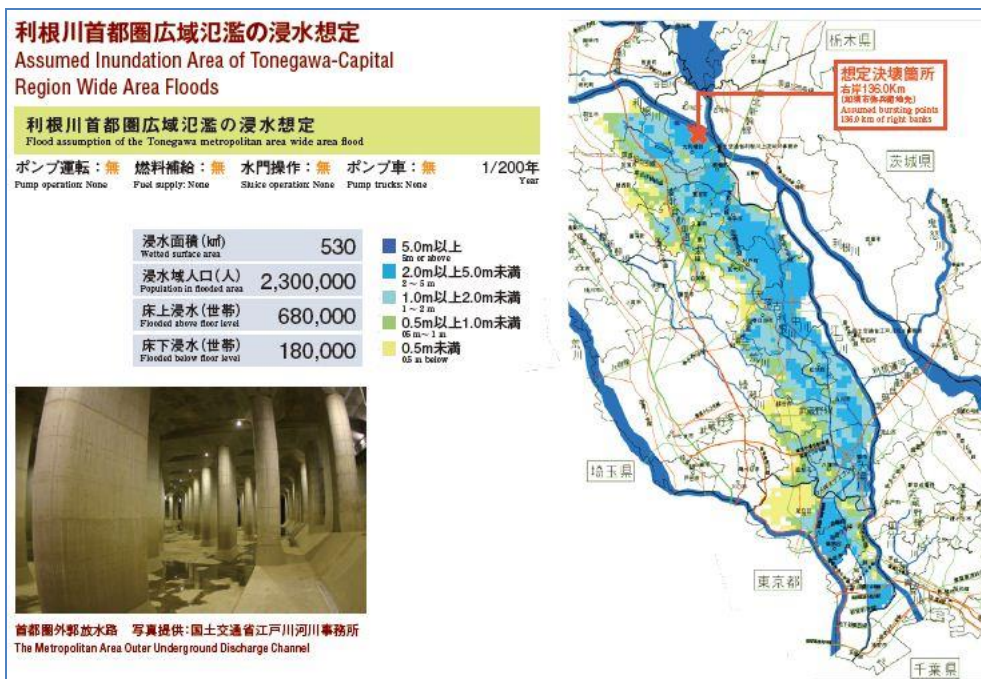


図3-23 首都圏廣域淹水想定



圖3-24 日本全國共佈設 4,377 個地震測站

在對策擬訂方面，針對地震災害，採取建築物耐震化、火災對策、土砂液化對策、基礎維生系統之耐震化等預防措施；針對海嘯災害，建造海嘯避難塔，確保安全之避難逃生路徑；針對風災、水災與火山災害等，則加強監測、預警通報與緊急避難等對策。



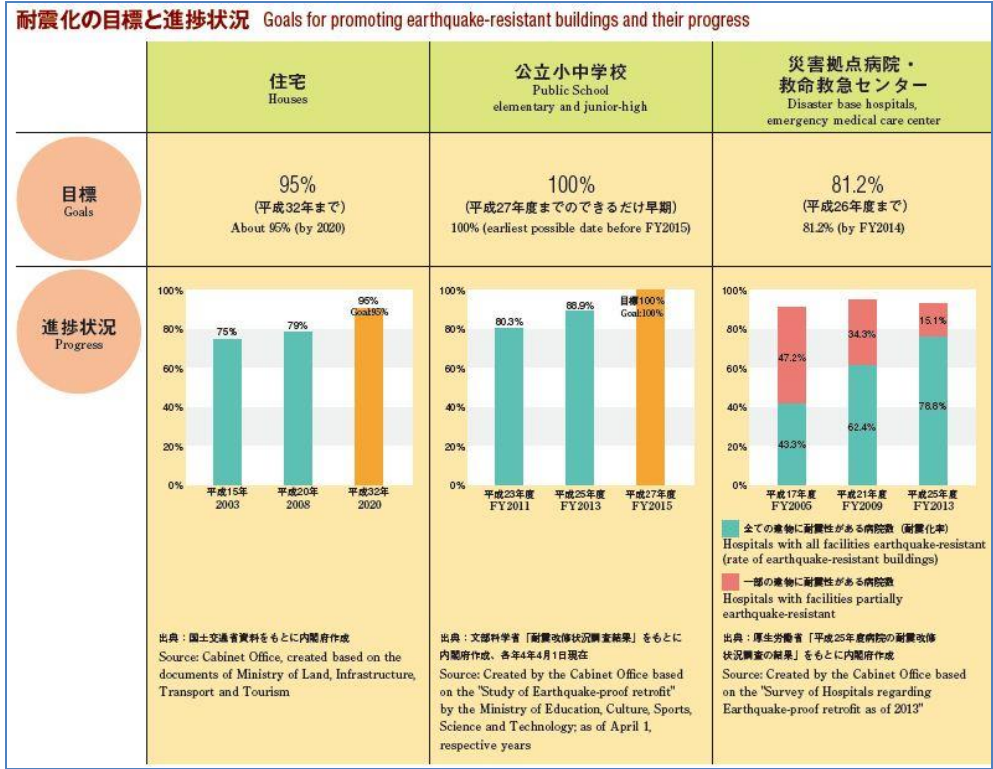


圖3-26 日本建築物耐震化推動目標

東日本大地震之後，災區政府有大量員工不堪負荷長期請假，故新增政府業務繼續計畫，以利災害發生後，災區政府之重建工作可持續運作。



圖3-27 政府業務繼續計畫示意圖



2. 災害應急整備：

包括早期預警系統、情報通信系統、受災者支援對策、防災訓練與人才養成、防災據點施設等。

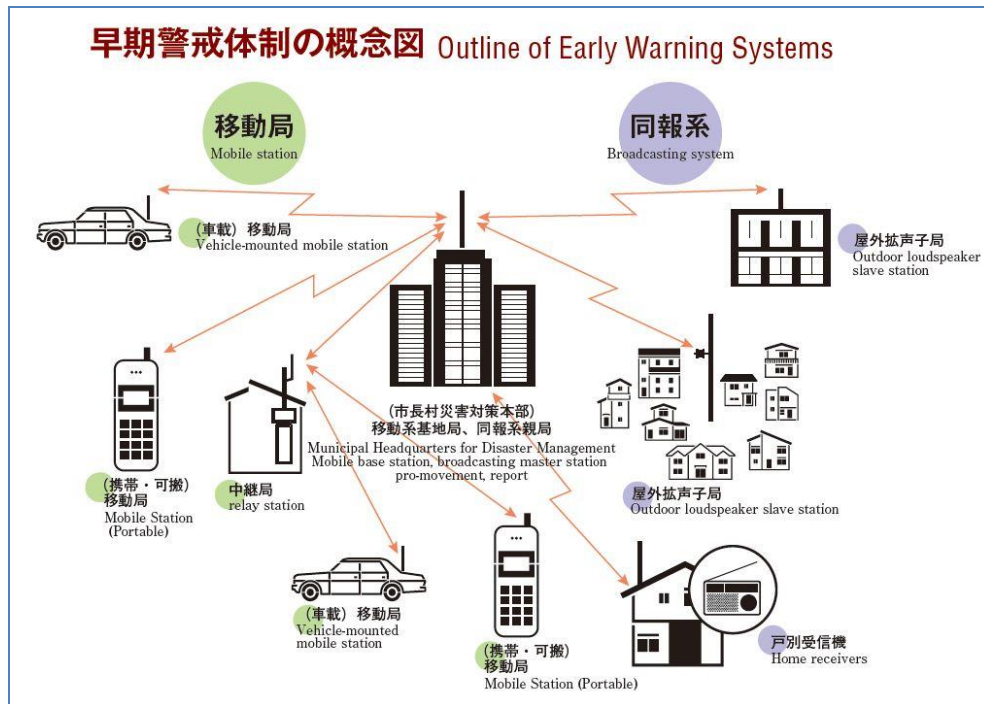


圖3-28 日本早期災害預警示意圖

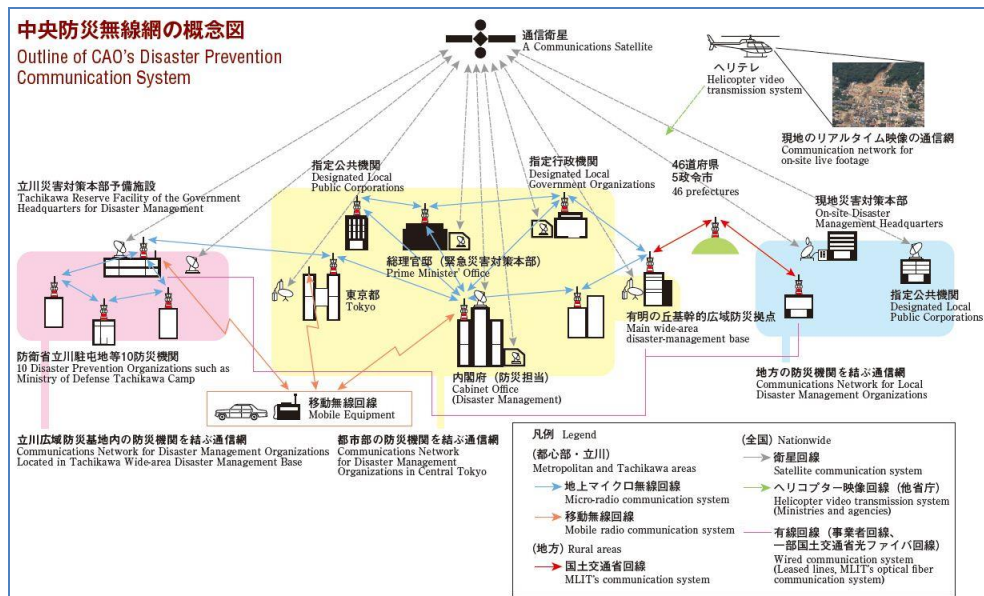


圖3-29 日本中央防災無線網示意圖



図3-30 日本廣域型災害防救中心規劃

3. 災害復原復興対策：包括災害復原復興対策概要、被災者生活重建支援法等。

| 大規模災害からの復興に関する法律の概要  |  | Overview of the Act on Reconstruction after Large-Scale Disaster |
|--|--|--|
| <p><b>1 復興に関する組織等</b><br/>Organization concerning recovery</p> <p>●復興対策本部の設置 Setting up the headquarters for recovery<br/>内閣総理大臣は、大規模災害が発生した場合において、復興を推進するために特別の必要があると認めるときは、内閣府に復興対策本部を設置することができるものとする。</p> <p>In the event that a major disaster occurs, the Prime Minister may set up the headquarters for a recovery within the cabinet office as he deems necessary to specially attend to recovery from such disaster.</p> <p>●復興基本方針の策定 Development of the policies for recovery<br/>政府は、当該災害からの復興のための施策に関する基本的な方針を定めるものとする。</p> <p>The Government shall establish the basic policies for recovery measures from such disaster</p>                | <p>The framework should allow a conference concerning the recovery plan to be set up through which a recovery plan be known to public, so that the alteration of the land use plan be dealt with at a single entity.</p> <p>●復興計画に記載された復興整備事業について、許認可等を緩和する特例を設けること。</p> <p>A special exemption shall be provided for ease of permits and approvals with regard to the recovery project listed in the recovery plan.</p> <p>●復興の拠点となる市街地を整備するため一団地の復興拠点、市街地形成施設に関する都市計画を設けること。</p> <p>A city development plan shall be established concerning a cluster of urban district for recovery to be a base for recovery, so that the area could work as a base for recovery of the entire area.</p> <p>●大規模災害を受けた市町村等からの要請により都道府県等が都市計画の決定等を代行できるものとする。等</p> <p>Upon request from the municipality struck by a major disaster, it shall be allowed that prefectures may decide on the city development plan on behalf of such municipalities.</p> |  |
| <p><b>2 復興計画の作成等</b><br/>Development of the recovery plans</p> <p>●大規模災害を受けた市町村が、土地利用の再編などによる円滑かつ迅速な復興を図るため、政府の復興基本方針等に即して、復興計画を作成できるものとする。</p> <p>Recovery policies should allow municipalities struck by a major disaster to develop a recovery plan based on and in line with the Government's basic policies for recovery, so that prompt recovery could be planned including re-definition of the land use plan.</p> <p>●大規模災害を受けた都道府県が、復興基本方針に即して、都道府県復興方針を定めることができるものとする。</p> <p>Recovery policies should allow prefectures struck by a major disaster to set up their own recovery policies in line with the Government's recovery policies.</p> | <p><b>4 災害復旧事業に係る工事の国等による代行</b><br/>Execution of the recovery construction project by the national government on behalf of local governments</p> <p>●大規模災害による被害を受けた地方公共団体を補完するため要請に基づいて、漁港、道路、海岸保全施設、河川等の災害復旧事業について国等が代行できるものとする。</p> <p>In order to compliment the local public entities struck by a major disaster, the national government may, upon request, execute and implement the reconstruction projects of fishery harbors, roads, shore protection works and rivers.</p>   |  |
| <p><b>3 復興計画等における特別の措置</b><br/>Special measures in the recovery plan</p> <p>●復興計画に関する協議会を設けて、そこでの協議等を経た復興計画を公表することで、土地利用基本計画の変更等をワンストップで処理できるものとする。</p>  | <p><b>5 その他</b><br/>Others</p> <p>●国は、大規模災害が発生した場合、特別の必要があると認めるときは、別に法律で定めるところにより、復興のための財政上の措置等を速やかに講ずるものとする。等</p> <p>Upon occurrence of a major disaster, the national government shall, as deemed necessary and as stipulated by law separately, promptly take actions for providing the necessary funding for recovery, etc.</p>  |  |

圖3-31 大規模災害復原復興対策概要

### (三) 民眾之防災運動

#### 1. 提升國民的防災意識，宣導普及防災知識

2011年3月11日東日本大地震發生當時，釜石的中小學生立即依照他們多年來的災難教育課程所學去行動，成立海嘯警報小組並迅速撤離，社區居民及高年級生也仿效他們一起跟著撤離到高地，成功挽救了三千多人的性命。在釜石近千名罹難者中，只有5名中小學生因未到校而遇難，這項事蹟被日本社會視為釜石奇蹟，由此也見證了防災教育的重要性。



圖3-32 防災教育與演練

## 2. 防災志工活動

日本天然災害頻繁，鑑於東日本大地震的經驗，政府行政體系同樣遭受地震海嘯襲擊而陷入癱瘓，民眾無法等待政府救援，加上少子高齡化社會及民眾跨縣市通勤等因素，對於未來可能發生的巨型災害，如首都圈直下型地震、南海海槽地震，正積極籌備因應大規模災難之減災措施，認為民眾的自救互助行動將愈加重要。

東日本大地震之後，日本總務省消防廳於 2011 年 3 月修訂「自主防災組織手冊（自主防災組織の手引）」，做為民眾成立自主防災組織、擬定防災計畫、進行防災演練、物資整備、避難規劃等各項自主防災工作之參考。2013 年 6 月「災害對策基本法」增訂民眾自助互助條文，同年 12 月日本國會通過「充實強化區域防災力之志願消防團法（消防団を中核とした地域防災力の充實強化に関する法律）」，目的在強化志願消防團組織以提升區域核心防災力，有助於確保居民安全。

2014 年 4 月 1 日日本內閣府通過「地區防災計畫（地区防災計画ガイドライン）」，主要是由市町村居民與當地企業團體所聯合進行的自主防災規劃系統，具有下列四大特點：

- (1) 以社區居民為基礎，由下而上自願進行的地區災害管理計畫。
- (2) 由社區居民根據當地環境特性設想可能的災害，所自行規劃的地

區災害管理計畫。

(3) 社區居民針對平時、災前、災中、災後等不同階段，規劃採取不同的防災行動，每個階段的防災行動都十分重要。此外，社區防災組織應與政府、專家、消防、企業、社會團體及志願者密切合作，共同促進地區整體防災能力。

(4) 社區居民除依據計畫內容實踐防災活動，須持續發現問題加以改善，不斷精進改良防災計畫與行動措施。

日本內閣府 2014 年 11 月 6 日選出 15 個地區防災規劃示範區，輔導當地民眾開始採用新思維來減少災害風險，由於很多地區居民多為高齡者，故由當地人士以老人容易理解的方式，自行擬定防災地圖、防災計畫，規劃方便高齡者疏散的避難路徑，並定期進行防災訓練，災害發生時，無需等待政府下令即行避難，希望能幫助更多人順利完成疏散避難，以挽救更多生命。該計畫內容與各地區推動情況，均公布於日本內閣府「地區防災計畫」官方網頁。



圖3-33 自主防災宣導

### 3. 推動企業防災合作

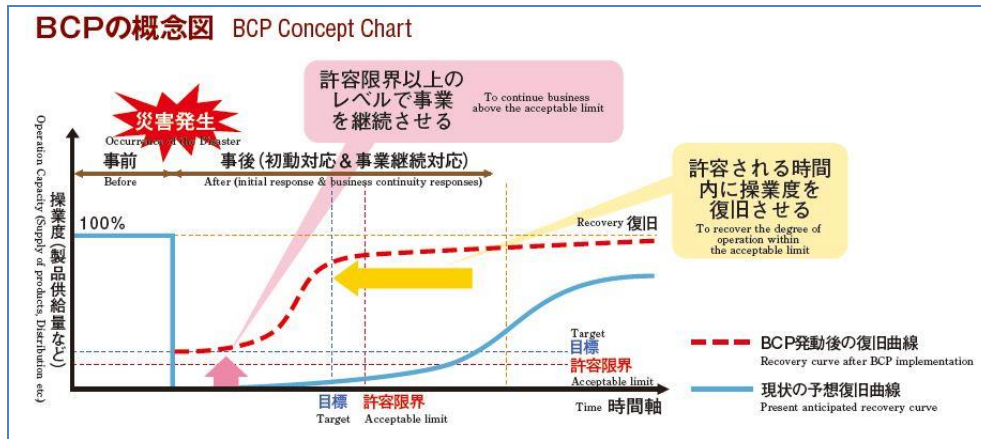


圖3-34 企業防災概念圖

#### (四) 國際防災合作：

包括日本對於世界災害之因應作為、國際防災組織之合作、向世界推廣擴展日本防災技術。

**兵庫行動枠組の実践のための柱**  
A Key Pillar for the Implementation of the Hyogo Framework for Action

**災害予防と復旧・復興プログラムの実施のためのリスク低減アプローチの体系的な取り込み**  
The systematic incorporation of risk reduction approaches into the Implementation of disaster recovery and reconstruction programs

**ナレッジ・マネジメント Knowledge Management**      **人材育成 Capacity Building**      **復興支援 Enhanced Recovery Operations**

**国際機関等の連携 (17機関)**  
Partnership of International Organizations (17 partners)

① Asian Development Bank (ADB) ② Asian Disaster Reduction Center (ADRC) ③ Hyogo Prefecture ④ International Federation of Red Cross and Red Crescent Societies (IFRC) ⑤ International Labour Organization (ILO) ⑥ Ministry of Foreign Affairs of Italy ⑦ Japanese government ⑧ Swiss Agency for Development and Cooperation (SDC) ⑨ United Nations Centre for Regional Development (UNCRD) ⑩ United Nations Development Programme (UNDP) ⑪ United Nations Environment Programme (UNEP) ⑫ United Nations Human Settlements Programme (UN-HABITAT) ⑬ United Nations International Strategy for Disaster Reduction (UNISDR) ⑭ United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) ⑮ United Nations Office for Project Services (UNOPS) ⑯ World Bank ⑰ World Health Organization (WHO)

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復旧ガイダンスノート  
Guidance Notes on Recovery

圖3-35 國際防災合作落實兵庫行動框架

#### 四、東日本大地震災後重建

日本東日本大地震重建計畫分為避難所支援、都市重建、產業重建、核災除汙、受災地方政府人力支援等五個部分，按日本復興廳 2015 年 3 月 10 日的統計資料，避難所居住人數從 47 萬人減少為 23 萬人，許多人搬移到臨時住宅、公營住宅或自行重建。住宅自主重建方面，截至 2015 年 3 月申請件數為 11.7 萬件；集體住宅搬遷計畫，在 2013 年 3 月已取得全體居民同意，截至 2015 年 3 月已有 94%開工；災區公營住宅供應需求為 29,941 戶，截至 2015 年 3 月，16%已完工，85%施工中。

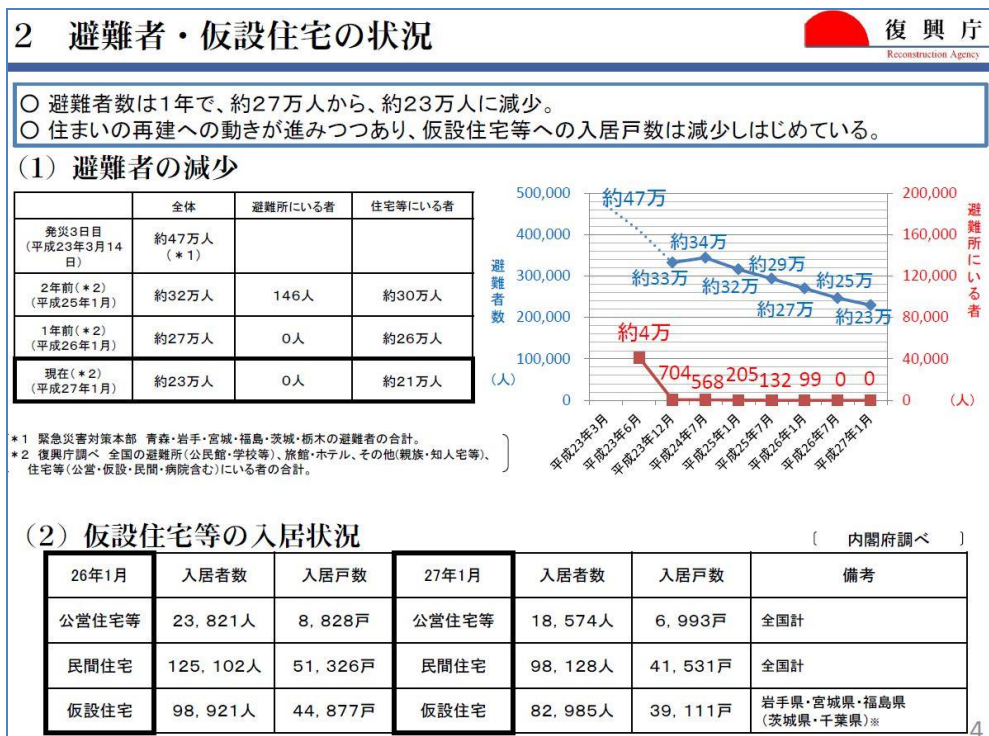


圖3-36 東日本大地震避難人口變化

以地震前一年當地人口普查數為基準，東日本地震過後岩手、宮城、福島三個受災地區的人口大量外移，2012 年外移人口逐漸趨緩，在 2014 年 7 月人口指數變動逐漸持穩，其中東北三縣的整體人口指數降為 0.97，但沿海地區降到 0.93，其中又以岩手縣降至 0.9 為最低。

(参考) 被災3県における人口の状況

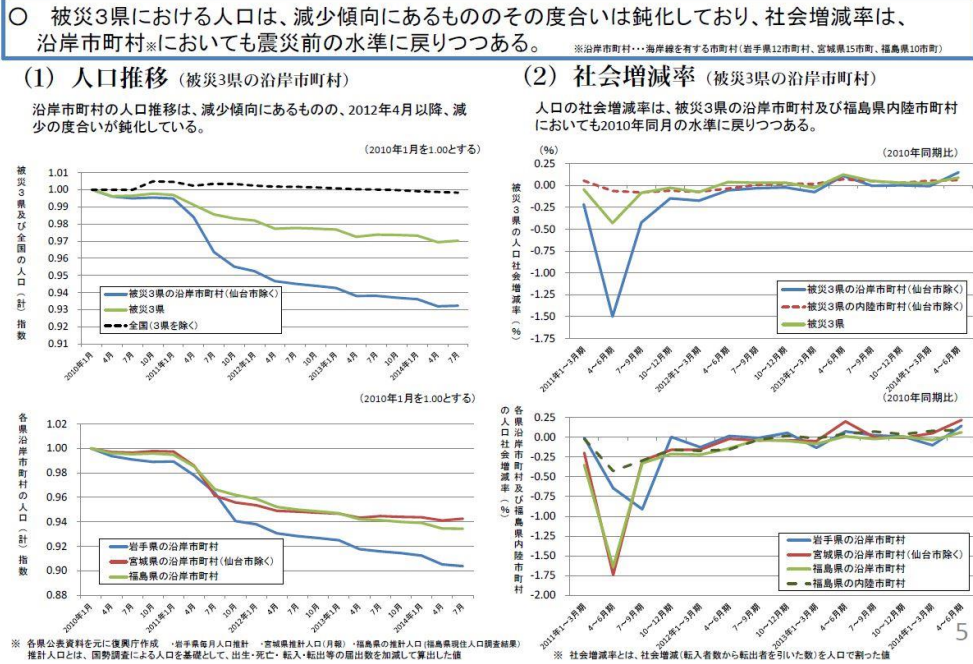


圖3-37 東日本大地震災區人口變遷統計

災害廢棄物處理方面，宮城縣及岩手縣在 2014 年 3 月已全數清除完畢，截至 2015 年 3 月福島縣已處理 94%；海岸對策方面，2015 年 3 月 77%已開始建設；國道路網方面，在 2012 年 3 月 99%已恢復通行；醫療院所因災損限制使用者計 182 所，在 2015 年初已有 95%恢復使用；受災損的公立學校計 2,307 所，2015 年初已有 96%恢復使用；受海嘯淹沒農地面積達 21,480 公頃，截至 2014 年底已完成除鹽清理者達到 70%；受災水產加工廠計 812 家，在 2015 年初已有 83%恢復營運；受災地區礦業，在 2012 年 1 月回復到災前的產值；未受海嘯波及地區的工業產值(與地震前同時期相比，不包括水產加工設施等)，在 2013 年 8 月左右大致恢復，但位於海嘯淹沒區工業場所產值，僅恢復到災前的 5%；在 2014 年底，累計有 574 家商家店鋪、工廠及事務所復業，申請補助金的中小企業計 10,220 家，總融資貸款金額達到 6.4 兆日圓；個人債務處理件數 1191 件。



## 4 公共インフラの本格復旧・復興の進捗状況①

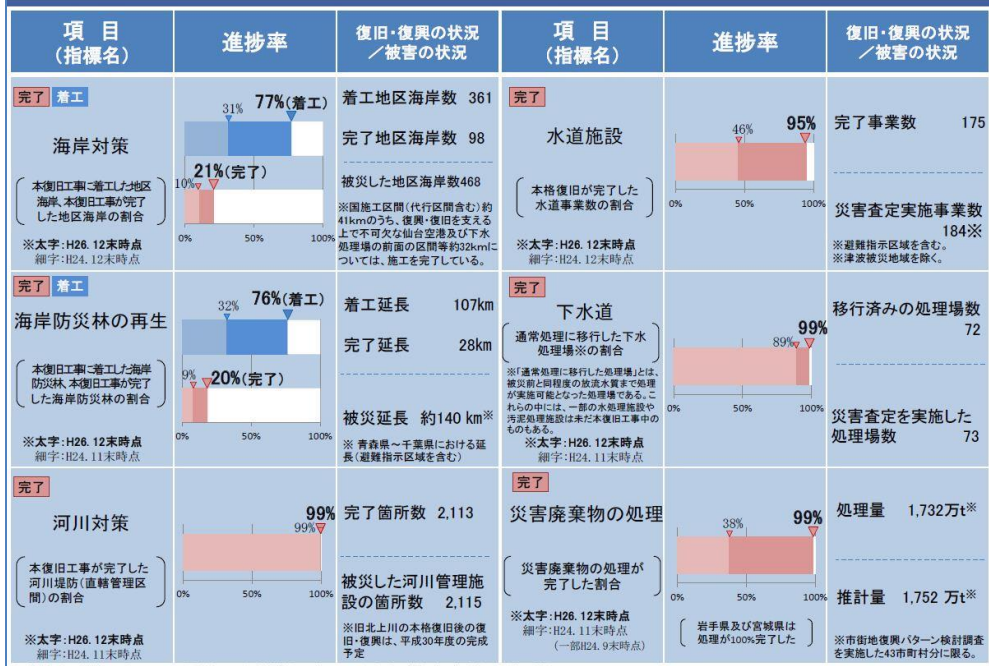


図3-38 公共工程重建進捗一

## 4 公共インフラの本格復旧・復興の進捗状況②

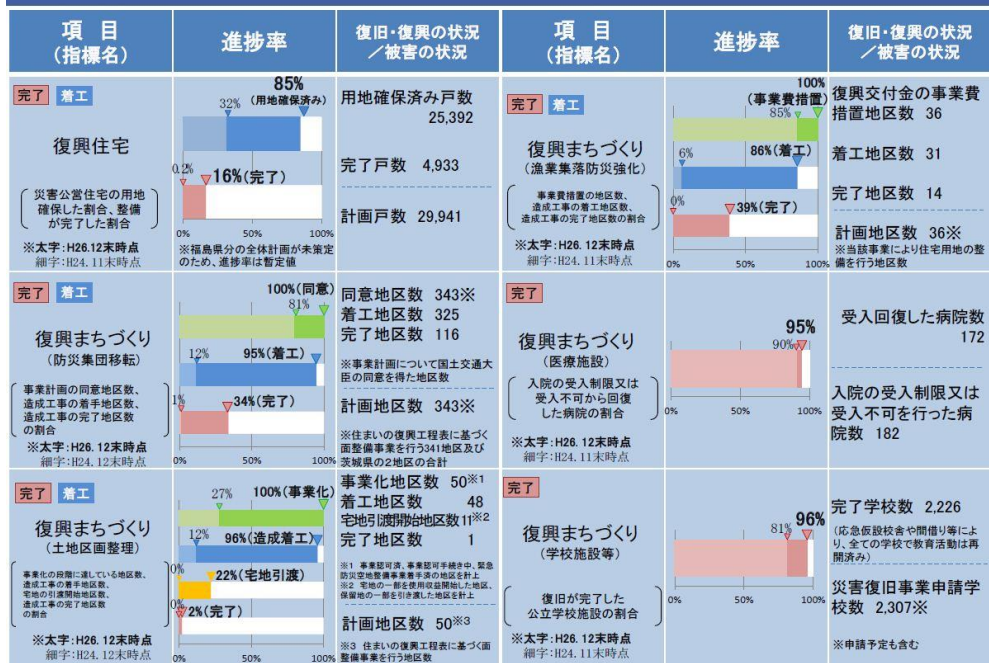


図3-39 公共工程重建進捗二

#### 4 公共インフラの本格復旧・復興の進捗状況③

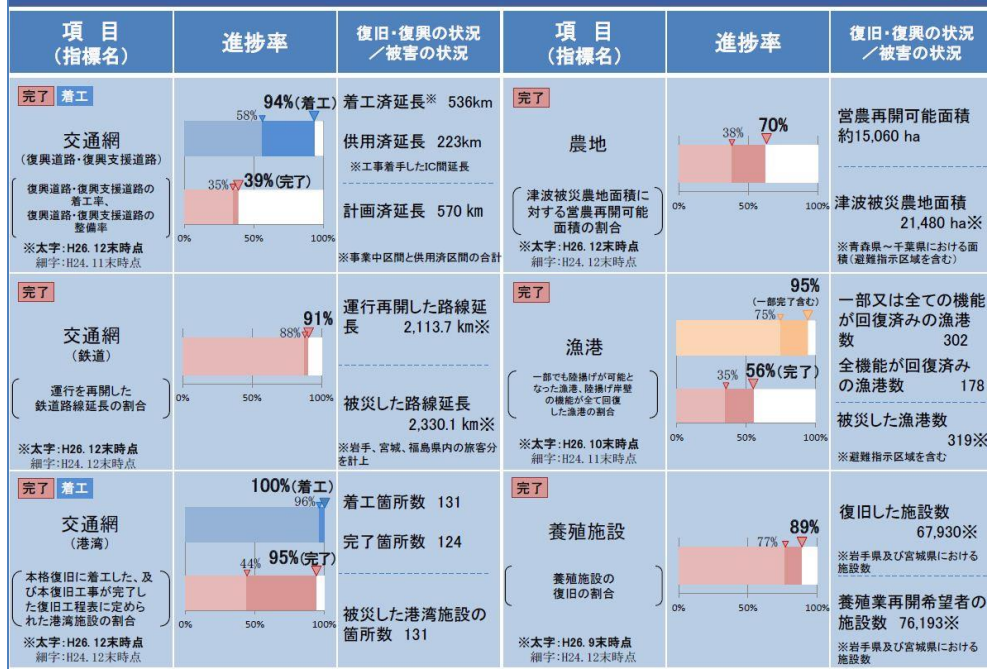


図3-40 公共工程重建進度三

福島地区則因受核事故影響，災後重建情勢最為嚴峻，其距離核電站 20 公里遠的楸葉町，所有災民一直在外地避難。目前災區仍面臨人口外移、經濟復甦緩慢、心理壓力沉重、公營住宅重建緩慢等多重問題亟待克服。

避難指示区域の概念図

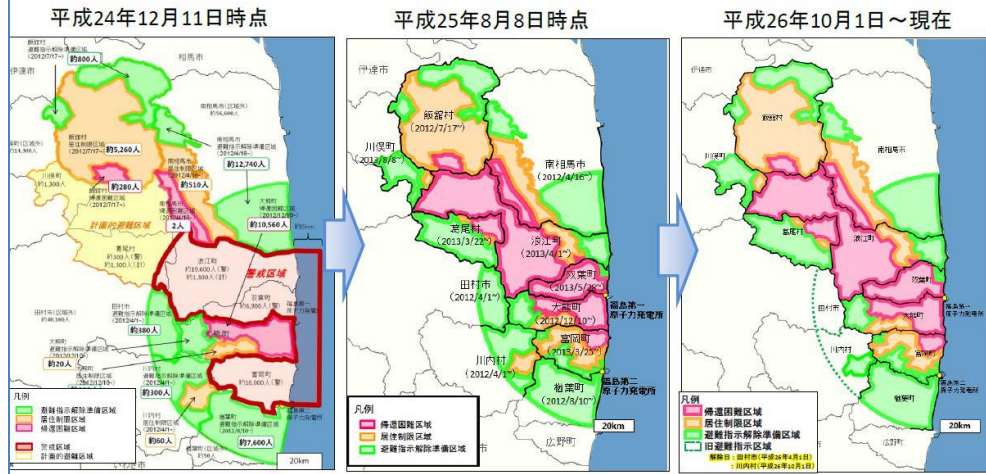


圖3-41 福島核災管制區域變化

五、建設更好的韌性城市-以仙台市為例

本屆大會在仙台媒體中心所舉辦的「東日本大地震重建減災展館」，展示介紹日本東北地區受災的青森、岩手、宮城、福島等四個受災縣與仙台市的受災情況與重建計畫，以下將以本屆大會主辦城市為例，深入介紹仙台市都市災後韌性重建的過程。

仙台市正好位於日本東北地區的中心，位於距離東京以北約 300 公里之處，地處本州島（日本四個主要島嶼中最大的島嶼）的太平洋一側，是日本東北地方政治和經濟的中心城市，擁有「森林之都」的美名。在 311 東日本大地震當時，震度達到 6 強，海嘯在地震約 1 小時後襲擊仙台東岸，仙台港口海嘯最高約 7.2 公尺，淹沒區域超過 4,500 公頃，死亡和失蹤人數合計 730 人，海嘯過後的廢棄物與沉積物總量高達 265 萬噸，許多建築物被震損、沖毀，包括仙台港、污水處理廠、辦公大樓、工業廠房、倉儲中心、學校、醫院、住宅等，單單公共設施、住宅和工業設施的損失就超過 13,000 億日圓。災害初期，有超過 10 萬民眾住在避難中心，1,800 公頃農地無法耕作，工商企業面臨生產營收萎縮不得不出走或關閉，旅遊業、畜

牧業與漁業也幾乎停擺，嚴重衝擊當地的社會經濟與民眾生活。



仙台媒體中心受損



仙台媒體中心現況



災後的仙台港地區



仙台港地區現況



海嘯過後只剩下房屋基礎



仙台港地區房屋重建

圖3-42 東日本大地震仙台地區災後重建對照

## 被害の概要

- 人的被害：死者：917名 行方不明者：28名 負傷者：2,275名(平成27年2月28日時点)
- 建物被害：全壊：30,034棟 大規模半壊：27,016棟 半壊：82,593棟 一部損壊：116,046棟  
(平成25年9月22日時点)
- 宅地被害：地震による被害の程度が「危険」または「要注意」と確認された宅地：5,728宅地
- 津波浸水：被害を受けた世帯：8,110世帯(うち農家1,160世帯)
- 浸水面積：約4,500ha(うち農地約1,860ha)
- 市内被害額：推計額 約1兆3,684億円(平成24年1月29日時点)

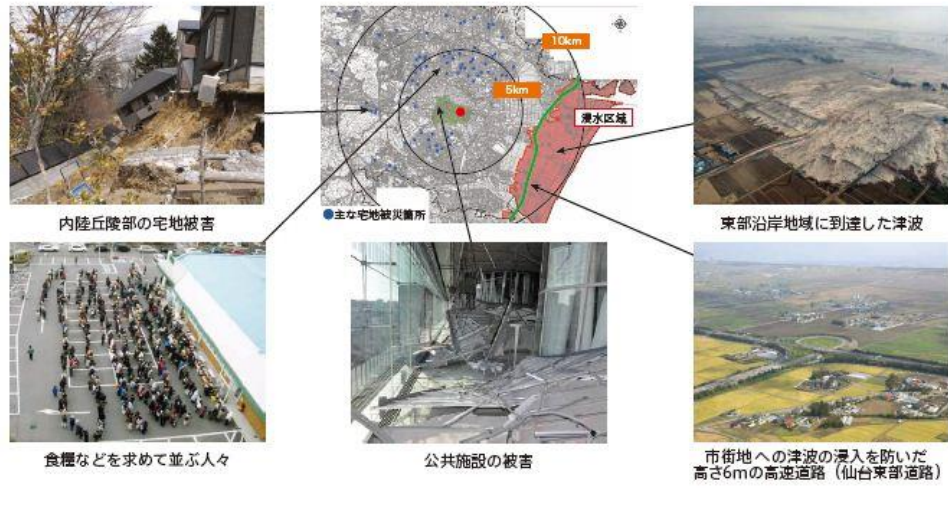


図3-43 東日本大地震仙台市災害概要

## 避難の状況

### 避難所

仙台市では、各地域にある小中高等学校などを災害時の避難所(指定避難所)に定めています。今回の震災では、最大で仙台市の人口の約10%にあたる10万人以上の方々が避難所に避難しました。避難所は、最も多い時で市内に288カ所(3月14日)開設されました。電気・水道・ガス等のライフラインや交通機関の復旧に伴い避難者は減少し、避難所の集約や仮設住宅等への入居などを経て、7月31日に市内にあった全ての避難所が閉鎖となりました。

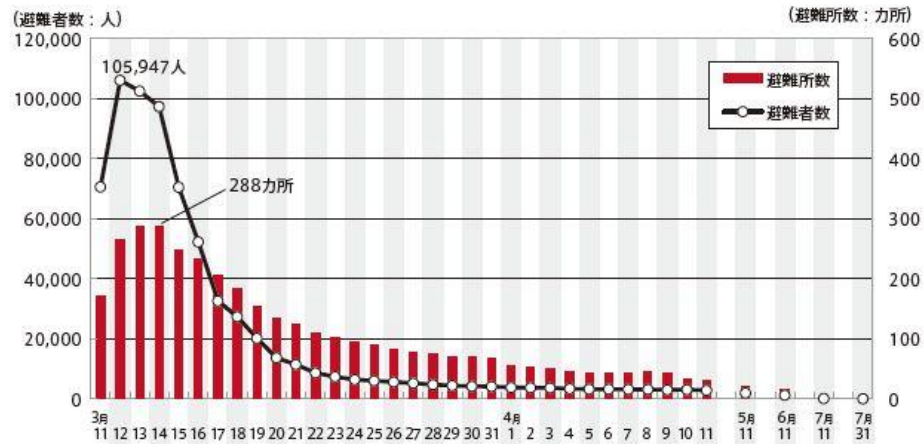


図3-44 仙台市避難状況

東日本大地震過後，仙台市政府依據災害對策基本法擬定各項重建計畫，於 2011 年 4 月 1 日公告「仙台市震災復興基本方針」、5 月 30 日訂定「仙台市震災復興願景」、9 月 20 日發布「仙台市震災復興規劃」過度方案，直到同年 11 月 30 日才正式確定「仙台市震災復興計畫」，已有英文翻譯版公開於仙台市政府官方網頁供各界參考。

「仙台市震災復興計畫」主要分為四大方向：

1. 減災防災基礎設施之重建：以控制自然災害，保障人命安全，將災害損失降至最低的重建方式。
2. 對應能源挑戰：促進燃料利用率，確保可再生能源。
3. 自立、互助、支持重建合作：從保護自己做起，進而支援弱勢族群，並支持政府重新建設。
4. 創造城市經濟活力、成為東北重建力量：為當地經濟發揮創造都市新活力，起而帶動東北重建。

由於當地民眾積極參與韌性抗災社區行動，仙台市於 2012 年 10 月獲選為聯合國國際減災戰略總署(UNISDR)「推動城市韌性抗災運動(Making Cities Resilient Campaign)」之模範城市，將與全世界分享東日本大地震的經驗教訓及其採行的減少災害風險措施，並協助全球減少災害風險策略之擬定。茲就仙台市減少災害風險之具體措施，重點說明如下：

#### **(五) 住宅安全搬遷重建**

地震災後重建最重要的課題是確保市民安全的居住環境，讓民眾早日回復正常生活。仙台市政府採取了三項措施，首先將受到海嘯破壞的東部沿海地區的住宅集體往內陸搬遷，避免再度遭受海嘯侵襲；其次，將內陸大規模山坡地社區災害復原，以及修復住宅用地週邊的公共設施，使受災害波及的住宅用地能恢復安全使用；第三，興建 3,206 戶公營住宅，照顧弱勢族群的居住權益。



圖3-45 住宅安全搬遷重建措施

### (六) 海嘯多重防禦對策

將傳統的「防災」觀念提升為「減災」措施，採取多重防禦的海嘯對策，如沿海海堤、提高道路高度、海嘯避難設施及住宅用地移轉等，期減少災害損失。



圖3-46 海嘯多重防禦系統

### (七) 強化都市維生系統耐震性

鑑於 1978 年宮城縣沖地震造成仙台市基礎維生系統嚴重破壞，如電力、天然氣、上下水道及污水處理廠等，仙台市大約一半區域停水，尤其是天然氣在一個月左右才恢復，維生系統災後恢復困難，對市民生活影響重大。因此，早期仙台市的災後重建已提高供水管道、下水道與天然氣管道的耐震性，轉移相關設施設備至安全的高地，避免全面停止供應的情況再度發生，此項措施讓仙台市在東日本大震災後能夠迅速展開重建工作，幫助民眾及早恢復正常生活。





圖3-47 維生系統耐震化

## (八) 民眾自主防災力向上提升

仙台市政府在 1978 年宮城縣沖地震發生後，積極推動以鄰里協會為單位的「自主防災組織」，藉以提高區域防災力。東日本大地震發生後，顧及區域特性以及婦女、高齡者、兒童、殘疾人及外國人的避難問題，仙台市政府與民間組織共同編訂「仙台市區域版避難所管理手冊事前準備解說編（仙台市區域版避難所運營マニュアル事前準備解說編）」，供各個避難所之運作管理參考。為了進一步加強區域防災力，仙台市政府啟動「仙台防災領導人（仙台市地域防災リーダー）」培訓計畫，教導防災領導人如何成立自主防災組織，並帶領組織成員制定防災計畫，辦理自主防災演

練，災害發生時指揮民眾避難疏散、緊急救護等，向上提升區域自主防災能力。



圖3-48 提升民眾自主防災能力

### (九) 保留記憶推展防災教育

仙台市歷史記載著幾個過去曾經歷過的大海嘯，例如，869 年的 Jogan 海嘯、1611 年的慶長海嘯，若非經歷過 311 地震，現代人根本無從想像當時的災害情境。當地政府、民間團體、學校及民眾都體認到紀錄地震的重要性，積極推動中小學防災教育，同時保留受災遺址，建立 3D 影像或模型，將這些經驗與記憶一代一代傳承給後代子孫，讓他們知道面對海嘯或災害發生時，自己可以迅速採取適當的行動保護自己，同時挽救他人的性命。



圖3-49 日本東北大學研發海嘯 3D 虛擬技術



圖3-50 兒童防災教育

#### 第四節 日本防災產業技術推展

日本企業長期致力於防救災技術的精進研發，除自行研發外，也透過產官學跨域合作方式，運用高科技改良各項技術處理歷年來曾面臨的災害問題，做為未來可能發生巨大災害的具體防減災措施，而仙台減災框架中「減少災害風險投資」的重點之一，即在於「有效利用防減災技術，達成減少災害損失，增加韌性能力」的投資。日本政府與日本防災平台（JBP）

在大會期間舉辦「防災產業展」及相關論壇活動，如東日本大地震綜合研討會由一般社團法人日本經濟團體連合會簡報「傳播推廣日本最新發展技術有助於預防減輕災害」，介紹日本長久以來累積的技術成果，分享東日本大地震後所應用的重要技術，讓世界各國認識日本最新進的防減災技術，據瞭解日本各項防災技術產品均有專利，將透過技術移轉或商業模式，共同促進國際防災技術之推廣與落實。

## 一、災害發生前：有效的預防預測技術

### (一) 建築物隔震減衰技術：

建築物隔震減衰技術是利用建築物隔震裝置吸收地震力，提高建築物耐震能力，適用於新建建築物與既有建築物耐震補強，日本三井住友建設改良傳統的隔震工法，在隔震層裝設減衰裝置(高性能阻尼)，開發 Hy-Retro 工法，來抑制建築物在地震時的擺動寬度，避免與鄰棟建築物碰撞損壞。

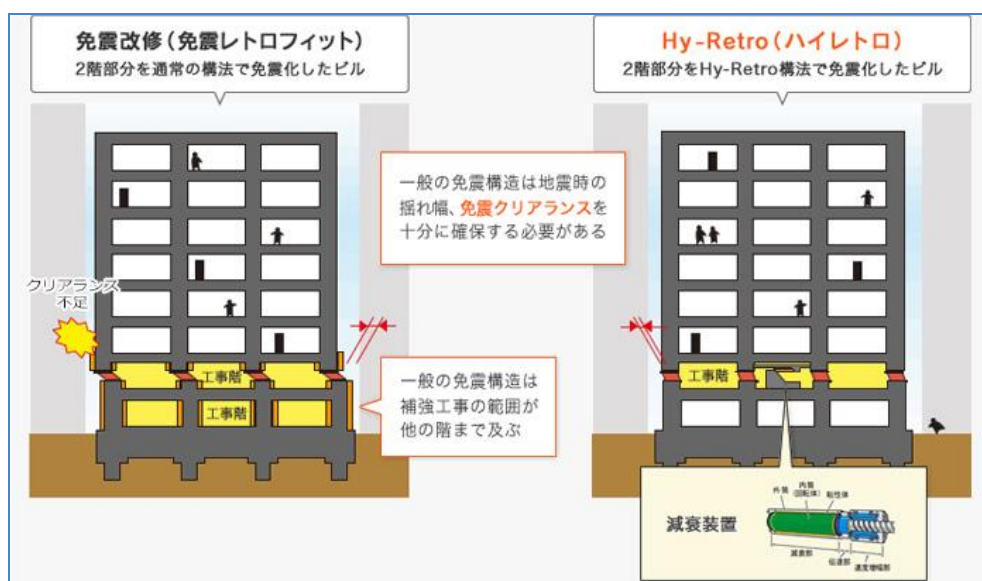


圖3-51 建築物免震減衰裝置

(圖片來源：三井住友建設)

### (二) 落橋防止裝置：

1995 年阪神大地震時，橋樑災損原因多為落橋所造成，故在橋樑版與柱之間加設纜線連結，兩端固定支架經過衝擊試驗可有效吸收地震衝擊

力，防止橋樑版因地震力位移過大而掉落的危險。

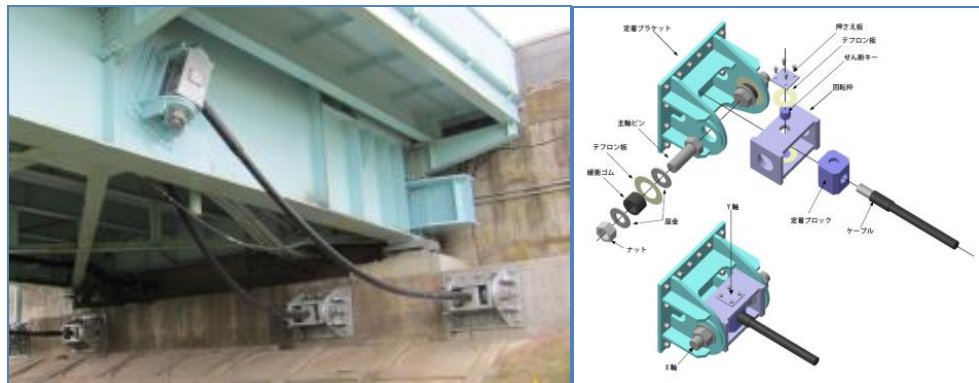


圖3-52 落橋防止裝置

(圖片來源：日本橫河化工技術建設株式會社)

(三) 空氣注入不飽和化地盤改良工法：

由日本國土交通省四國地方整備局、愛媛大學與民間株式會社共同開發「空氣注入不飽和化 (Air-des) 工法」，利用空氣注入地盤土壤，將容易液化的飽和地盤改良為不飽和地盤。

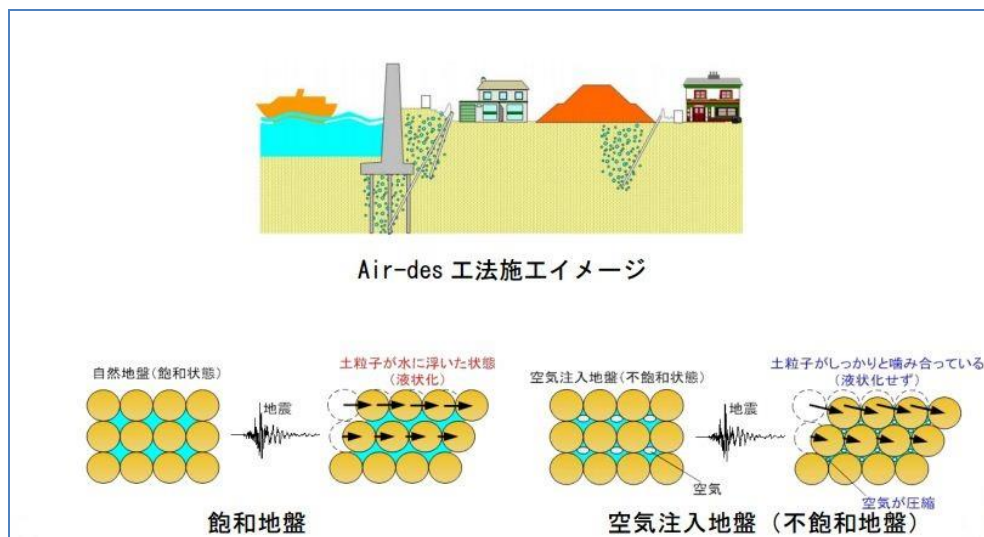


圖3-53 空氣注入不飽和化地盤改良工法

(圖片來源：日本東亞建設工業株式會社)

(四) 防潮堤混合結構快速工法：

東日本大震災受災區沿岸的防潮堤重建，常面臨人力、機具、施工作

業場地不足等問題，日本 JFE 株式會社利用預製鋼材與混凝土製作強勁的混合結構，有效改善狹窄區域的作業性，減少現場作業人力，且施工便利快速，岩手縣山田漁港及氣仙沼港護岸工程即採用此項工法，對東日本大地震災的早期重建具有高度貢獻。

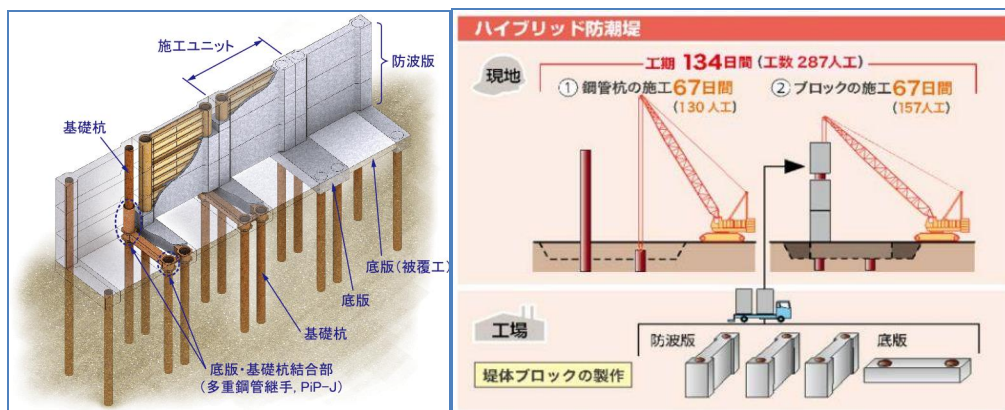


圖3-54 防潮堤混合結構快速工法

(圖片來源：日本 JFE 株式會社)

#### (五) 高速鐵路時效雨量運轉規則：

東日本新幹線鐵道株式會社利用「實效雨量」(包含 24 小時內連續有效雨量與 24 小時前累積雨量)推估邊坡土壤有效應力與行車速度的關係，作為新幹線營運安全管控之基準，避免降雨量造成土壤強度降低，影響路堤邊坡穩定性，以維行車安全。

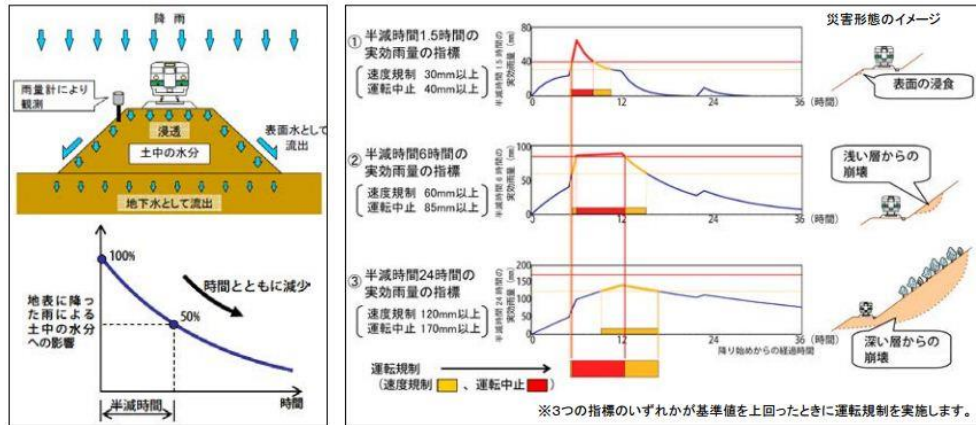


圖3-55 日本新幹線實效雨量運轉規則

(圖片來源：東日本新幹線鐵道株式會社)

(六) 三次元天氣雷達：

由日本國立研究開發法人信息和通信技術研究院、大阪大學與東芝公司為了觀察局部暴雨和龍捲風所成功發展的三次元構造豪雨觀測雷達，該雷達每 10 秒無間隙觀測 100 米內的三維降水分佈，有助於突發性氣象災害之監測預報。

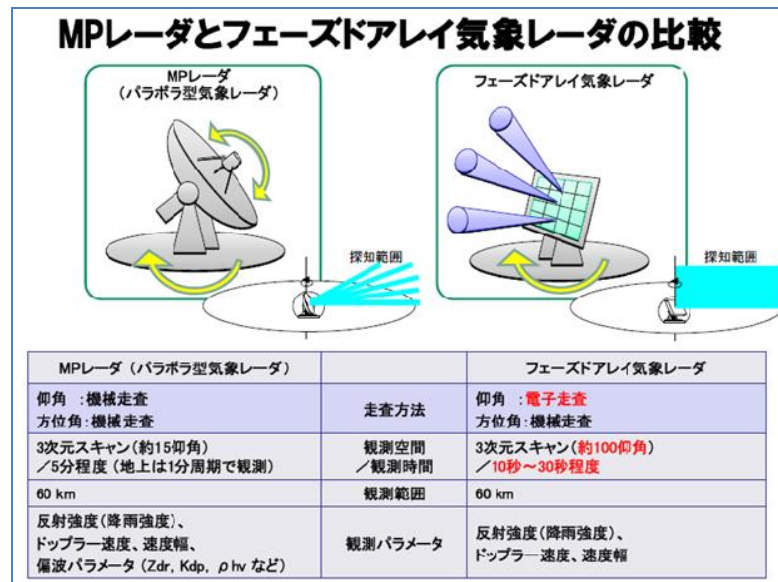


圖3-56 傳統雷達與三次元天氣雷達之比較

(圖片來源：日本國立研究開發法人信息和通信技術研究院)

(七) CCTV 河川水位影像觀測技術：

短延時強降雨是造成河川水位迅速上漲的重要因素。日本 IDEA 株式會社有效利用電視攝影機，密集觀測河川上中下游的水位變化，該技術特色是在橋墩柱或目標觀測物的警戒水位標示紅色或黃色線條，佈設 CCTV 攝影機拍攝目標觀測物的圖像，每 10 分鐘判讀一次，進而預測河川水位高度變化，將有助於更複雜的洪水預報和河流管理。目前，我國經濟部水利署在河川水位監測、都市地區水位影像監測方面也有相當先進的技術研發成果。

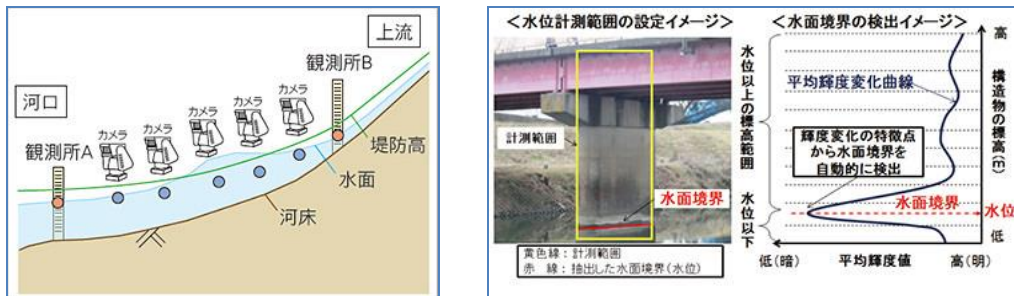


圖3-57 CCTV 河川水位影像觀測技術

(圖片來源：日本 IDEA 株式會社)

(八) 斜面計測監視 ICT：

由日本安藤間土木事業本部所研發的山坡地安全監測系統 (HAZAMA ANDO Monitoring System)，將山坡地的裂縫監測、地下水位監測、影像監測等監測數據，自動回傳系統程式進行山坡地安全評估，透過 GPS 呈現監測分析結果，可立即公布於網站上開放共享。



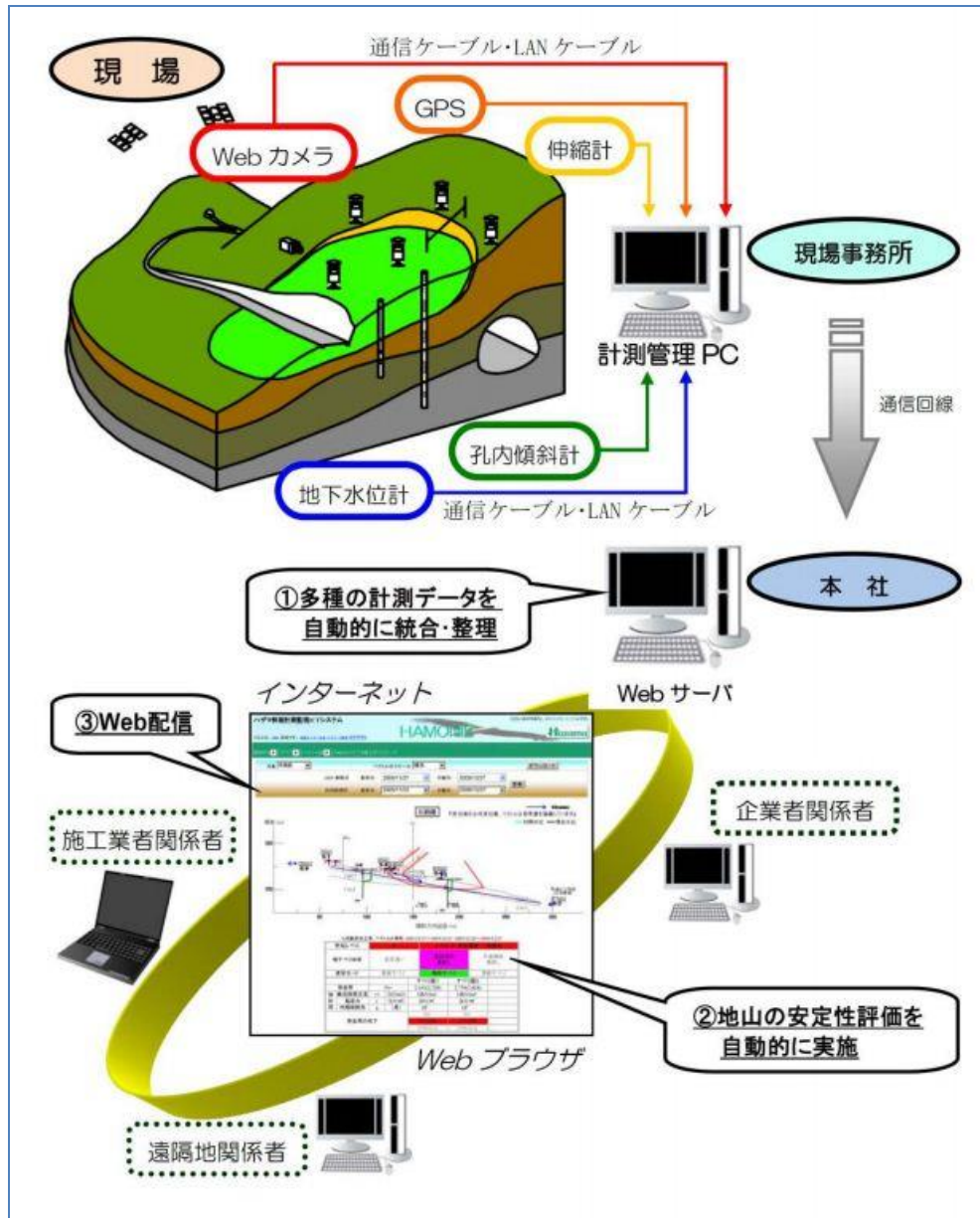


圖3-58 斜面計測監視 ICT 概念圖

(圖片來源：日本安藤ハザマ 土木事業本部)

### (九) 重大工業區各種自然災害潛在問題之弱點發掘與改進對策

煉油廠、大型化工廠等重大工業區容易因地震導致設備損壞、滲漏，甚至爆炸引發大規模火災，往往需要耗費很多時間方能恢復運轉，對上下游工業鏈及社會經濟造成嚴重影響，因此，煉油廠、大型化工廠等重大工業區有必要進行減少災害風險管理。日本出光興產株式會社即運用重現週期的概念，找出場區的弱點部位，提出減災措施，期盡量減少個人災害和

大規模災害和環境汚染。

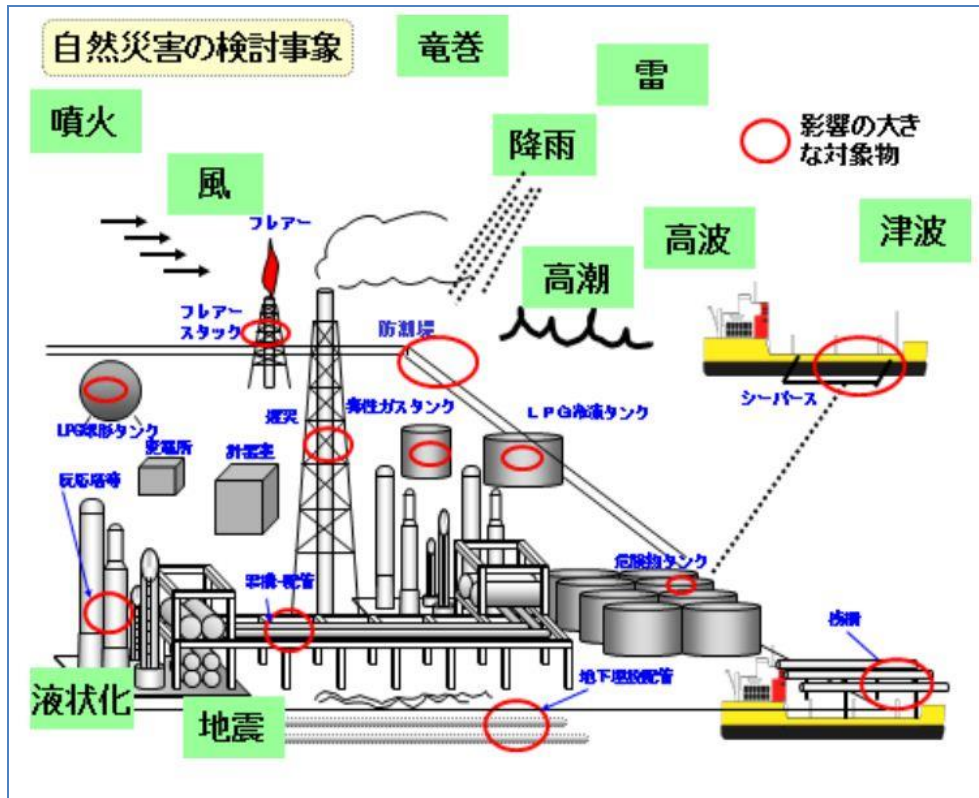


圖3-59 重大工業區天然災害檢討項目

(圖片來源：日本出光興產株式會社)

| 地震リスクマネジメント              |                                  |   |
|--------------------------|----------------------------------|---|
| 再現期間<br>(発生確率)           | 要求性能                             | 具体的検討施設   |
| 再現期間 970年<br>(50年間で 5%)  | 1. 人身災害防止<br>2. 大規模災害防止          | ・製油所・工場現場建屋<br>(旧建築基準法で建設された建屋)<br>・球形・冷凍タンク<br>(重要度 I, I.a, II 設備) |
| 再現期間 475年<br>(50年間で 10%) | 3. 環境汚染防止<br>4. 製油所全体の<br>長期停止防止 | ・危険物タンク<br>(海上への大量漏洩)<br>・煙突・フルア・大型棧橋<br>(再建に6ヶ月以上掛る設備)             |
| 再現期間 100年<br>(50年間で 50%) | 連続運転可能<br>(既設は対応済み)              | 上記以外の設備   |

圖3-60 重大工業區不同地震重現周期之性能要求

(圖表來源：日本出光興產株式會社)

(十) 即時海嘯淹水損壞模擬評估技術：

這項技術是由 NEC、國際航業株式會社與日本東北大學災害科學國際研究所共同開發，超高速大型電腦可以在地震發生後 20 分鐘內，完成高精度的海嘯抵達時間預測，並模擬海嘯淹水區域，評估可能的損害情況，目前在高知、靜岡，石卷、東松島進行驗證。

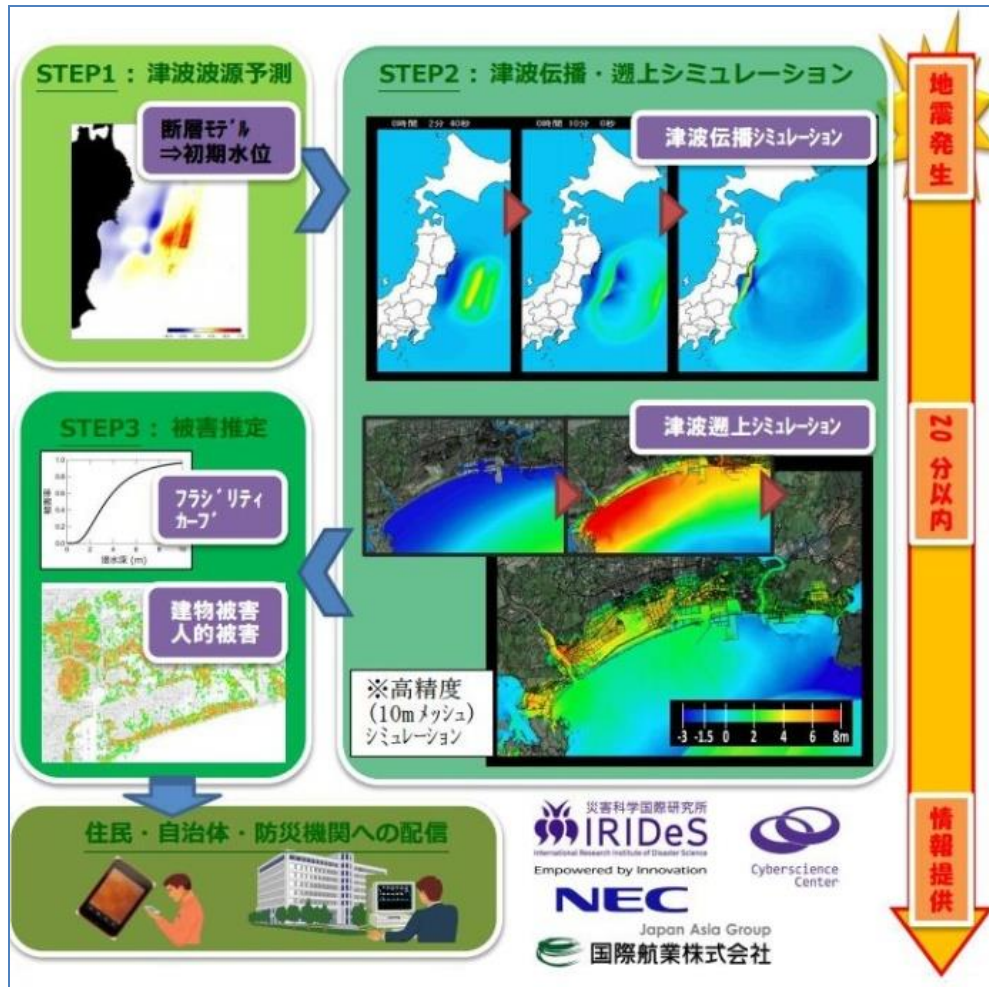


圖3-61 即時海嘯淹水損壞模擬評估流程圖

(圖表來源：日本國際航業株式會社)

二、災害發生後：有效的復興技術

災難發生後，首先要快速且準確的掌握災害情況，並透過網路傳媒向民眾公開各項最新訊息，如災損資訊、避難資訊、人員安全訊息，才能有效援助救濟災區。此外，應優先恢復基本維生設施，必須盡可能降低餘震

可能造成的災害，以利後續長時間的災後重建工作。

(一) 海嘯受災農地修復技術：

日立造船株式會社與住友化學株式會社為解決海嘯淹水後，農田土壤因鹽分與細碎屑沉積而無法耕作的狀態，所提出的農田改良修復技術，必須在進行推除作業之前，先配合 GPS 定位檢測分析出每個單位面積的沉積厚度，才能有效改善農田狀態。

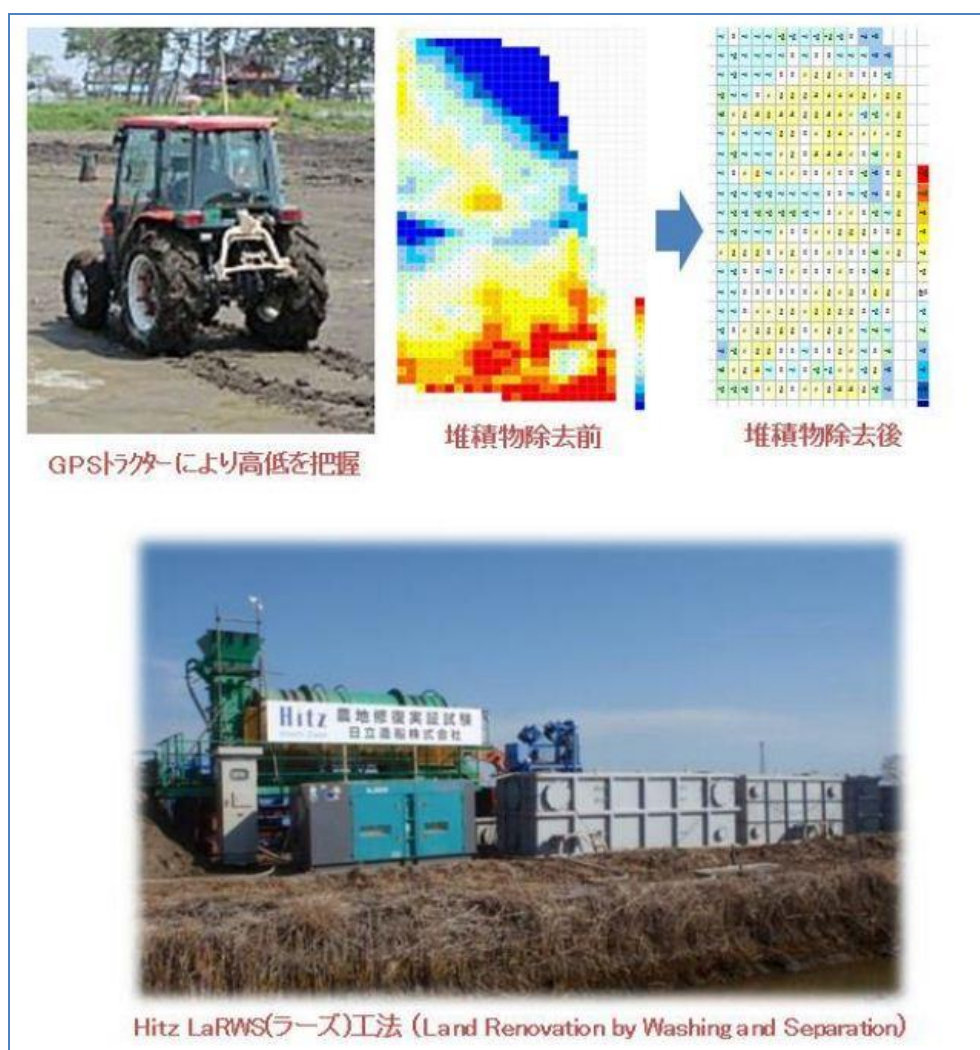


圖3-62 海嘯受災農地修復

(圖片來源：日立造船株式會社、一般社團法人日本經濟團體聯合會)

(二) 防災避難場所用保溫材料 (Torepefu)

Torepefu 是 TORAY 樹脂公司 1968 年製造開發註冊的一種聚烯烴泡沫

材料，具緩衝性、柔軟性、耐水性、阻燃級與耐熱性等特性，在東日本大震災防災避難所內被廣泛運用。



圖3-63 避難所用保溫材料

（圖片來源：一般社團法人日本經濟團體連合會）

### （三）公民參與型防災系統

由日本富士通所開發一套供市民使用的防災系統，運用社群網路服務相互通知的優點，除了收集各項感測器的觀測數據進行災害預警，通知民眾進行疏散避難之外，也提供市民資訊共享的平台，以迅速掌握災害監測和破壞情況。

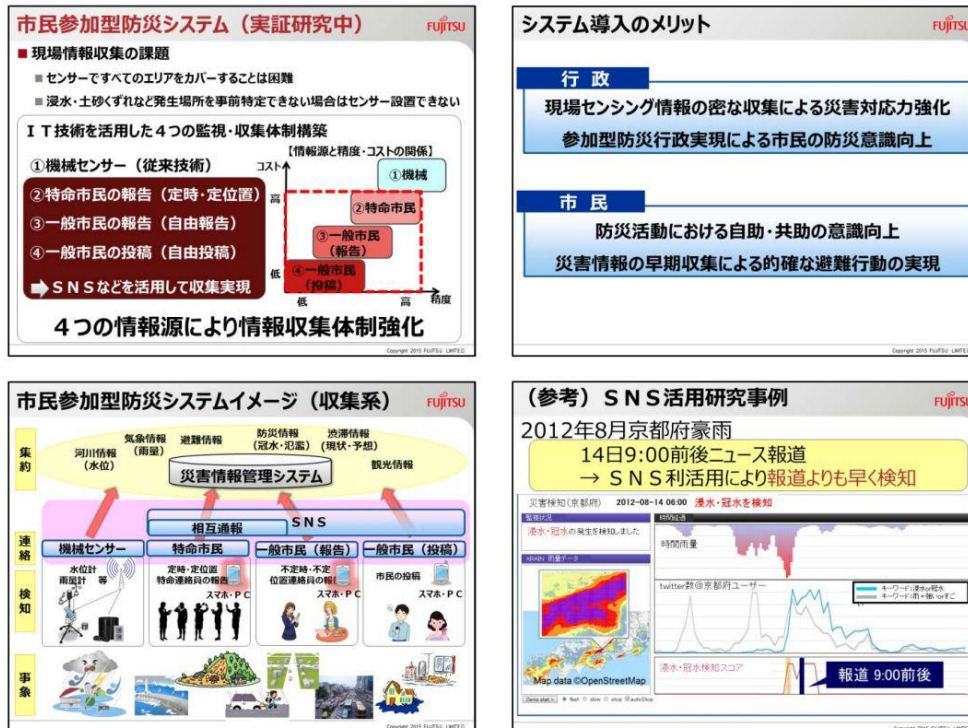


圖3-64 公民參與型防災系統

(圖片來源：日本富士通)

(四) 受災者生活重建支援台帳管理系統

2013年6月日本災害對策基本法開始強制規定地方政府應於災後迅速發放「建築破壞調查認證」、「調查結果登記」、「受災證明書」及「受災者生活重建基金(最高300萬日圓)」給受災戶，面對災害後數量龐大的受災建築物，政府如何迅速召集全國具緊急鑑定資格的民間判定士，在最短的時間內公平公正地完成所有災損建築物的調查，同時建立受災建築物損害調查結果與受災戶基本資料檔案，立即發給受災戶相關證明文件與生活重建基金，以及受災戶後續貸款支援、稅捐減免、臨時住宅申請、水電費減免等各項攸關災民權益的行政作業與資料管理，對政府而言是一項相當龐大且艱鉅的任務，對遭受重大創傷的受災戶而言更是困難。因此，京都城市大學防災研究所、新潟大學危機管理研究小組與NTT日本電信電話株式會社共同開發「受災者生活重建支援台帳管理系統」，依照政府和災民的需要，將受災者生活各階段的行政申請作業一貫化，歷經2004年新

瀧縣中越地震、2007 年能登半島地震、2007 年新瀧縣中越地震、2011 東日本大地震，長達十年的實證演變，在 2014 年 6 月正式商品化，對於受害者生活重建支援制度貢獻良多。



圖3-65 受災者生活再建支援台帳管理系統

(圖片來源：NTT 日本電信電話株式會社)

#### (五) 企業供應鏈管理系統

自然災害、意外事故、迅速的經濟匯率波動、政治動盪衝突等因素，都可能成企業永續經營的致命傷害。IBM 日本公司所開發「企業供應鏈管理系統」，旨在提供全球工商界風險管理永續經營的解決方案，運用風險管理的三大原則「風險評估」、「減災規劃」及「監測」，找出上、中、下游供應鏈中的所有風險，避免零件短缺影響製程及出貨，隨時追蹤各項風險因素，並提出減災備援規劃以降低災損衝擊與影響，幫助企業迅速應對各種突發的災害風險。

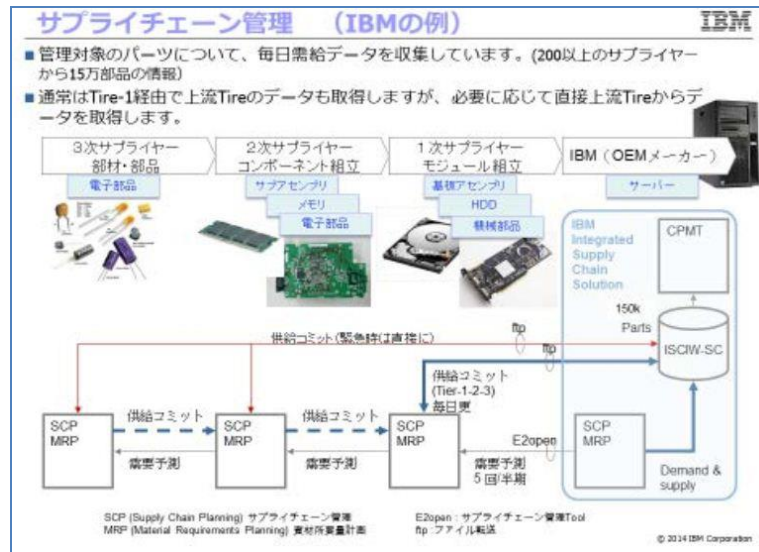


圖3-66 供應鏈管理示意圖

(圖片來源：IBM 日本公司)

### (六) 大型防救災機具、車輛

為因應巨大災害後的緊急搶救，日本帝國纖維株式會社特別開發以下防救災裝備與車輛機具，如消防人員防護用品、救災車輛等，另針對企業防災組織、自主防災組織及家庭防災需求，產製所需相關設備與產品，更進一步依災害類型，如禽流感大流行、災區醫院去污、生化攻擊、放射性汙染、爆炸、地鐵隧道防洪防火、地下大型購物中心災後恢復、飛機起火、機場安檢、航空貨運保安、核災、有害物質災害、油罐火災等不同人為災害或天然災害，分別提出可行的搶救災措施及對應的防救災產品。以東日本大地震千葉煉油廠火災為例，因廠區內數個儲油槽連環爆炸引發大火，火焰上竄數十公尺高空，火勢延燒長達 10 天才撲滅。日本帝國纖維株式會社即採用 2 組具有強大渦輪水力噴射能力的噴氣發動機，可以長時間（10 天以上）大量連續遠距離噴射滅火，適合應用在大型石化火災、都市街廓型火災，號稱世界上第一個「立體聯防滅災」消防系統。



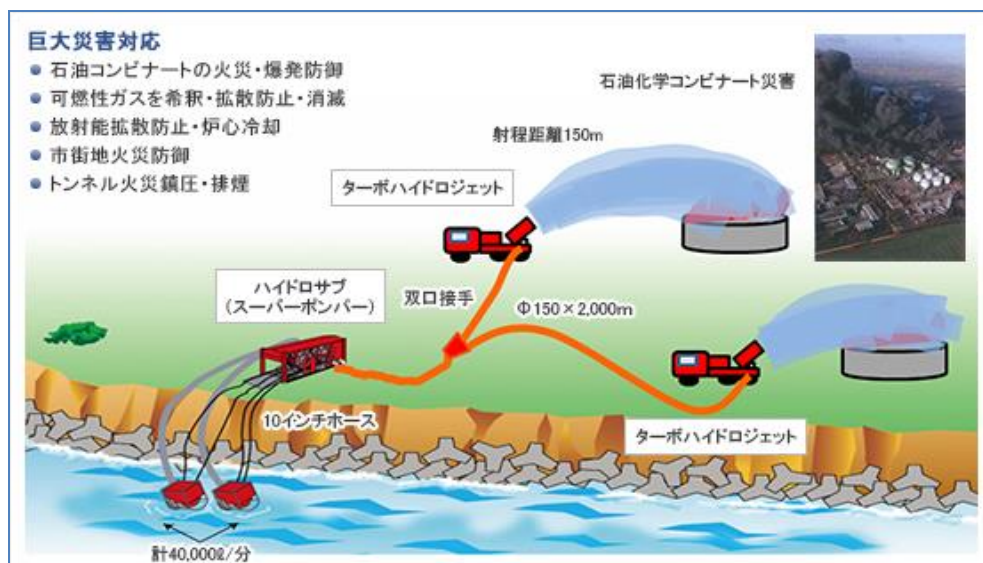


圖3-67 立體聯防減災消防系統示意圖

(圖片來源：日本帝國纖維株式會社)

### (七) 建築結構地震安全監測系統

本項技術主要是在建築物各樓層安裝地震加速度感應器，自動傳輸收集各樓層的加速度數據後，由系統主機實際模擬建築物在地震下的搖擺狀況，進一步分析評估地震後建築物的安全性，並立即通知屋內人員是否需進行緊急疏散。

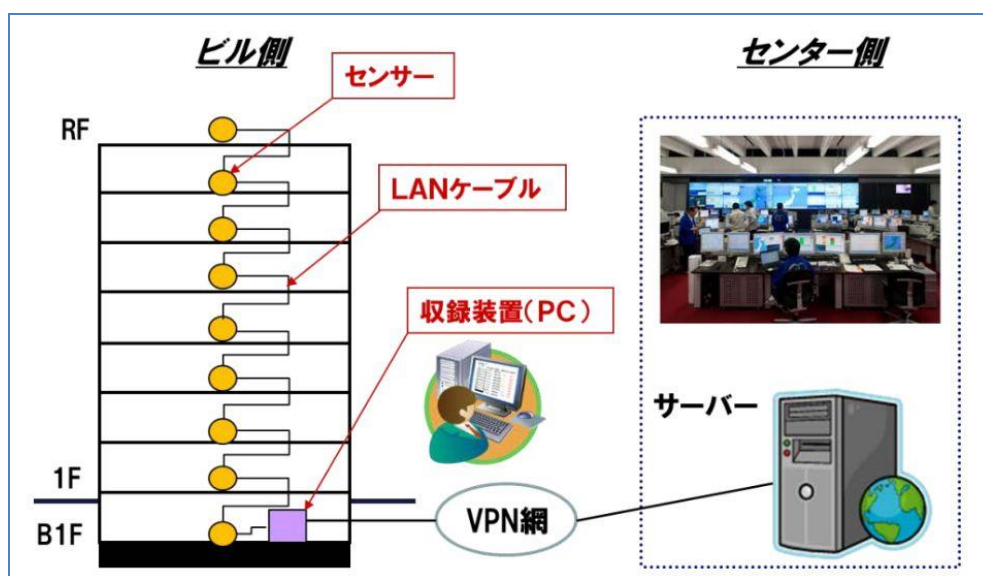


圖3-68 建築結構地震安全監測系統

(圖片來源：NTT 日本電信電話株式會社)

(八) 防水閘門、防水板、防水門

防止豪大雨從車道、門、窗戶等位置，淹入建築物內部的設施，分為防水閘門、防水板、防水門、防水窗戶等。



圖3-69 防水措施

(圖片來源：一般社團法人日本經濟團體連合會)

### 第五節 日本女性防災主流化

日本內閣府為推動日本社會兩性平權，保障女性參與防災政策決策過程、活化災後社會經濟體系、就業平等、生活與工作平衡、兩性高齡問題、消除所有婦女暴力、女性終身健康、性別平等教育與研究等權益，訂有「男女共同參與社會基本法（男女共同参画社会基本法）」、「男女共同參與白皮書（男女共同参画白書）」等相關規定。

在東日本大地震之後，日本中央防災會議於 2011 年 12 月增修「防災基本計畫（防災基本計画）」，賦予女性參與臨時避難所管理職權，讓避難所的營運、規劃與管理，能夠兼顧婦女、兒童、家庭保育及高齡弱勢者的需要。2012 年 6 月，「男女共同參與白皮書（男女共同参画白書）」新增了「性別平等觀點之防災與重建（男女共同参画の視点からの防災・復興）」，旨在促進防災環境的性別平等，改善適合高齡者、殘疾人及外國人都能安心生活的居住環境。

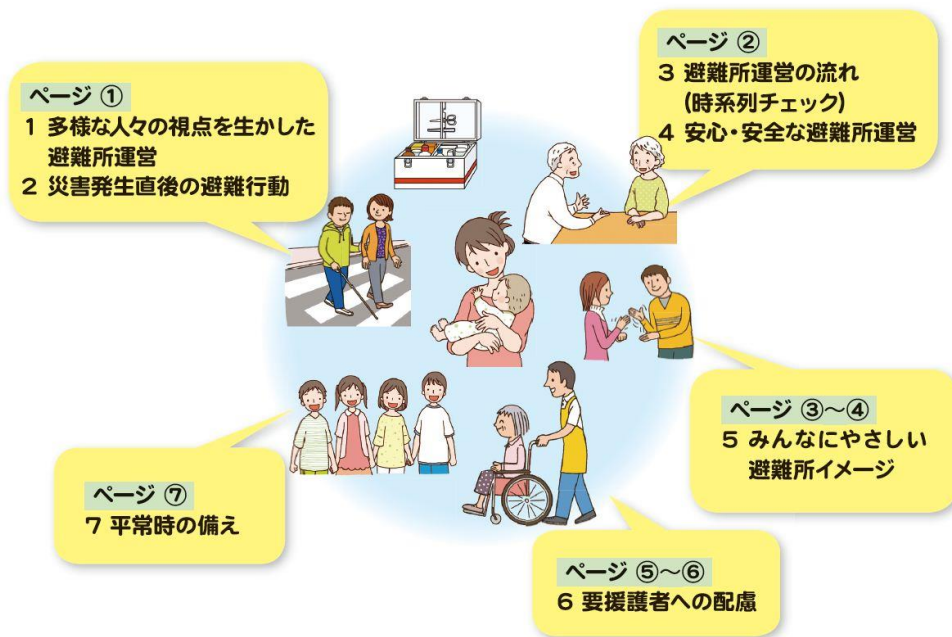


圖3-70 高齡弱勢避難關懷示意圖

日本首相安倍晉三在本屆大會 3 月 14 日政府間高級別多方利益合作夥伴關係對話高級別合作對話中演講「動員婦女領導減少災害風險（Mobilizing Women's Leadership in Disaster Risk Reduction）」，讚揚日本婦女在東日本大地震中的付出與貢獻，說明其在社區如何發揮減少災害風險之領導作用，也正視女性力量為減少災害風險與災後重建的重要基礎。本屆大會期間在仙台市青葉區 141 大樓 5、6 樓所舉辦的「女性防災展」，由日本政府、NGO 及災區婦女從性別平等的角度分享災後經驗，並舉辦一系列專題座談進行意見交流，會場提供了宮城縣政府 2013 年 11 月發行「男

女共同參與防災減災之多元觀點（男女共同參画・多様な視点 みんなで備える防災・減災のてびき）」及內閣府男女共同參画局 2015 年 1 月發行「保護生命的避難所管理準則（命とくらしを守る避難所運営ガイドライン）」等書面資料供參。茲將女性防災主流化對於東日本大地震災後重建之實際貢獻，摘要如次：



圖3-71 日本兩性共同參與防災管理資料封面

## 一、女性領導在災害發生時的重要性

在日本所有地區，社區防災組織與演練主要是由男性負責，然而，如果在白天發生大地震，男性大多外出工作，留在社區及家裡的大多數是女性，此刻發揮女性力量以減少社區災害風險將極為重要，因此主張“婦女也必須在發生災害時積極行動”。

## 二、婦女發揮災民心理照護的作用

東日本大地震之後，日本警政廳派遣一支女警大隊到受災最嚴重的地區，長期陪伴照顧避難所內的災民，細心聆聽災民所面臨的困難，協助心理支援照護工作，也幫助許多有自殺傾向的災民走出傷痛重啟人生，災民們深深感激有她們的陪伴。

### 三、婦女恢復生計的作用

以日本港口城市一氣仙沼市為例，當地婦女擁有漁網編織衣服的悠久傳統，在東日本大地震後，充分利用這項傳統技藝編織生產毛衣，不斷創新求變，有超過 30 名婦女參與這項工作，其產品深獲日本民眾喜愛，訂單源源不絕，不僅創造高經濟產值，也逐漸發展為當地的重要企業。

### 四、婦女在社區重建中的作用

國際間對於災後女性受暴案例的調查報告相當多，婦女受暴案件往往隨著災後混亂程度大幅增加，包括家庭暴力傷害、性暴力、性侵害等，凸顯出女性在災害中的弱勢問題，尤其必須加強對青少年及兒童保護。東日本大地震發生後，婦女在社區防災組織與避難所內貢獻許多心力，共同參與避難所的各項事務，避難所的空間規劃必須保障隱私，設法做好女性用品的發放，同時照顧所有婦幼、老人及弱勢者的安全與需求，營造安心安全的生活空間。

### 五、女性平時參與防災

在平時積極邀請女性成員擔任地方防災會議委員，參與各項減少災害風險之決策過程。十年前，日本全國僅半數都道府縣地方防災會議有邀請女性委員，目前各地方政府的防災會議均已邀請女性成員加入。



## 第四章 心得及建議

### 一、考察心得

此行 7 天的考察行程相當緊湊充實，亦從中獲得許多寶貴經驗，現今氣候變遷災害風險日趨巨大化，且威脅影響深達每一個角落，世界各國各自面臨著不同的災害課題，尤其對發展中國家、小島國家及貧困弱勢族群衝擊影響更劇。「兵庫行動框架」在聯合國國際減災戰略總署、各國政府及 NGO 團體共同努力之下，積極推動減貧及促進共榮，已成功幫助許多國家大幅提升抗災韌性能力。本屆會議更通過「2015-2030 年仙台減災框架」提出了七大全球性目標與四大優先行動計畫，呼籲各國擴大投資以減少災害，並將透過國際合作持續加強韌性建設，共同引領全球邁向 2030 年大幅降低災害死亡率、減少全球受災人數及直接經濟損失的新目標。

而在參加日本政府所舉辦的系列論壇與展覽活動期間，深刻體會到類似東日本大地震的巨大複合型天然災害，對國家、社會甚至個人所造成傷害之大及影響之深遠，非短期間能夠恢復，也對日本政府率先呼應仙台減災框架提出「日本減少災害風險仙台合作倡議」，結合 NGO 團體、民間企業與民眾上下一心攜手努力打造更美好的新東北，同時為未來可能遭遇的巨災做好準備，倍感敬佩。我國實有必要借鏡東日本大震災的災後重建經驗，學習聯合國國際減災戰略總署建構韌性都市做法，重新檢討國內都市防減災機制與相關重建法令，以整體提升我國都市建築之防災韌性。

災害無國界，國際減災合作已是未來防災工作推動之重要模式，回顧我國歷經 921 地震、納莉風災及莫拉克風災等天然災害洗禮，在防災政策制度方面已有相當成果，每年亦在各防災領域投注可觀的科研經費，持續累積了相當的科研技術成果與能量，因此可參考日本 JICA、Bosai 平台等經驗，由政府出面整合產官學研，聚積防災研究能量，移轉帶動防災產業

向上發展，逐步建構國家減災韌性基礎，同時參與國際防災組織、國際防災會議或國際防災展覽等世界性活動，除掌握國際防災趨勢，與國際交流分享我國的防災技術經驗，更能積極向外拓展我國能見度。

## 二、建議事項

我國與日本一樣逐漸趨向少子高齡化社會，未來面對氣候變遷天然災害的強度與頻率增加，災害範圍廣泛且災情多元化，處境將日益艱難。都市防災規劃與建築安全設計是建構減災韌性社會之關鍵核心，爰針對本所近年所關注發展的都市建築減災調適技術、建築創新技術、全人關懷生活及智慧環境科技等研究領域，提出以下建議供相關部會及本所相關科技計畫規劃參考：

### (一) 精進巨大複合型災害都市防災機制與法令研究，創造活力韌性新社會

巨大複合型災害都市防災機制與法令牽涉層面相當廣泛，涉及政府各部會及地方政府權責，謹依本所「都市與建築減災與調適科技精進及整合應用發展計畫」所規劃之「廣域性巨大（複合）災害耐災復原能力（Resilience）建構」、「坡地社區安全維護—法令與自然環境衝擊評估、設施維護與社區自主防災」及「少子化高齡化社會防減災問題預測與應對」等研究面向，研提意見如下：

1. 東日本大地震的災後重建經驗相當值得我國借鏡學習，故建議深入進行東日本大地震災後重建制度之比較研究，重新體檢我國都市防災政策，找出現行法令制度的缺口，諸如國內目前比較欠缺薄弱的廣域支援體制、巨型災害想定與對策擬訂、災後快速重建對策、政府業務繼續計畫、高齡弱勢自主防災及受災者生活再建支援台帳管理系統等做法，提出改善建議或研究課題規劃，提供相關部會與本所都市建築防災科技發展研究參考。



2. 我國科技部已整合國內各部會災害評估技術，建置「DMIP 災害管理資訊研發應用平台」，未來可參考日本巨災模擬預想做法加以應用，進行都市廣域型巨大複合性災害風險評估與韌性對策研究，深入探討災後社會經濟可能發生的連鎖反應，並持續關注國際韌性城市、韌性社區之發展，導入韌性規劃理念，研擬提出都市韌性減災之因應對策，創造活力韌性新社會。

## （二）提升建築物抗震耐風技術，健全管理制度

日本建築物隔減震技術為世界翹楚，其技術成就相當值得我國學習。然而本次考察期間日本新聞媒體適報導日本東洋橡膠工業株式會社於 2004 年 7 月至 2015 年 2 月期間生產安裝於政府辦公大樓、醫院、消防局等 55 棟重要建築物的隔震橡膠產品不符合規定，且部分建築物已發現差異沉陷、傾斜等現象，引發社會大眾嚴重恐慌，凸顯出建築物隔減震系統配套管理之重要性。目前國內建築物耐震設計規範已有隔震元件實體試驗與性能保證試驗等要求，未來可思考進行建築物隔減震系統配套管理研究，探討將建築結構地震監測系統應用於隔震建築物長期追蹤管理之可行性。揆諸建築物附屬設施設備之耐震能力，其實是災後韌性回復之重要指標，建議參考日本及國際相關規範，重新檢討國內技術規範有關附屬於建築物之結構物部分構體、非結構構材與設備之地震力規定；亦可思考進行隔減震裝置運用於高科技廠房之微震控制技術研究，以利國內高科技產業永續經營。此外，聯合國國際減災戰略總署（UNISDR）與國際風工程協會（IAWE）合作，因應未來極端氣候可能出現的超級強風，正進行全尺寸風洞實驗，試圖建立國際性的超強風設計準則與減災策略，從風工程領域落實減災工作，本所宜持續關注未來發展動態，以帶領國內風工程科技發展與國際接軌。

## （三）結合無障礙通用設計與 ICT 技術，滿足高齡弱勢行動不便者之減災需求

「仙台減災框架」首度納入性別、年齡、殘疾與文化等弱勢族群之減災考量，而日本在東日本大地震後，也將婦女、高齡者、兒童、殘疾人及外國人等生活需求，納入避難所之空間規劃與管理。此外，無障礙全球環境技術聯盟（GAATES）2014年最新出版的「公共空間無障礙設計圖解指南（Illustrated Technical Guide to the Standard for the Design of Public Spaces）」，及與亞太廣播聯盟（APBU）、亞洲備災中心（ADPC）共同制定了「無障礙通訊技術指導手冊（A Guide to the Integrated Accessibility Standards Regulation）」、「行動不便者無障礙通訊技術準則（Integrated accessibility standards regulation Providing accessible information to people with disabilities）」，結合無障礙通用設計與 ICT 技術，協助行動不便者進行災害預警與疏散避難，達成減少高齡弱勢等行動不便者災害傷亡之目標，對本所全人關懷無障礙空間通用化設計及高齡弱勢者防災避難相關研究，卓有助益。

#### （四）整合智慧防災產業技術優勢，佈局國際新興防災產業市場

廣泛運用資通訊技術進行災害評估、災害預警與資訊傳遞，已列為「仙台減災框架」的全球七大目標之一，我國擁有相當先進的資通訊技術，長期佈局防災平台與監測設備系統之研發建置，已普遍運用於智慧安全之永續建築、社區管理與城市發展，建議科技部與經濟部合作進行國內智慧防災技術整合，移轉強化國內防災產業能量，創立我國防災產業技術平台，並積極輔導加入國際防災組織，參與國際研討會與展覽活動，向國際拓展新興防災產業市場。

## 附錄一 國際防災組織機構及出版品網址



| 一、國際防災組織機構                    | 網 址   |
|-------------------------------|---|
| 1. 第3屆聯合國世界減災大會 (WCDRR)       | <a href="http://www.wcdrr.org/">http://www.wcdrr.org/</a>   |
| 2. 聯合國國際減災戰略總署 (UNISDR)       | <a href="http://www.unisdr.org/">http://www.unisdr.org/</a>   |
| 3. 第三屆聯合國世界減災大會影片 (UN WEB TV) | <a href="http://webtv.un.org/meetings-events/conferencessummits/">http://webtv.un.org/meetings-events/conferencessummits/</a> |
| 4. 第三屆聯合國世界減災會議仙台執行委員會        | <a href="http://www.bosai-sendai.jp/">http://www.bosai-sendai.jp/</a>   |
| 5. 世界銀行集團(WBG)                | <a href="http://www.worldbank.org/">http://www.worldbank.org/</a>   |
| 6. 世界銀行集團全球減災重建基金會 (GFDRR)    | <a href="https://www.gfdr.org/">https://www.gfdr.org/</a>   |
| 7. 國際風工程協會 (IAWE)             | <a href="http://iawe.org/">http://iawe.org/</a>   |
| 8. 無障礙全球環境技術聯盟 (GAATES)       | <a href="http://gaates.org/">http://gaates.org/</a>   |
| 9. 日本首相官方網頁                   | <a href="http://www.kantei.go.jp/cn/index.html">http://www.kantei.go.jp/cn/index.html</a>                                     |
| 10. 日本內閣府                     | <a href="http://www.bousai.go.jp/index.html">http://www.bousai.go.jp/index.html</a>   |
| 11. 日本內閣府防災情報網                | <a href="http://www.bousai.go.jp/">www.bousai.go.jp/</a>  |
| 12. 日本內閣府男女共同參與局              | <a href="http://www.gender.go.jp/index.html">http://www.gender.go.jp/index.html</a>   |
| 13. 日本總務省消防廳                  | <a href="http://www.fdma.go.jp/">http://www.fdma.go.jp/</a>   |
| 14. 日本外務省                     | <a href="http://www.mofa.go.jp/mofaj/">http://www.mofa.go.jp/mofaj/</a>   |
| 15. 日本復興廳                     | <a href="http://www.reconstruction.go.jp/">http://www.reconstruction.go.jp/</a>   |
| 16. 日本國際協力機構 JICA             | <a href="http://www.jica.go.jp/english/">http://www.jica.go.jp/english/</a>   |
| 17. JICA 研究所                  | <a href="http://jica-ri.jica.go.jp/ja/index.html">http://jica-ri.jica.go.jp/ja/index.html</a>                                 |
| 18. 日本防災 BOSAI 平台             | <a href="https://bosai-jp.org/">https://bosai-jp.org/</a>   |

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|---|---|
| 19. 宮城縣政府   | <a href="http://www.pref.miyagi.jp/site/kyousha/">http://www.pref.miyagi.jp/site/kyousha/</a>   |
| 20. 仙台市政府   | <a href="http://www.city.sendai.jp/">http://www.city.sendai.jp/</a>   |
| 二、出版品   | 網 址   |
| 1. Sendai Framework for Disaster Risk Reduction 2015-2030 | <a href="http://www.wcdrr.org/uploads/Sendai_Framework_for_Disaster_Risk_Reduction_2015-2030.pdf">http://www.wcdrr.org/uploads/Sendai_Framework_for_Disaster_Risk_Reduction_2015-2030.pdf</a> |
| 2. Sendai Declaration                                     | <a href="http://www.wcdrr.org/uploads/EN7.pdf">http://www.wcdrr.org/uploads/EN7.pdf</a>   |
| 3. Stakeholders' voluntary commitments                    | <a href="http://www.wcdrr.org/uploads/Resolution_Voluntary_Commitment.pdf">http://www.wcdrr.org/uploads/Resolution_Voluntary_Commitment.pdf</a>   |
| 4. WCDRR Public Forum Program                             | <a href="http://www.bosai-sendai.jp/doc/A4.pdf">http://www.bosai-sendai.jp/doc/A4.pdf</a>   |
| 5. 内閣府の政策   | <a href="http://www.cao.go.jp/seisaku/seisaku.html#bousai">http://www.cao.go.jp/seisaku/seisaku.html#bousai</a>   |
| 6. 復興の教科書   | <a href="http://fukko.org/">http://fukko.org/</a>   |
| 7. 消防団を中核とした地域防災力の充実強化に関する法律                              | <a href="http://law.e-gov.go.jp/htmldata/H25/H25HO110.html">http://law.e-gov.go.jp/htmldata/H25/H25HO110.html</a>   |
| 8. 東日本大震災の実体験に基づく 災害初動期指揮心得                               | <a href="http://ebook.itmedia.co.jp/ebook/articles/1502/09/news109.html">http://ebook.itmedia.co.jp/ebook/articles/1502/09/news109.html</a>   |
| 9. 日本復興廳東日本大地震重建統計  | <a href="http://www.reconstruction.go.jp/topics/main-cat1/sub-cat1-1/20150310_genjyo.pdf">http://www.reconstruction.go.jp/topics/main-cat1/sub-cat1-1/20150310_genjyo.pdf</a>                 |
| 10. 地区防災計画  | <a href="http://www.chikubousai.go.jp/">http://www.chikubousai.go.jp/</a>   |
| 11. GFDRR 出版品   | <a href="https://www.gfdr.org/publications">https://www.gfdr.org/publications</a>   |
| 12. 宮城縣男女共同參與及全方位觀點-大家一起來防備防災減災手冊<br>(中文繁體版)              | <a href="http://www.pref.miyagi.jp/uploaded/attachment/287986.pdf">http://www.pref.miyagi.jp/uploaded/attachment/287986.pdf</a>   |
| 13. 福島 10 大教訓   | <a href="http://fukushimalessons.jp/assets/content/doc/Fukushima10Lessons_CHN.pdf">http://fukushimalessons.jp/assets/content/doc/Fukushima10Lessons_CHN.pdf</a>                               |
| 14. 仙台市復興事業   | <a href="http://www.city.sendai.jp/fukko/">http://www.city.sendai.jp/fukko/</a>   |

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| 15. 仙台市復興事業簡報   | <a href="http://www.city.sendai.jp/shinsai/report/riport30.pdf">http://www.city.sendai.jp/shinsai/report/riport30.pdf</a>   |
| 16. 東日本大震災仙台市震災記録誌－発災から1年間の活動記録   | <a href="http://www.city.sendai.jp/fukko/1207640_2757.html">http://www.city.sendai.jp/fukko/1207640_2757.html</a>   |
| 17. 「仙台市震災復興計画」関連情報   | <a href="http://www.city.sendai.jp/fukko/1198749_2757.html">http://www.city.sendai.jp/fukko/1198749_2757.html</a>   |
| 18. 仙台地震災後恢復重建計畫(英文版)   | <a href="http://www.city.sendai.jp/shinsai/shinsaihukkorentou/pdf/keikakushiryou/plan%20English.pdf">http://www.city.sendai.jp/shinsai/shinsaihukkorentou/pdf/keikakushiryou/plan%20English.pdf</a> |
| 19. 仙台の復興   | <a href="http://www.city.sendai.jp/shinsai/report/reconstructionJ0309.pdf">http://www.city.sendai.jp/shinsai/report/reconstructionJ0309.pdf</a>   |
| 20. 東日本大震災栗原市の記録  | <a href="http://www.kuriharacity.jp/index.cfm/11,2111,c.html/2111/kurihara-kiroku_all.pdf">http://www.kuriharacity.jp/index.cfm/11,2111,c.html/2111/kurihara-kiroku_all.pdf</a>                     |
| 21. 日本外務省 ODA 開発協力大綱  | <a href="http://www.mofa.go.jp/mofaj/gaiko/oda/files/000072774.pdf">http://www.mofa.go.jp/mofaj/gaiko/oda/files/000072774.pdf</a>   |
| 22. 避難所運営マニュアル 事前準備解説編  | <a href="http://www.city.sendai.jp/syoubou/bousai/hinanjo-manual/pdf250401/junbi.pdf">http://www.city.sendai.jp/syoubou/bousai/hinanjo-manual/pdf250401/junbi.pdf</a>                               |
| 23. 日本総務省消防廳 自主防災組織手引   | <a href="http://www.fdma.go.jp/html/life/bousai/bousai_2304-all.pdf">http://www.fdma.go.jp/html/life/bousai/bousai_2304-all.pdf</a>   |
| 24. 防災・減災に資する技術等の普及・開発促進に向けて  | <a href="http://www.keidanren.or.jp/policy/2015/016_honbun.pdf">http://www.keidanren.or.jp/policy/2015/016_honbun.pdf</a>   |
| 25. 男女共同參與白皮書   | <a href="http://www.gender.go.jp/about_danjo/whitepaper/index.html">http://www.gender.go.jp/about_danjo/whitepaper/index.html</a>   |
| 26. 「命とくらしを守る避難所運営ガイドライン」～地域にくらす多様な人々にとって、安心・安全な避難所～                            | <a href="http://www.sankaku-npo.jp/wp-content/uploads/2015/02/npo_20150219_1.pdf">http://www.sankaku-npo.jp/wp-content/uploads/2015/02/npo_20150219_1.pdf</a>                                       |
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| 28. Illustrated Technical Guide to the Standard for the Design of Public Spaces | <a href="http://gaates.org/wp-content/uploads/2014/pdf/DOPS_Illustrated_Guide_140527_FINAL.pdf">http://gaates.org/wp-content/uploads/2014/pdf/DOPS_Illustrated_Guide_140527_FINAL.pdf</a>           |
| 29. International Best Practices in Universal Design                            | <a href="http://gaates.org/wp-content/uploads/2014/pdf/BP_english.pdf">http://gaates.org/wp-content/uploads/2014/pdf/BP_english.pdf</a>   |
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| information to people with disabilities  |   |
| 31. UNESCO Global Report Opening New Avenues for Empowerment<br>ICTs to Access Information and Knowledge for Persons with Disabilities | <a href="http://unesdoc.unesco.org/images/0021/002197/219767e.pdf">http : //unesdoc.unesco.org/images/0021/002197/219767e.pdf</a>   |
| 32. A Guide to the Integrated Accessibility Standards Regulation   | <a href="http://www.mcass.gov.on.ca/documents/en/mcass/accessibility/CombinedEnglishDocumentsIASR-02%20FINAL-s.pdf">http :<br/>//www.mcass.gov.on.ca/documents/en/mcass/accessibility/CombinedEnglishDocumentsIASR-02%20FINAL-s.pdf</a> |



## 附錄二

仙台減災框架：2015-2030（**Sendai Framework for Disaster Risk Reduction 2015-2030**）、仙台宣言（**Sendai Declaration**）、利益相關方自願承諾（**Stakeholders' voluntary commitments**）






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**Third United Nations World Conference on  
 Disaster Risk Reduction**

Sendai, Japan, 14-18 March 2015

Agenda item 11

**Adoption of the final outcomes of the Conference**
**Sendai Framework for Disaster Risk Reduction 2015-2030**
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## I. Preamble

1. The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third United Nations World Conference on Disaster Risk Reduction, held from 14 to 18 March 2015 in Sendai, Miyagi, Japan, which represented a unique opportunity for countries to:

(a) Adopt a concise, focused, forward-looking and action-oriented post-2015 framework for disaster risk reduction;

(b) Complete the assessment and review of the implementation of the Hyogo Framework for Action 2005-2015: Building Resilience of Nations and Communities to Disasters;<sup>1</sup>

(c) Consider the experience gained through the regional and national strategies/institutions and plans for disaster risk reduction and their recommendations, as well as relevant regional agreements for the implementation of the Hyogo Framework for Action;

(d) Identify modalities of cooperation based on commitments to implement a post-2015 framework for disaster risk reduction;

(e) Determine modalities for the periodic review of the implementation of a post-2015 framework for disaster risk reduction.

2. During the World Conference, States also reiterated their commitment to address disaster risk reduction and the building of resilience<sup>2</sup> to disasters with a renewed sense of urgency within the context of sustainable development and poverty eradication, and to integrate, as appropriate, both disaster risk reduction and the building of resilience into policies, plans, programmes and budgets at all levels and to consider both within relevant frameworks.

### **Hyogo Framework for Action: lessons learned, gaps identified and future challenges**

3. Since the adoption of the Hyogo Framework for Action in 2005, as documented in national and regional progress reports on its implementation as well as in other global reports, progress has been achieved in reducing disaster risk at local, national, regional and global levels by countries and other relevant stakeholders, leading to a decrease in mortality in the case of some hazards.<sup>3</sup> Reducing disaster risk is a cost-effective investment in preventing future losses.

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<sup>1</sup> A/CONF.206/6 and Corr.1, chap. I, resolution 2.

<sup>2</sup> Resilience is defined as: “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions”, United Nations Office for Disaster Risk Reduction (UNISDR), “2009 UNISDR Terminology on Disaster Risk Reduction”, Geneva, May 2009 (<http://www.unisdr.org/we/inform/terminology>).

<sup>3</sup> Hazard is defined in the Hyogo Framework for Action as: “A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards).

Effective disaster risk management contributes to sustainable development. Countries have enhanced their capacities in disaster risk management. International mechanisms for strategic advice, coordination and partnership development for disaster risk reduction, such as the Global Platform for Disaster Risk Reduction and the regional platforms for disaster risk reduction, as well as other relevant international and regional forums for cooperation, have been instrumental in the development of policies and strategies and the advancement of knowledge and mutual learning. Overall, the Hyogo Framework for Action has been an important instrument for raising public and institutional awareness, generating political commitment and focusing and catalysing actions by a wide range of stakeholders at all levels.

4. Over the same 10-year time frame, however, disasters have continued to exact a heavy toll, and as a result the well-being and safety of persons, communities and countries as a whole have been affected. Over 700 thousand people have lost their lives, over 1.4 million have been injured and approximately 23 million made homeless as a result of disasters. Overall, more than 1.5 billion people have been affected by disasters in various ways, with women, children and people in vulnerable situations disproportionately affected. The total economic loss was more than \$1.3 trillion. In addition, between 2008 and 2012, 144 million people were displaced by disasters. Disasters, many of which are exacerbated by climate change and which are increasing in frequency and intensity, significantly impede progress towards sustainable development. Evidence indicates that exposure of persons and assets in all countries has increased faster than vulnerability<sup>4</sup> has decreased, thus generating new risks and a steady rise in disaster-related losses, with a significant economic, social, health, cultural and environmental impact in the short, medium and long term, especially at the local and community levels. Recurring small-scale disasters and slow-onset disasters particularly affect communities, households and small and medium-sized enterprises, constituting a high percentage of all losses. All countries — especially developing countries, where the mortality and economic losses from disasters are disproportionately higher — are faced with increasing levels of possible hidden costs and challenges in order to meet financial and other obligations.

5. It is urgent and critical to anticipate, plan for and reduce disaster risk in order to more effectively protect persons, communities and countries, their livelihoods, health, cultural heritage, socioeconomic assets and ecosystems, and thus strengthen their resilience.

6. Enhanced work to reduce exposure and vulnerability, thus preventing the creation of new disaster risks, and accountability for disaster risk creation are needed at all levels. More dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change, weak institutional arrangements, non-risk-informed policies, lack of regulation and incentives for private disaster risk reduction investment, complex supply chains, limited availability of technology, unsustainable uses of natural resources, declining

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<sup>4</sup> Vulnerability is defined in the Hyogo Framework for Action as: “The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards”.

ecosystems, pandemics and epidemics. Moreover, it is necessary to continue strengthening good governance in disaster risk reduction strategies at the national, regional and global levels and improving preparedness and national coordination for disaster response, rehabilitation and reconstruction, and to use post-disaster recovery and reconstruction to “Build Back Better”, supported by strengthened modalities of international cooperation.

7. There has to be a broader and a more people-centred preventive approach to disaster risk. Disaster risk reduction practices need to be multi-hazard and multisectoral, inclusive and accessible in order to be efficient and effective. While recognizing their leading, regulatory and coordination role, Governments should engage with relevant stakeholders, including women, children and youth, persons with disabilities, poor people, migrants, indigenous peoples, volunteers, the community of practitioners and older persons in the design and implementation of policies, plans and standards. There is a need for the public and private sectors and civil society organizations, as well as academia and scientific and research institutions, to work more closely together and to create opportunities for collaboration, and for businesses to integrate disaster risk into their management practices.

8. International, regional, subregional and transboundary cooperation remains pivotal in supporting the efforts of States, their national and local authorities, as well as communities and businesses, to reduce disaster risk. Existing mechanisms may require strengthening in order to provide effective support and achieve better implementation. Developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, need special attention and support to augment domestic resources and capabilities through bilateral and multilateral channels in order to ensure adequate, sustainable, and timely means of implementation in capacity-building, financial and technical assistance and technology transfer, in accordance with international commitments.

9. Overall, the Hyogo Framework for Action has provided critical guidance in efforts to reduce disaster risk and has contributed to the progress towards the achievement of the Millennium Development Goals. Its implementation has, however, highlighted a number of gaps in addressing the underlying disaster risk factors, in the formulation of goals and priorities for action,<sup>5</sup> in the need to foster disaster resilience at all levels and in ensuring adequate means of implementation. The gaps indicate a need to develop an action-oriented framework that Governments and relevant stakeholders can implement in a supportive and complementary manner, and which helps to identify disaster risks to be managed and guides investment to improve resilience.

10. Ten years after the adoption of the Hyogo Framework for Action, disasters continue to undermine efforts to achieve sustainable development.

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<sup>5</sup> The Hyogo Framework priorities for action 2005-2015 are: (1) ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation; (2) identify, assess and monitor disaster risks and enhance early warning; (3) use knowledge, innovation and education to build a culture of safety and resilience at all levels; (4) reduce the underlying risk factors; and (5) strengthen disaster preparedness for effective response at all levels.

11. The intergovernmental negotiations on the post-2015 development agenda, financing for development, climate change and disaster risk reduction provide the international community with a unique opportunity to enhance coherence across policies, institutions, goals, indicators and measurement systems for implementation, while respecting their respective mandates. Ensuring credible links, as appropriate, between these processes will contribute to building resilience and achieving the global goal to eradicate poverty.

12. It is recalled that the outcome of the United Nations Conference on Sustainable Development, held in 2012, “The future we want”,<sup>6</sup> called for disaster risk reduction and the building of resilience to disasters to be addressed with a renewed sense of urgency in the context of sustainable development and poverty eradication and, as appropriate, to be integrated at all levels. The Conference also reaffirmed all the principles of the Rio Declaration on Environment and Development.<sup>7</sup>

13. Addressing climate change as one of the drivers of disaster risk, while respecting the mandate of the United Nations Framework Convention on Climate Change,<sup>8</sup> represents an opportunity to reduce disaster risk in a meaningful and coherent manner throughout the interrelated intergovernmental processes.

14. Against this background, and in order to reduce disaster risk, there is a need to address existing challenges and prepare for future ones by focusing on: monitoring, assessing and understanding disaster risk and sharing such information and how it is created; strengthening disaster risk governance and coordination across relevant institutions and sectors and the full and meaningful participation of relevant stakeholders at appropriate levels; investing in the economic, social, health, cultural and educational resilience of persons, communities and countries and the environment, as well as through technology and research; enhancing multi-hazard early warning systems, preparedness, response, recovery, rehabilitation and reconstruction. To complement national action and capacity, there is a need to enhance international cooperation between developed and developing countries and between States and international organizations.

15. This Framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.

## II. Expected outcome and goal

16. While some progress in building resilience and reducing losses and damages has been achieved, a substantial reduction of disaster risk requires perseverance and

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<sup>6</sup> A/RES/66/288, annex.

<sup>7</sup> *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

<sup>8</sup> The climate change issues mentioned in this Framework remain within the mandate of the United Nations Framework Convention on Climate Change under the competences of the Parties to the Convention.

persistence, with a more explicit focus on people and their health and livelihoods, and regular follow-up. Building on the Hyogo Framework for Action, this Framework aims to achieve the following outcome over the next 15 years:

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries

The realization of this outcome requires the strong commitment and involvement of political leadership in every country at all levels in the implementation and follow-up of this Framework and in the creation of the necessary conducive and enabling environment.

17. To attain the expected outcome, the following goal must be pursued:

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience

The pursuance of this goal requires the enhancement of the implementation capacity and capability of developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, including the mobilization of support through international cooperation for the provision of means of implementation in accordance with their national priorities.

18. To support the assessment of global progress in achieving the outcome and goal of this Framework, seven global targets have been agreed. These targets will be measured at the global level and will be complemented by work to develop appropriate indicators. National targets and indicators will contribute to the achievement of the outcome and goal of this Framework. The seven global targets are:

(a) Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015;

(b) Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020-2030 compared to the period 2005-2015;<sup>9</sup>

(c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;

(d) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;

(e) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;

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<sup>9</sup> Categories of affected people will be elaborated in the process for post-Sendai work decided by the Conference.



(f) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030;

(g) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030;

### III. Guiding principles

19. Drawing from the principles contained in the Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action<sup>10</sup> and the Hyogo Framework for Action, the implementation of this Framework will be guided by the following principles, while taking into account national circumstances, and consistent with domestic laws as well as international obligations and commitments:

(a) Each State has the primary responsibility to prevent and reduce disaster risk, including through international, regional, subregional, transboundary and bilateral cooperation. The reduction of disaster risk is a common concern for all States and the extent to which developing countries are able to effectively enhance and implement national disaster risk reduction policies and measures in the context of their respective circumstances and capabilities can be further enhanced through the provision of sustainable international cooperation;

(b) Disaster risk reduction requires that responsibilities be shared by central Governments and relevant national authorities, sectors and stakeholders, as appropriate to their national circumstances and systems of governance;

(c) Managing the risk of disasters is aimed at protecting persons and their property, health, livelihoods and productive assets, as well as cultural and environmental assets, while promoting and protecting all human rights, including the right to development;

(d) Disaster risk reduction requires an all-of-society engagement and partnership. It also requires empowerment and inclusive, accessible and non-discriminatory participation, paying special attention to people disproportionately affected by disasters, especially the poorest. A gender, age, disability and cultural perspective should be integrated in all policies and practices, and women and youth leadership should be promoted. In this context, special attention should be paid to the improvement of organized voluntary work of citizens;

(e) Disaster risk reduction and management depends on coordination mechanisms within and across sectors and with relevant stakeholders at all levels, and it requires the full engagement of all State institutions of an executive and legislative nature at national and local levels and a clear articulation of responsibilities across public and private stakeholders, including business and academia, to ensure mutual outreach, partnership, complementarity in roles and accountability and follow-up;

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<sup>10</sup> A/CONF.172/9, chap. I, resolution 1, annex I.

(f) While the enabling, guiding and coordinating role of national and federal State Governments remain essential, it is necessary to empower local authorities and local communities to reduce disaster risk, including through resources, incentives and decision-making responsibilities, as appropriate;

(g) Disaster risk reduction requires a multi-hazard approach and inclusive risk-informed decision-making based on the open exchange and dissemination of disaggregated data, including by sex, age and disability, as well as on easily accessible, up-to-date, comprehensible, science-based, non-sensitive risk information, complemented by traditional knowledge;

(h) The development, strengthening and implementation of relevant policies, plans, practices and mechanisms need to aim at coherence, as appropriate, across sustainable development and growth, food security, health and safety, climate change and variability, environmental management and disaster risk reduction agendas. Disaster risk reduction is essential to achieve sustainable development;

(i) While the drivers of disaster risk may be local, national, regional or global in scope, disaster risks have local and specific characteristics that must be understood for the determination of measures to reduce disaster risk;

(j) Addressing underlying disaster risk factors through disaster risk-informed public and private investments is more cost-effective than primary reliance on post-disaster response and recovery, and contributes to sustainable development;

(k) In the post-disaster recovery, rehabilitation and reconstruction phase it is critical to prevent the creation of and to reduce disaster risk by “Building Back Better” and increasing public education and awareness of disaster risk;

(l) An effective and meaningful global partnership and the further strengthening of international cooperation, including the fulfilment of respective commitments of official development assistance by developed countries, are essential for effective disaster risk management;

(m) Developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income and other countries facing specific disaster risk challenges, need adequate, sustainable and timely provision of support, including through finance, technology transfer and capacity-building from developed countries and partners tailored to their needs and priorities, as identified by them.

#### **IV. Priorities for action**

20. Taking into account the experience gained through the implementation of the Hyogo Framework for Action, and in pursuance of the expected outcome and goal, there is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas:

1. Understanding disaster risk.
2. Strengthening disaster risk governance to manage disaster risk.
3. Investing in disaster risk reduction for resilience.

4. Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction.

21. In their approach to disaster risk reduction, States, regional and international organizations and other relevant stakeholders should take into consideration the key activities listed under each of these four priorities and should implement them, as appropriate, taking into consideration respective capacities and capabilities, in line with national laws and regulations.

22. In the context of increasing global interdependence, concerted international cooperation, an enabling international environment and means of implementation are needed to stimulate and contribute to developing the knowledge, capacities and motivation for disaster risk reduction at all levels, in particular for developing countries.

### **Priority 1. Understanding disaster risk**

23. Policies and practices for disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be leveraged for the purpose of pre-disaster risk assessment, for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response to disasters.

#### **National and local levels**

24. To achieve this, it is important to:

(a) Promote the collection, analysis, management and use of relevant data and practical information. Ensure its dissemination, taking into account the needs of different categories of users, as appropriate;

(b) Encourage the use of and strengthening of baselines and periodically assess disaster risks, vulnerability, capacity, exposure, hazard characteristics and their possible sequential effects at the relevant social and spatial scale on ecosystems, in line with national circumstances;

(c) Develop, periodically update and disseminate, as appropriate, location-based disaster risk information, including risk maps, to decision makers, the general public and communities at risk of exposure to disaster in an appropriate format by using, as applicable, geospatial information technology;

(d) Systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information;

(e) Make non-sensitive hazard exposure, vulnerability, risk, disaster and loss-disaggregated information freely available and accessible, as appropriate;

(f) Promote real-time access to reliable data, make use of space and in situ information, including geographic information systems (GIS), and use information and communications technology innovations to enhance measurement tools and the collection, analysis and dissemination of data;

(g) Build the knowledge of government officials at all levels, civil society, communities and volunteers, as well as the private sector, through sharing experiences, lessons learned, good practices and training and education on disaster risk reduction, including the use of existing training and education mechanisms and peer learning;

(h) Promote and improve dialogue and cooperation among scientific and technological communities, other relevant stakeholders and policymakers in order to facilitate a science-policy interface for effective decision-making in disaster risk management;

(i) Ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans and programmes of specific sectors, with a cross-sectoral approach, which should be tailored to localities and to the context;

(j) Strengthen technical and scientific capacity to capitalize on and consolidate existing knowledge and to develop and apply methodologies and models to assess disaster risks, vulnerabilities and exposure to all hazards;

(k) Promote investments in innovation and technology development in long-term, multi-hazard and solution-driven research in disaster risk management to address gaps, obstacles, interdependencies and social, economic, educational and environmental challenges and disaster risks;

(l) Promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and non-formal education, as well as in civic education at all levels, as well as in professional education and training;

(m) Promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;

(n) Apply risk information in all its dimensions of vulnerability, capacity and exposure of persons, communities, countries and assets, as well as hazard characteristics, to develop and implement disaster risk reduction policies;

(o) Enhance collaboration among people at the local level to disseminate disaster risk information through the involvement of community-based organizations and non-governmental organizations.

### **Global and regional levels**

25. To achieve this, it is important to:

(a) Enhance the development and dissemination of science-based methodologies and tools to record and share disaster losses and relevant disaggregated data and statistics, as well as to strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems;

(b) Promote the conduct of comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios;

(c) Promote and enhance, through international cooperation, including technology transfer, access to and the sharing and use of non-sensitive data and information, as appropriate, communications and geospatial and space-based technologies and related services; maintain and strengthen in situ and remotely-sensed earth and climate observations; and strengthen the utilization of media, including social media, traditional media, big data and mobile phone networks, to support national measures for successful disaster risk communication, as appropriate and in accordance with national laws;

(d) Promote common efforts in partnership with the scientific and technological community, academia and the private sector to establish, disseminate and share good practices internationally;

(e) Support the development of local, national, regional and global user-friendly systems and services for the exchange of information on good practices, cost-effective and easy-to-use disaster risk reduction technologies and lessons learned on policies, plans and measures for disaster risk reduction;

(f) Develop effective global and regional campaigns as instruments for public awareness and education, building on the existing ones (for example, the “One Million Safe Schools and Hospitals” initiative, the “Making Cities Resilient: my city is getting ready!” campaign, the United Nations Sasakawa Award for Disaster Reduction and the annual United Nations International Day for Disaster Reduction), to promote a culture of disaster prevention, resilience and responsible citizenship, generate understanding of disaster risk, support mutual learning and share experiences; and encourage public and private stakeholders to actively engage in such initiatives and to develop new ones at the local, national, regional and global levels;

(g) Enhance the scientific and technical work on disaster risk reduction and its mobilization through the coordination of existing networks and scientific research institutions at all levels and in all regions, with the support of the UNISDR Scientific and Technical Advisory Group, in order to: strengthen the evidence-base in support of the implementation of this Framework; promote scientific research on disaster risk patterns, causes and effects; disseminate risk information with the best use of geospatial information technology; provide guidance on methodologies and standards for risk assessments, disaster risk modelling and the use of data; identify research and technology gaps and set recommendations for research priority areas in disaster risk reduction; promote and support the availability and application of science and technology to decision-making; contribute to the update of the publication “2009 UNISDR Terminology on Disaster Risk Reduction”; use post-disaster reviews as opportunities to enhance learning and public policy; and disseminate studies;

(h) Encourage the availability of copyrighted and patented materials, including through negotiated concessions, as appropriate;

(i) Enhance access to and support for innovation and technology, as well as in long-term, multi-hazard and solution-driven research and development in the field of disaster risk management.

## **Priority 2. Strengthening disaster risk governance to manage disaster risk**

26. Disaster risk governance at the national, regional and global levels is of great importance for an effective and efficient management of disaster risk. Clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders, are needed. Strengthening disaster risk governance for prevention, mitigation, preparedness, response, recovery and rehabilitation is therefore necessary and fosters collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development.

### **National and local levels**

27. To achieve this, it is important to:

(a) Mainstream and integrate disaster risk reduction within and across all sectors and review and promote the coherence and further development, as appropriate, of national and local frameworks of laws, regulations and public policies, which, by defining roles and responsibilities, guide the public and private sectors in: (i) addressing disaster risk in publically owned, managed or regulated services and infrastructures; (ii) promoting and providing incentives, as relevant, for actions by persons, households, communities and businesses; (iii) enhancing relevant mechanisms and initiatives for disaster risk transparency, which may include financial incentives, public awareness-raising and training initiatives, reporting requirements and legal and administrative measures; and (iv) putting in place coordination and organizational structures;

(b) Adopt and implement national and local disaster risk reduction strategies and plans, across different timescales, with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience;

(c) Carry out an assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at the local and national levels;

(d) Encourage the establishment of necessary mechanisms and incentives to ensure high levels of compliance with the existing safety-enhancing provisions of sectoral laws and regulations, including those addressing land use and urban planning, building codes, environmental and resource management and health and safety standards, and update them, where needed, to ensure an adequate focus on disaster risk management;

(e) Develop and strengthen, as appropriate, mechanisms to follow up, periodically assess and publicly report on progress on national and local plans. Promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction;

(f) Assign, as appropriate, clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks and undertake comprehensive

public and community consultations during the development of such laws and regulations to support their implementation;

(g) Establish and strengthen government coordination forums composed of relevant stakeholders at the national and local levels, such as national and local platforms for disaster risk reduction, and a designated national focal point for implementing the Sendai Framework for Disaster Risk Reduction. It is necessary for such mechanisms to have a strong foundation in national institutional frameworks with clearly assigned responsibilities and authority to, inter alia, identify sectoral and multisectoral disaster risk, build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, contribute to and coordinate reports on local and national disaster risk, coordinate public awareness campaigns on disaster risk, facilitate and support local multisectoral cooperation (e.g. among local governments) and contribute to the determination of and reporting on national and local disaster risk management plans and all policies relevant for disaster risk management. These responsibilities should be established through laws, regulations, standards and procedures;

(h) Empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level;

(i) Encourage parliamentarians to support the implementation of disaster risk reduction by developing new or amending relevant legislation and setting budget allocations;

(j) Promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations;

(k) Formulate public policies, where applicable, aimed at addressing the issues of prevention or relocation, where possible, of human settlements in disaster-risk-prone zones, subject to national law and legal systems.

### **Global and regional levels**

28. To achieve this, it is important to:

(a) Guide action at the regional level through agreed regional and subregional strategies and mechanisms for cooperation for disaster risk reduction, as appropriate, in the light of this Framework, in order to foster more efficient planning, create common information systems and exchange good practices and programmes for cooperation and capacity development, in particular to address common and transboundary disaster risks;

(b) Foster collaboration across global and regional mechanisms and institutions for the implementation and coherence of instruments and tools relevant to disaster risk reduction, such as for climate change, biodiversity, sustainable development, poverty eradication, environment, agriculture, health, food and nutrition and others, as appropriate;

(c) Actively engage in the Global Platform for Disaster Risk Reduction, the regional and subregional platforms for disaster risk reduction and the thematic platforms in order to forge partnerships, periodically assess progress on

implementation and share practice and knowledge on disaster risk-informed policies, programmes and investments, including on development and climate issues, as appropriate, as well as to promote the integration of disaster risk management in other relevant sectors. Regional intergovernmental organizations should play an important role in the regional platforms for disaster risk reduction;

(d) Promote transboundary cooperation to enable policy and planning for the implementation of ecosystem-based approaches with regard to shared resources, such as within river basins and along coastlines, to build resilience and reduce disaster risk, including epidemic and displacement risk;

(e) Promote mutual learning and exchange of good practices and information through, inter alia, voluntary and self-initiated peer reviews among interested States;

(f) Promote the strengthening of, as appropriate, international voluntary mechanisms for monitoring and assessment of disaster risks, including relevant data and information, benefiting from the experience of the Hyogo Framework for Action Monitor. Such mechanisms may promote the exchange of non-sensitive information on disaster risks to the relevant national Government bodies and stakeholders in the interest of sustainable social and economic development.

### **Priority 3. Investing in disaster risk reduction for resilience**

29. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation.

#### **National and local levels**

30. To achieve this, it is important to:

(a) Allocate the necessary resources, including finance and logistics, as appropriate, at all levels of administration for the development and the implementation of disaster risk reduction strategies, policies, plans, laws and regulations in all relevant sectors;

(b) Promote mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on governments and societies, in urban and rural areas;

(c) Strengthen, as appropriate, disaster resilient public and private investments, particularly through: structural, non-structural and functional disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and physical infrastructures; building better from the start to withstand hazards through proper design and construction, including the use of the principles of universal design and the standardization of building materials; retrofitting and rebuilding; nurturing a culture of maintenance; and taking into account economic, social, structural, technological and environmental impact assessments;



(d) Protect or support the protection of cultural and collecting institutions and other sites of historical, cultural heritage and religious interest;

(e) Promote the disaster risk resilience of workplaces through structural and non-structural measures;

(f) Promote the mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes;

(g) Promote the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal flood plain areas, drylands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help reduce risks;

(h) Encourage the revision of existing or the development of new building codes and standards and rehabilitation and reconstruction practices at the national or local levels, as appropriate, with the aim of making them more applicable within the local context, particularly in informal and marginal human settlements, and reinforce the capacity to implement, survey and enforce such codes through an appropriate approach, with a view to fostering disaster-resistant structures;

(i) Enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level; developing the capacity of health workers in understanding disaster risk and applying and implementing disaster risk reduction approaches in health work; promoting and enhancing the training capacities in the field of disaster medicine; and supporting and training community health groups in disaster risk reduction approaches in health programmes, in collaboration with other sectors, as well as in the implementation of the International Health Regulations (2005) of the World Health Organization;

(j) Strengthen the design and implementation of inclusive policies and social safety-net mechanisms, including through community involvement, integrated with livelihood enhancement programmes, and access to basic health-care services, including maternal, newborn and child health, sexual and reproductive health, food security and nutrition, housing and education, towards the eradication of poverty, to find durable solutions in the post-disaster phase and to empower and assist people disproportionately affected by disasters;

(k) People with life threatening and chronic disease, due to their particular needs, should be included in the design of policies and plans to manage their risks before, during and after disasters, including having access to life-saving services;

(l) Encourage the adoption of policies and programmes addressing disaster-induced human mobility to strengthen the resilience of affected people and that of host communities, in accordance with national laws and circumstances;

(m) Promote, as appropriate, the integration of disaster risk reduction considerations and measures in financial and fiscal instruments;

(n) Strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction;

(o) Increase business resilience and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices;

(p) Strengthen the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds;

(q) Promote and integrate disaster risk management approaches throughout the tourism industry, given the often heavy reliance on tourism as a key economic driver.

### **Global and regional levels**

31. To achieve this, it is important to:

(a) Promote coherence across systems, sectors and organizations related to sustainable development and to disaster risk reduction in their policies, plans, programmes and processes;

(b) Promote the development and strengthening of disaster risk transfer and sharing mechanisms and instruments in close cooperation with partners in the international community, business, international financial institutions and other relevant stakeholders;

(c) Promote cooperation between academic, scientific and research entities and networks and the private sector to develop new products and services to help reduce disaster risk, in particular those that would assist developing countries and their specific challenges;

(d) Encourage the coordination between global and regional financial institutions with a view to assessing and anticipating the potential economic and social impacts of disasters;

(e) Enhance cooperation between health authorities and other relevant stakeholders to strengthen country capacity for disaster risk management for health, the implementation of the International Health Regulations (2005) and the building of resilient health systems;

(f) Strengthen and promote collaboration and capacity-building for the protection of productive assets, including livestock, working animals, tools and seeds;

(g) Promote and support the development of social safety nets as disaster risk reduction measures linked to and integrated with livelihood enhancement programmes in order to ensure resilience to shocks at the household and community levels;

(h) Strengthen and broaden international efforts aimed at eradicating hunger and poverty through disaster risk reduction;

(i) Promote and support collaboration among relevant public and private stakeholders to enhance the resilience of business to disasters.

#### **Priority 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction**

32. The steady growth of disaster risk, including the increase of people and assets exposure, combined with the lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. Empowering women and persons with disabilities to publicly lead and promote gender equitable and universally accessible response, recovery rehabilitation and reconstruction approaches are key. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

##### **National and local levels**

33. To achieve this, it is important to:

(a) Prepare or review and periodically update disaster preparedness and contingency policies, plans and programmes with the involvement of the relevant institutions, considering climate change scenarios and their impact on disaster risk, and facilitating, as appropriate, the participation of all sectors and relevant stakeholders;

(b) Invest in, develop, maintain and strengthen people-centred multi-hazard, multisectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems. Develop such systems through a participatory process. Tailor them to the needs of users, including social and cultural requirements, in particular gender. Promote the application of simple and low-cost early warning equipment and facilities and broaden release channels for natural disaster early warning information;

(c) Promote the resilience of new and existing critical infrastructure, including water, transportation and telecommunications infrastructure, educational facilities, hospitals and other health facilities, to ensure that they remain safe, effective and operational during and after disasters in order to provide live-saving and essential services;

(d) Establish community centres for the promotion of public awareness and the stockpiling of necessary materials to implement rescue and relief activities;

(e) Adopt public policies and actions that support the role of public service workers to establish or strengthen coordination and funding mechanisms and procedures for relief assistance and plan and prepare for post-disaster recovery and reconstruction;

(f) Train the existing workforce and voluntary workers in disaster response and strengthen technical and logistical capacities to ensure better response in emergencies;

(g) Ensure the continuity of operations and planning, including social and economic recovery, and the provision of basic services in the post-disaster phase;

(h) Promote regular disaster preparedness, response and recovery exercises, including evacuation drills, training and the establishment of area-based support systems, with a view to ensuring rapid and effective response to disasters and related displacement, including access to safe shelter, essential food and non-food relief supplies, as appropriate to local needs;

(i) Promote the cooperation of diverse institutions, multiple authorities and related stakeholders at all levels, including affected communities and business, in view of the complex and costly nature of post-disaster reconstruction, under the coordination of national authorities;

(j) Promote the incorporation of disaster risk management into post-disaster recovery and rehabilitation processes, facilitate the link between relief, rehabilitation and development, use opportunities during the recovery phase to develop capacities that reduce disaster risk in the short, medium and long term, including through the development of measures such as land use planning, structural standards improvement and the sharing of expertise, knowledge, post-disaster reviews and lessons learned and integrate post-disaster reconstruction into the economic and social sustainable development of affected areas. This should also apply to temporary settlements for persons displaced by disasters;

(k) Develop guidance for preparedness for disaster reconstruction, such as on land use planning and structural standards improvement, including by learning from the recovery and reconstruction programmes over the decade since the adoption of the Hyogo Framework for Action, and exchanging experiences, knowledge and lessons learned;

(l) Consider the relocation of public facilities and infrastructures to areas outside the risk range, wherever possible, in the post-disaster reconstruction process, in consultation with the people concerned, as appropriate;

(m) Strengthen the capacity of local authorities to evacuate persons living in disaster-prone areas;

(n) Establish a mechanism of case registry and a database of mortality caused by disaster in order to improve the prevention of morbidity and mortality;

(o) Enhance recovery schemes to provide psychosocial support and mental health services for all people in need;

(p) Review and strengthen, as appropriate, national laws and procedures on international cooperation, based on the guidelines for the domestic facilitation and regulation of international disaster relief and initial recovery assistance.

#### **Global and regional levels**

34. To achieve this, it is important to:

(a) Develop and strengthen, as appropriate, coordinated regional approaches and operational mechanisms to prepare for and ensure rapid and effective disaster response in situations that exceed national coping capacities;

(b) Promote the further development and dissemination of instruments, such as standards, codes, operational guides and other guidance instruments, to support coordinated action in disaster preparedness and response and facilitate information sharing on lessons learned and best practices for policy practice and post-disaster reconstruction programmes;

(c) Promote the further development of and investment in effective, nationally-compatible, regional multi-hazard early warning mechanisms, where relevant, in line with the Global Framework for Climate Services, and facilitate the sharing and exchange of information across all countries;

(d) Enhance international mechanisms, such as the International Recovery Platform, for the sharing of experience and learning among countries and all relevant stakeholders;

(e) Support, as appropriate, the efforts of relevant United Nations entities to strengthen and implement global mechanisms on hydrometeorological issues in order to raise awareness and improve understanding of water-related disaster risks and their impact on society, and advance strategies for disaster risk reduction upon the request of States;

(f) Support regional cooperation to deal with disaster preparedness, including through common exercises and drills;

(g) Promote regional protocols to facilitate the sharing of response capacities and resources during and after disasters;

(h) Train the existing workforce and volunteers in disaster response.

## V. Role of stakeholders

35. While States have the overall responsibility for reducing disaster risk, it is a shared responsibility between Governments and relevant stakeholders. In particular, non-State stakeholders play an important role as enablers in providing support to States, in accordance with national policies, laws and regulations, in the implementation of this Framework at local, national, regional and global levels. Their commitment, goodwill, knowledge, experience and resources will be required.

36. When determining specific roles and responsibilities for stakeholders, and at the same time building on existing relevant international instruments, States should encourage the following actions on the part of all public and private stakeholders:

(a) Civil society, volunteers, organized voluntary work organizations and community-based organizations to: participate, in collaboration with public institutions, to, inter alia, provide specific knowledge and pragmatic guidance in the context of the development and implementation of normative frameworks, standards and plans for disaster risk reduction; engage in the implementation of local, national, regional and global plans and strategies; contribute to and support public awareness, a culture of prevention and education on disaster risk; and advocate for resilient communities and an inclusive and all-of-society disaster risk management that strengthen synergies across groups, as appropriate. On this point, it should be noted that:

(i) Women and their participation are critical to effectively managing disaster risk and designing, resourcing and implementing gender-sensitive disaster risk reduction policies, plans and programmes; and adequate capacity building measures need to be taken to empower women for preparedness as well as to build their capacity to secure alternate means of livelihood in post-disaster situations;

(ii) Children and youth are agents of change and should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and educational curricula;

(iii) Persons with disabilities and their organizations are critical in the assessment of disaster risk and in designing and implementing plans tailored to specific requirements, taking into consideration, inter alia, the principles of universal design;

(iv) Older persons have years of knowledge, skills and wisdom, which are invaluable assets to reduce disaster risk, and they should be included in the design of policies, plans and mechanisms, including for early warning;

(v) Indigenous peoples, through their experience and traditional knowledge, provide an important contribution to the development and implementation of plans and mechanisms, including for early warning;

(vi) Migrants contribute to the resilience of communities and societies and their knowledge, skills and capacities can be useful in the design and implementation of disaster risk reduction;

(b) Academia, scientific and research entities and networks to: focus on the disaster risk factors and scenarios, including emerging disaster risks, in the medium and long term; increase research for regional, national and local application; support action by local communities and authorities; and support the interface between policy and science for decision-making;

(c) Business, professional associations and private sector financial institutions, including financial regulators and accounting bodies, as well as philanthropic foundations, to: integrate disaster risk management, including business continuity, into business models and practices through disaster-risk-informed investments, especially in micro, small and medium-sized enterprises; engage in awareness-raising and training for their employees and customers; engage in and support research and innovation, as well as technological development for disaster risk management; share and disseminate knowledge, practices and non-sensitive data; and actively participate, as appropriate and under the guidance of the public sector, in the development of normative frameworks and technical standards that incorporate disaster risk management;

(d) Media to: take an active and inclusive role at the local, national, regional and global levels in contributing to the raising of public awareness and understanding and disseminate accurate and non-sensitive disaster risk, hazard and disaster information, including on small-scale disasters, in a simple, transparent, easy-to-understand and accessible manner, in close cooperation with national authorities; adopt specific disaster risk reduction communications policies; support, as appropriate, early warning systems and life-saving protective measures; and stimulate a culture of prevention and strong community involvement in sustained

public education campaigns and public consultations at all levels of society, in accordance with national practices.

37. With reference to the General Assembly resolution 68/211 of 20 December 2013, commitments by relevant stakeholders are important in order to identify modalities of cooperation and to implement this Framework. Those commitments should be specific and time-bound in order to support the development of partnerships at local, national, regional and global levels and the implementation of local and national disaster risk reduction strategies and plans. All stakeholders are encouraged to publicize their commitments and their fulfilment in support of the implementation of this Framework, or of the national and local disaster risk management plans, through the website of the United Nations Office for Disaster Risk Reduction.

## **VI. International cooperation and global partnership**

### **General considerations**

38. Given their different capacities, as well as the linkage between the level of support provided to them and the extent to which they will be able to implement this Framework, developing countries require an enhanced provision of means of implementation, including adequate, sustainable and timely resources, through international cooperation and global partnerships for development, and continued international support, so as to strengthen their efforts to reduce disaster risk.

39. International cooperation for disaster risk reduction includes a variety of sources and is a critical element in supporting the efforts of developing countries to reduce disaster risk.

40. In addressing economic disparity and disparity in technological innovation and research capacity among countries, it is crucial to enhance technology transfer, involving a process of enabling and facilitating flows of skill, knowledge, ideas, know-how and technology from developed to developing countries in the implementation of this Framework.

41. Disaster-prone developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, warrant particular attention in view of their higher vulnerability and risk levels, which often greatly exceed their capacity to respond to and recover from disasters. Such vulnerability requires the urgent strengthening of international cooperation and ensuring genuine and durable partnerships at the regional and international levels in order to support developing countries to implement this Framework, in accordance with their national priorities and needs. Similar attention and appropriate assistance should also be extended to other disaster-prone countries with specific characteristics, such as archipelagic countries, as well as countries with extensive coastlines.

42. Disasters can disproportionately affect small island developing States, owing to their unique and particular vulnerabilities. The effects of disasters, some of which have increased in intensity and have been exacerbated by climate change, impede their progress towards sustainable development. Given the special case of small island developing States, there is a critical need to build resilience and to provide

particular support through the implementation of the outcome of the SIDS Accelerated Modalities of Action (SAMOA) Pathway<sup>11</sup> in the area of disaster risk reduction.

43. African countries continue to face challenges related to disasters and increasing risks, including those related to enhancing resilience of infrastructure, health and livelihoods. These challenges require increased international cooperation and the provision of adequate support to African countries to allow for the implementation of this Framework.

44. North-South cooperation, complemented by South-South and triangular cooperation, has proven to be key to reducing disaster risk and there is a need to further strengthen cooperation in both areas. Partnerships play an additional important role by harnessing the full potential of countries and supporting their national capacities in disaster risk management and in improving the social, health and economic well-being of individuals, communities and countries.

45. Efforts by developing countries offering South-South and triangular cooperation should not reduce North-South cooperation from developed countries as they complement North-South cooperation.

46. Financing from a variety of international sources, public and private transfer of reliable, affordable, appropriate and modern environmentally sound technology, on concessional and preferential terms, as mutually agreed, capacity-building assistance for developing countries and enabling institutional and policy environments at all levels are critically important means of reducing disaster risk.

#### **Means of implementation**

47. To achieve this, it is necessary to:

(a) Reaffirm that developing countries need enhanced provision of coordinated, sustained, and adequate international support for disaster risk reduction, in particular for the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, through bilateral and multilateral channels, including through enhanced technical and financial support and technology transfer on concessional and preferential terms, as mutually agreed, for the development and strengthening of their capacities;

(b) Enhance access of States, in particular developing countries, to finance, environmentally sound technology, science and inclusive innovation, as well as knowledge and information-sharing through existing mechanisms, namely bilateral, regional and multilateral collaborative arrangements, including the United Nations and other relevant bodies;

(c) Promote the use and expansion of thematic platforms of cooperation, such as global technology pools and global systems to share know-how, innovation and research and ensure access to technology and information on disaster risk reduction;

(d) Incorporate disaster risk reduction measures into multilateral and bilateral development assistance programmes within and across all sectors, as appropriate, related to poverty reduction, sustainable development, natural resource

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<sup>11</sup> General Assembly resolution 69/15, annex.



management, the environment, urban development and adaptation to climate change.

#### **Support from international organizations**

48. To support the implementation of this Framework, the following is necessary:

(a) The United Nations and other international and regional organizations, international and regional financial institutions and donor agencies engaged in disaster risk reduction are requested, as appropriate, to enhance the coordination of their strategies in this regard;

(b) The entities of the United Nations system, including the funds and programmes and the specialized agencies, through the United Nations Plan of Action on Disaster Risk Reduction for Resilience, United Nations Development Assistance Frameworks and country programmes, to promote the optimum use of resources and to support developing countries, at their request, in the implementation of this Framework, in coordination with other relevant frameworks, such as the International Health Regulations (2005), including through the development and the strengthening of capacities and clear and focused programmes that support the priorities of States in a balanced, well-coordinated and sustainable manner, within their respective mandates;

(c) The United Nations Office for Disaster Risk Reduction, in particular, is requested to support the implementation, follow-up and review of this Framework by: preparing periodic reviews on progress, in particular for the Global Platform, and, as appropriate, in a timely manner, along with the follow-up process at the United Nations, supporting the development of coherent global and regional follow-up and indicators, and in coordination, as appropriate, with other relevant mechanisms for sustainable development and climate change, and updating the existing web-based Hyogo Framework for Action Monitor accordingly; participating actively in the work of the Inter-Agency and Expert Group on Sustainable Development Indicators; generating evidence-based and practical guidance for implementation in close collaboration with States and through the mobilization of experts; reinforcing a culture of prevention among relevant stakeholders through supporting development of standards by experts and technical organizations, advocacy initiatives and dissemination of disaster risk information, policies and practices, as well as by providing education and training on disaster risk reduction through affiliated organizations; supporting countries, including through national platforms or their equivalent, in their development of national plans and monitoring trends and patterns in disaster risk, loss and impacts; convening the Global Platform for Disaster Risk Reduction and supporting the organization of regional platforms for disaster risk reduction in cooperation with regional organizations; leading the revision of the United Nations Plan of Action on Disaster Risk Reduction for Resilience; facilitating the enhancement of, and continuing to service, the UNISDR Scientific and Technical Advisory Group in mobilizing science and technical work on disaster risk reduction; leading, in close coordination with States, the update of the publication “2009 UNISDR Terminology on Disaster Risk Reduction”, in line with the terminology agreed upon by States; and maintaining the stakeholders’ commitment registry;

(d) International financial institutions, such as the World Bank and regional development banks, to consider the priorities of this Framework for providing financial support and loans for integrated disaster risk reduction to developing countries;

(e) Other international organizations and treaty bodies, including the Conference of the Parties to the United Nations Framework Convention on Climate Change, international financial institutions at the global and regional levels and the International Red Cross and the Red Crescent Movement to support developing countries, at their request, in the implementation of this Framework, in coordination with other relevant frameworks;

(f) The United Nations Global Compact, as the main United Nations initiative for engagement with the private sector and business, to further engage with and promote the critical importance of disaster risk reduction for sustainable development and resilience;

(g) The overall capacity of the United Nations system to assist developing countries in disaster risk reduction to be strengthened by providing adequate resources through various funding mechanisms, including increased, timely, stable and predictable contributions to the United Nations Trust Fund for Disaster Reduction and by enhancing the role of the Fund in relation to the implementation of this Framework;

(h) The Inter-Parliamentary Union and other relevant regional bodies and mechanisms for parliamentarians, as appropriate, to continue supporting and advocating disaster risk reduction and the strengthening of national legal frameworks;

(i) The United Cities and Local Governments organization and other relevant bodies of local governments to continue supporting cooperation and mutual learning among local governments for disaster risk reduction and the implementation of this Framework.

#### **Follow-up actions**

49. The Conference invites the General Assembly, at its seventieth session, to consider the possibility of including the review of the global progress in the implementation of the Sendai Framework for Disaster Risk Reduction as part of its integrated and coordinated follow-up processes to United Nations conferences and summits, aligned with the Economic and Social Council, the High-level Political Forum for Sustainable Development and the quadrennial comprehensive policy review cycles, as appropriate, taking into account the contributions of the Global Platform for Disaster Risk Reduction and regional platforms for disaster risk reduction and the Hyogo Framework for Action Monitor system.

50. The Conference recommends to the General Assembly the establishment, at its sixty-ninth session, of an open-ended intergovernmental working group, comprised of experts nominated by Member States, and supported by the United Nations Office for Disaster Risk Reduction, with involvement of relevant stakeholders, for the development of a set of possible indicators to measure global progress in the implementation of this Framework in conjunction with the work of the inter-agency expert group on sustainable development indicators. The Conference also recommends that the working group consider the recommendations of the UNISDR Scientific and Technical Advisory Group on the update of the “2009 UNISDR Terminology on Disaster Risk Reduction” by December 2016, and that the outcome of its work be submitted to the Assembly for its consideration and adoption.



# General Assembly

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## Third United Nations World Conference on Disaster Risk Reduction

Sendai, Japan, 14-18 March 2015

Agenda item 11

### Adoption of the final outcomes of the Conference

#### Sendai Declaration

1. We, the Heads of State and Government, ministers and delegates participating in the Third United Nations World Conference on Disaster Risk Reduction, have gathered from 14 to 18 March 2015 in Sendai City of Miyagi Prefecture in Japan, which has demonstrated a vibrant recovery from the Great East Japan Earthquake in March 2011. Recognizing the increasing impact of disasters and their complexity in many parts of the world, we declare our determination to enhance our efforts to strengthen disaster risk reduction to reduce losses of lives and assets from disasters worldwide.
2. We value the important role played by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters during the past 10 years. Having completed the assessment and review of and considered the experience gained under its implementation, we hereby adopt the Sendai Framework for Disaster Risk Reduction 2015-2030. We are strongly committed to the implementation of the new framework as the guide to enhance our efforts for the future.
3. We call all stakeholders to action, aware that the realization of the new framework depends on our unceasing and tireless collective efforts to make the world safer from the risk of disasters in the decades to come for the benefit of the present and future generations.
4. We thank the people and the Government of Japan as well as the City of Sendai for hosting the Third United Nations World Conference on Disaster Risk Reduction and extend our appreciation to Japan for its commitment to advancing disaster risk reduction in the global development agenda.



18 March 2015

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### **Stakeholders' voluntary commitments**

The Third United Nations World Conference on Disaster Risk Reduction,

1. Welcomes the stakeholders' expression of voluntary commitments to reduce disaster risk.
2. Invites further expressions of voluntary commitments and the creation of partnerships to implement the Sendai Framework for Disaster Risk Reduction 2015-2030.