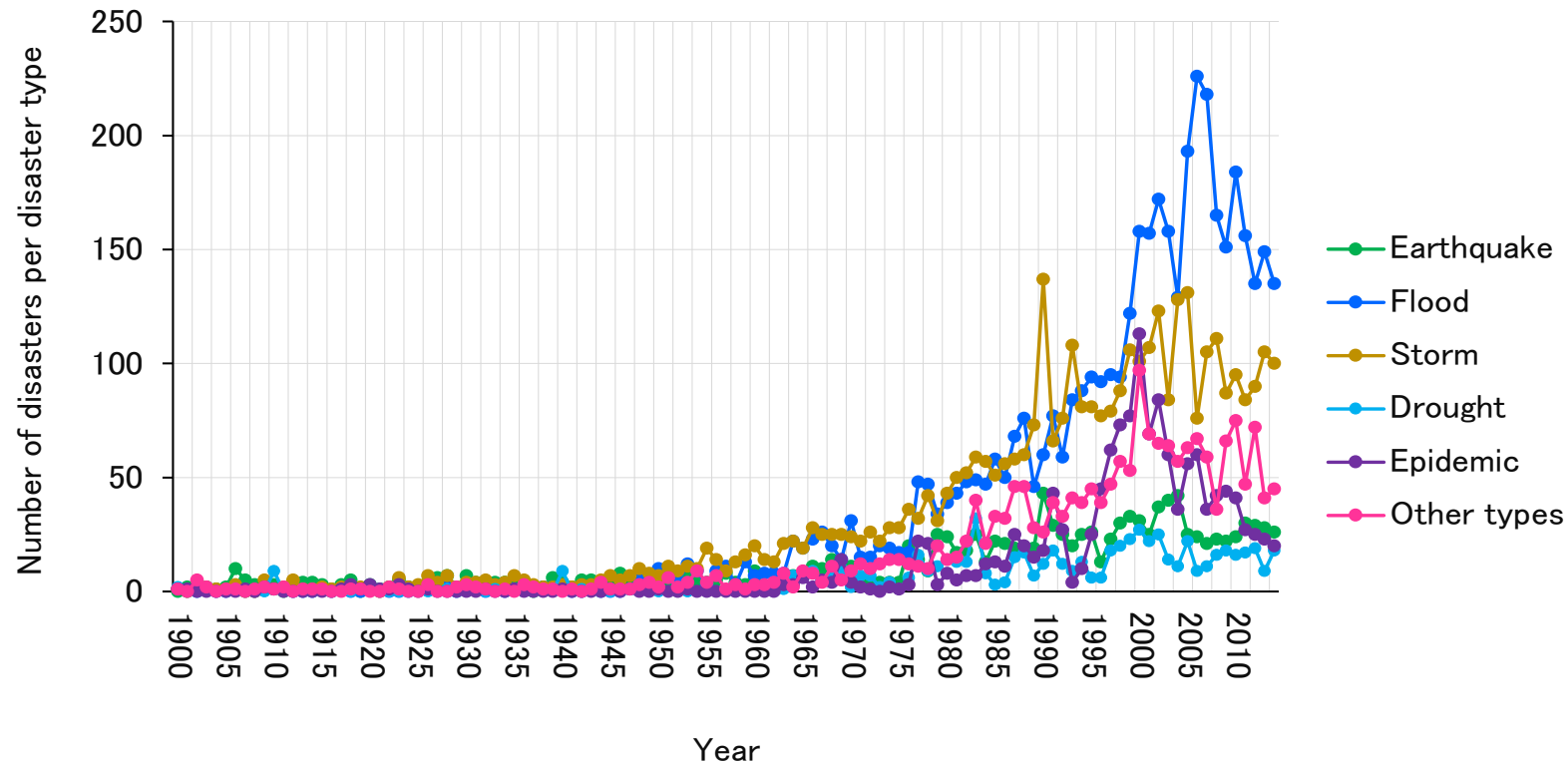
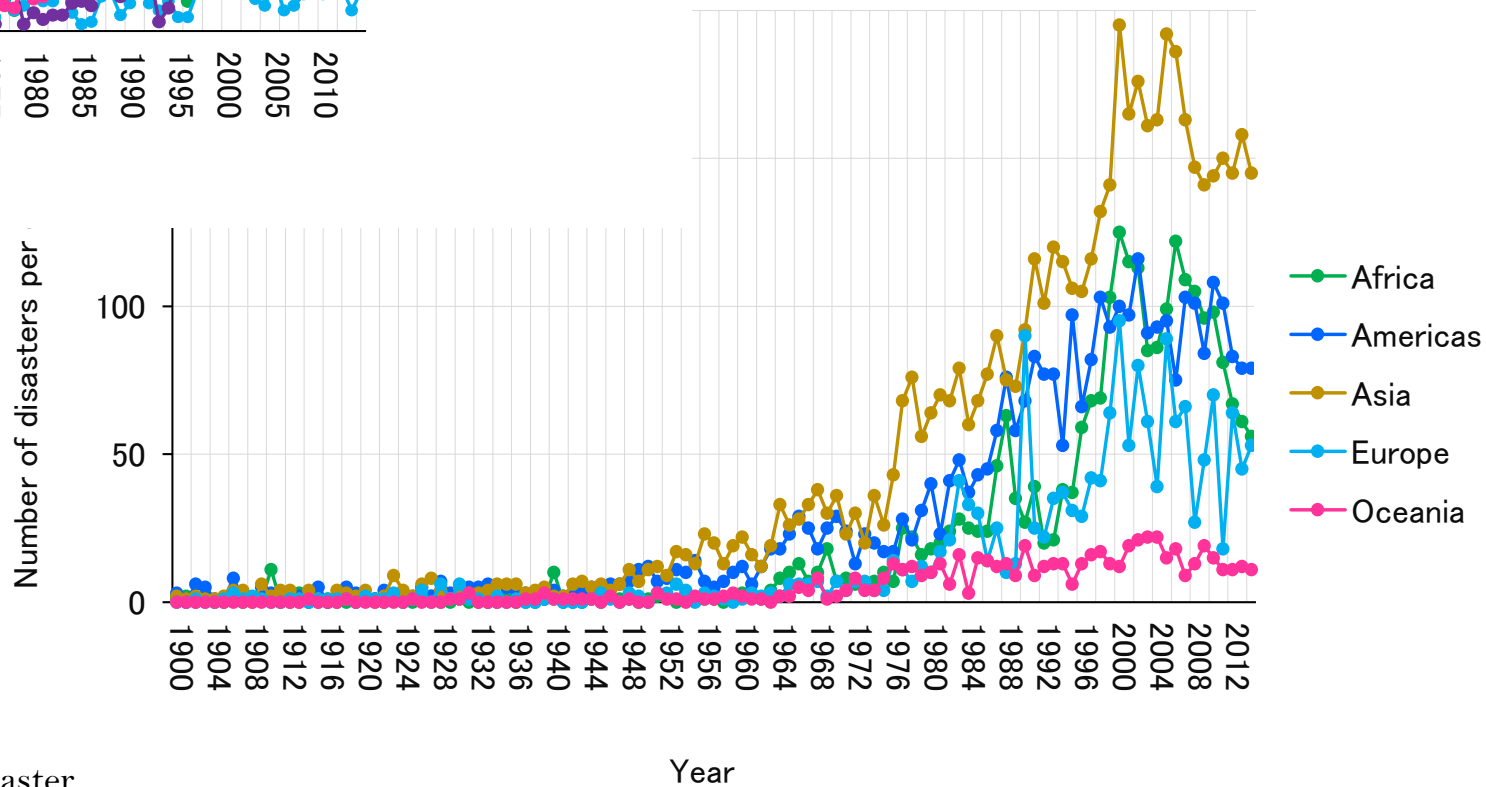


Dealing with Disaster Wastes in Japan

Prof. Shinichi Sakai, Kyoto University



Trend of Natural Disaster



Points;

- Flood & Storm (*CC impact*)
- All Region
- Asia (+ *Urbanization*)

March 11, 2011

- 14:46 the Great East Japan Earthquake
 - M 9.0 (depth 24km) [2nd M 8.2; World 4th, 1900-]
 - 130km away from the seashore
- 16:00 Tsunami



Establishment of the JSMCWM (Japan Society of Material Cycles and Waste Management) task team

- **By 14 March**, many suggestions from young researchers of JSMCWM (Japanese society of material cycle and waste management) to deal with disaster waste.
- **18 March**: The Task team on Disaster Waste Management and Reconstruction was established.
 - More than 150 members, including not only researchers but also private engineers, citizens and personnel related to local authorities.
- Opinions and information have been exchanged actively through a website and a mailing list.
 - <http://eprc.kyoto-u.ac.jp/saigai/>

The objectives of establishing the task team

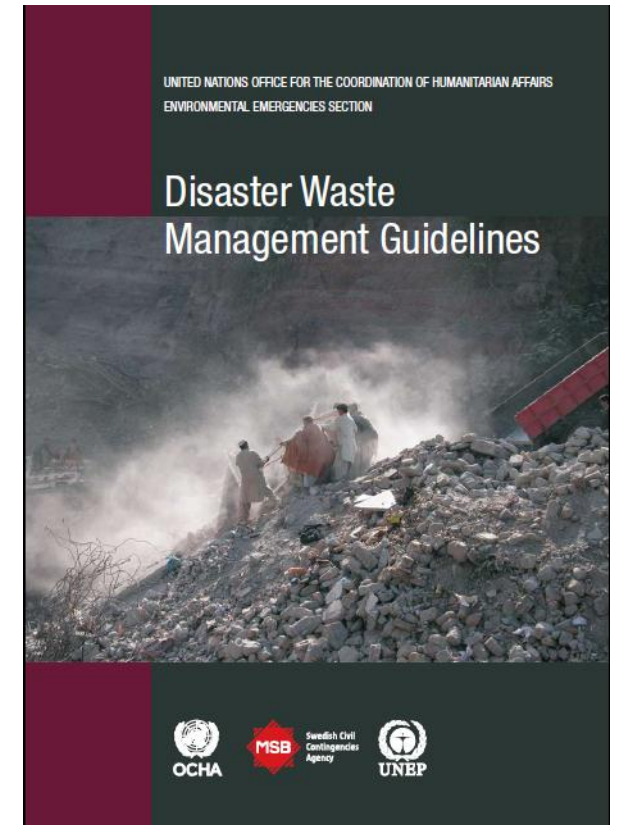
1. Establishment of **a platform for information** about disaster waste.
2. **Networking of different stakeholders** for better management against disaster waste
3. **Documentation** and dissemination **of experiences** and knowledge obtained through activities in disaster area (Revision of the Japanese guidelines).



One of the major tasks was to make the manual “**Strategy of separation and treatment of disaster waste**” which is taken into account

Existing guidelines for disaster waste (2011)

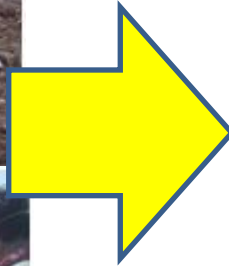
- In Japan...2 Guidelines
- In other countries...US FEMA, EPA and some states in USA etc.
- In the World...
 - United Nations Office for the Coordination of Humanitarian Affairs Environmental Emergencies Section Disaster Waste Management Guidelines (UNOCHA guidelines, 2012)
 - The WHO Technical Notes on Drinking water, Sanitation and Hygiene in Emergencies etc.



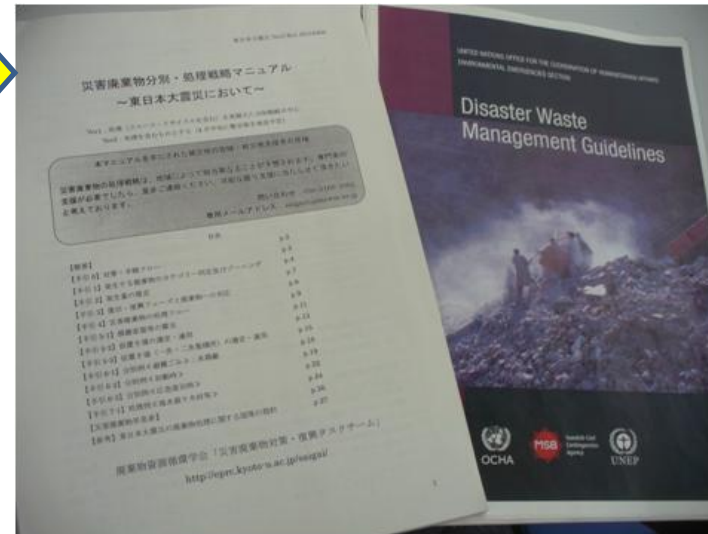
No information about TSUNAMI wastes or detailed management techniques

Field activity and fact (issue) finding from 25th March 2011

Development and dissemination of the manual



1st version (30 pages) on 4 April 2011



A book published in May 2012



Separation from the beginning



Wait their turn and report items



Sorted storage
(e.g. WEEE)

Metals



Mixed waste
(to separation)

Wood, tires, combustible waste, dishes, concrete, etc.

In Sendai city (2011)

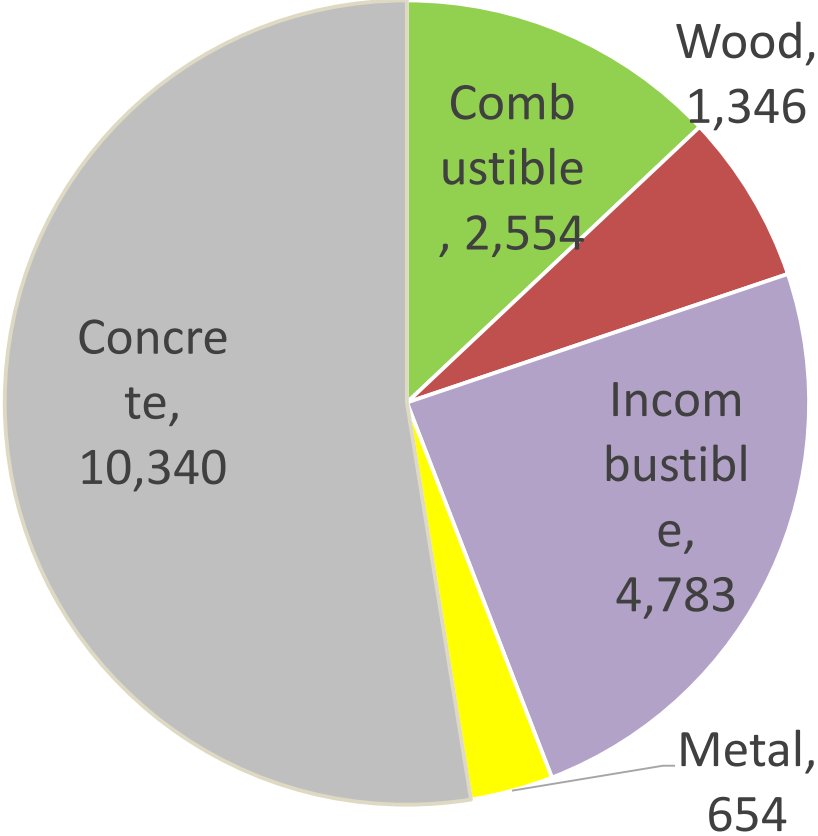
Special care for some items

Governmental staff of Sendai city collected memorabilia. Volunteers removed dirt from them and posted at the entrance of a cultural center for finding. (April 2011, Sendai city)

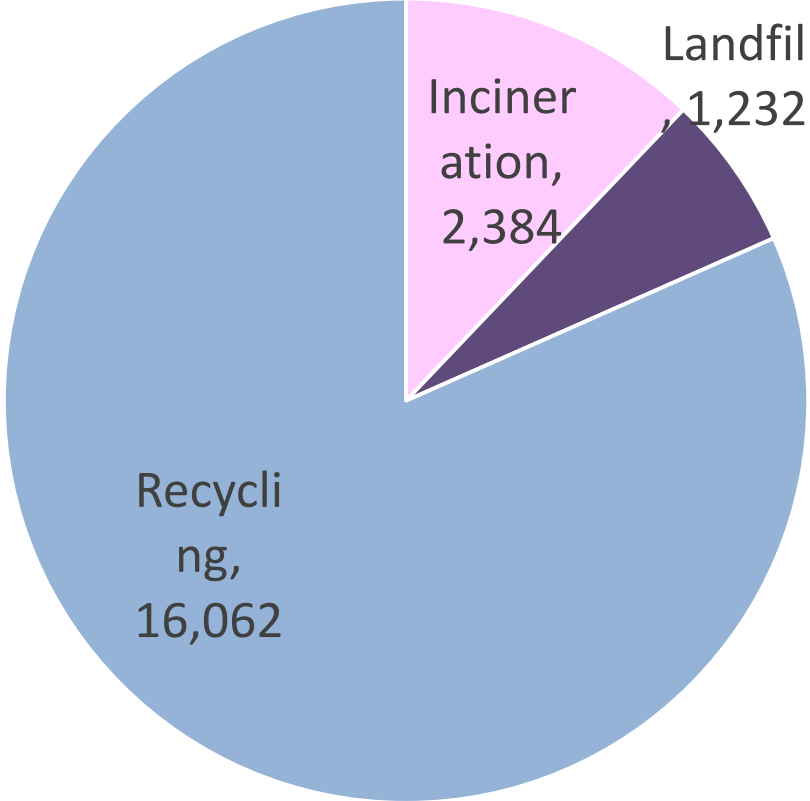


Recycling for disaster waste

Disaster waste components (1,000 ton; wet weight) beside Tsunami sediment



Treatment method of disaster waste (1,000 ton; wet weight) beside Tsunami sediment



Almost 100% of Tsunami sediment (11,000ton) was recycled.

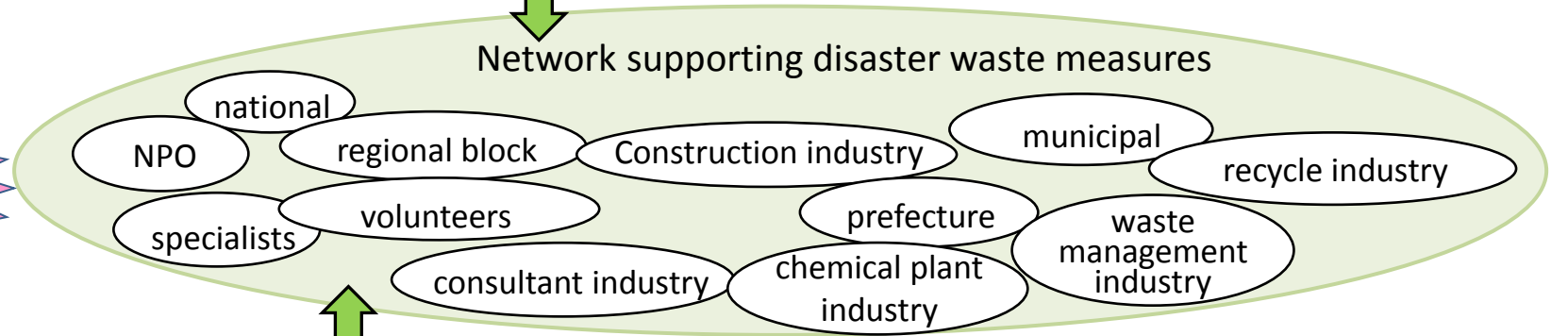
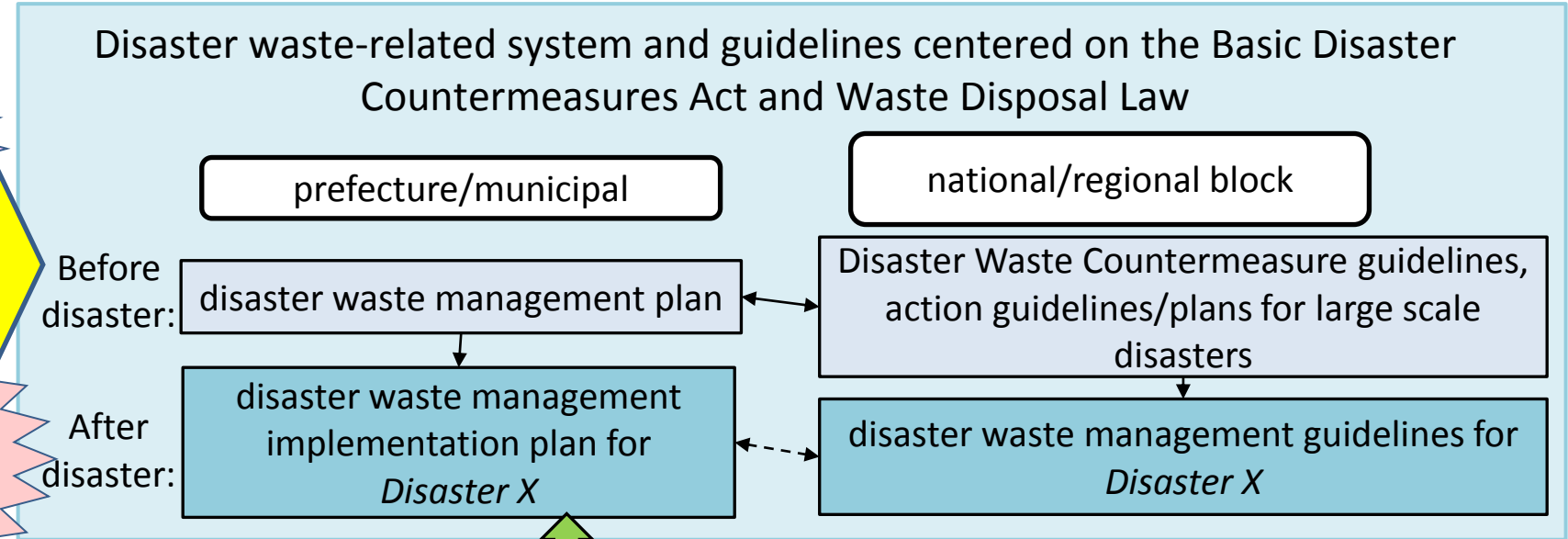
http://www.nikkenren.com/doboku/saigai/pdf/report/data_gaiyou.pdf

Improvement and challenges

Great East Japan Earthquake (2011): management required a long period of time, became a social problem

A Strong Nankai Trough Earthquake: estimates of being over 10 times stronger than the Great East Japan Earthquake

Responses to the disasters constantly occurring every year (frequent and large scale)



Continuous issues and progress of disaster waste measures

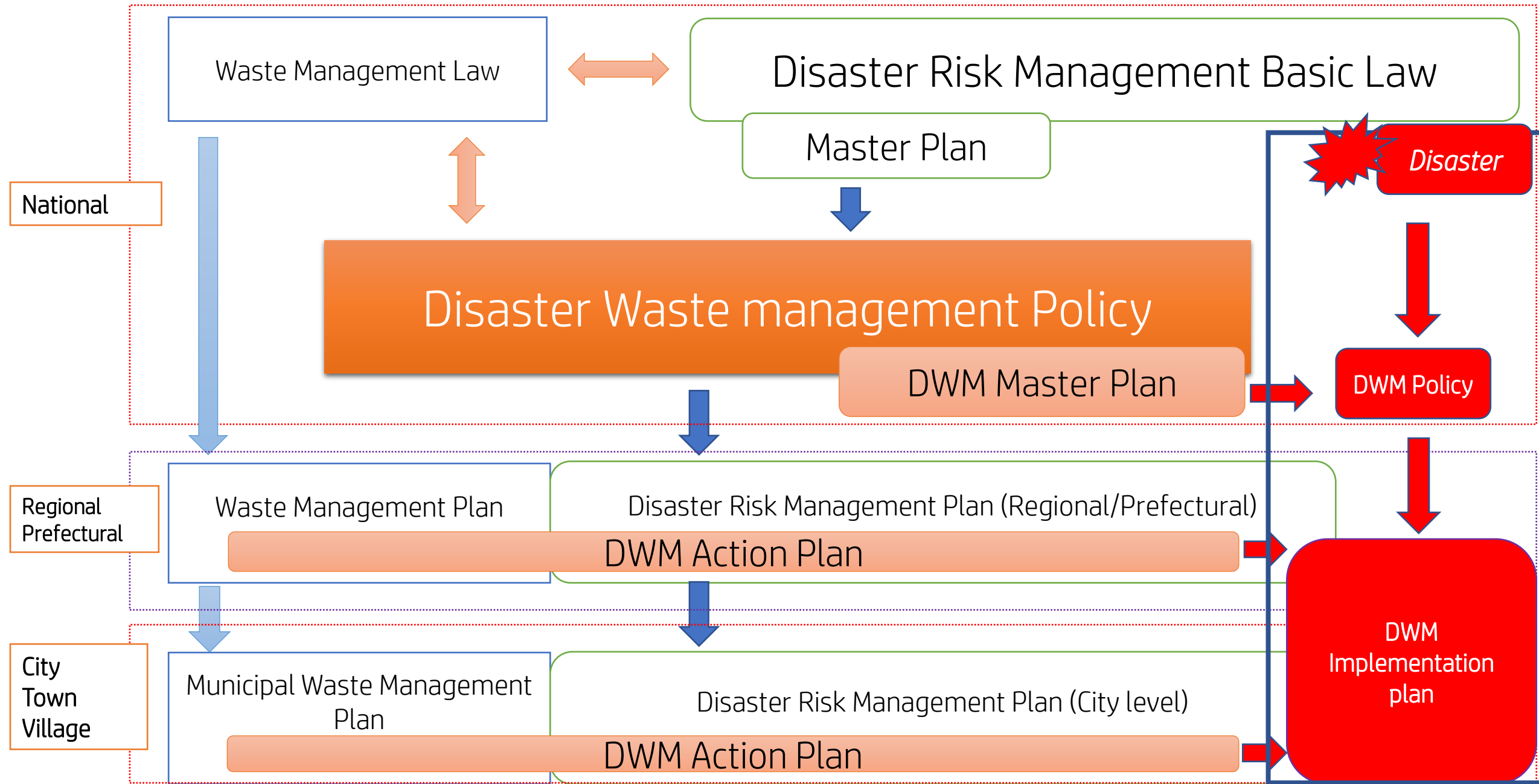
(1) Cultivating knowledge from and reflecting on small scale disasters

(2) Executing a system with progress in wide-scale coordination (connected to Basic Waste Disposal and Public Cleaning Policy and grants)

(3) Investigating whether the 3Rs are being implemented for cultivated stock materials

(4) Sharing experiences of disaster measures with various places around the world and international coordination

Example of improvement in Japan after 2011 earthquake and Tsunami



Disaster Waste Treatment Network (D.Waste-Net)

(Established on Sep.16, 2015)

D.Waste-Net

Group for initial motion/emergency response (initial)

Support for Activities

MOE

(Secretariat)

Support for Activities

Group for recovery/restoration (medium to long term)

Request

Request

- To secure/manage temporary storage sites, on-site support on how to treat items difficult to dispose of, etc.
- To support for collecting, transporting and disposing of residential waste (incl. waste from shelters) and clean up waste and so on

Request of Cooperation

- Technical support for drawing out a disaster waste management action plan
- To construct a scheme to implement disaster waste disposal over wide areas, to coordinate acceptance at disposal facilities, etc.

Regional Environment Office(MOE)

Regional Block Network

Municipal Governments

- National Institute for Environmental Studies
- Japan Environmental Sanitation Center
- Japan Waste Management & 3R Research Foundation
- Japan Waste Management Association, etc.

- National Federation of Industrial Waste Management Associations
- Japan Federation of Construction Contractors
- Japan Cement Association
- Japan Federation of Coastal Shipping Associations, etc.

Kumamoto Earthquake in 2016

➤ Outline of Kumamoto Earthquake:

- Foreshock : Magnitude 6.5 beneath Mashiki town on April 14, 2016
- Main shock : Magnitude 7.3 beneath Mashiki town on April 16, 2016

➤ Human damage : Death toll: 244 Injured: 2,709

➤ House damage: Completely destroyed 8,664 Half destroyed 34,026 Partly destroyed 147,742

(As of Aug.10,2017)



Amount of disaster waste generation classified by material type in Kumamoto Earthquake

Waste generated mainly by household clean up

	Waste disposal amount/ estimated waste generation amount	Waste concrete	Waste wood	Waste metal	Others (remaining materials)			
					Mixed waste (landfill)	Combustible material	Tile	Others
Apr.- Aug.2016 Disposal amount (thousand ton)	471	137	45	4	153	68	45	18
Ratio (%)	100.0%	29.1%	9.6%	0.9%	32.4%	14.5%	9.6%	3.8%
Sep.2016- Mar.2018 Estimated generation amount (thousand ton)	2,422	1,233	411	9	263	63	252	190
Ratio (%)	100%	50.9%	17.0%	0.4%	10.9%	2.6%	10.4%	7.9%
Total (thousand ton)	2,893	1,371	456	14	416	131	297	208
Ratio (%)	100%	47.4%	15.7%	0.5%	14.4%	4.5%	10.3%	7.2%

Note: Some totals don't match due to calculations after decimal point rounding.

Waste generated mainly by buildings demolition

West Japan Flooding Disaster in July, 2018

➤ Outline of West Japan Flooding :

- Heavy rain in western area as total of 1,200 – 1,800 mm during July 5 and 8, 2018
- Most heavy main in 24 hours: 691 mm in Kochi prefecture
- Human damage : Death toll: 220 (missing 9)
Injured: 366
- House damage: Completely destroyed 5,851
Half destroyed 10,117

Water exposure damage 28,904
(As of July 31, 2018)



<https://www.sankei.com/smp/west/news/180709/west180>

**Kurashiki City
Okayama Pref.**



**Kure City
Hiroshima Pref.**

2018/08/05



2018/08/05



2018/08/04

Disaster Waste in West Japan Flooding 2018 (Tentative)

- Amount of Disaster waste : 2.9 million tons
 - Okayama Pref.: 413 thousand tons
 - Hiroshima Pref.: 1, 958 thousand tons
 - Ehime Pref.: 530 thousand tons
- Heavily mixed waste just after cleanup activities
- Debris and waste mixed with soil and sand in Hiroshima and Ehime Prefectures



Amount of Disaster Waste Generated in Japan

Disaster	Year	Amount of Disaster waste	Amount of destroyed houses	Treatment Period
Great East Japan Earthquake	March, 2011	31 million t (incl. 11 million t of tsunami waste)	Completely destroyed: 118,822 Half destroyed: 184,615	3 years (excl. fukushima)
Great Hanshin-Awaji Earthquake	January, 1995	15 million t	Completely destroyed: 104,906 Half destroyed: 144,274 Partially destroyed: 390,506 Destruction by fire: 7,534	3 years
The 2004 Mid-Niigata Earthquake	October, 2004	0.6 million t	Completely destroyed: 3,175 Half destroyed: 13,810 Partially destroyed: 103,854	3 years
Hiroshima Landslide Disaster	August, 2016	0.58 million t	Completely destroyed: 179 Half destroyed: 217 Partially destroyed: 189 Water exposure damage: 4,164	1.5 years
Kanto-Tohoku Heavy Rainfall (Joso city)	September, 2015	0.093 million t (estimation)	Completely destroyed : 53 Half destroyed : 5,054 Water exposure damage : 3,220	1 year
Kukamoto Earthquake	April, 2016	2.89 million t	Completely destroyed : 8,664 Half destroyed : 34,026 Partially destroyed : 147.742	2 years
West Japan Flooding 2018	July, 2018	2.9 million t	Completely destroyed : 5,851 Half destroyed : 10,117 Water exposure damage: 26,904	???

Amount of disaster waste generated

Year	Disaster	Amount of waste
2011	The Great East Japan Earthquake	31 million t
2010	2010 Haiti earthquake	Around 23 - 60 million t
2009	Terremoto dell'Aquila (Italy)	Around 1- 3 million t
2008	2008 Sichuan earthquake (China)	20 million t
2005	Hurricane Katrina (U.S.)	76 million m ³
2004	Hurricane Frances & Jeanne (U.S.)	3 million m ³
2004	2004 Indian Ocean earthquake and tsunami	10 million m ³ (only in Indonesia)
2004	Hurricane Charley (U.S.)	2 million m ³
1999	Marmara earthquake (Turkey)	13 million t
1995	The Great Hanshin-Awaji Earthquake (JPN)	15 million t

Note :Some modification was made on review article by Brown et al.

Regional Block Network, etc.

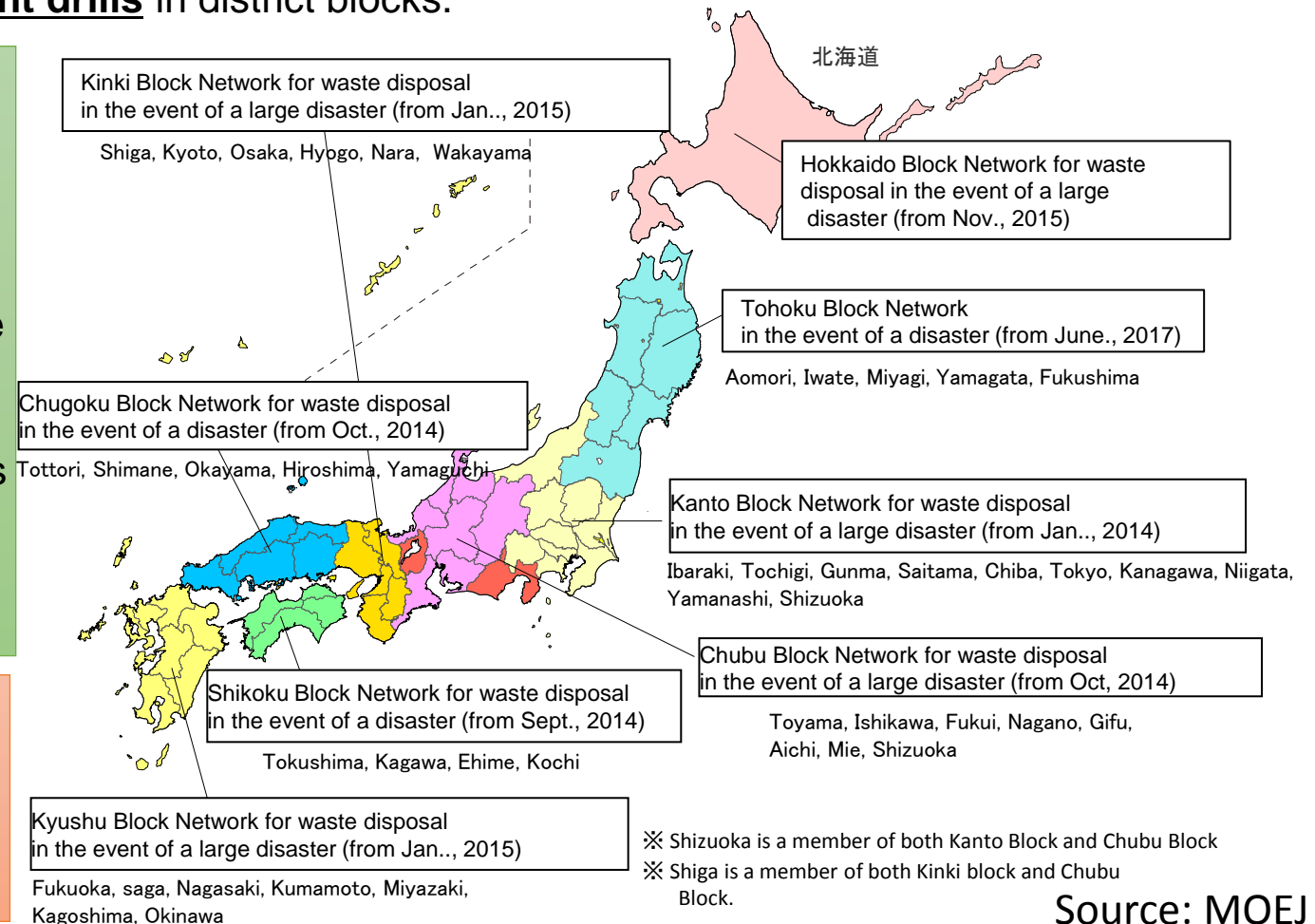
- Aiming at reinforcing local measures for disaster waste, the Regional Environmental Offices sponsored and called for many municipalities, operators, etc. which potentially get involved in waste disposal in their district to participate and established 8 district block conferences nationwide.
- As preparation during ordinary times, they coordinated parties concerned, aiming at **drawing out an action plan for managing disaster waste** by district block, and **advised municipalities on how to draw out a disposal plan and cooperate in drills by municipalities,** to begin with, aiming at **holding joint drills** in district blocks.

【Actions of Regional Block Network, etc.】

- ① Management of Regional Block Network, etc.
- ② Generation of action plans to manage disaster waste by regional block, etc.
- ③ Seminars/visit tours for municipalities, etc.
- ④ Support for devising an action plan for disaster waste management by municipalities
- ⑤ Joint drills in regional blocks
- ⑥ Basic research/technical research of actual situations of regional blocks
- ⑦ Generation of cartularies, etc. of disaster waste disposal of disasters which occurred

【Members】

Ministry of the Environment, Local branch offices of relevant government offices, Prefectures, Major municipalities, Experts of municipalities, etc.



Source: MOEJ

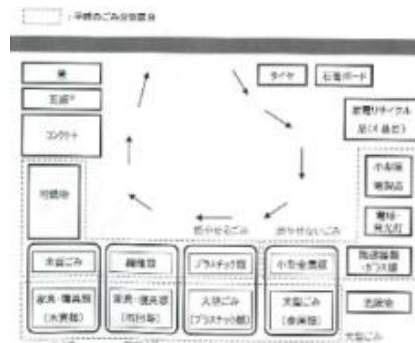
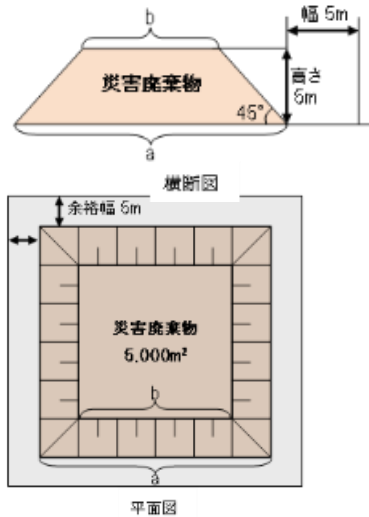
Support for Municipalities

Ministry of the Environment, Japan has supported the development of disaster waste management plan by municipalities by implementing 22 model projects from fiscal year 2015 for achievement targeted in Fundamental Plan for National Resilience (the development rate of disaster waste management plan: 80% of prefectural governments and 60% of municipal governments). It's expected also to put 72 model projects into effect until this fiscal year.

1. Development of disaster waste management plan

《Main theme of studies》

- Item on occurrence scale of disaster waste
 - Amount of disaster waste and sewage generated
 - Amount of disaster waste according to the constitution
 - Necessary number of collection and transportation vehicles
- Item on temporary storage sites
 - Estimation of amount of disaster waste generated by demolition process of collapsed houses
 - Calculation of the area of sites considered how to store disaster wastes
 - Selection of candidate sites where the topographical conditions are considered
 - Study on types of segregation of disaster waste and layout of sites
- Item on disaster waste disposal
 - Study on disposal flow including segregation
 - Study on possible amount of disaster waste disposal in existing treatment facilities
- Another related items
 - Implementation of exchange of views among municipalities, scholarship and regional environment office etc.
 - Field survey of candidate temporary storage sites etc.



Support for development of disaster waste management plan by municipalities through the above studies

2. Proper handling of hard-to-handle items generated in the event of a disaster

《Main theme of studies》

- Study on types and amounts of hard-to-manage wastes to disposal considering with regional characteristics
 - For example, waste of marine products, fishing nets, automobiles, leak of the oil from a large crude oil tank due to earthquake and tsunami damage
- Proper treatment methods for hard-to-manage wastes
 - Study on processing flow according to type of waste
 - Study on proper storage and transportation of wastes
- Hearing survey on acceptance in waste disposers and recycler etc.



3. Training on disaster waste treatment

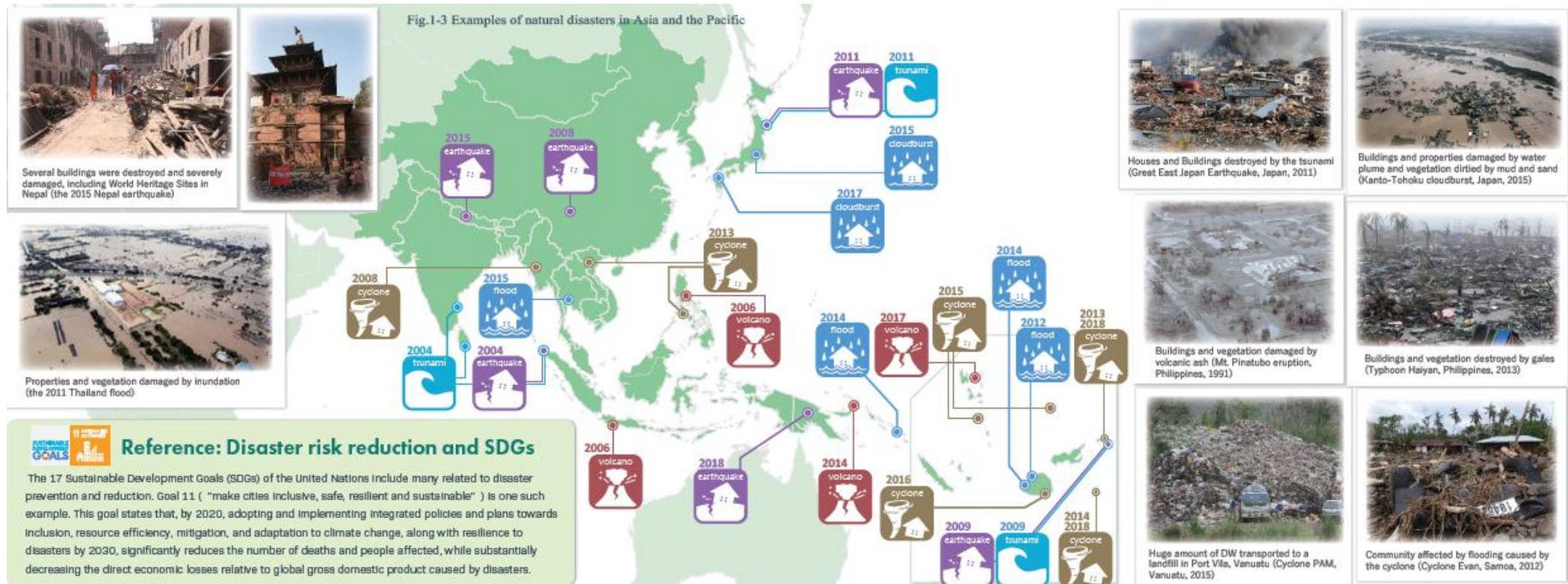
《Main theme of studies》

- Solution to problem of the disaster waste treatment system which become clear by the training
- Feedback the solution to the local government's disaster treatment system which is planned in disaster waste treatment plan



Background of guideline for Asia-Pacific

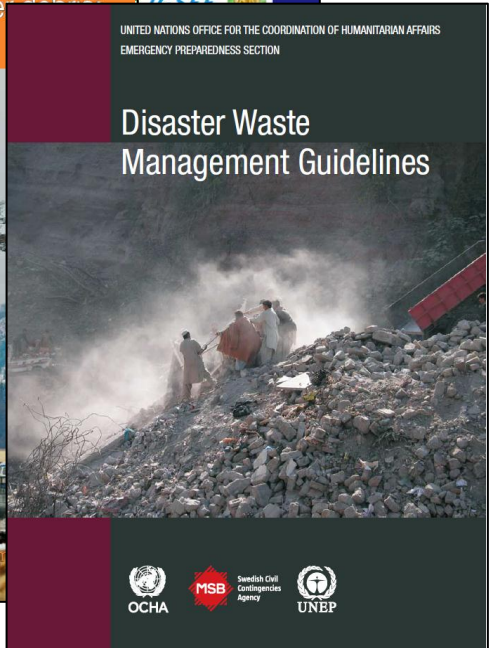
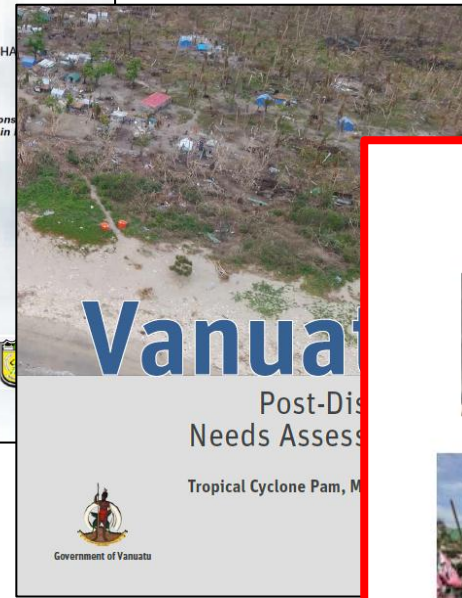
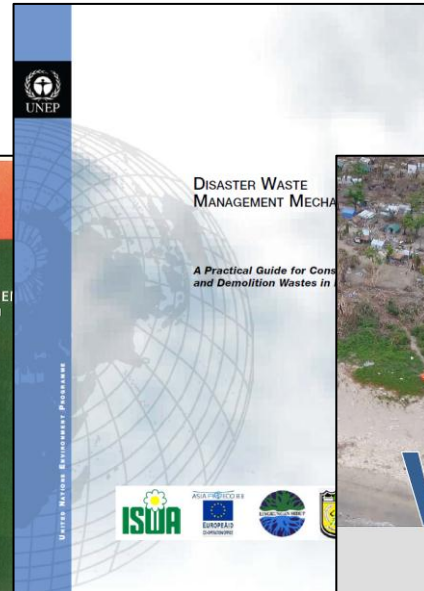
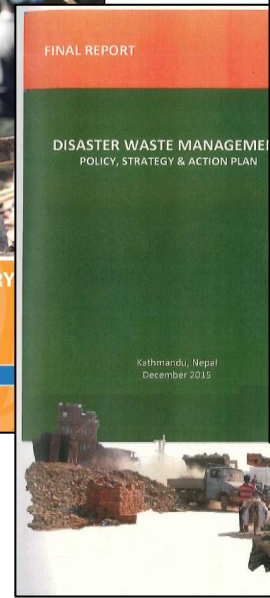
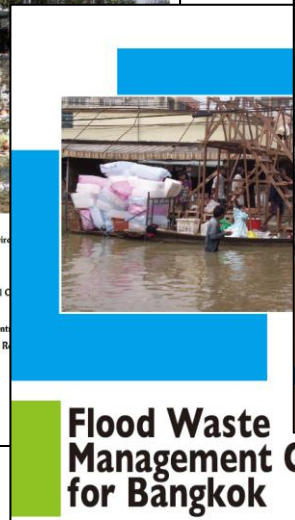
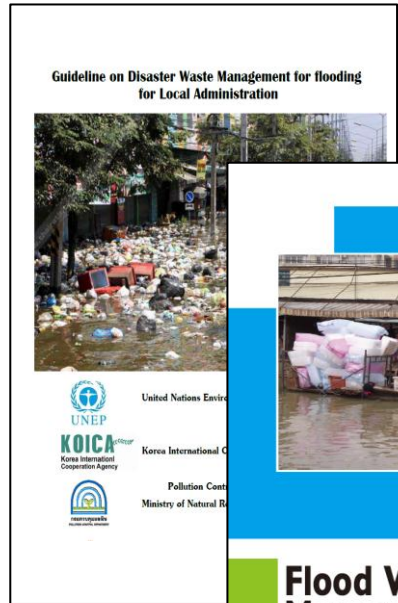
- Current Disaster Waste Management (DWM) practice (Asia and the Pacific)...
 - ✓ Ad-hoc response
 - ✓ No systematic approach
 - ✓ Lack of coordination
 - ✓ Improper action
- No review for relevant documents including plans and guidelines, (need more practically utilized)
- Need to reflect Asia and the Pacific context
- Lessons learnt and know-how accumulated in Japan especially after the Great East Japan earthquake and tsunami 2011



Policy of the Guideline

- Main Target:
 - National, Local government officers in charge to be **practically utilized**
- Align with the **context of Asia and the Pacific** including **case studies**
- Prioritize “**Preparedness**” activities for emergency response in current **Waste Management System in place**
- Include **lessons learnt** accumulated in Japan, other Asian and the Pacific region
- Discuss the strategy to request for **necessary assistance** on DWM
- Highlight Continuous Process of **DRR/Resilience Building integrated the CCA context** through DWM (Enhance current waste management system to respond DWM)
- Discuss **outreach** of the Guideline to be practically used in Asia and the Pacific including being used as a training material
- **Collaborate** with UN Env./OCHA, MSB, JICA, SPREP and other stakeholders

Current Progress



- Systematic Review for DWM relevant case study reports and guidelines
- Review of institutional framework relevant to DWM in Asia and the Pacific
- Identify challenging issues on DWM
- Draft framework of the preparation for planning on DWM



Disaster Waste Management Guideline in Asia and the Pacific (Framework)

Great Hanshin earthquake, 1995*

Pakistan Earthquake, 2005*

Sumatra-Andaman earthquake, 2004*

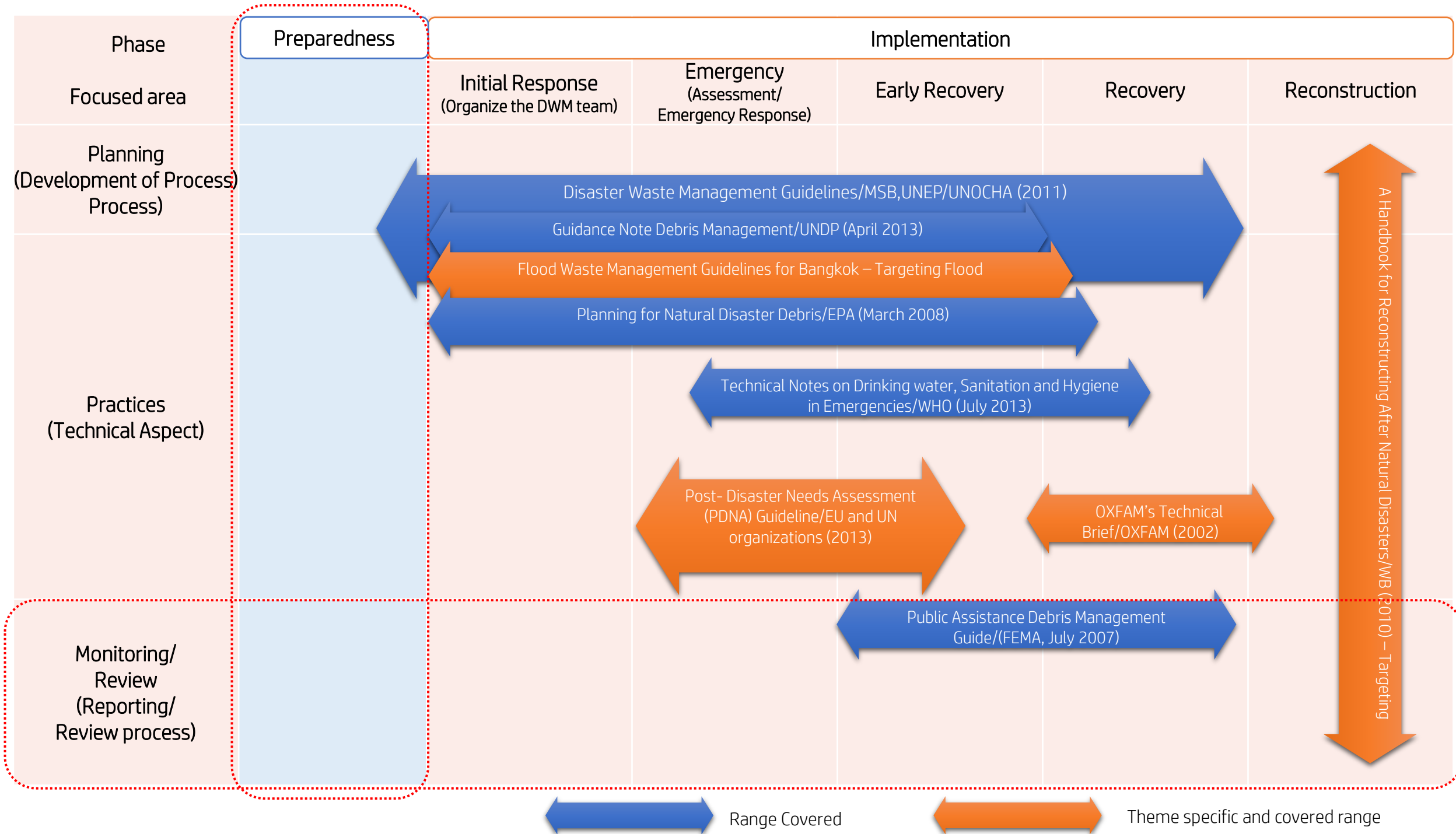
The Great East Japan Earthquake, 2011*

Nepal earthquake, 2015*

(* Sources of photos above are listed on the back-cover page).

Pacific Consultants Co., Ltd.
Japan Society of Material Cycles and Waste Management

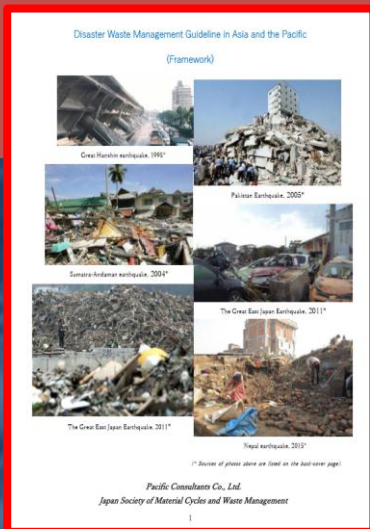
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GUIDELINE DEVELOPMENT +

In 2016

- Review GLs & plans
- Draft Outline of GL



In 2017

- Develop Full version of the GL

In 2018

- Information Hub (website)
- Workshop & Training
- Pilot Project



Thank you for your attention