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# **“Community Based DRR practices for Flood Risk Management with special focus on Early Warning, Resilient infrastructures and livelihood opportunities, along with other scalable DRR interventions for Flood plains-**

*Research Report Presentation towards completion of Visiting Researcher programme, 2018 A*

**Presented by-**

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Visiting Researcher, India  
FY-2018 A***

## **UDY AREA**

### **AREAS VISITED DURING THE RESEARCH PERIOD:**

1. HYOGO
2. KYOTO
3. OSAKA
4. TOKYO
5. HOKKAIDO
6. AWAJI etc.



# METHODOLOGY

## PRIMARY DATA COLLECTION

discussions,  
interviews,  
open-ended questions,  
observation,  
case studies  
Conference proceedings  
etc

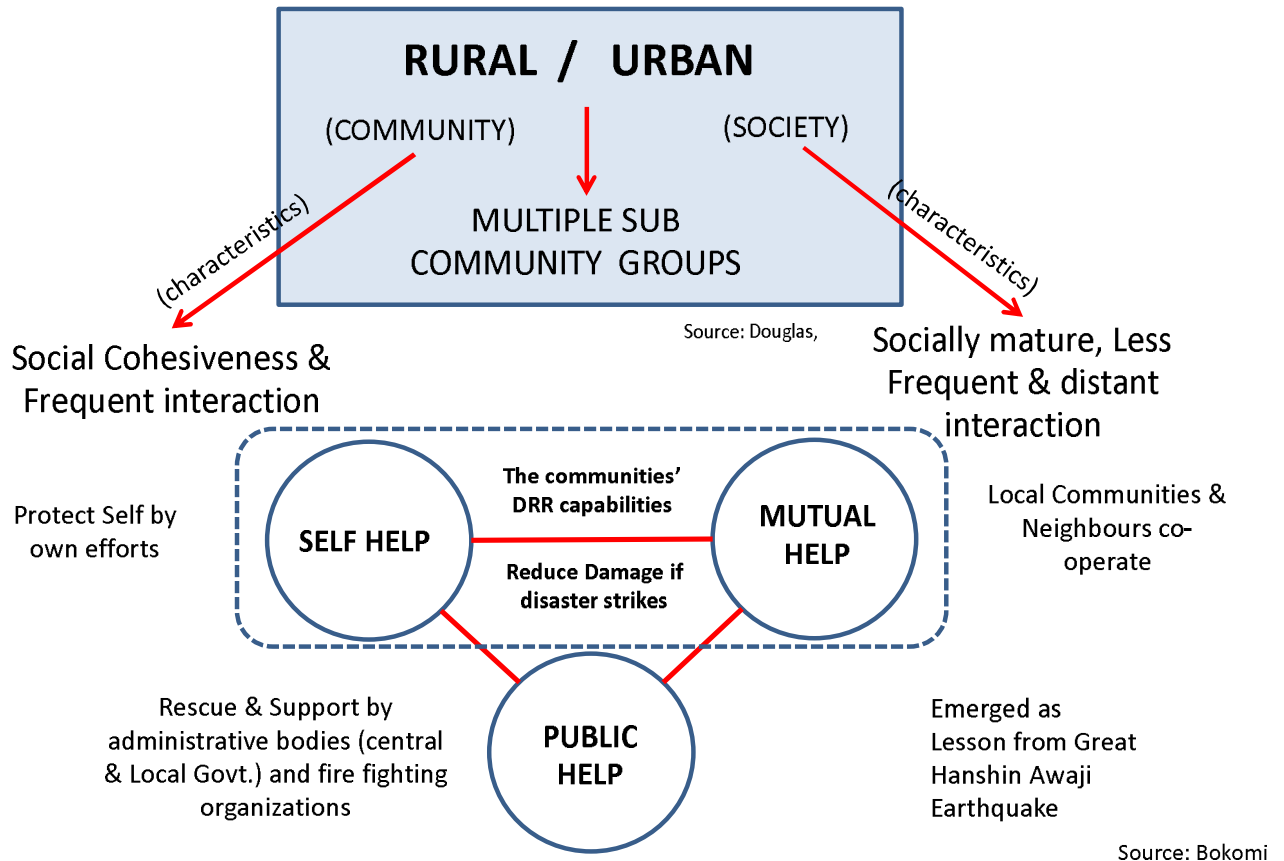
## SECONDARY DATA COLLECTION

books,  
reports,  
brochures,  
online portals

# OBJECTIVE

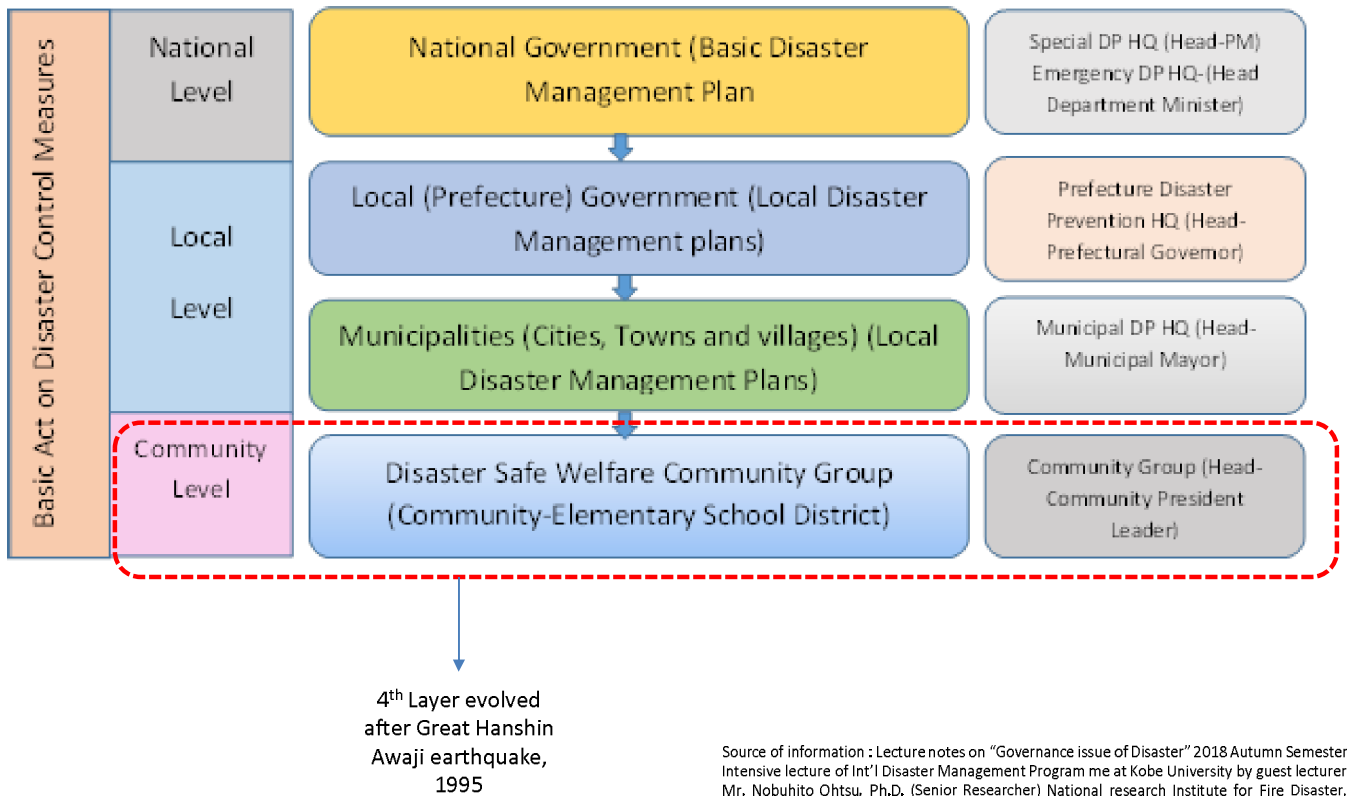
- Disaster Risk Reduction Legislations
- Governance in the lowest administrative units (*Community level*)
- DRR Planning (involving lowest units) with focus on
  - method of preparation of Hazard /vulnerability map by local government in Japan and
  - preparation of localized Disaster Management plans
  - development of contingency plans
- Convergence among sectors and stakeholders. (Business Continuity Planning etc.)
- Early Warning Systems to improve dissemination of communication to the last mile in probable flood condition.
- Resilient Infrastructure patterns for all hazard sustainability with special reference to flood hazard.
- Livelihood opportunities for communities in pre and post disaster condition.

# COMMUNITY BASED DRR

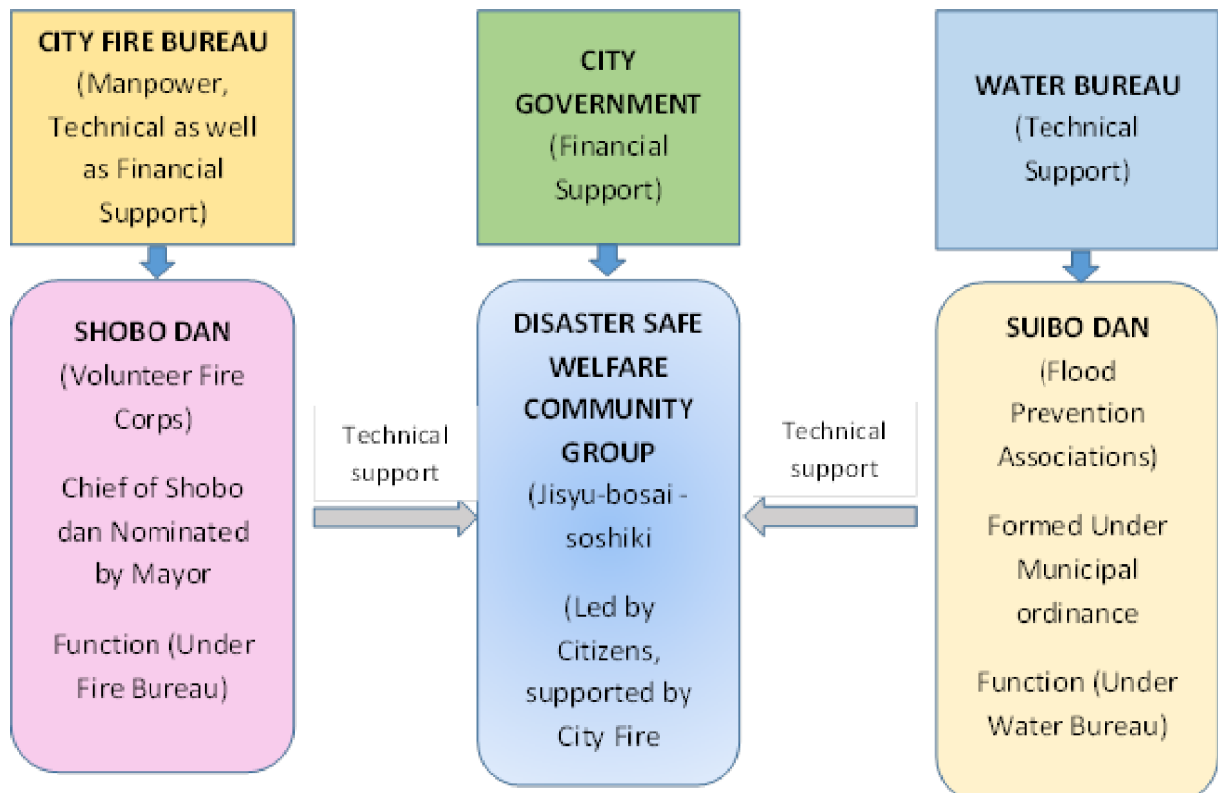


## DRR LEGISLATIONS

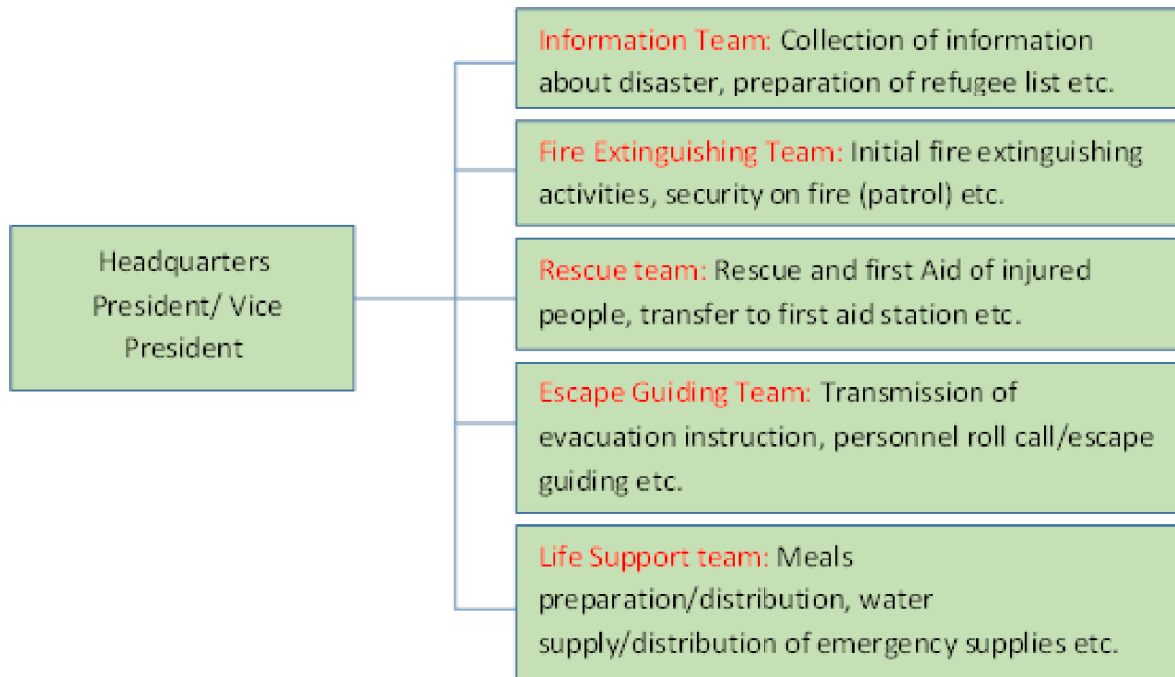
- No separate laws/policy for community based DRR
- Role of Community DRR is integrated in all major laws like Basic law, River Law, Sediment Disaster Countermeasure Act etc.
- Laws undergo amendment with new disaster experiences
- By Law, MLIT prepares and distribute Hazard Maps to community
- Article 5 of Basic Disaster Countermeasure Law promotes CBDRR



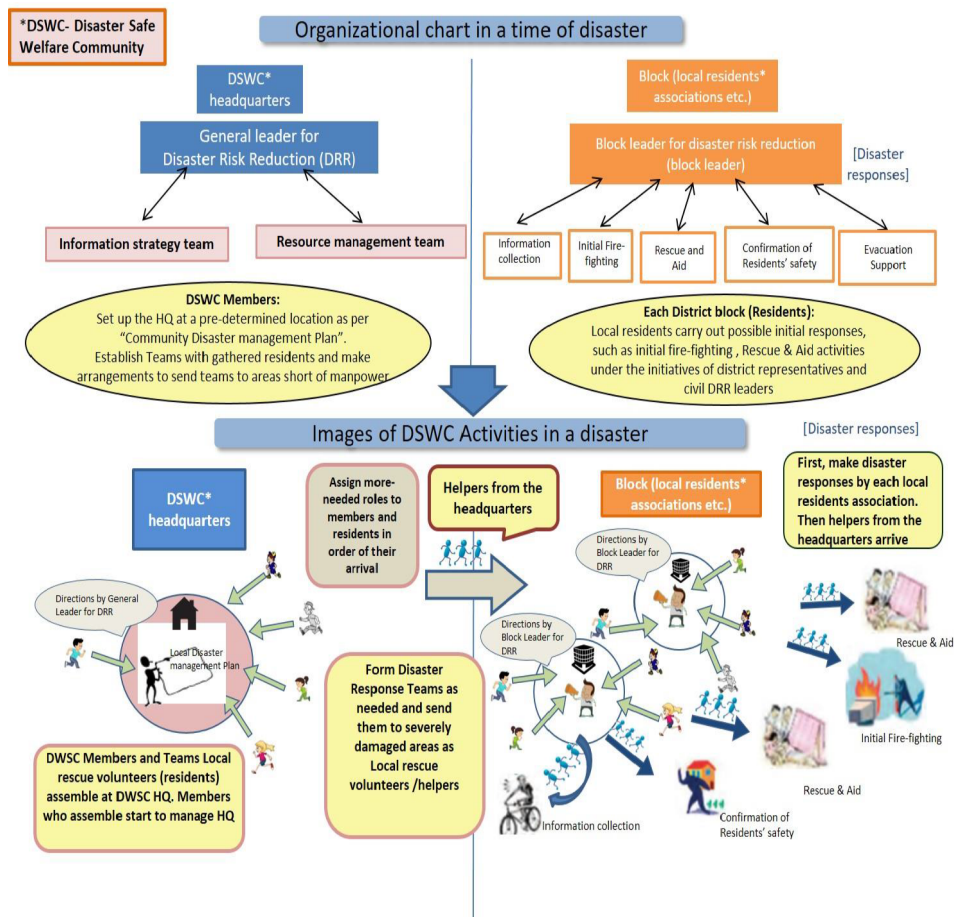
# COMMUNITY ORGANIZATION FOR DRR



# STRUCTURE OF DISASTER SAFE WELFARE COMMUNITY GROUP



Source : Lecture notes on "Issues of disaster risk reduction" 2018 Autumn Semester Intensive lecture of Int'l Disaster Management Program me at Kobe University by Prof Yuka Kaneko, law and Development Program, GSICS, Professor, Research Center for Urban safety & Security, Kobe university



(Disclaimer: this image is partially modified version of the image available in the "Bokomi Guidebook" of Kobe city for easy understanding of role of DSWC in DRR)

Fig 6: Flowchart showing Disaster Response by "Disaster Safe Welfare Community Group" in Japan

# DISASTER MANAGEMENT PLANNING

Types of plans	Planning Body	Timeline for review
Basic Plan of Disaster Prevention	Central Disaster Prevention Body	Yearly review
Disaster Preventive Operation plan	Designated Administrative Org. Designated Public org.	Yearly review
Prefectural Disaster Prevention Plan	Prefecture Disaster Prevention Body	Yearly review
Municipal Disaster Prevention plan	Municipal disaster Prevention Body	Yearly review
Community Disaster Prevention plan	Proposal by Local Residents (Disaster Welfare Community Group)	
Intra Prefecture Disaster Prevention Plan	Co-ordination Committee of Prefecture Disaster Prevention Bodies	Yearly review
Inter Prefecture Disaster Prevention Plan	Co-ordination Committee of Municipal Disaster Prevention Bodies	Yearly review

Source : Lecture notes on "Issues of disaster risk reduction" 2018 Autumn Semester Intensive lecture of Int'l Disaster Management Programme at Kobe University by Prof Yuka Kaneko, Law and Development Program, GSICS, Professor, Research Center for Urban Safety & Security, Kobe University

## COMPONENTS OF CDPP (Community Disaster Prevention Plan)

- Hazard Identification & Mapping
- Resource Map preparation
- To Do List During different Disasters
- Emergency Contacts
- Flowcharts for assignment of responsible person etc.
- Emergency Drill Planning to test plan

# HAZARD MAPPING

- ✓ 1<sup>st</sup> Workshop: Initial Discussion & Base map preparation by community residents
- ✓ Town Watching
- ✓ 2<sup>nd</sup> Workshop: Update Hazards & Resources information in Base map and discuss on hazard information
- ✓ Printing of Map by City officials
- ✓ 3<sup>rd</sup> Workshop: Sharing of printed map to residents for final correction

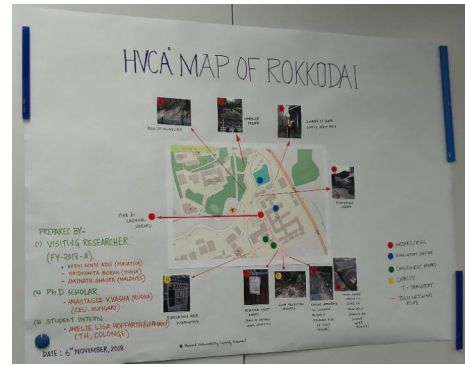
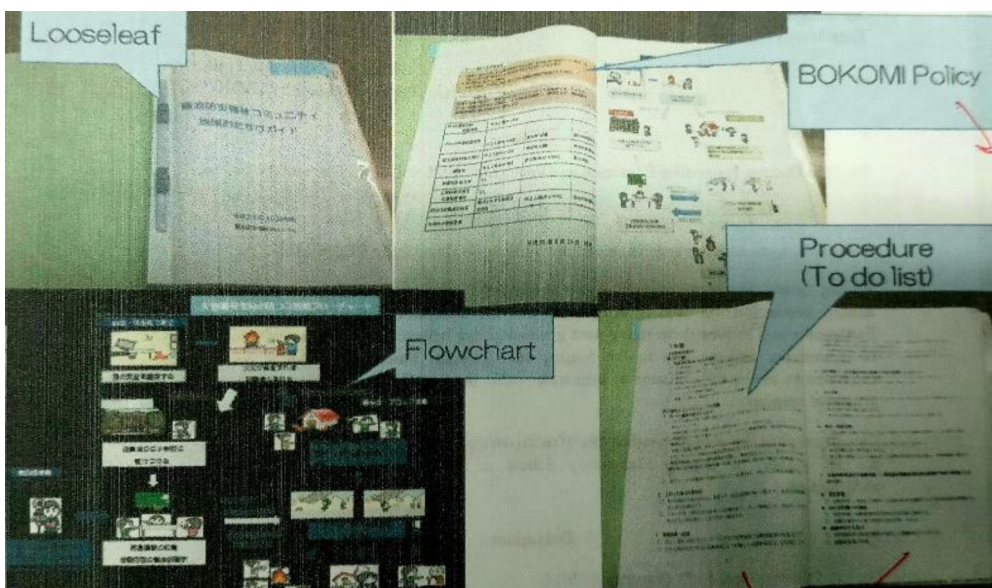


Figure: Hazard Vulnerability & Capacity Assessment of Rokkodai Campus, Kobe University



Figure: Hazard Map of Tsurukabuto

# COMMUNITY DRR PLAN





# COMMUNITY EMERGENCY DRILLS



Bokomi Members engaged in setting up Community Kitchen



Community Emergency Drinking water facility



Display of Emergency Food Packets during Drills



Fire Fighting Drills by Shobo Dan and Fire Bureau

# EARLY WARNING SYSTEMS

## River Information and Behavior Necessary to Municipal Governments and Residents

Note: A standardized color sign is put on bridges and gauges over the country for everyone to know dangerous water levels.

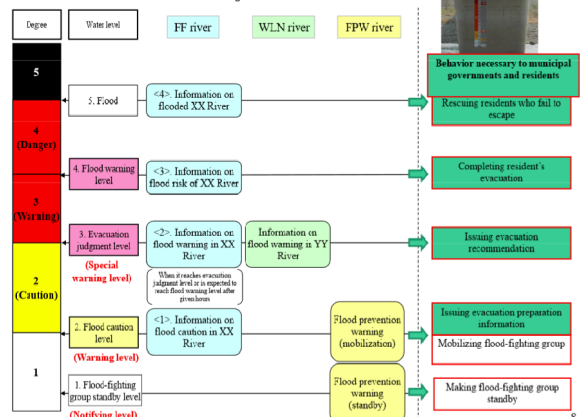


Figure : Warnings and corresponding action of municipalities/residents

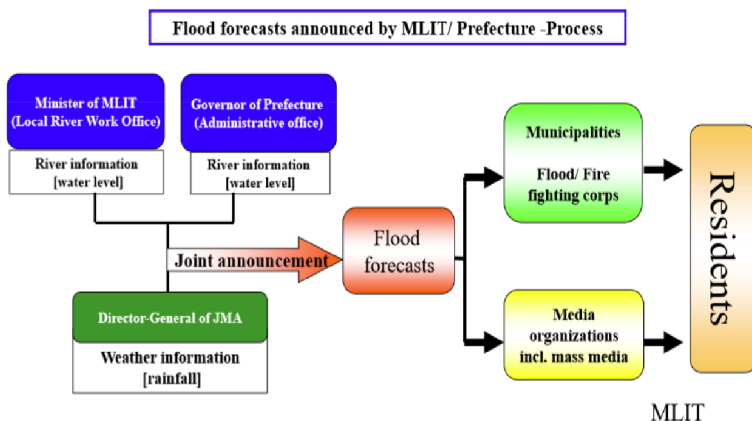


Figure : Flowchart depicting Flood forecast dissemination from government to residents

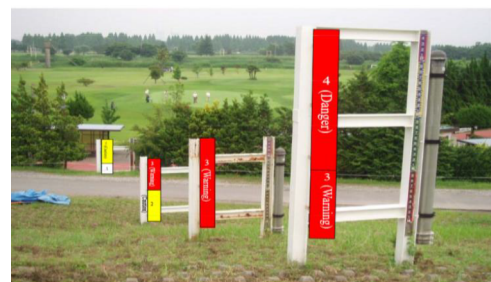
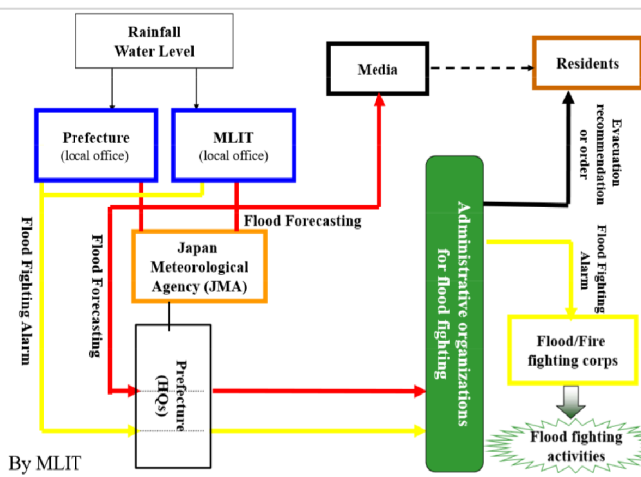


Figure : MLIT River Monitoring System using Water Gauge



Announcement of flood forecasts/warnings		Types of Flood Forecasts/ Warnings	
<b>(1) Flood Forecasts</b>			
Joint announcement by MLIT and JMA			
<-1> Flood cautious/advisory	Issued for urging caution when the water reaches Flood Watch Water Level and is expected to increase above the level.		
<-2> Flood warning	Issued for urging more vigilance when the water reaches Evacuation Alert Water Level and is expected to reach Flood Danger Water level.		
<-3> Flood danger information	Issued when the water reaches Flood Danger Water Level.		
<-4> Flood notification	Issued when a flood occurs.		
<b>(2) Flood Fighting Alarm</b>			
Announcement by MLIT/ Prefecture			
1 "Stand-by"	When a flood or increase of the water level is expected, a warning is issued to request flood fighting corps to be stand-by-for action.		
2 "Preparation"	Sharing of flood fighting-related information, gathering flood defense equipment and securing transmissions' transportation as well as issuing a warning that requests flood fighting corps to prepare for operation.		
3 "Operation"	When the water level is expected to increase beyond Flood Watch Water Level, a warning is issued to request flood fighting corps to act.		

Flood Fighting Alarm			
Issued by Upper River Office, Kanto Regional Development Bureau, Ministry of Land, Infrastructure and Transportation 1 1st September, '98, 2007			
Area	Observation	Operation	Not used
Trunk river	XX	Operation	X
<b>Current status</b>			
<b>Forecast</b>			
<b>Instruction</b>			
<b>Status of flood fighting alarm by district</b>			

Figure 12: Flowchart showing activities from "Flood Forecast" to "Flood Fighting"

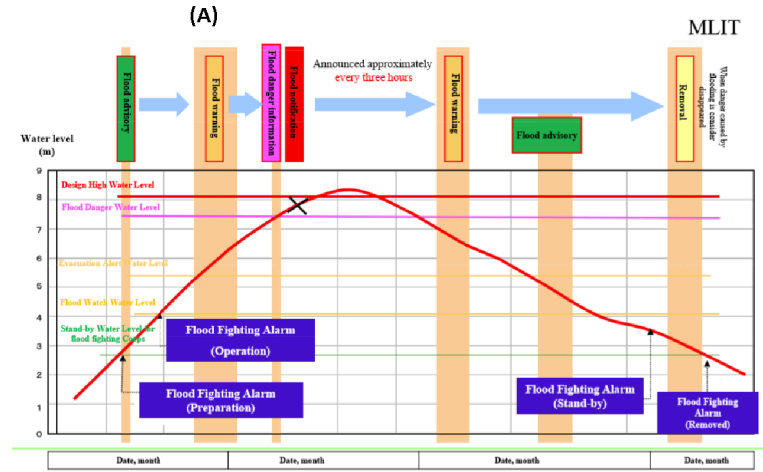
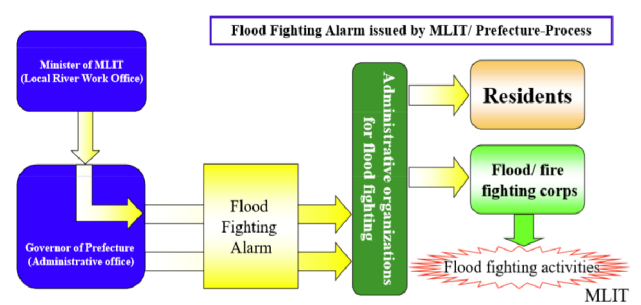


Figure 11: Flowchart for showing activities after issue of "Flood Fighting Alarm"

(source: <http://whrmkamoto.com/assets/files/Early%20Warning%20System%20201>)

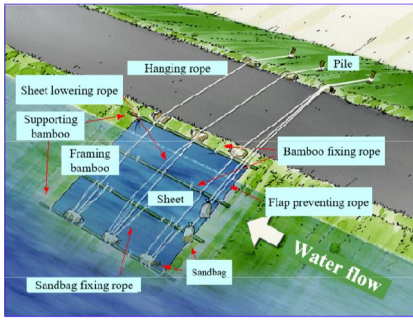
Source A, B, C: River information system, Flood Forecasting and Early Warning. Images are from: Kanto Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT) And Foundation of River and Basin Integrated Communication(FRICs)

# FLOOD FIGHTING TECHNIQUES

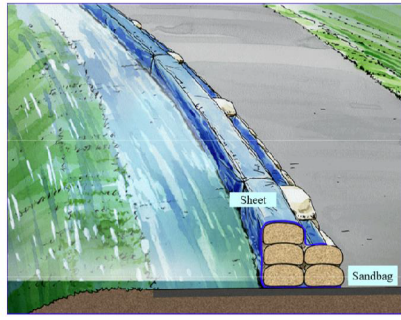
(Short term structural mitigation measures)



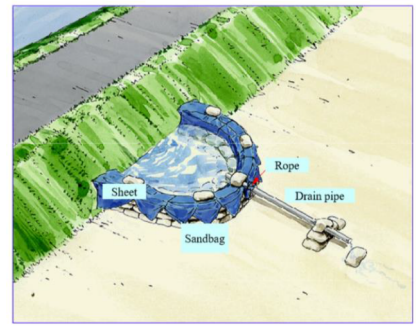
Models showing activities on Flood Protection/ Prevention by Suibo-Dan (Flood Fighters) using sand bags, bamboo and local materials (photo source: Tsunami & Storm Surge Disaster Prevention center, Osaka)



Sheet Covering Method



Improved Sand Bag Piling Method



(source: http

## Flood Fighting Techniques of Suibo-Dan

### RESIDENTS ACTION ON FLOOD WARNING;

#### Evacuation order/ Evacuation recommendation

Elderly People, Senior Citizens,  
People with Special Abilities evacuate first  
to nearby evacuation center



## RESILIENT INFRASTRUCTURE



Flood gate models at Tsunami Storm Surge Station in Osaka



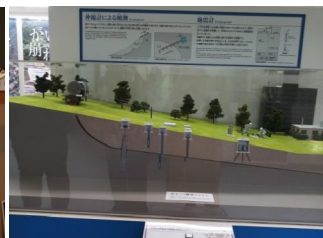
Flood gate at Higashi-nada ward in Kobe



Model showing Sediment Disaster Prevention using Anchor work in Nigawa Landslide Museum (B) Sediment disaster countermeasures in Tamba city



Model showing Kanda River Underground Regulating Reservoir Tunnel

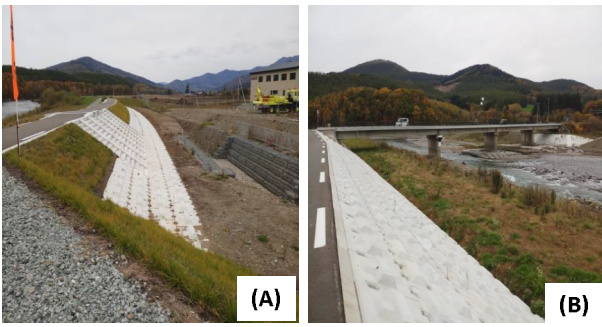


Model showing (A) Sediment Disaster Early warning system using "Inclinometer" in Nigawa Landslide Museum (B) Sediment disaster prevention using "Drainage works"



Sabo works for sediment erosion control in Tamba city

*(Long term structural mitigation measures for resilience to Hydro-meteorological hazard and related phenomena)*



(A) Road cum Embankment in Sorachi river, Hokkaido (B) Embankment on Left bank of River with river channel improvement measures in river bed, Minamifurano, Hokkaido



(A)



(B)



(C)



(D)

Channel Improvement measures in river of Tamba City (A) During Aug,2014 disaster the River damages caused by flood (photo source: SEEDS, ASIA) (B) Same site of River after restoration (pic-2018) (C) Restoration work (Example of Build Back Better initiative) through channel improvement, levee reconstruction etc.

### System of Comprehensive Flood Control Measures

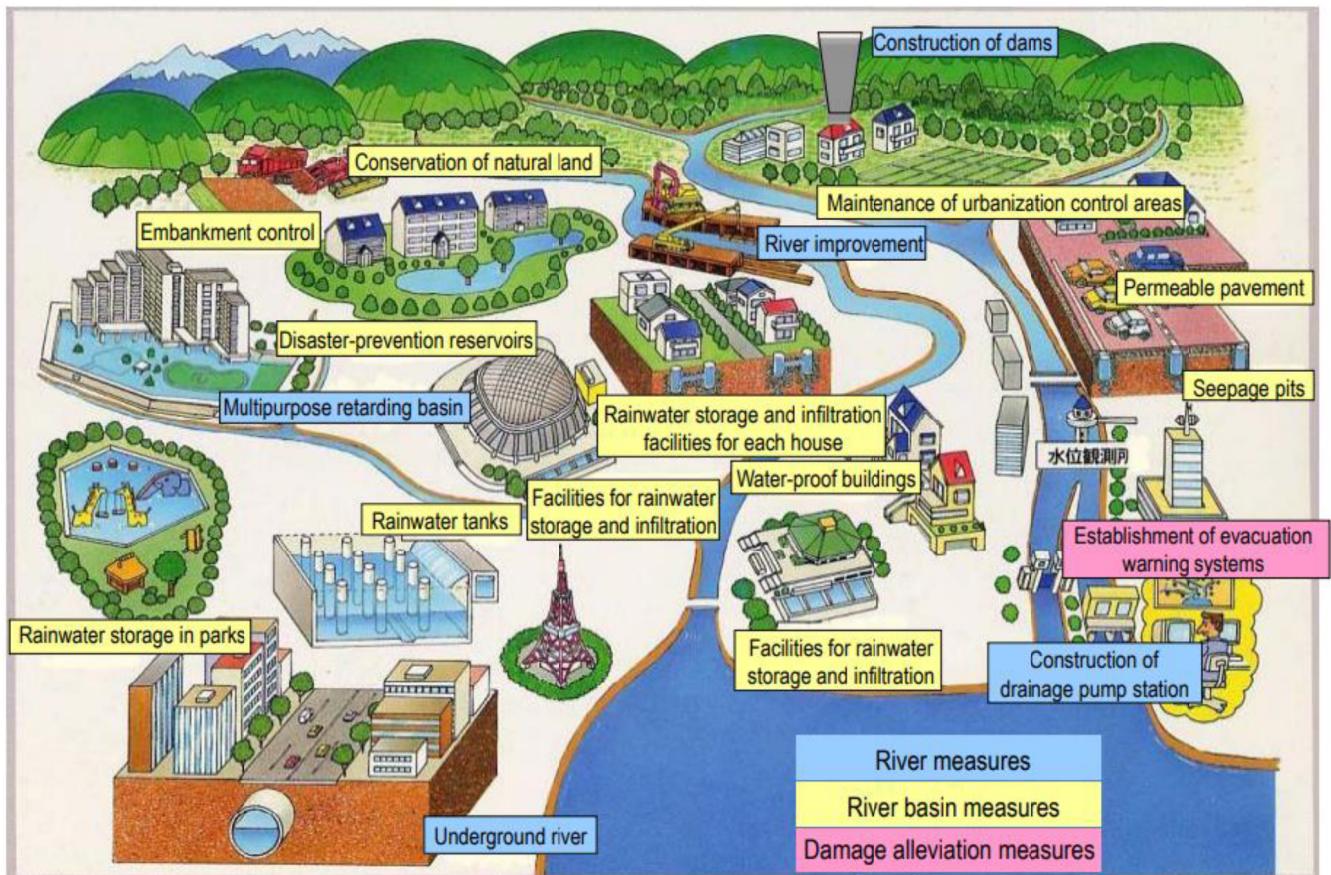
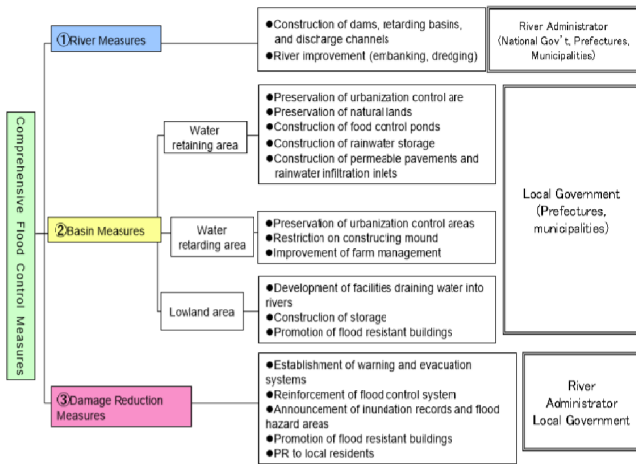


Figure :Comprehensive Flood Control Measures in River Basin

Source: www.mlit.go.jp

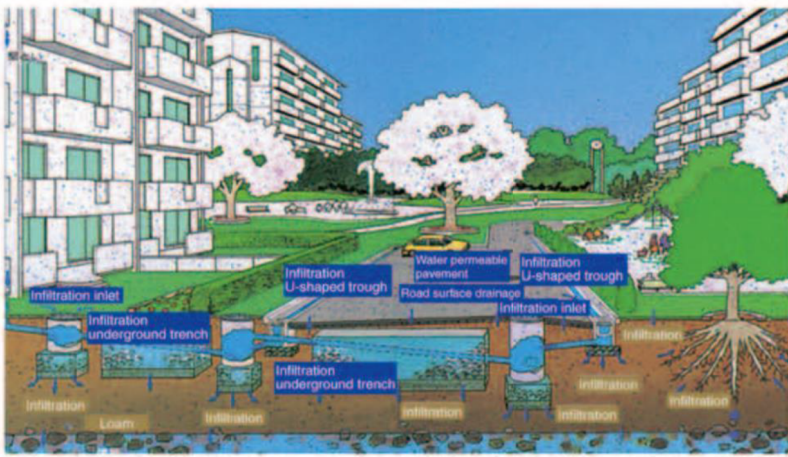


Image of development of storage and infiltration facilities

Source: [http://www.mlit.go.jp/river/basic\\_info/english/pdf/riversinjapan.pdf](http://www.mlit.go.jp/river/basic_info/english/pdf/riversinjapan.pdf)



Figure: Rainwater storage facilities between apartment complexes (source: <http://www.mlit.go.jp>)

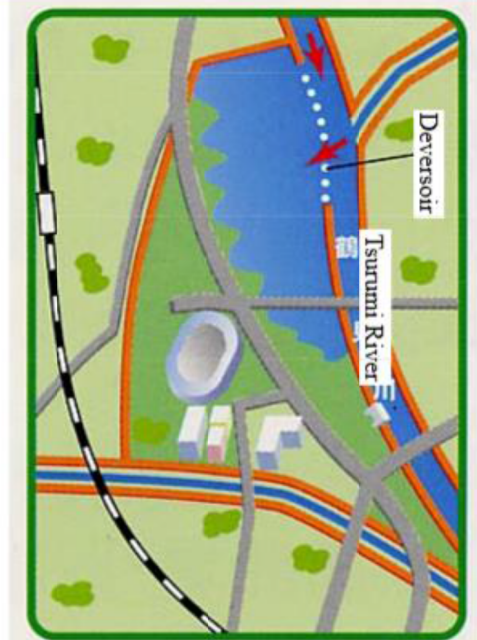
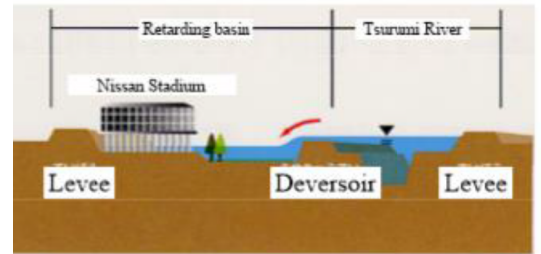
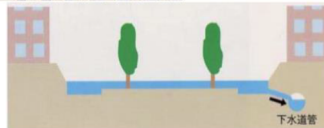
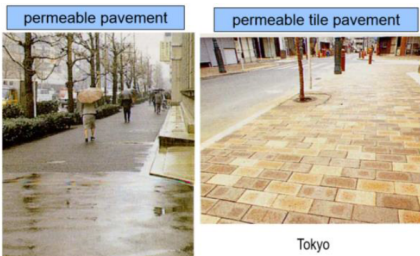
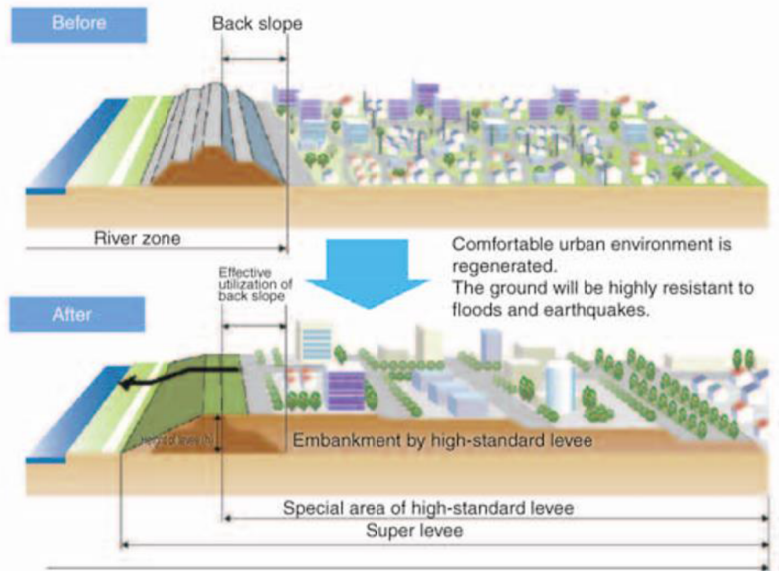


Figure: Deversoir/Retarding Basin in Tsurumi River, Japan (source: <http://>)

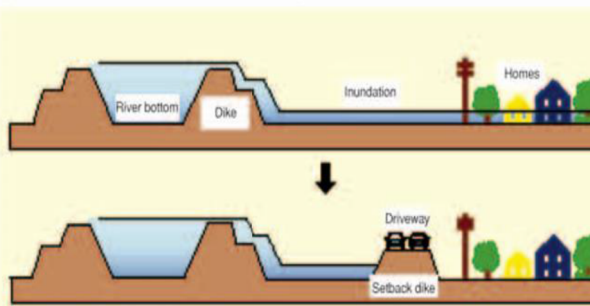


Tokyo

■ Concept of "Super levee"



■ Setback dike preventing spread of inundation



■ Countermeasures on watershed



Kirigaike regulating reservoir, Kanagawa Prefecture This is normally used as a tennis court.



Reservoir filled with water in June 1985



Figure: Flood Control Ponds

(source : [http://www.mlit.go.jp/river/basic\\_info/english/pdf/riversinjapan.pdf](http://www.mlit.go.jp/river/basic_info/english/pdf/riversinjapan.pdf))

# LIVELIHOOD OPPORTUNITIES

Rural Communities depend on Agricultural produce like local beans, rice, coffee, tea, vegetables and fruits

Sell produce in local markets or nearby cities



Recreational/ Tourism facilities created as disaster museums (Eg: Nigawa Landslide Museum & park) can provide livelihood opportunities through employment generation

Urban Societies depend on salaried jobs or local businesses for livelihood

Infrastructures provide sustainable livelihood opportunities for the community.



The water resources in Japan have been utilized as an opportunity by promoting tourism/recreational facilities for instance the Rain water storage parks, multi-purpose retarding basins, usage of sewerage treated water for artificial water falls/fountains/toilets; River improvement and beautification are opportunities



Phosphorous bags" sold in local markets generated by Higashinada Sewerage Treatment plant as a byproduct of treatment process are used for enhancement of agriculture produce

# ROLE OF BUSINESS COMMUNITY IN DRR



## JAPAN BOSAI PLATFORM

- Association of Japanese Private sector companies
- Supported by Government
- Provide DRR solutions
- sector/hazard specific scientific solution provider

□ Pre-Agreements with Government for smooth execution of Disaster Management services during emergencies

Business Communities are required to prepare "Business Continuity Plans" as per Guideline on BCP for SME

As per the Cabinet Office "White paper-2016", as lessons learnt from the Kanto-Tohoku Torrential rains of September 2015, the Government of Japan plans to promote the "formulation of evacuation implementation plans and BCPs by hospitals etc.

Local Businesses in Japan usually have general equipment for disaster support and few business establishment conduct or participate in regular community drills

# CONCLUSION

- A. **Community Based Disaster Risk Management** is still an **evolving concept** and needs to be **strengthened and institutionalized into a system**. The Community groups exist but there is still lack of clarity regarding total strength of members, mode of constitution etc.
- B. More focus should be laid on preparation of **Community Disaster Prevention plans**.
- C. The Community Groups **mostly include Elderly citizens and sometimes High school students as volunteers**. Middle Age group of citizens should be encouraged to join community groups and participate in Drills.
- D. The Technical support groups for Flood Fighting like **Suib-Dan** should be encouraged and more members should be volunteering in such flood fighting activities. It can be **regarded as a “Good practice”** for community based flood mitigation.
- E. **Disaster adversities can be turned into opportunities** for livelihood generation through scientific infrastructure creation.
- F. **Water resources can be used sustainably for cities and towns** through proper planning of infrastructures thereby reducing the probability of flood occurrence

# SUGGESTIONS

- A. Infrastructures like **“Sabo dam”** are **good examples for sediment erosion control** and perhaps can be **replicated in North East India** with a proper scientific feasibility study of the region. These kind of infrastructures perhaps has the potential to solve the problem of excessive siltation in northern Assam districts like Dhemaji, Lakhimpur etc. and also prevent river widening due to excessive siltation.
- B. **Early warning dissemination mechanisms need to be strengthened in Assam**, by integration of alarm systems, water level gauges at different locations, Installation of Public Announcement systems (like mics etc.), closed circuit camera installation to monitor upper reaches of river etc.
- C. **The Dam monitoring and operation mechanism in Assam/North-East India perhaps can be strengthened** with proper estimation of water levels and release of excess water into down streams. Establishing water supply companies or other related companies to distribute excess water to the neighborhood cities or towns for drinking or irrigation purpose perhaps can be effective solution for flood mitigation.
- D. **Strengthening the community groups with equipment support, training** through frequent drills as well as fixing responsibilities can help in institutionalizing CBDRM at community level.
- E. Livelihood opportunities can be created for the communities through sustainable use of water resources. **Tourism or Urban Development (City Beautification)** can be a sectors for livelihood generation.

**THANK YOU!!**  
**(Arigato Gozaimasu)**