「Sharing F-DRR approaches and techniques with developing countries: Experiences, realities and opportunities of private sectors」
「森林の防災・減災機能を強化する技術の海外展開と民間企業の参画」

Movement and trends of disaster risk reduction in Vietnam, Indonesia and Myanmar
ベトナム・インドネシア・ミャンマーでの防災・減災の動向

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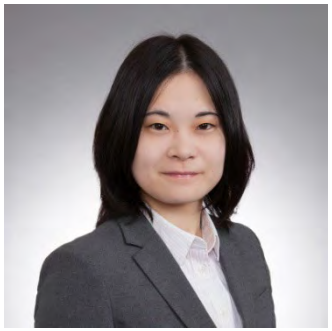
MUFG

Presenter

Yoko Asada



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- Yoko Asada, Satoshi Tatsuhara（2011）Estimating carbon sequestration by sugi (Cryptomeria japonica) plantations according to site and management conditions. Journal of Forest Planning, Vol.16: 189-198.

Outline of today's presentation

- Comparison of characteristics of forests, disasters, and organization structure of governments for disaster risk reductio (DRR) in Viet Nam, Myanmar and Indonesia
- Characteristics of disaster risk reduction in each country
- Key points for overseas expansion of DRR projects by Japanese entities –Development of sustainable organization arrangements
- Conclusions

Comparison of characteristics of Forests, Disasters, and Organization structure of governments for disaster risk reduction (DRR) in Viet Nam, Myanmar and Indonesia

Forest

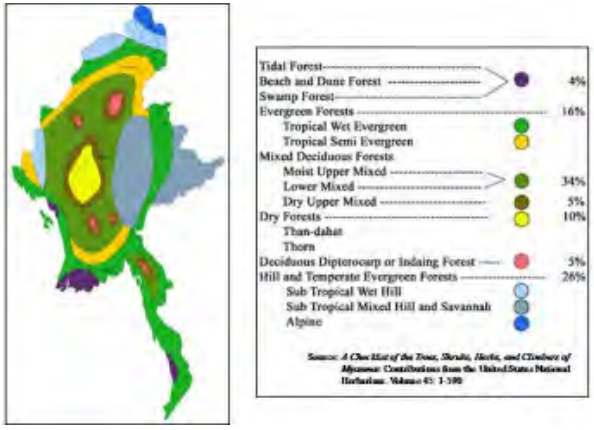
■ All three countries have mangrove forest in coast side.

Viet Nam

- 47% of land is forest. Natural forest is 70%, plantation forest is 30%.
- Forest structure:
  - Mountainous area in northern part: Evergreen forest
  - Lowland: Deciduous forest
  - Mekong Delta: Mangrove
- Area of forest and plantation forest has been increasing from 1990s.

Myanmar

- 44% of land is forest. Almost all forest is natural forest. Recently, rate of plantation forest is increasing.
- There are 19 million ha of natural teak forest wit high economic value, of which 16 million ha are in Myanmar.
- Forest rate is decreasing from 60% in 1990 to 44% in 2020. Deforestation drivers are slash & burn, fuel wood collection, land conversion for agriculture, mining, etc.
- There are 500 thousand ha mangrove in coastal areas, disappearing at a faster speed than neighboring countries.



Indonesia

- 49% of land is forest. Almost all forest is natural forest. Recently, rate of plantation forest is increasing.
- Tropical forest
- 65% of natural forest is mixed hill forest, which is most important for timber production.
- Mangrove forest is large at 3 million ha, 21% of the world's mangrove forest area.
- Forest rate is decreasing from 63% in 1990 to 49% in 2020. Deforestation drivers are illegal logging, forest fire, conversion to oil palm plantation, etc.

Natural disaster

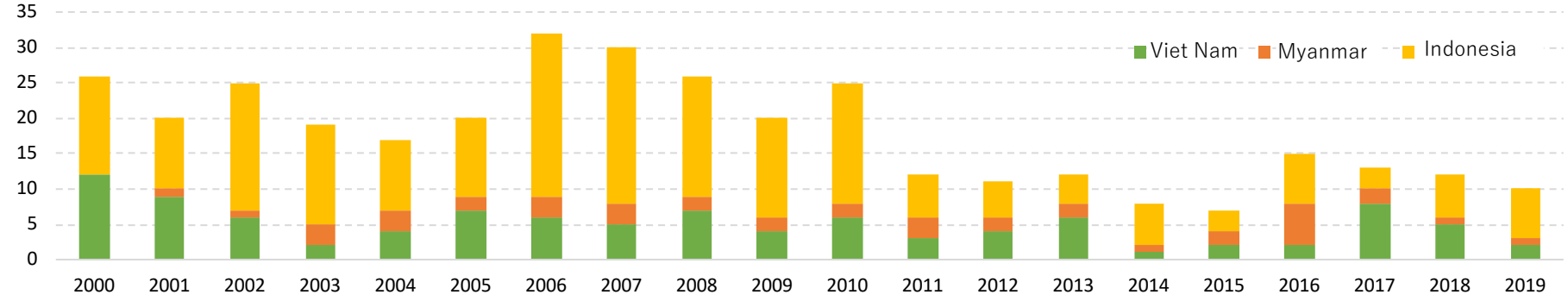
- Indonesia has the highest number of disasters, followed by Viet Nam and Myanmar.
- Indonesia has significantly more flood, land slide, earthquake and tsunami, volcano than other two countries, while fewer typhoon.
- Most of the disasters in Viet Nam and Myanmar are typhoon and cyclone, flood, flash flood.

Number of natural disasters by country and disaster type (1990-2020)

	Earth quake	Typhoon, Cyclone	Flood, Flash flood	Land slides	Drought	Tsunami	Fire	Extreme temperature	Volcano	Others	Total
Viet Nam	0	53	53	2	5	0	1	0	0	0	114
Myanmar	6	11	29	5	0	1	1	0	0	0	53
Indonesia	51	4	87	42	4	7	7	1	19	2	224

(Source) GLIDEnumber (https://glidenumber.net/glide/public/search/search.jsp)

Annual number of natural disasters by country (2000-2019)

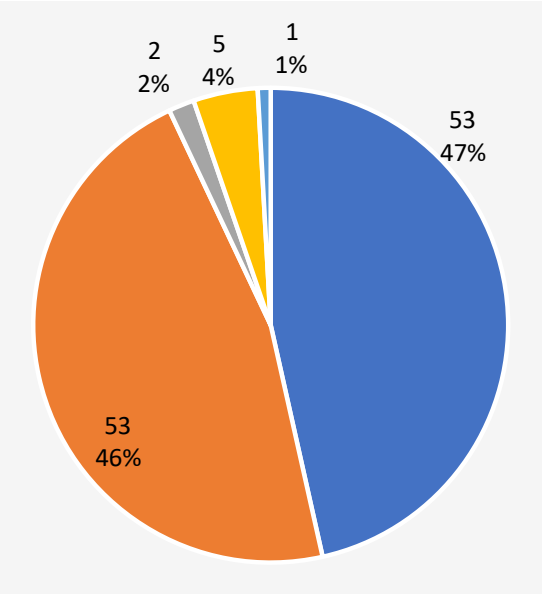


(Source) GLIDEnumber (https://glidenumber.net/glide/public/search/search.jsp)

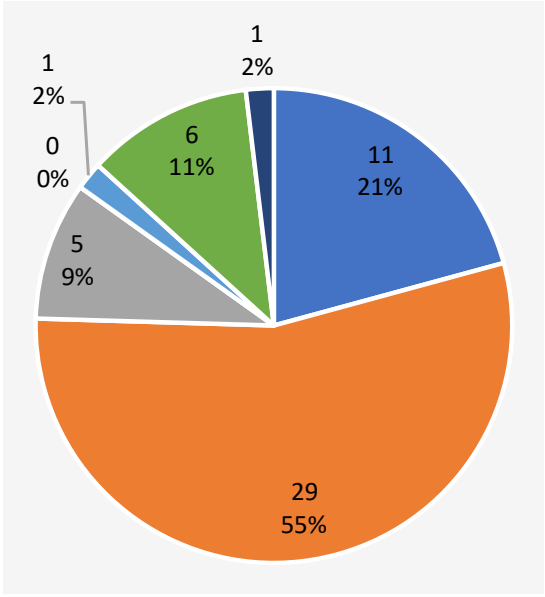
Natural disaster (cont.)

- Indonesia has significantly more flood, land slide, earthquake and tsunami, volcano than other two countries, while fewer typhoon.
- Most of the disasters in Viet Nam and Myanmar are typhoon and cyclone, flood, flash flood.

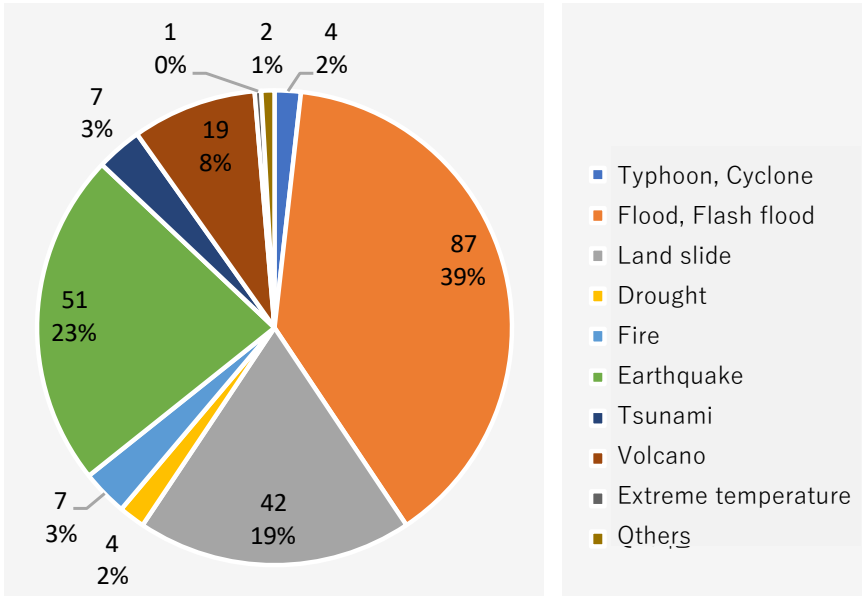
Viet Nam
(144 disasters in 1990-2019)



Myanmar
(53 disasters in 1990-2019)



Indonesia
(224 disasters in 1990-2019)



(Source) GLIDEnumber (https://glidenumber.net/glide/public/search/search.jsp)

Government structure for disaster risk reduction

■ **Regarding DRR, a supervising ministry leads in Viet Nam, a cross-ministerial organization is developed in Myanmar, and an independent organization under the president is developed in Indonesia.**

Viet Nam

■ **Focal point of DRR**: Central Steering Committee for Natural Disaster Prevention and Control (CSCNDPC), National Committee for Search and Rescue (NCSR)
- Secretariat: **Vietnam Disaster Management Authority (VNDMA) in Ministry of Agriculture and Rural Development (MARD)**
- Key ministries:
  - For wind and flood: Ministry of Natural Resources and Environment (MONRE)
  - For earthquake and Tsunami: Vietnam Academy of Science and Technology (VAST)

■ **Focal point of forest**: **MARD**
- **VNFOREST under MARD**: plantation, forest resource management, timber production, forest conservation
  - For forest data management: Forest Inventory and Planning Institute(FIPI), Forest Protection Department (FPD), under VNFOREST

Myanmar

■ **Focal point of DRR**: **National Disaster Preparedness Central Committee (NDPCC)**
- Cross-ministries organization
- Secretariat: Ministry of Social Welfare, Relief and Resettlement
- Key ministries: Ministry of Information, Ministry of Education, Ministry of Home Affairs
- National Disaster Preparedness Management Working Committee (NDPMWC) under NDPCC

■ **Focal point of forest**: **Forest Department (FD), Ministry of Natural Resources and Environmental Conservation (MONREC)**
- For timber production, processing and sales: Myanmar Timber Enterprise (MTE) under MONREC

Indonesia

■ **Focal point of DRR**: National Disaster Management Authority (BNPB)
- Established in 2008
- Organization under the direct control of the president
- Function: Coordination of ministries, implementation of countermeasures to disasters (disaster prevention, emergency response, recovery and reconstruction)

■ **Focal point of forest**: **Ministry of Environment and Forestry (MOEF)**
- MOEF's role for DRR: Planning and management of preventive measures, support, and early warning to prevent environment-related disasters and forest fires

Characteristics of disaster risk reduction in each country

Natural disaster in Vie Nam

■ **After 1990, Typhoon Linda in 1997 caused great damage, 3,700 people were killed. The second largest number of deaths (700 people) was caused by flood by heavy rains in central part of Viet Nam in October 1999.**

Major natural disasters in Viet Nam (1990-2020)

Year and Month	Place	Type of Disaster	Number of Deaths	Overview
November, 1997	Binh Dinh Province and others	Typhoon (Linda)	3,682	Typhoon Linda killed 3,682, injured 857, left 383,045 homeless.
October, 1999	Thanh Hoa Province and other central coast area	Flood	711	Coastal area in central Viet Nam experienced flooding caused by heavy rain over 2,000mm in 1 week where over 3.4 million people were affected and 90,000 left homeless.
May, 2006	All Viet Nam and Philippines, China	Tropical cyclone (Chanchu)	204	The tropical storm Chanchu (Caloy/T0601) killed 204 and affected 600,000 in Viet Nam. In Philippines, 37 people was killed and 53,000 people were affected.
August, 2008	Northern region	Flash Flood, Land slide	100	More than 100 people were dead or missing in flash floods and landslides as heavy rains brought by tropical storm Kammuri pounded mountainous northern Vietnam.
November, 2009	Central and Southern Highlands, Van Canh	Typhoon (Mirinae)	116	Typhoon Mirinae in central and southern highland caused heavy rain (from hundreds to 1,000 mm) at night of November 2nd. Flood caused 116 people killed, 125 people injured, and 96024 affected.
November, 2017	10 provinces and the city of Danag	Typhoon (Damrey)	123	Typhoon Damrey caused 123 death and damaged 40,000 houses in 10 provinces and the city of Danang on November 4th.
November, 2020	Northern and Central Viet Nam	Typhoon (Vamco, and others)	239	6 typhoons which attacked in about 1 month including typhoon Vamco caused at least 239 death or missing,

(Note) Natural disasters which number of deaths is more than 100 are listed.

Disaster risk reduction in Viet Nam

- **For disaster risk reduction (DRR), hard and soft measures are planned and implemented by Vietnam government.**
- **661 program (5 million ha reforestation program) is also effective as a DRR measure.**

Examples of DRR program in Viet Nam

Disaster	Hard	Soft		
	Measures to Structures	Risk Assessment	Monitoring	Nonstructural Measures
Flood	■ In Mekong River, construction of levee and expansion of drainage functions decrease flood damage. ■ Along Red River in Hanoi city, the levee which can deal with disasters whose scale are 100-year return period is developed. The levee is managed by Department of Dyke Management & Flood and Storm Control (DDMFSC), MARD.	■ Flood hazard map has been developed based on past flood by Mekong River Committee.	■ National Hydro-Meteorological Service (NHMS), MONRE is responsible for weather monitoring, flood forecasting, distributing information, developing hazard map.	■ **661 program (5 million ha reforestation program) has been implemented in response to past flood disasters caused by significant rate of deforestation.** ■ Disaster risk reduction at a community level is implemented in some province and commune. A committee is developed, the committee starts activities after developing the organization route of information distribution, and hazard map.
Earthquake, Tsunami	-	-	■ Broadband seismometer	-
Land disaster (Land slide, Debris flow)	-	■ Landslide risk assessment using satellite images has been implemented in the central highland by JICA.	-	-
Common	-	-	-	■ A disaster monitoring system in the Disaster Management Center (DMC) monitors, records, reports data of serious risk and damage caused by disasters.

Natural disaster in Myanmar

■ **Tropical cyclone Nargis in 2008 stands out as a disaster that has caused a large number of deaths since 1990.**

Major natural disasters in Myanmar (1990-2020)

Year and Month	Place	Type of Disaster	Number of Deaths	Overview
May, 2004	Pauktaw, Myebon, Sittway, Kyaukpyu in Rakhine State	Tropical cyclone, Flood, Tidal Surge	140	On 19 May, a storm that formed over the Bay of Bengal crossed the southwest coast in Myanmar near the border with Bangladesh. The storm with winds of over 160 km per hour caused tidal surges and flooding in the four towns in Rakhine State. 140 people were dead, 3,700 families (approximately 18,000 people) were affected and made temporarily homeless , over 1,000 houses were destroyed.
December, 2004	Sumatra island in Indonesia, Myanmar, others	Earthquake, Tsunami (Sumatra earthquake)	More 226,000 over the world (including Myanmar)	The Sumatra earthquake that occurred on December 26th caused extensive damage. More than 226,000 people were killed in many countries including Indonesia and .
May, 2008	Myanmar	Tropical cyclone (Nargis)	about140,000	Approximately 140,000 people died due to tidal surge of 2~3 m. 【Background of the disaster】 The course of the tropical cyclone was unexperienced for local people, the delay in evacuating due to lack of a sufficient disaster forecast and warning system, and no place to escape in large delta area are the main reasons for the increase in the number of deaths.
October, 2011	*Unknown*	Heavy storm, Flash flood	100	More than 100 people died by flash flood caused by heavy rain.
July, 2015	Western state of Rakhine, Kachin State and Sagaing Region	Flood	103	Flood was occurred on July 2nd due to heavy rain over past few days, in western state of Rakhine. The flood destroyed nearly 200 homes and 1,500 people were evacuated. Flood was occurred on July 19th in Kachin and Sagaing state, affected 57,000 people.

（Note）Natural disasters which number of deaths is more than 100 are listed.

Disaster risk reduction in Myanmar

■ Myanmar government promotes countermeasures to tsunami damage using mangrove plantation.

Examples of DRR program in Myanmar

Disaster	Hard	Soft		
	Measures to Structures	Risk Assessment	Monitoring	Nonstructural Measures
Flood	■ Irrigation and Water Utilization Management Department (IWUMD), Ministry of Agriculture, Livestock and Irrigation: operation of multi-purpose dams, maintenance and management of levees to protect cropland from floods	■ IWUMD: development of hazard map ■ 48 cities are designated as flood damage potential areas	■ Department of Meteorology and Hydrology (DMH): meteorological and hydrological observations, forecasting and warning of typhoons and floods ■ Observation interval is 3 hours in normal, 0.5~1 hour during disasters	■ **FD, MONREC: management of annual allowance cut of timber** ■ **IWUMD and FD: protection and regeneration of forest in major river basins** ■ Department of relief and resettlement: implementation of disaster management training at regional and state level
Earthquake, Tsunami	■ Construction of tsunami and evacuation shelters in Delta ■ **Mangrove plantation in Delta as a measure to mitigate tsunami**	■ Myanmar Geoscience Society (MGS): development of seismic zone distribution map and geological structure map	■ DMH: seismic observation, analysis and transmission (around the clock basis)	■ National and regional government: evacuation training for damage from tsunami
Land disaster (Land slide, Debris flow)	-	■ MGS: development of hazard map for sediment disaster	■ DMH: Heavy rain warning	■ MGS and Myanmar Engineering Society (MES): holding workshops on land slides in some regions
Typhoon, Cyclone	■ Construction of levees with evacuation sites and drinking water ponds in areas where the frequency of typhoon is high.	■ International donors(UNDP, ADRC, Seeds Asia, Action Aid, etc.): risk assessment in vulnerable area, community support	■ Observation by DMH	-

F-DRR in Myanmar

- **In response to the tropical cyclone Nargis in 2008 and other disasters which have caused many deaths, ministries and other related organizations (Myanmar Engineering Society, Myanmar Geoscience Society, etc.) published "Hazard Profile of Myanmar" in 2009, supported by UK government. The report provides the frequency and scale of occurrence, geographical characteristics (vulnerable areas, etc.), suggestion of DRR approaches for each type of disaster.**

Disaster in Forest, Proposal for F-DRR (Forest-based Disaster Risk Reduction)

Disaster	Forest referred as disaster target	Proposal of F-DRR (Forest-based Disaster Risk Reduction)
Cyclone	-	■ It is effective to plant patches of mangroves along coasts and rivers.
Drought	-	■ Eucalyptus and Acacia are planted to restore forest in dry regions.
Flood	-	■ IWUMD and FD work together to implement forest conservation and reforestation in high risk areas to mitigate risk of flood.
Forest Fire	■ Forest fires frequently have been caused by burning for land conversion. Spontaneous combustion dur to drought is also one of a factor of forest fires. ■ Forest fires occur frequently during the dry season (December to May) ■ In some cases, firebreaks are set by harvesting as a countermeasure.	-
Surge, Tsunami	-	■ In Ayeyarwady delta and southern part of Myanmar, mangrove forest has a certain effect of tide restriction

Natural disaster in Indonesia

■ Thousands of people are often killed by earthquakes and tsunamis.

Major natural disasters in Indonesia (1990-2020)

Year and Month	Place	Type of Disaster	Number of Deaths	Overview
December, 1992	Flores Island	Earthquake, Tsunami	2,100	-
November, 2003	North Sumatra	Heavy rain, Flash flood	100	Flash flood caused by heavy rain in tourists spot of Sumatra island killed at least 100 people.
December, 2004	Sumatra island, and others	Earthquake, Tsunami (Sumatra earthquake)	More 226,000 over the world	The Sumatra earthquake that occurred on December 26th caused extensive damage. More than 226,000 people were killed in many countries including Indonesia and .
July, 2006	East Java	Earthquake, Tsunami	100	An earthquake occurred 355 km south of Jakarta, Java island on 17th July. At least 100 people killed, 150 injured and many buildings destroyed by a tsunami with wave heights of at least two meters in the Pangandaran area.
September, 2009	Sumatra island	Earthquake	1,200	An earthquake of magnitude 7.9 and depth 87km has struck a highly populated area in the Sumatera Barat Province.
December, 2014	Central Indonesia	Heavy rain, Land slide	108	Heavy rains in central Indonesia loosened soil and collapsed a hill, setting off a landslide that killed at least 18 villagers and left 90 others missing under piles of mud.
August, 2018	Lombok island	Earthquake	564	There are three times earthquakes in northern part of Lombok island on 29th July, 5th and 19th August. Number of deaths by the 3 earthquakes were more than 500.
September, 2018	Slawesi island	Earthquake, Tsunami	3,400	An earthquake occurred on 28th September caused extensive damage due to liquefaction, and also caused land slide and tsunami.
March, 2019	Sentani District, Papua province	Flood	206	112 people were killed with 94 missing, and 915 injured by flash flood and land slide after heavy rain. 17,000 people evacuated.

（Note）Natural disasters which number of deaths is more than 100 are listed.

Disaster risk reduction in Indonesia

Examples of DRR program in Indonesia

Disaster	Hard	Soft		
	Measures to Structures	Risk Assessment	Monitoring	Nonstructural Measures
Flood	■ River Basin Headquarter (BBWS) and River Basin Office (BWS), Ministry of Public Works and Housing (PUPR): flood management, construction and management of flood control structures ■ BNPB: development of guidelines for comprehensive disaster risk analysis in major infrastructure construction	■ Province and city government: general hazard map development ● In Jakarta, flood base map is developed every year.	■ Local office of PUPR: hydrological observation ■ Agency for Meteorology, Climatology, and Geophysics (BMKG): meteorological observation	■ BNPB: development of disaster data base including flood data since 1822 ■ Local office of PUPR: development of flood warning guidelines for each rainy season ■ PUPR: development of manual for flood early warning and evacuation system
Earthquake, Tsunami	■ Ministry of Marin and Fisheries (KKP): **plantation in const side**, construction of stilt houses ■ Ache region: 4 evacuation building including the Ache Tsunami Memorial Hall which can accommodate 6,000 people	■ BNPB: development of national hazard map ■ Research Center for Geotechnology: development of tsunami hazard map for west Slawesi, Gorontalo, and Ache	■ BMKG: development of seismic intensity distribution map, regular seismic observation ■ Agency for Assessment and Application of Technology (BPPT) and Geospatial Information Agency (BIG): tsunami observation	■ Ministry of Research and Technology : development of guidelines for national standard of evacuation from tsunami ■ Indonesian Institute of Science (LIPI): education material to mitigate tsunami damage ■ Construction of including the Ache Tsunami Memorial Hall for tsunami education
Land disaster (Land slide, Debris flow)	-	■ Center for Volcanology and Geological Hazard Mitigation (CVGHM): distribution of dangerous area map which are developed based on land slide risk area map and monthly rainfall forecast to the target area ■ BNPB: development of hazard map on land disaster成	■ CVGHM: land disaster observation using GPS and rain gauge	■ Manual for debris flow and flash flood
Volcano	-	■ BNPB and CVGHM: development of hazard map on volcano disaster ■ Now developing regional own alert and evacuation information system for some specific volcano	■ CVGHM: observation of all active volcanoes which have erupted since 1600	■ Evacuation of community from dangerous area after eruption of mount Merapi
Common	-	-	-	■ WEB-GIS database 「GEOSPASIAL」: information on damage caused by disasters within 30 days, various hazard map, map of administrative boundaries, etc.

Key points for overseas expansion of DRR projects by Japanese entities
–Development of sustainable organization arrangements

Example of F-DRR project by international organization

Japan Red Cross「Disaster management in Viet Nam」

（1997~2015）

- Objective: Supporting disaster vulnerable community to become safer and more resilient from disaster risk and climate change impact
- Site: 8 province in northern coastal area, 2 province in mountainous area
  Beneficiaries: 356 communities, 72 regions in 10 province, direct beneficiaries 125 thousand people and indirect beneficiaries 2 million people
- F-DRR technology:
  - Mangrove plantation in coastal area and tree plantation in mountainous area, and their management
  - Plantation area: 10,408.6ha（Mangrove 9,740.6ha, Others 668ha）
- Effect of the program
  - Conservation effect by Mangrove: protection of coast side and river side, decreasing number of deaths by disasters, reduction of cost for maintenance of levees, mitigation of physical damage by disasters (infrastructure, crop, livestock and fishery resources)
  - Livelihood improvement: mangrove's function as a natural aquaculture pond for fish and shrimp
  - Ecological effect: CO2 sequestration, nutrient and sediment retention, biodiversity, water purification, water supply
- Key points of the program
  - **Sharing understanding on the effects of mangrove plantation with local government and communities**
  - **Project proponents and partners**：
    - Japan Red Cross (JRC) cooperated with Vietnam Red Cross (VRC), and by spending more than ten years on the project, it was possible to involve local communities and transfer the necessary technology.
    - As JRC closely communicated with local government through VRC as a counter part, it was possible to deal with issues such as land ownership.
    - In collaboration with the local Mangrove Ecosystem Research Center (MERC), JRC verified the effects of mangrove plantation.

Type of F-DRR	
Native Ecosystem	■ Forest in mountainous area ■ Coastal area, Ocean
Type of Disaster	■ Mountain disaster: land slide, debris flow ■ Coastal disaster: Tsunami, surge
Type of F-DRR	■ Conservation and management of existing native ecosystem ■ Creation of a new ecosystem ■ Integration of artificial construction and native ecosystem

Mangrove Plantation

Project Activity

Support needs for DRR including F-DRR

■ **Issues and needs on DRR by each country is below. The applicability of Japanese F-DRR technologies should be considered based on those issues and needs.**

Viet Nam

- **Capacity of forecasting and detailed understanding of extreme weather events (flash flood, land slide and coastal erosion, etc.)**
- **Technical requirement and investment for introduction of DRR infrastructures in mountainous areas**
- **Knowledge of the relationship between forest and natural disaster mitigation (appropriate planting species, area, forest distribution, etc.)**
- **Restriction on timber harvesting (road construction, area of harvesting, etc.)**

Myanmar

- **Early warning of floods and flood control plans and countermeasures;**
  - **for wide area flood caused by typhoons and tropical cyclones**
  - **for flash flood in mountainous areas and semi-dried areas**
- **Introduction and improvement of advance hardware measures against land disasters**
- **DRR by communities for land disasters**

Indonesia

- **Measures to large scale flood**
  - Driver of frequent large scale flood: large scale land conversion including conversion from forest to palm oil plantation
- **Preparation of a budget for flood control measure**
- **Preparation of a budget for DRR in regional level**
  - Especially for water disaster prevention
- **Measures to future expansion of scale of tropical cyclones, increase of damage by tidal surge**
- **Measures to fire in peat land**
  - There are both natural driver (El Niño) and anthropogenic driver (burning for land conversion).

Conclusions

Conclusions

- All 3 countries have a forest coverage rate of less 50% and promote forest conservation. Viet Nam and Myanmar, which are located on the continent and are long from north to south, and Indonesia, which is an island country long from east to west, have various differences in climate and topography. All three countries have mangrove forest in coast side.
- Indonesia has the highest number of disasters, followed by Viet Nam and Myanmar. Indonesia has significantly more flood, land slide, earthquake and tsunami, volcano than other two countries, while fewer typhoon. Most of the disasters in Viet Nam and Myanmar are typhoon and cyclone, flood, flash flood.
- Regarding DRR by national governments, a supervising ministry leads in Viet Nam, a cross-ministerial organization is developed in Myanmar, and an independent organization under the president is developed in Indonesia. All the ministries in charge of forest are also partly responsible for DRR.
  - In Viet Nam, the focal point of DRR and forest are the same, MARD.
- In the 3 countries, DRR measures have been considered, but the practice of Eco-DRR and F-DRR has not been implemented yet. The applicability of Japanese F-DRR technologies should be considered based on the issues and needs in the countries.
  - In all 3 countries, JICA is one of the main international donors for (F-)DRR.
- As a key point in the participation of Japanese private entities, it can be a sustainable program by building a cooperative system with local stakeholders.