3.1 基調講演

「日本の砂防事業について」

砂防部長

南　哲行

SABO Administration in JAPAN

November 30 , 2012

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MLIT

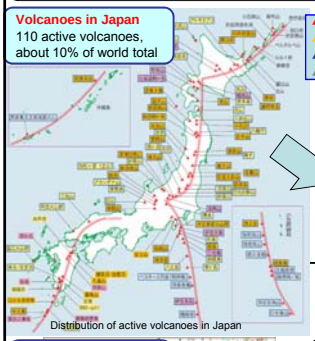
Ministry of Land, Infrastructure, Transport and Tourism

1. Recent Sediment-Related Disasters

Multiple Causes of Sediment Related Disasters in Japan

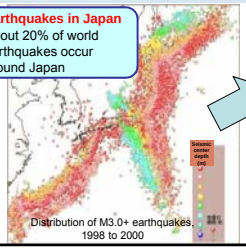
Most advanced countries in Europe have stable geology and no volcanoes or earthquakes. Therefore, sediment related disasters after heavy rain are rare. But Japan suffers from all of these adverse conditions. Sediment related disasters countermeasures are essential to saving lives and a vital prerequisite for infrastructure.

Volcanoes in Japan
110 active volcanoes, about 10% of world total



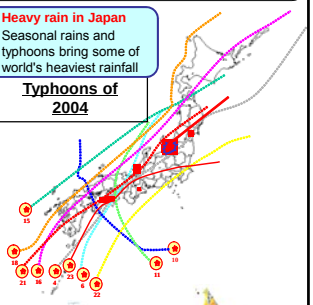
Distribution of active volcanoes in Japan

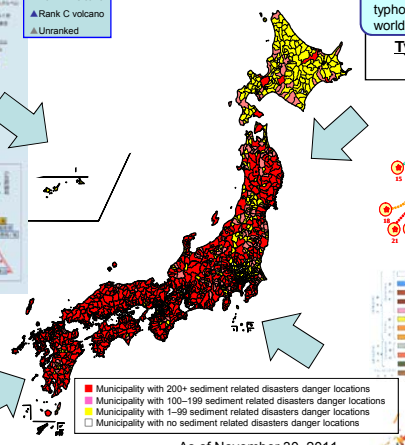
Earthquakes in Japan
About 20% of world earthquakes occur around Japan


Distribution of M3.0+ earthquakes 1998 to 2000

Heavy rain in Japan
Seasonal rains and typhoons bring some of world's heaviest rainfall

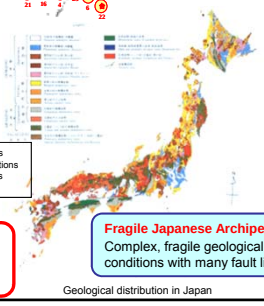
Typhoons of 2004





As of November 30, 2011

Due to harsh natural conditions, about 90% of Japan's cities/town/villages are near danger of sediment related disasters



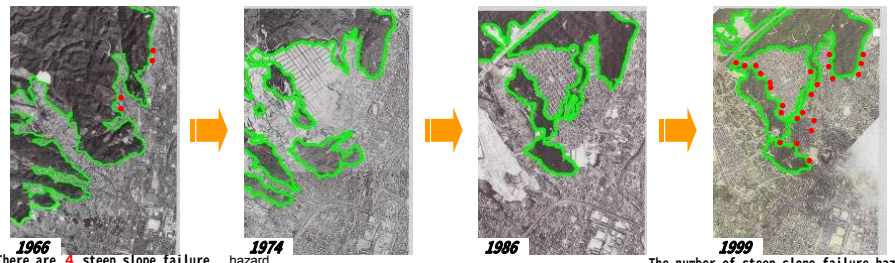
Fragile Japanese Archipelago
Complex, fragile geological conditions with many fault lines

Geological distribution in Japan

Expanding Urbanization and Sediment Related Disasters

○ Random sprawling of urbanized areas is rapidly increasing the risk of sediment rerated disasters.

Present situation of residential development (example of Saeki-ku, Hiroshima city)

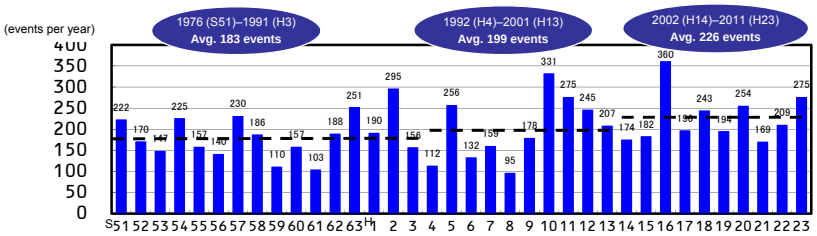


Debris flow and Slope failure disasters that destroyed the residential area that extended to the mountain foot because of residential development
(Disasters in Hiroshima city by the torrential rain at the end of June 1999).

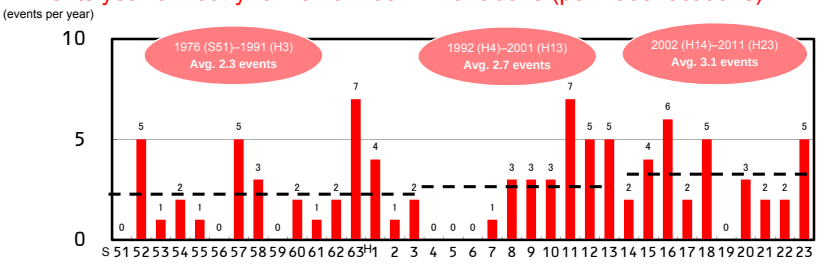
Number of Incidents per Year of Hourly Rainfall (1976–2011)

1. Events/year of hourly rainfall of 50 mm or above (per 1000 locations)

• Events/year of hourly rainfall
• 1300 AMeDAS observation stations nationwide



2. Events/year of hourly rainfall of 100 mm or above (per 1000 locations)



Source: Japan Meteorological Agency data

Triggers of Sediment-related disasters

① Torrential rain by typhoons, etc.
- Slope failure
- Debris flow (including drift wood disasters)
- Landslide

② Volcanic activities
- Lava flow
- Pyroclastic flow
- Volcanic debris flow
- Collapse of volcanic edifice

③ Earthquake
- Collapse of volcanic edifice
- Collapse of natural dam
- Torrential rain disaster
- Collapse of volcanic edifice

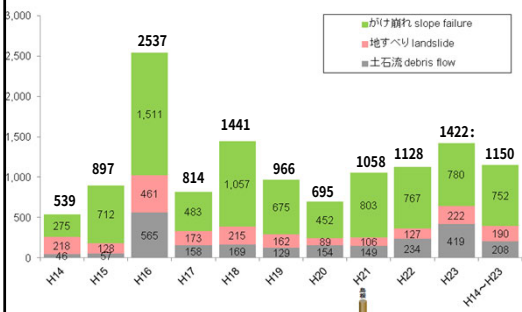
Debris flow caused by the rainy frontal torrential rain (Yamaguchi pref. July (2009)

Mt. Kirishima (Shinmoedake) eruption January 2011

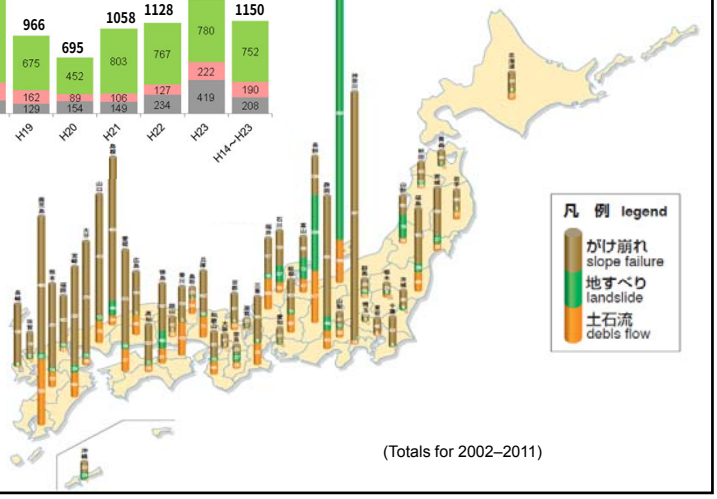
Landslide induced by Great East Japan Earthquake (Shirakawa City, Fukushima Pref.: March 2011)

Over Past 10 Years, Sediment-Related Disasters Have Occurred in Every Prefecture

■ Number of recent sediment-related disasters



■ Number of sediment-related disasters by prefecture



(Totals for 2002–2011)

Major Sediment-Related Disasters in 2011

Number of Sediment-Related Disasters
1,422 events
Debris Flow : 419
Landslide : 222
Slope Failure : 781

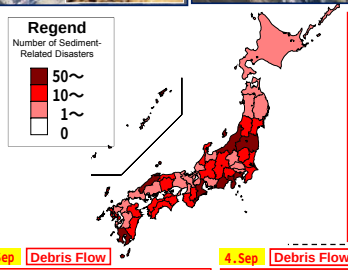
People Affected
Dead : 72
Missing : 13

11.Mar Landslide
Shirakawa City, Fukushima Pref
Dead:13

11.Mar Landslide
Nasukarsuyama City, Tochigi Pref
Dead:2

29.July Slope Failure
Tohkamachi City,Niigata Pref

1/19～ Volcanic Eruption
Shinmoe-dake(Miyazaki & Kagoshima Pref.)



19.July Debris Flow
Kitagawa Village,Kochi Pref

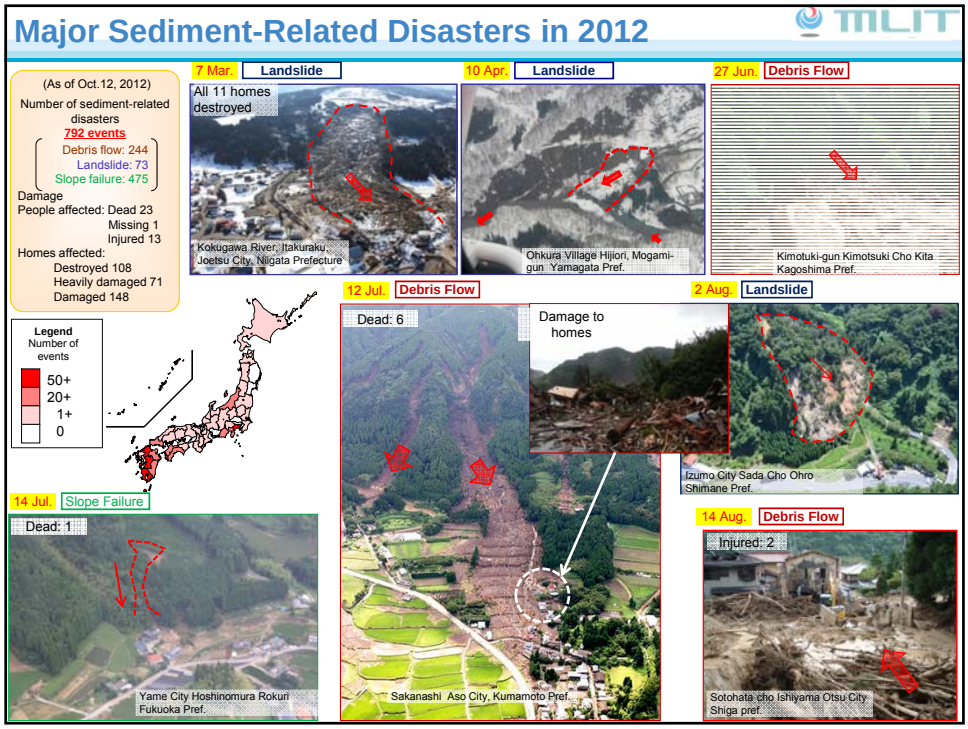
4.Sep Debris Flow
Gojo City,Nara Pref

4.Sep Debris Flow
Nachikatsuura Town,Wakayama Pref
Dead:21
Missing:1

4.Sep Debris Flow
Tanabe City,Wakayama Pref
Dead:5

4.Sep Debris Flow
Gojo City,Nara Pref
Dead:7
Missing:4

1) Sediment-Related Disasters induced by Torrential Rain



Disasters at Facilities for Persons Requiring Assistance During Disasters

Hofu City, Yamaguchi Pref. (July 21, 2009)

Special nursing home Life Care Takasago
Date of disaster: July 21, 2009
Damage: 7 dead

2) Sediment-Related Disasters induced by Earthquakes

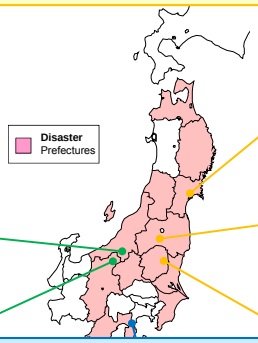
Sediment-Related Disasters in 2011 Great East Japan Earthquake

Number of sediment-related disasters
141 events

Debris flow: 13 events
Landslide: 29 events
Slope failure: 97 events
Snow avalanche: 2 events

• Earthquake Off the Pacific Coast of Tohoku 114 events
Dead: 19
• North Nagano Pref. Earthquake 24 events
East Shizuoka Pref. Earthquake 3 events

[2011 Earthquake Off the Pacific Coast of Tohoku]
• Date and time: March 11, 2011 14:46
• Location and depth: Off Sanriku region, 24 km
• Locations where seismic intensity 6 lower recorded
Miyagi, Fukushima, Ibaraki, Tochigi, Iwate, Gunma, Saitama, Chiba Prefectures



Slope Failure
1 apartment destroyed
11 Mar.
Ishinomaki City
Kazuma Miyagi Pref.

Debris Flow
12 Mar.
Nakauonuma-gun
Tsunanmachi Tatsunoguchi
Niitaga Pref.

Landslide 11 Mar.
Dead: 13
Homes destroyed: 10
Hanokidaira Shirakawa City
Fukushima Pref.

[North Nagano Prefecture Earthquake]
• Date and time: March 12, 2011 03:59
• Location and depth: North Nagano Pref., 8 km
• Locations where seismic intensity 6 lower recorded:
North Nagano Pref., Niigata Pref. Chuetsu

[East Shizuoka Prefecture Earthquake]
• Date and time: March 15, 2011 22:31
• Location and depth: East Shizuoka Pref., 14 km
• Locations where seismic intensity 6 lower recorded:
East Shizuoka Pref.

Debris Flow
12 Mar.
Sakae Village, Nagano Pref.

Cliff Collapse
Homes damaged: 1
15 Mar.
Fujinomiya City, Shizuoka Pref.

Landslide 11 Mar.
Dead: 2
Homes destroyed: 3
Kawanishi, Nasukarasuyama City
Tochigi Pref.

Sediment-Related Disasters by Rainfall After 2011 Great East Japan Earthquake

In municipalities where severe tremors were observed during the Great East Japan Earthquake, even modest amounts of rainfall led to sediment-related disasters.
These events after the 2011 earthquake took place at locations categorized as Type B (*2) in the emergency inspections (*1) carried out by municipalities.

(*1) In municipalities where seismic intensity of 5 upper or greater was observed, emergency inspections were carried out to prevent or meliorate sediment-related disasters during the snow melt and rainy seasons.
(*2) Type A: Locations where deformation is large, and construction work is needed urgently
Type B: Locations where deformation is slight and construction work is to be carried out as required after detailed surveys
Type C: Locations without deformation where construction work is not needed

Ibaragi
Disaster location

[Cliff collapse]
Date: June 13, 2011
Disaster location: Namegata City Ibaragi Pref. (inside debris flow special precaution zone)
Rainfall: Total rainfall 41 mm (daily rainfall 41 mm, max. hourly rainfall 12 mm)
Seismic intensity: Main shock (6 -), aftershocks (5 + (1 event), 5 - (1 event))
Damage: Homes damaged

Damage

Sediment-related disasters occur even when rainfall is not very strong! !

3) Sediment-Related Disasters after Volcanic Eruptions

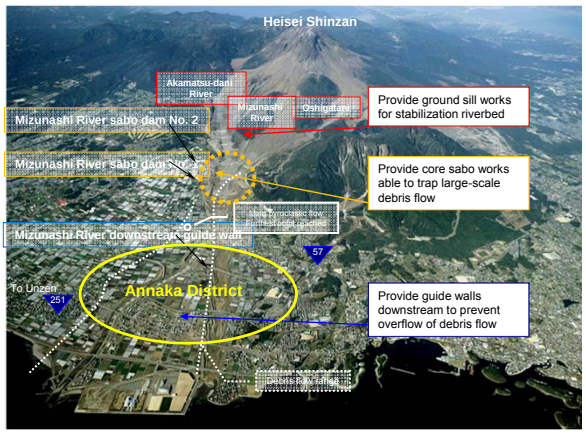
Countermeasures To Volcanic Eruptions

Mount Unzen, Fugen-dake

➢ Began volcanic activity in 1990, after a pause of 198 years. Pyroclastic flow claimed 54 victims and the region was devastated by repeated debris flows.

Provision of Sabo Works

➢ Sabo restoration work project were carried out by Central Goverment project beginning 1993 to protect downstream homes etc. from debris flows.



2. Problems

Aging Society

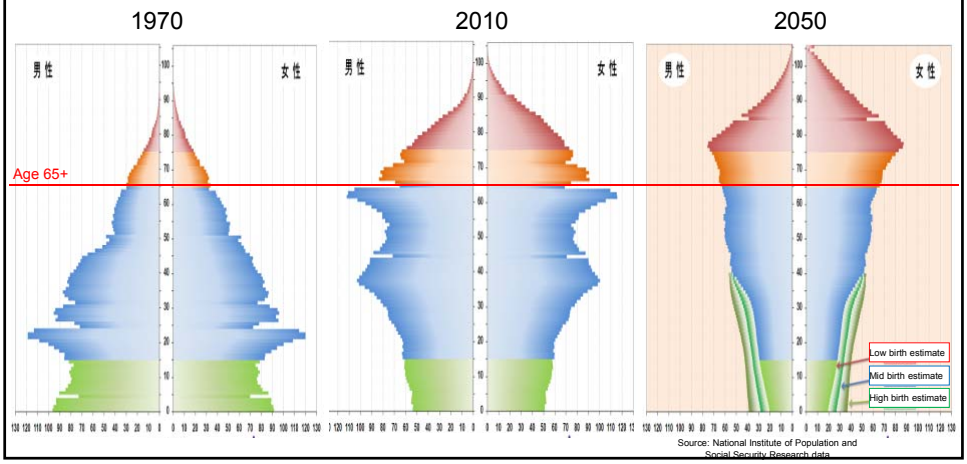
In today's rapidly aging society, the elderly have become vulnerable to disasters, for example requiring more time to evacuate. Warning, evacuation and mutual assistance systems to respond to the aging of society are needed.

40 years ago
Population aged 65+
7%

Today
Population aged 65+
23%

40 years from now
Population aged 65+
42%*

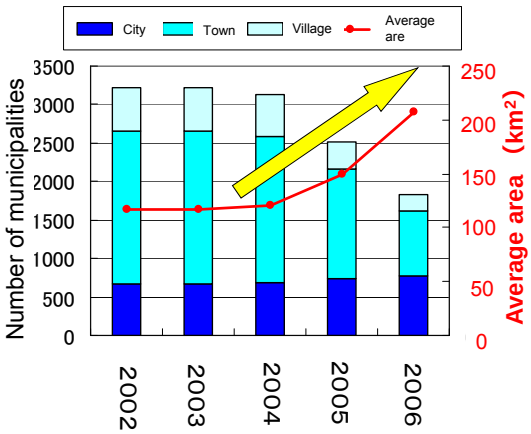
* Case of low birth/death rates



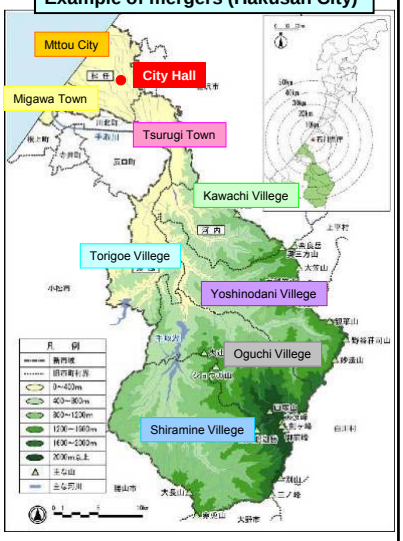
Source: National Institute of Population and Social Security Research data

Municipal Mergers

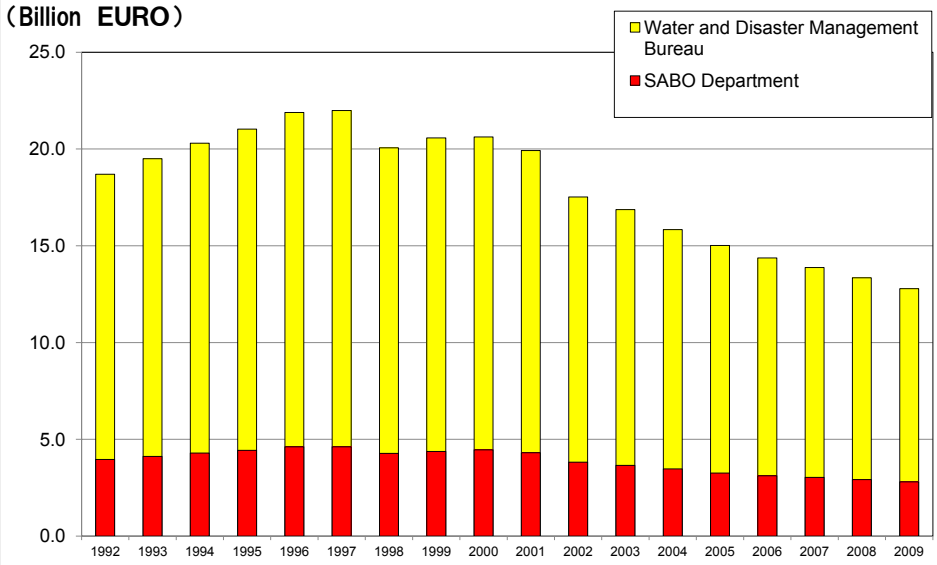
- The area that must be covered by 1 municipality has increased as municipalities have merged.
- From the end of 2002 to the end of 2006, the area of the average municipality increased by 77%.



Example of mergers (Hakusan City)



Budget for Disaster Management

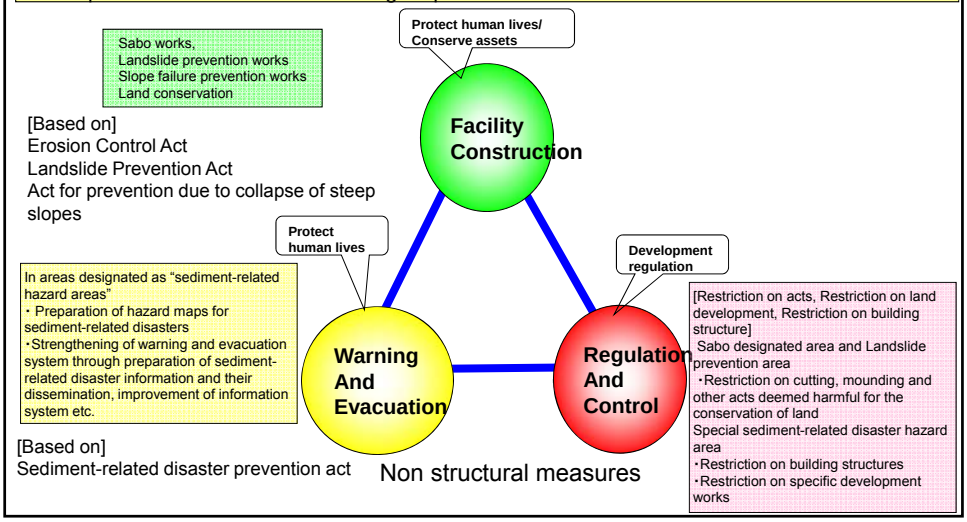


1EURO＝ 105.75JPY（28.Nov.2012）

3. Countermeasures against Sediment-Related Disasters

Three main actions of countermeasures against Sediment Related disasters

1. **"Facility construction"** Structural measures to protect human lives and to conserve assets
2. **"Warning and Evacuation"** Non-structural measures to protect human lives through evacuation
3. **"Regulation and Control"** Non-structural measures to regulate new residential area development at sediment disaster danger spot



Responding to Sediment Related Disasters by Facility Construction

About 1,000 sediment-related disasters occur every year, causing tremendous damage. Countermeasures are vital to protect human lives and property.

Debris flow

Debris flow at Aso City, Kumamoto Pref. (July 2012: 1 death, 10 homes destroyed)

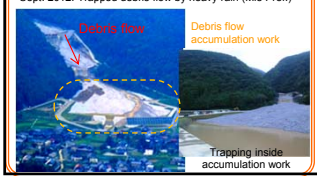
[Countermeasure]

<Build sabo dam to trap debris flow>

Debris trapped after July 2012 torrential rain (Oita Pref.)

<Build debris flow accumulation work>

Sept. 2012: Trapped debris flow by heavy rain (Mie Pref.)



Landslide

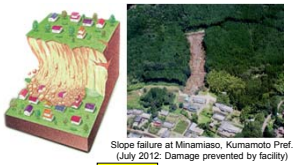
Landslide at Joetsu City, Niigata Pref. (March 2012: 11 homes destroyed)

[Countermeasure]

<Remove landslide-causing groundwater>

<Build facilities to stop landslide>

Slope failure



Slope failure at Minamiaso, Kumamoto Pref. (July 2012: Damage prevented by facility)

[Countermeasure]

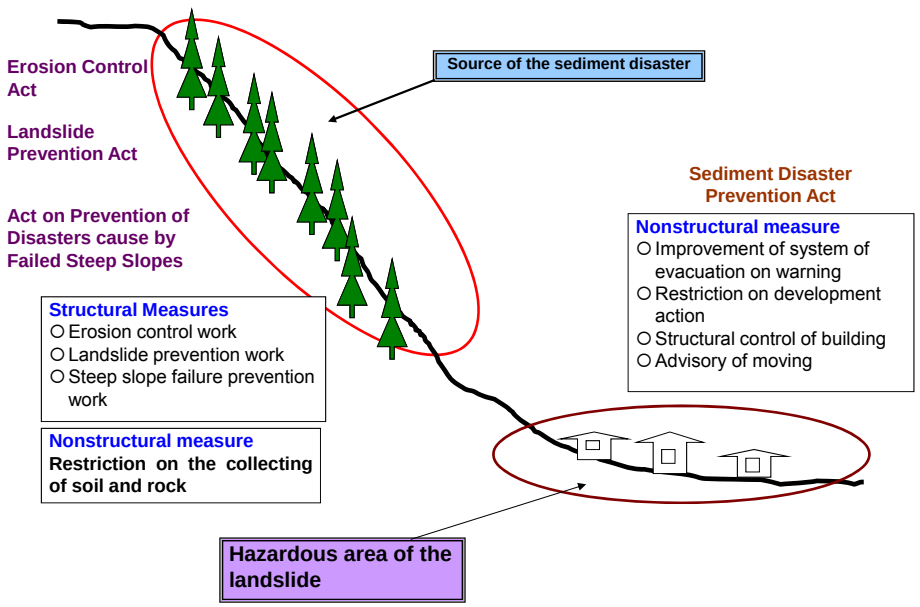
<Build retaining walls to trap landslide>

June 2012: Trapped slope failure by heavy rain (Oita Pref.)

<Build slope frame work to stop slope failure>

23

4 Laws to Sediment Related Disasters



Overview of Sediment Disaster Prevention Act

Sediment Disaster Prevention Act (2000)

For areas at risk of disaster, publicize the risk, organize a warning and evacuation system, discourage new home building, encourage relocation of existing homes.

[Specification of Precaution Areas Under Sediment Disaster Prevention Act]

Sediment disaster precaution area

These are areas where residents are at risk of death or injury in the event of a steep slope collapse or other disaster. Publicize the risk and organize warning and evacuation systems.

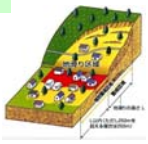
Sediment disaster special precaution area

In areas where steep slope collapse has occurred, and where buildings have been damaged and there is serious danger of death or injury to residents, regulations are established for certain kinds of development and structural regulations are established for buildings.

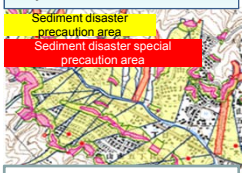
Debris flow

Collapse of steep slopes

Landslide



Notify residents of disaster risk areas

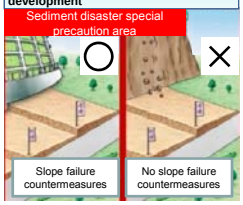


Display locations at risk of disaster in sediment disaster precaution areas

Organize warning and evacuation system

Specify information transmission system and important points for evacuation in disaster plans for municipalities

Restrictions on certain kinds of development



Structural regulations for buildings

3. Countermeasures against Large-Scale Sediment-Related Disasters

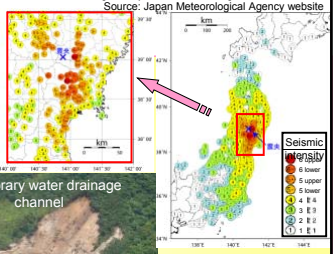
Unzen Fugendake (1991)

Pyroclastic flow caused 43 deaths on June 3, 1991

Response to Sediment-Related Disasters of 2008 Earthquakes in Iwate and Miyagi Prefectures

There were 15 river blockages (natural dam) in Iwate and Miyagi Prefectures.
In 9 of these central government sediment-related emergency projects were carried out

[Earthquake distribution]
Source: Japan Meteorological Agency website



• Earthquake date and time: June 14, 2008 08:43 (M7.2)

1. Earthquake scale
Max. seismic intensity 6 upper
(Oshu City, Iwate Pref.; Kurihara City, Miyagi Pref.) [M7.2]

2. Damage
By debris flows
Deaths and missing: 18

3. Sediment disaster events
Sediment disaster events: 48
River blockage (natural dam) locations: 15

Emergency response to river blockage (natural dam)
Azabu area (Kurihawa City Miyagi Pref.)

Response

June 14–

[On day of disaster]
• Helicopter survey by advance party
→ Confirm natural dam

June 16–

• Urgent inspections
→ Conduct about 2,800 inspections and report results to Iwate and Miyagi Prefectures

June 17–

[3 days after earthquake]
• Start emergency countermeasures
(central government sediment-related emergency projects)

June 19–

• Perform 24-hour construction work

June 21–

[7 days after earthquake]
• Temporary water drainage channel

Act to partially amend the Act on Sediment Disaster Countermeasures for Sediment Disaster Prone Areas (established on November 17, 2010)

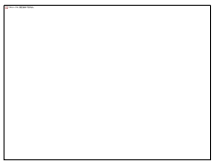
Enforced since May 1, 2011

Background

① Many landslide dams (or the damming of rivers) were formed by the Iwate-Miyagi Nairiku Earthquake (2008) and the Mid Niigata Prefecture Earthquake (2004).
② In case of imminent large-scale sediment disasters associated with landslides, landslide dams and debris flows accompanying volcanic eruptions:

- **They may cause a good deal of damage over a wide area once they occur,**
- **Because of the continuously changing circumstances, technical skills are required to understand the risks**

Landslide dam formed by the Iwate-Miyagi Nairiku Earthquake



Area designated for evacuation at first in the lower basin of the Iwaigawa River (roughly 20 km from the landslide dam (or the damming of the river))

Issues

With regard to imminent large-scale sediment disasters:
① It is within the authority of municipalities to issue evacuation instructions to local residents. However, they lack necessary technical skills. As a consequence, they may have difficulty acquiring information, on which they can base their judgments about evacuation instructions, on their own. Thus, they need technical assistance from the central or prefectural government.
② The roles and involvement of the central and prefectural governments are not clearly defined.

Purpose of the amendment

① The central or prefectural governments need to provide information about the probable areas and time period of damage, so that municipal governments can make proper judgments about the issuance of evacuation instructions to local residents when facing imminent large-scale sediment disasters.
② It is necessary to legally specify the roles and involvement of the central government in the case of sediment disasters requiring high technical skills, and those of prefectural governments in the case of other sediment disasters.

Summary

Imminent large-scale sediment disasters〔landslides, landslide dams and debris flows accompanying volcanic eruptions〕

Additional items

The carrying out of emergency investigations by the central government in the case of landslide dams, debris flows accompanying volcanic eruptions and the flooding of landslide dams (i.e., sediment disasters requiring high technical skills) and by prefectural governments in the case of landslides

Notification of information about the probable areas and periods of damage (i.e., emergency information about sediment disasters) drawn from the findings of the emergency investigations to municipal governments and its dissemination to the public

Issuance of evacuation orders for residents by municipalities (pursuant to Article 60 of the Basic Act on Disaster Control Measures), etc.

Protection of the lives and health of the citizens from sediment disasters

Emergency surveys

MLIT

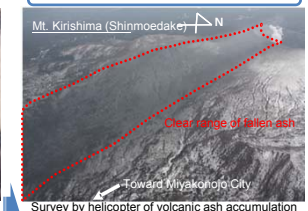
- On January 27, 2011, Mt. Kirishima (Shinmoedake) began intensified volcanic activity. The activity continued, leading to volcanic ash accumulation in the surrounding areas.
- To survey the volcanic ash accumulation, surveys were carried out from a helicopter and the ground.
- The ash distribution and ash thickness were determined, and debris flow simulations were carried out for streams at risk of debris flows.

Volcanic eruption

January 2011 eruption of Mt. Kirishima (Shinmoedake)

Volcanic ash accumulated across a wide area in the mountains, creating the risk of debris flows from accumulated ash.

Survey of volcanic ash accumulation



Survey by helicopter of volcanic ash accumulation in streams at risk of debris flow

Ground survey of volcanic ash accumulation

Preparation of emergency debris flow disaster information by data analysis

• Actions for preparation of emergency debris flow disaster information

Helicopter survey of fallen ash (27 Jan. 2011)

Helicopter survey of fallen ash (28–29 Jan. 2011)

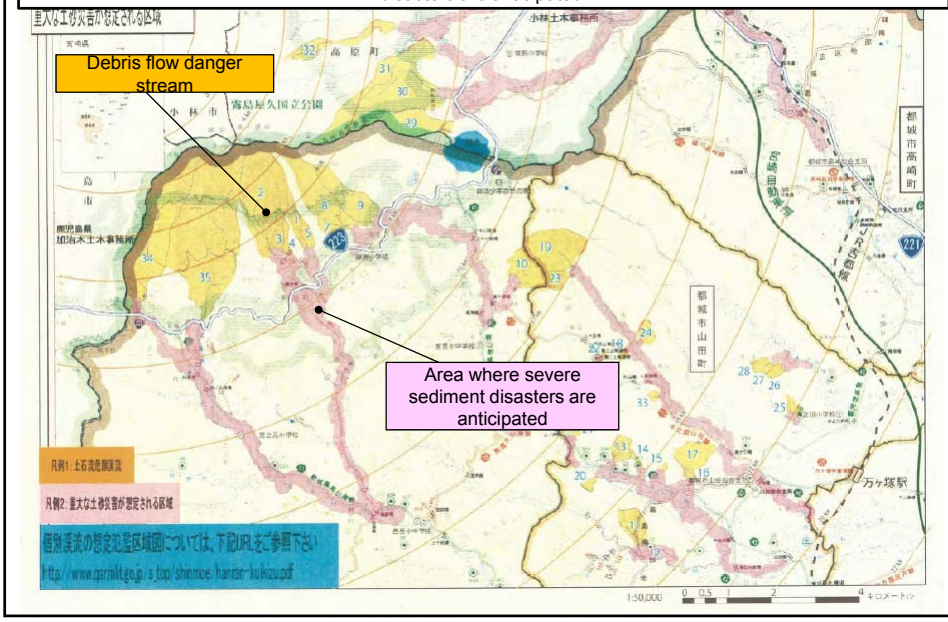
Check of streams at risk of debris flows from accumulated ash (30 Jan. 2011)

Analysis by simulation (31 Jan.–3 Feb. 2011)

Provision of information to local governments (4 Feb. 2011)
Provision of information updated by rainfall standards (1 Mar. 2011)

Sediment Disaster Emergency Information (Areas Where Severe Sediment Related Disasters Are Anticipated)

Display debris flow risk streams around Mt. Kirishima (Shinmoedake) and areas where severe sediment disasters are anticipated.



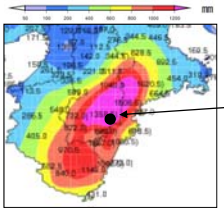
Number of sediment disaster caused by Typhoon Talas

No. of sediment disasters:
208

Debris flows: 94
Landslides: 32
Slope failures:82

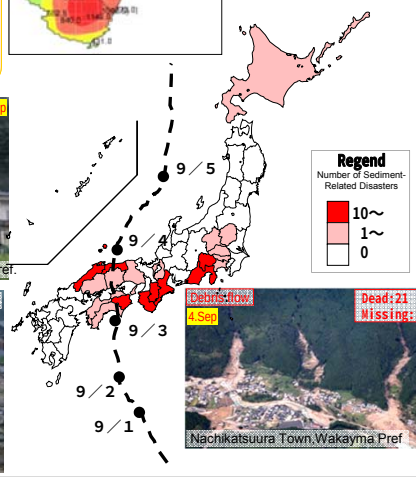
Overall damage:
No. of deaths: 78; No. of missing persons: 16
(as of 6:00 p.m., Dec. 15, 2011)
* Source: Fire and Disaster Management Agency
The above includes damage caused by sediment disasters as follows:
No. of deaths: 49; No. of missing persons: 13
No. of completely destroyed houses: 99; half-destroyed houses: 46;partially destroyed houses: 45
* Source: Ministry of Land, Infrastructure, Transport and Tourism

Amount of rainfall during 8/30 18:00～9/4 24:00



Nara Pref.
Kamikitayama observatory (JMA)

Continuous rainfall :1812.5 mm
(8/31 0:00～9/4 24:00)
Maximum hourly rainfall :46.0mm
(9/2 22:00)
Maximum Daily rainfall: 661mm
(9/3)

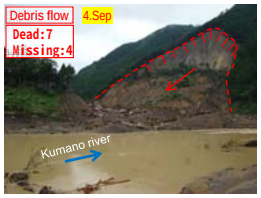


Regend
Number of Sediment-Related Disasters
10～
1～
0

Ikeda Town, Miyoshi City Tokushima Pref.

Nachikatsuura Town,Wakayama Pref

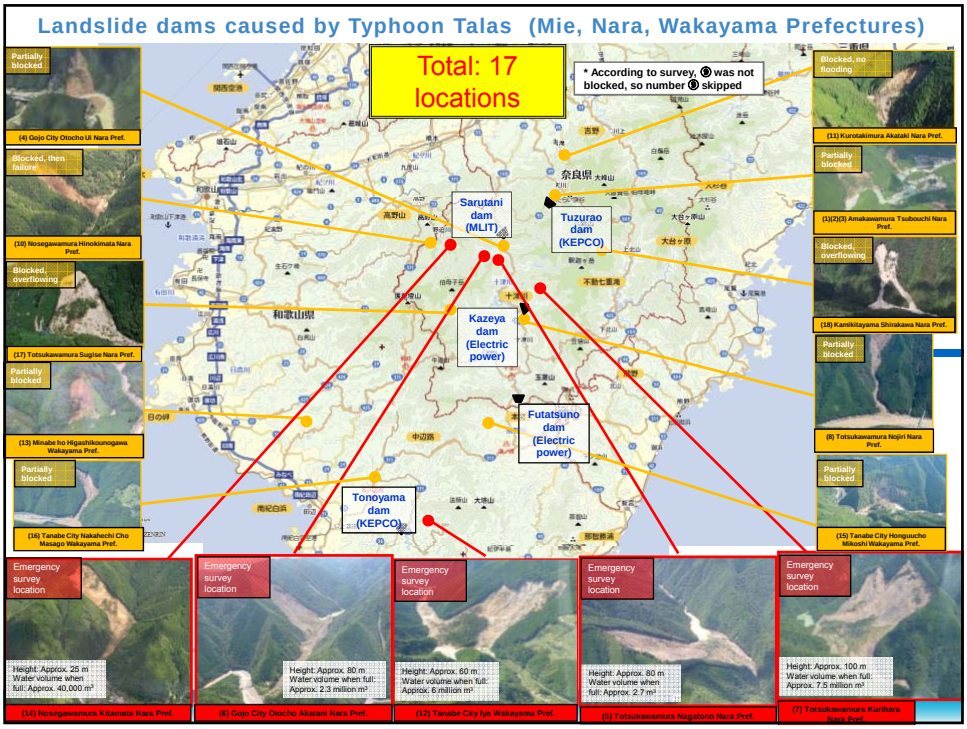
Tanabe City, Wakayama Pref.



Gojo City, Nara Pref.

Tanabe City,Wakayama Pref

Landslide dams caused by Typhoon Talas (Mie, Nara, Wakayama Prefectures)



Conducting an emergency survey on river blockage caused by Typhoon Talas, and taking other related action

MLIT

Sep. 6, 2011: An emergency survey was conducted in the three drainage areas of the Kumano River (Totsu River), and one drainage area of the Hiki River in Wakayama Prefecture.
Sep. 8, 2011: Emergency information on sediment disaster, such as (1) debris-flow-prone areas, and (2) when to expect serious sediment disaster for evacuation purposes, was sent to relevant prefectural governments, and municipalities, and support was provided for precautious evacuation.
Sep. 12, 2011: In the four areas where an emergency survey was conducted on September 6, 2011, information on surveying was updated, and emergency information on sediment disaster was provided again. (Measured with a laser device from an helicopter. → Aerial photos were taken. [by the Geospatial Information Authority of Japan])
Sep. 13, 2011: Because it was confirmed that another drainage area of the Kumano River (Totsu River) in Nara Prefecture requires an emergency survey, an additional emergency survey was conducted.
Sep. 15, 2011: Issuance of emergency information on sediment disaster, and a newly discovered area of the river blockage in the drainage area of the Kumano River (Totsu River) in Nara Prefecture.

Implementation of emergency survey, etc.

Occurrence of river blockage

Akadani, Ooto-cho, Gojo City, Nara Prefecture

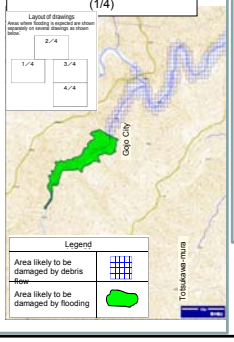
Continuous observation of the flood height of the river blocked

Dropping a buoy for measuring the water level

Issuance of emergency information on sediment disaster

Debris-flow-prone areas

Akadani, Ooto-cho, Gojo City (1/4)



When to expect serious sediment disaster

Akadani, Ooto-cho, Gojo City

Area where river blockage was confirmed	When to expect serious sediment disaster
Akadani, Ooto-cho, Gojo City, Nara Prefecture	When a sudden shower occurs

(Reference)

Evacuation	Estimated accumulated rainfall to the highest possible water level of river before causing river blockage
Evacuation will be necessary.	Approximately 30 mm

As of Sep. 12, 2011

Measuring the height of the river blocked, etc.

Measurement with the use of a laser device from above the river

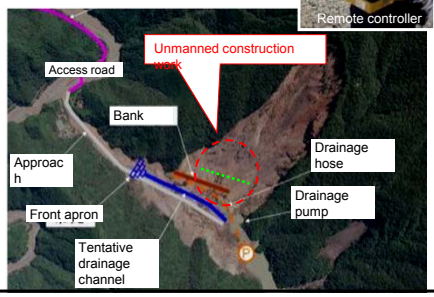
Monitoring the downstream area of the river blocked

Observation via a monitoring camera above the satellite communications vehicle

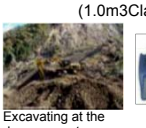
Remote controllable construction working system in Kii Peninsula

■ To ensure the safety work ⇨ Remote controllable construction machines Operated by a remote control system

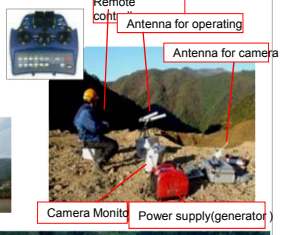
Akatani Constructing a bank ・Length : 200m
・Period ：Nov. 17~Nov. 18, Nov. 28~Dec. 3
・Machines : Backhoe（1.6m3 class）
Crawler dump truck（10t class）

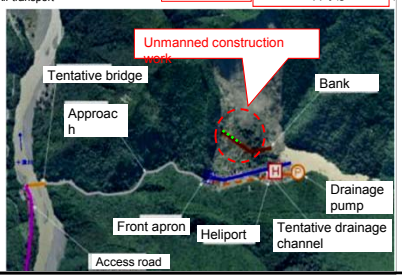


Nagatono Constructing a bank
・Length : 75m
・Period ： 11/16～11/18
・Machine ： Dismantled type backhoe (1.0m3Class)


Excavating at the dangerous steep slo

Air transport





Progress of Countermeasures and Change of off-limit area

Response status

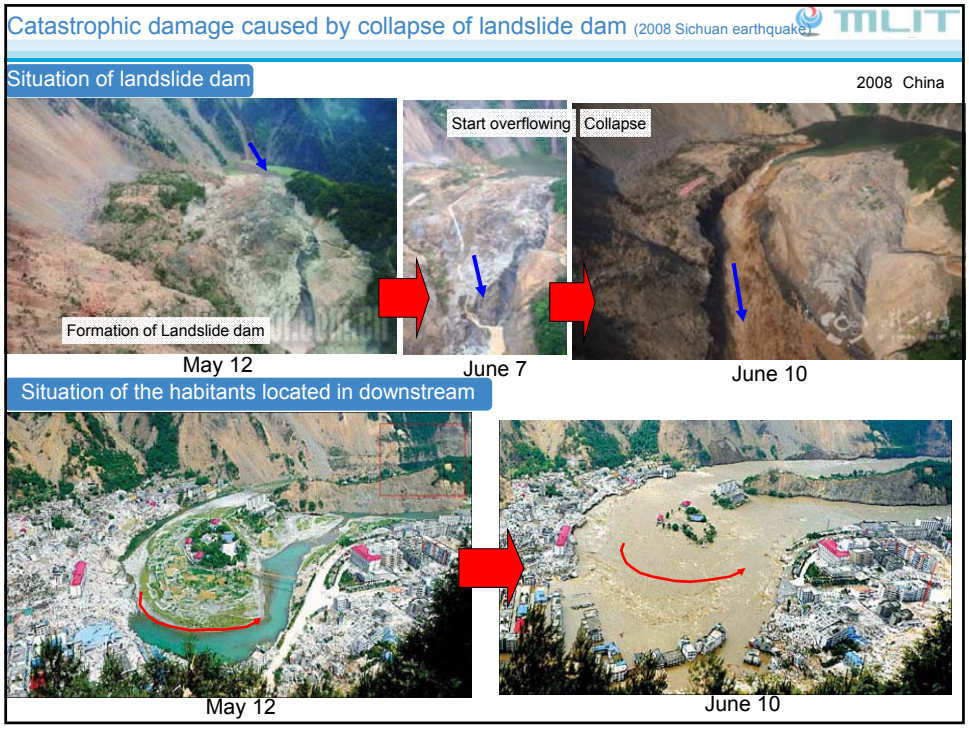
Sep 2 – 5	• Hit by typhoon Talas	
Sep 6	• Emergency investigation	
Sep 16	• Start emergency work	Sep 16 Set off-limit
Sep 25	• Further investigation by specialist	Sep 27 Reduction off-limit
Oct 1	• Start pumping drainage	Nov 2 Reduction off-limit
The end of Jan	• Completion of tentative drainage channel	Feb 8 Call off Off-limit

The situation of the site


Soon after hit by typhoon

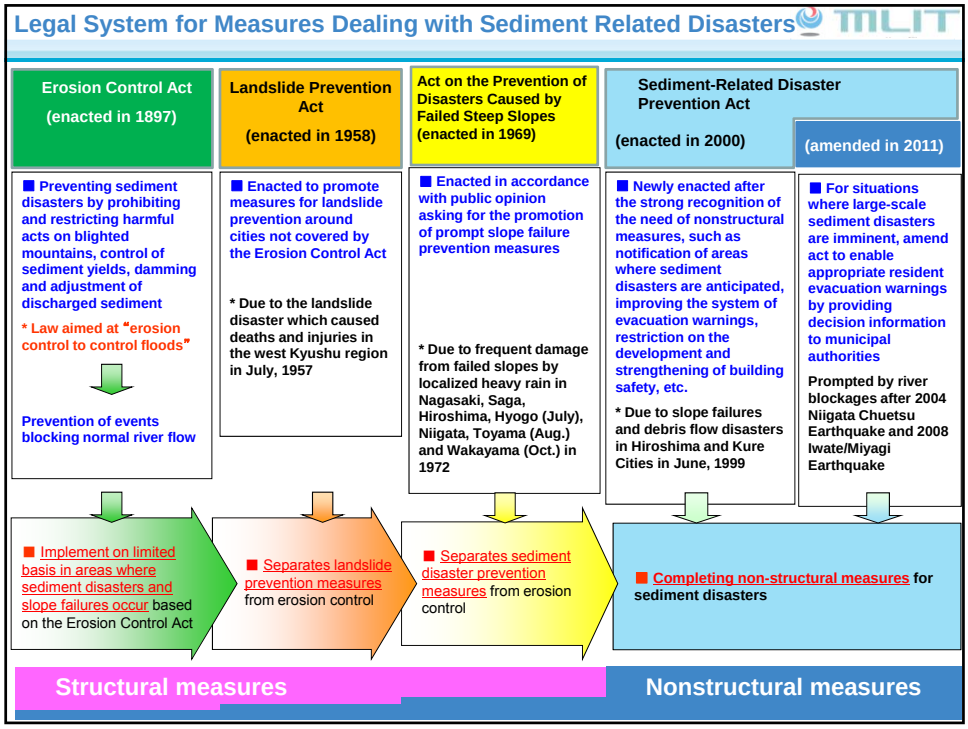

Nov 2


Jan 25

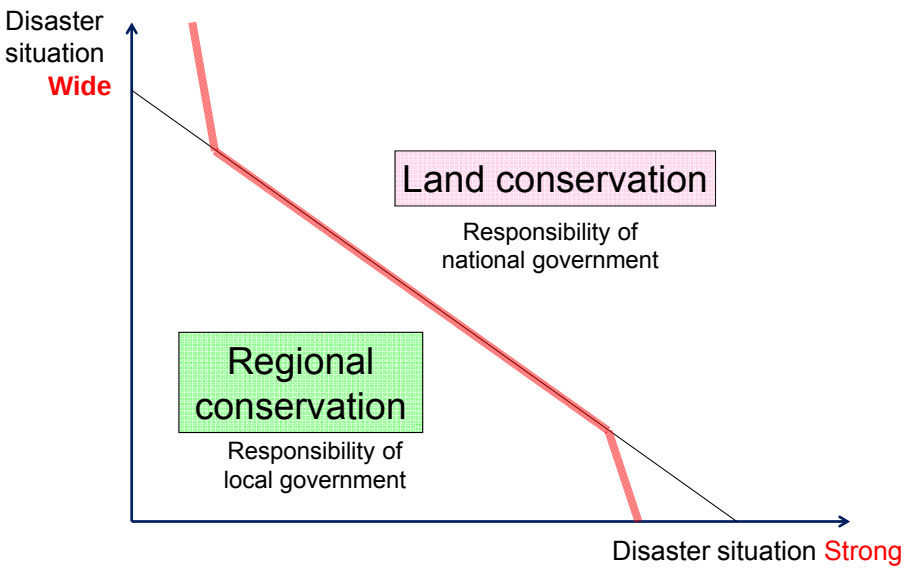


4. Sabo Administration in the Future

Legal System for Measures Dealing with Sediment Related Disasters



Conceptual Diagram of Regional and Land conservation



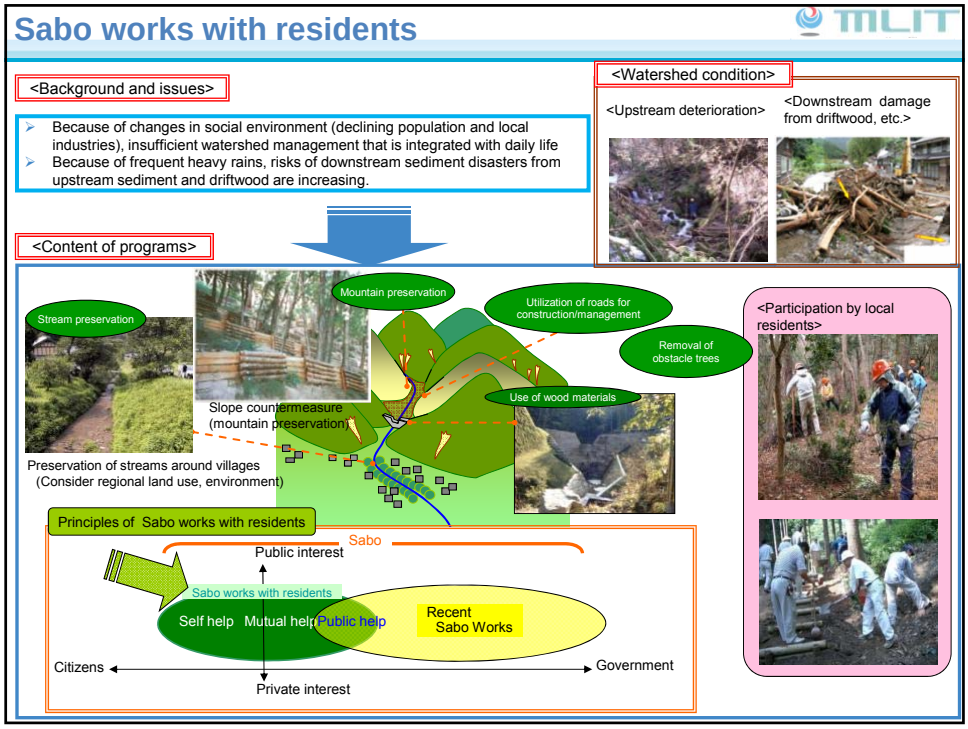
(1) Regional Conservation

Example of effective facility: Kuma River , Kawabe River Water System (Taguchi No. 2 Sabo Dam, Taguchi Sabo Dam)

Dates of disasters: July 12, 2012 [max. hourly rainfall 68 mm (12.July, 11:00), continuous rainfall 322 mm (12.July, 01:00–13.July, 14:00)]
June 24, 2012 [max. hourly rainfall 31 mm (24.June, 09:00), continuous rainfall 274 mm (23.June, 08:00–24.June, 21:00)]
Disaster location:Itsuki Villege, Kumamoto Pref.
Damage: Debris flow occurred because of a rain season rain front, but sabo dams had been provided and trapped the debris (approx. 7,600 m3).
Damage to the area downstream was prevented.

Approx. 7,100 m3 trapped after rains of July 12 (Photo July 13, 2012)

2 dams trapped debris and prevented debris flow disaster


Sabo works with residents
<Background and issues>
Because of changes in social environment (declining population and local industries), insufficient watershed management that is integrated with daily life
Because of frequent heavy rains, risks of downstream sediment disasters from upstream sediment and driftwood are increasing.
<Watershed condition>
<Upstream deterioration>
<Downstream damage from driftwood, etc.>
<Content of programs>
Stream preservation
Mountain preservation
Utilization of roads for construction/management
Removal of obstacle trees
Use of wood materials
Slope countermeasure (mountain preservation)
Preservation of streams around villages (Consider regional land use, environment)
<Participation by local residents>
Principles of Sabo works with residents
Sabo
Public interest
Sabo works with residents
Self help
Mutual help
Public help
Recent Sabo Works
Citizens
Government
Private interest


Protect yourself !! Evacuation trainings
国土交通省
Evacuation training with physically challenged person
Rescue training using a helicopter
Hazard Map making by residents themselves
Studying for disaster prevention at a refuge

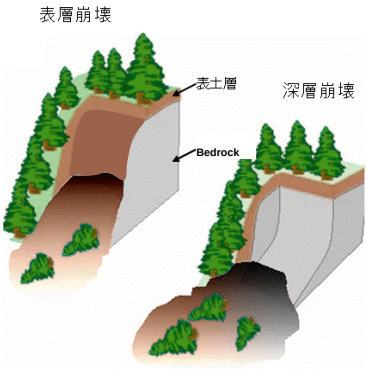
(2) Land Conservation

What is Deep-Seated Collapse?

- Deep-seated refers to collapse not only of the surface in mountain and hill slopes (weathered layer) but collapse that reaches down to the bedrock.

- It occurs after torrential rain, earthquakes, snowmelt, etc.

Characteristics of deep-seated collapse
- The motion of soil and rock blocks is sudden and temporary
- The speed of soil and rock block motion is high
- Soil and rock blocks are deformed and do not retain their original shapes
- The amount of debris is greater than in surface collapses, and reaches farther distances




(Former) Mimikawa Saigo Villege, Miyazaki Pref. (2005)


(Former) Tanocho Mt. Wanizukayama, Miyazaki Pref. (2005)


Gojo City Akatani, Nara Pref. (2011)

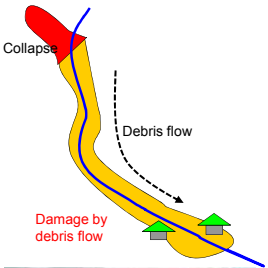
Sediment Related Disasters by Deep-Seated Collapse

- Compared to sediment disasters, which occur about 1,000 times per year, deep-seated collapses occurred only 31 times in the decade between 2001 and 2010.
- Because the amount of moving debris is large compared to surface collapses, severe damage can result if a deep-seated collapse occurs.
- The following types of damage are caused by deep-seated collapses.

① Falling of collapsed debris

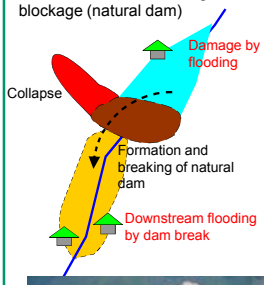
Gojo City Otocho Ui Shimizu, Nara Pref. (2011)

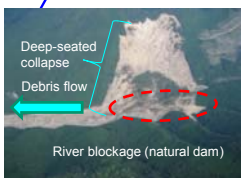
② Downstream debris flow



(Former) Tanocho Mt. Wanizukayama, Miyazaki Pref. (2005)

③ Formation and breaking of river blockage (natural dam)



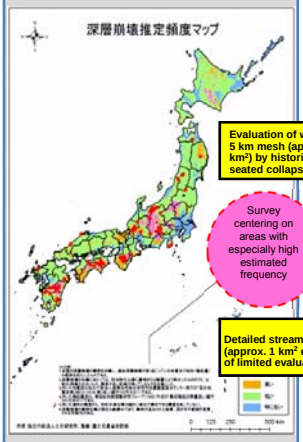


Tanabe city Iya, Wakayama Pref. (2011)

Survey Results on Deep-Seated Collapses (published September 10, 2012)

- **"Deep-seated collapse estimated density map"** showing nationwide deep-seated collapse trends
- Create and publish a **"Deep-seated collapse stream level evaluation map"**.

Deep-seated collapse estimated frequency map (published August 2010)



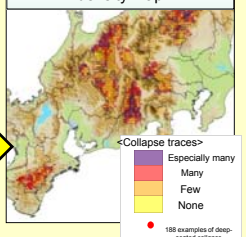
From about 120 examples of deep-seated collapse events since the Meiji period (1868–1912), frequency was estimated on basis of relation with Quaternary uplift and geological conditions.

Evaluation of wide-area 5 km mesh (approx. 30 km²) by historical deep-seated collapse events

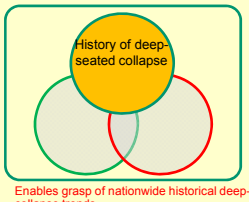
Survey centering on areas with especially high estimated frequency

Detailed stream-level (approx. 1 km² evaluation of limited evaluation area

Deep-seated collapse traces density map

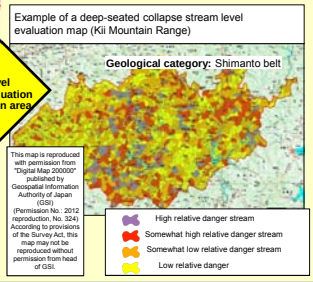


Divide the entire country into a 5 km mesh (about 30 km2). For areas where the anticipated frequency of deep-seated collapse is "especially many", evaluate in 4 stages by using index 1 of deep-seated collapse traces among the 3 indices of the stream-level survey.

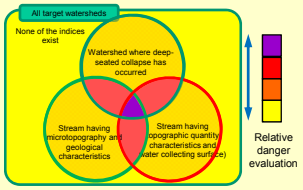


Enables grasp of nationwide historical deep-seated collapse trends

Example of a deep-seated collapse stream level evaluation map (Kii Mountain Range)



For areas where ground and weather conditions are thought to be roughly equal, in units of 1 km², evaluate using 3 indices of past deep-seated collapse incidents, geological structure and microtopography, and topographic quantity



Allows relative danger to be grasped within an area in stream units

Countermeasures to Deep-seated collapse (draft)

Publish deep-seated collapse map

- Deep-seated collapse estimated frequency map (August 2010)
- Deep-seated collapse traces density map
- Deep-seated collapse stream level evaluation map (September 2012)

Counter by precautionary evacuation

- Guidelines for warning and evacuation

Counter by facilities

- Technical standards for use of existing facilities (temporary name)
- Technical standards for deep-seated collapse mediation countermeasures (temporary name)

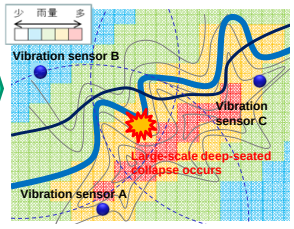
Fundamental countermeasures

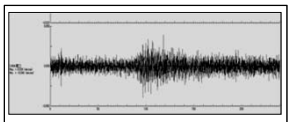
Realize mountain region economic development based on deep-seated collapse information

Monitoring system to Deep-Seated Collapse

Large-scale deep-seated collapse monitoring and warning system

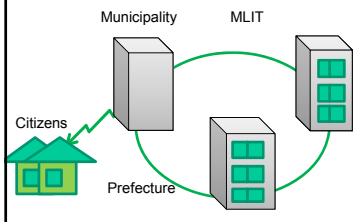
Vibration sensors detect and aggregate large-scale sediment movement

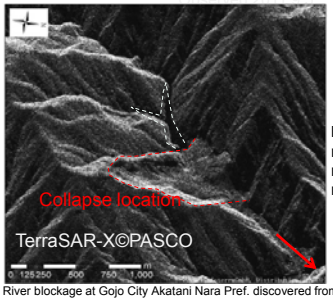




Vibration sensors detect and aggregate large-scale sediment movement
→ Deduce location from difference in arrival time between three or more vibration sensors

Share event data with relevant authorities





River blockage at Gojo City Akatani Nara Pref. discovered from satellite images

Identify location and measure scale by satellite radar, day and night, regardless of weather

Training with prefectures and municipalities against Large-Scale Sediment Disaster

Date and time: October 3 , 2012 13:00–17:00
Location: Katashinamura Office, Gunma Pref.
Participating organizations: Kanto Regional Development Bureau. Tone River System Sabo Work Office, Gunma Prefecture, Numata City, Katashinamura
Participants: 107 (breakdown: 51 training participants, 36 observers, 2 media, 18 office staff)

<Purpose of event>
Recently, numerous records for heavy and torrential rainfall have been broken, and numerous sediment disasters are occurring all over Japan. More than ever before, national and local governments need to cooperate to respond swiftly and precisely

To enable this, training that envisaged a large-scale sediment disaster was carried out to check the roles of the various relevant organizations and verify the transmission of information, with the aim of enhancing swift and smooth disaster response capabilities.

- Postulated disaster: River blockage (natural dam) caused by large-scale collapse, and multiple simultaneous sediment disasters
- Purpose of training: Swift provision of information to relevant authorities; execution of surveys according to Sediment Disaster Prevention Act; assessment of prospective damage from natural dam and emergency recovery measures; other
- Training method: Learning type training

Overview of Technical Emergency Control Force (TEC-FORCE)

Background to establishment of TEC-FORCE

- Support by Regional Development Bureaus and other offices to public service organizations during large-scale natural disasters has contributed to early recovery from many disasters, including the Maruyamagawa River dike break after Typhoon No. 23 in 2004 and the Niigata Chuetsu Earthquake in 2007.
→ However, on those occasions, the support system was organized each time after the disaster occurred.
- To prepare for large-scale natural disasters, and enable even speedier support to local public service organizations, TEC-FORCE was established in April 2008.
→ By designating employees as TEC-FORCE members in advance, everyday training and material preparation became possible.

Activity

On instructions from the Minister (director of the disaster countermeasure department), carry out the following activities.

- Disaster situation surveys
- Emergency response to disasters
- Support for local government disaster relief
- Prevention of secondary disasters

Preparation

- By designating employees as TEC-FORCE members, establish system in advance for dispatch and reception of personnel and materials, for rapid response
- Enhance capabilities through periodic training and drills
- Strengthen by preparing action plans and operating bases

Total number of TEC-FORCE members

Total of 3,575 members drawn from MLIT organizations
(As of August 1, 2012)

Deployment of disaster countermeasure equipment

- Deploy disaster countermeasure equipment (helicopters, pump trucks, lighting trucks, satellite communication vehicles, fast assembly bridges, etc.) to regional development bureaus and offices.

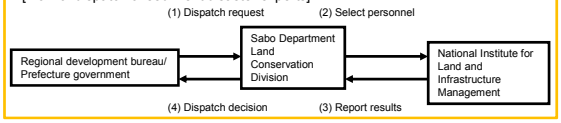
Technical Assistance by Experts for Sediment Related Disasters

For sediment disasters nationwide, respond to requests from regional development bureaus and prefectural governments by dispatching experts to offer technical assistance and support for disaster countermeasures.

[Content of technical assistance]

- Conduct local survey
- Offer assistance and advice on emergency countermeasures and recovery
- Offer guidance and advice about warning and evacuation

[Flow of dispatch of sediment disaster experts]



In response to the debris flow disaster of June 27–28 at Kimotsukicho Kimotsuki-gun, Kagoshima Prefecture, organize warning and evacuation and provide assistance for future countermeasures.

Dispatch date: June 30 (Monday), 2012

In response to the upstream debris flow disaster of July 3 at the Takemoto River in Yufuincho, Yufu City, Oita Prefecture, organize warning and evacuation and provide assistance for future countermeasures.

Dispatch date: July 5 (Thursday) to July 6 (Friday), 2012