

# Non-structural measures against landslides and debris flows in Japan

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# Japan: the hot spot of landslides and debris flows

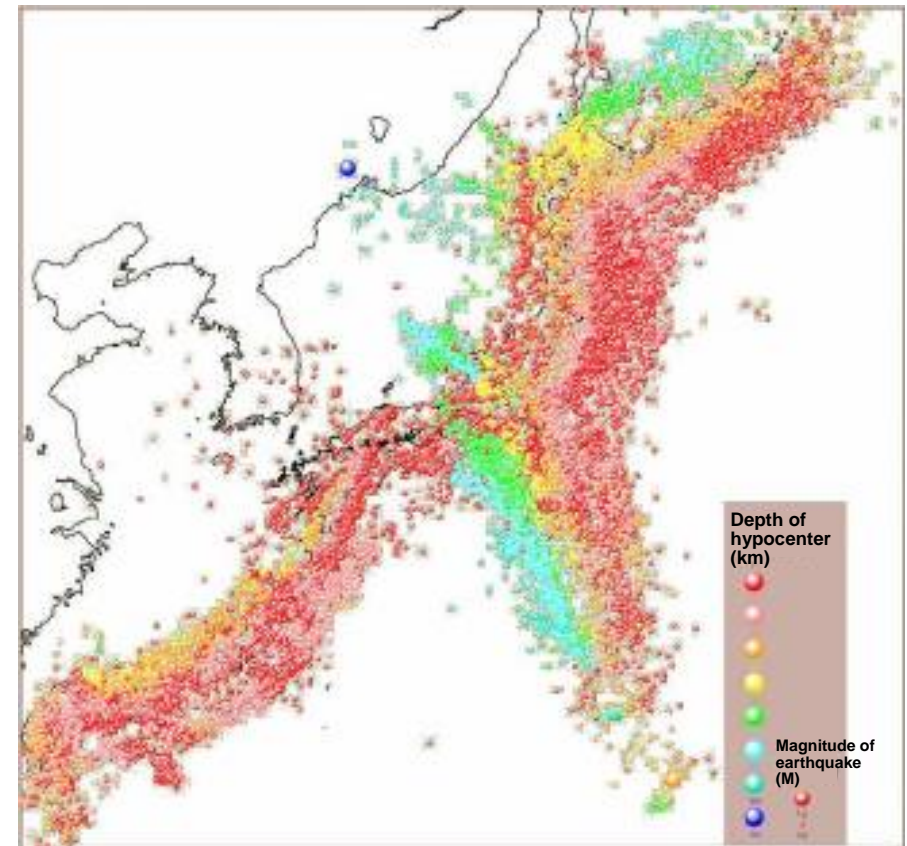
## Volcanic country

~10% of the world's active volcanoes  
(108 active volcanoes)



## Earthquake country

~20% of the world's earthquakes



Distribution of epicenters of earthquakes with M=3.0 or more in 1998-2000

# Japan: the hot spot of landslides and debris flows

## Vulnerable and steep geology

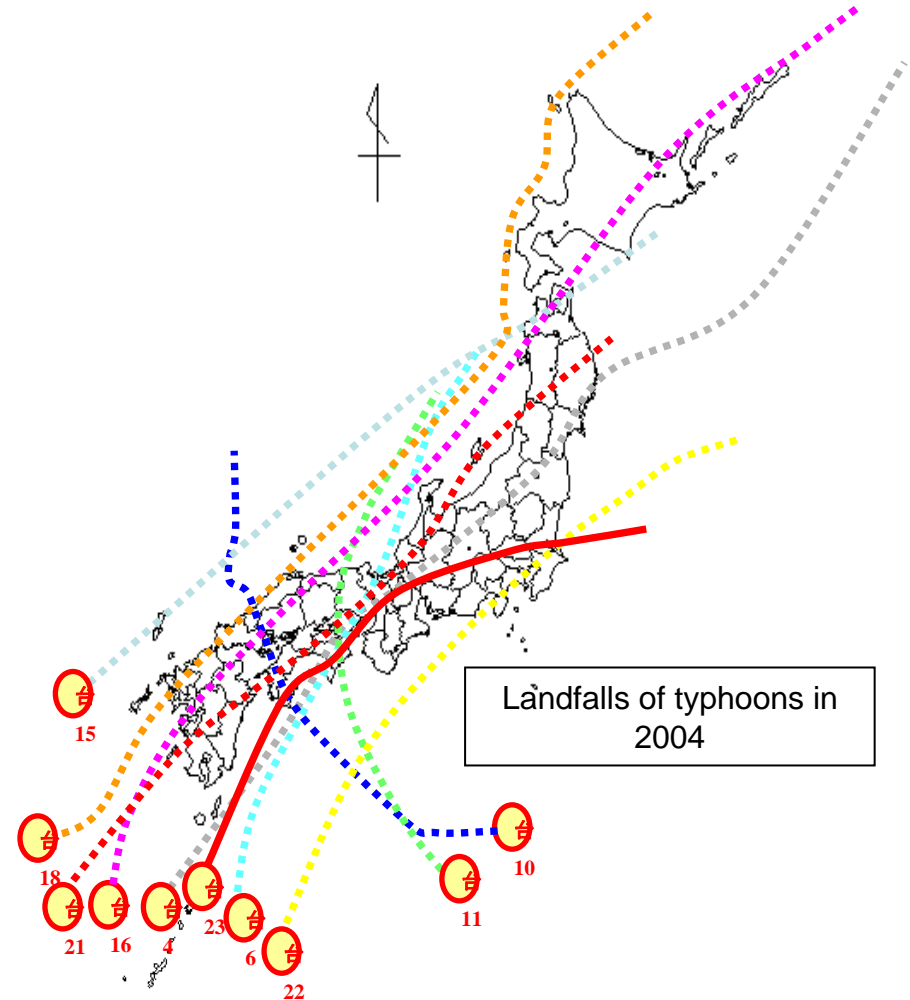
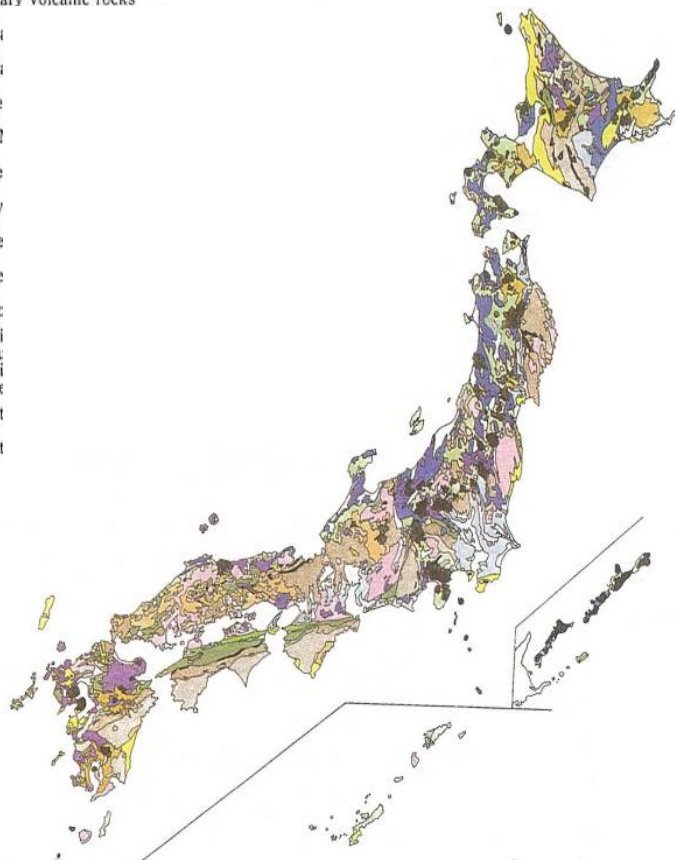
With many faults and complex geology, the Japanese islands are vulnerable to collapses.

## Rainy country

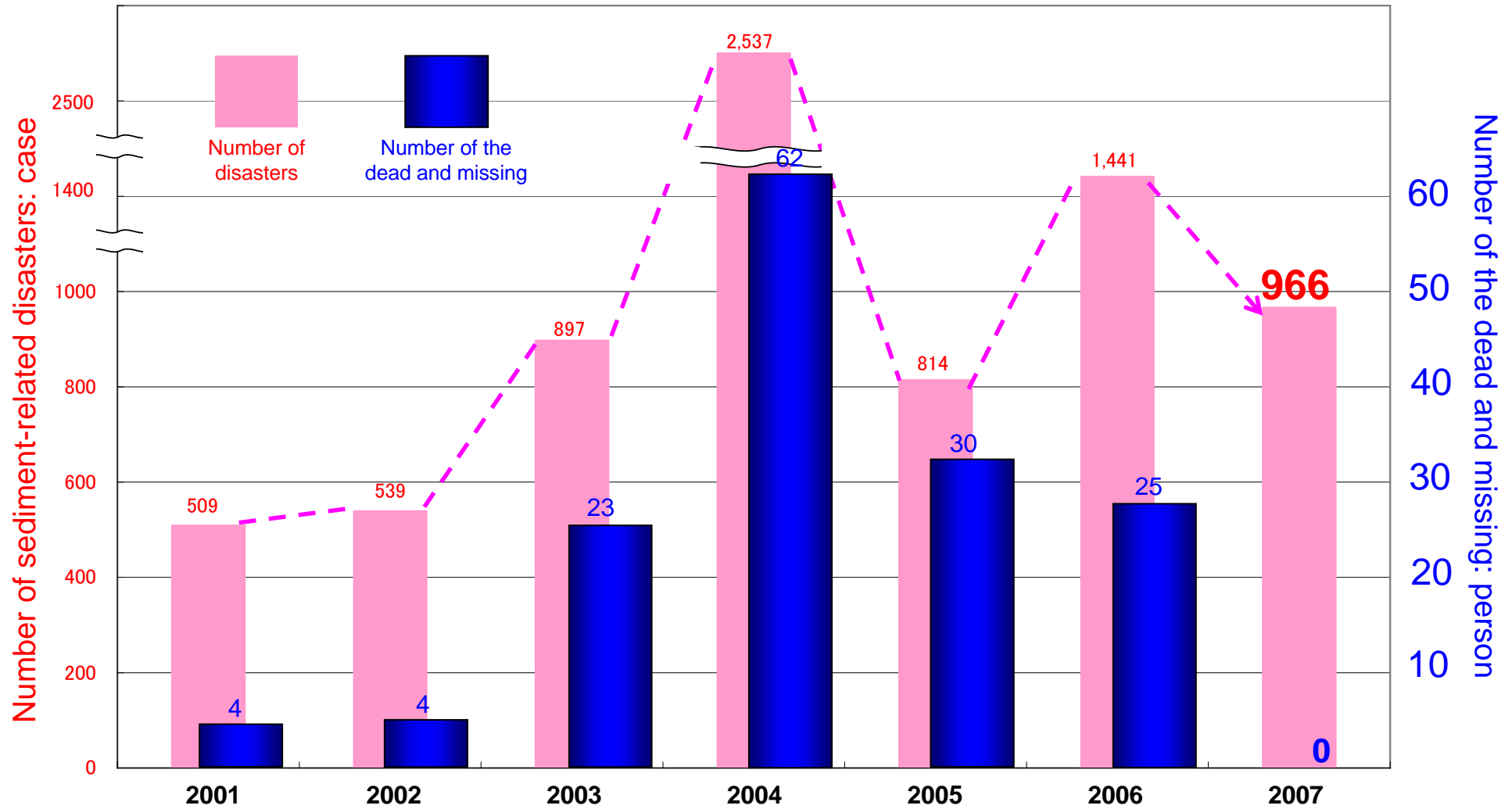
Heavy rains caused by the rainy season and typhoons.

Division

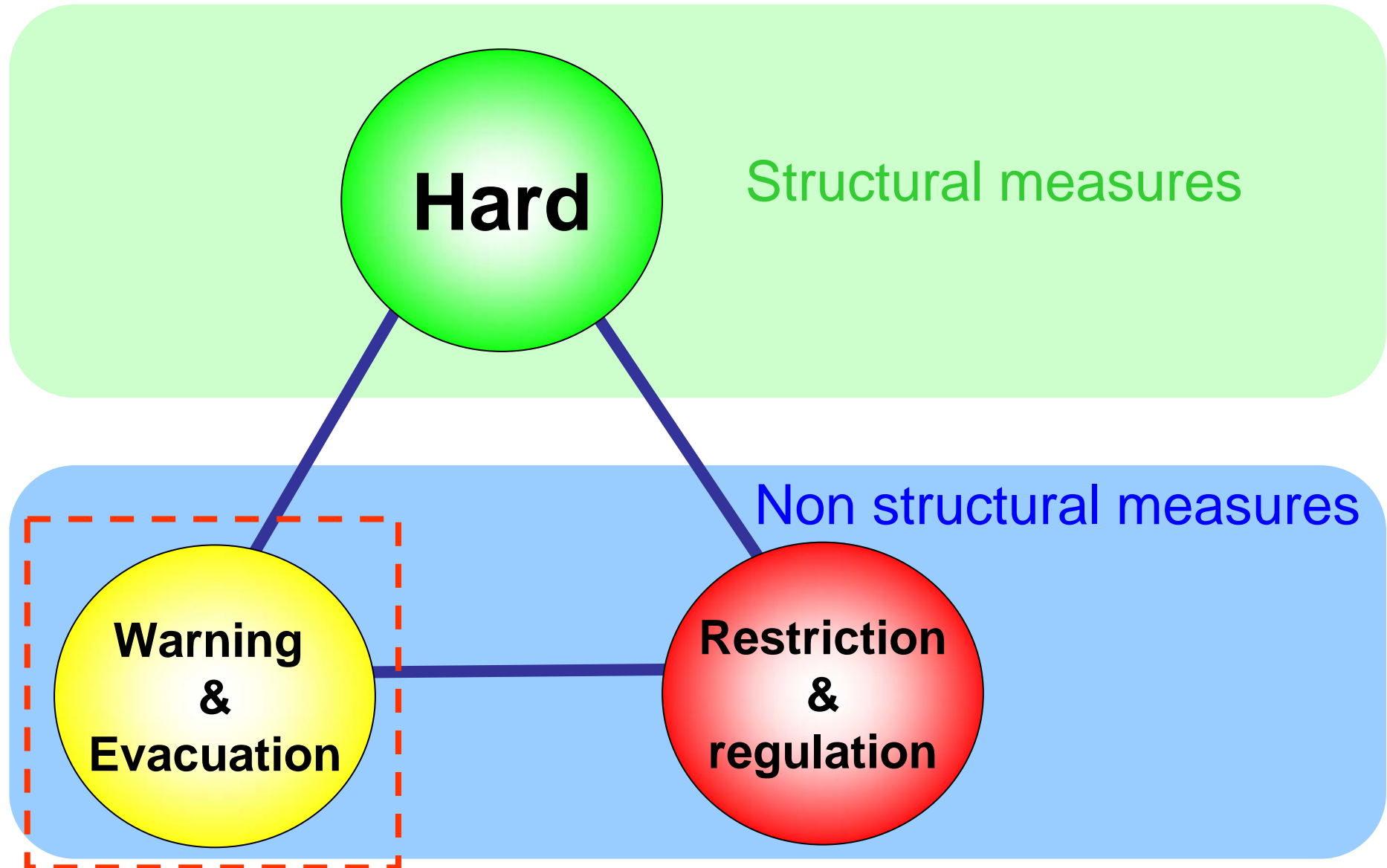
- 15 Late Pleistocene-Holocene clastic sediments
- 14 Quaternary volcanic rocks
- 13 Quaternary
- 12 Quaternary
- 11 Pliocene
- 10 Middle Miocene
- 9 Miocene
- 8 Tertiary
- 7 Late Miocene
- 6 Late Miocene
- 5 Cretaceous
- 4 Paleozoic accretionary zone
- 3 Paleozoic zone
- 2 Pre-Tertiary
- 1 Pre-Tertiary



# Landslides and debris flows in recent years



# Three major categories against landslides and debris flows mitigation

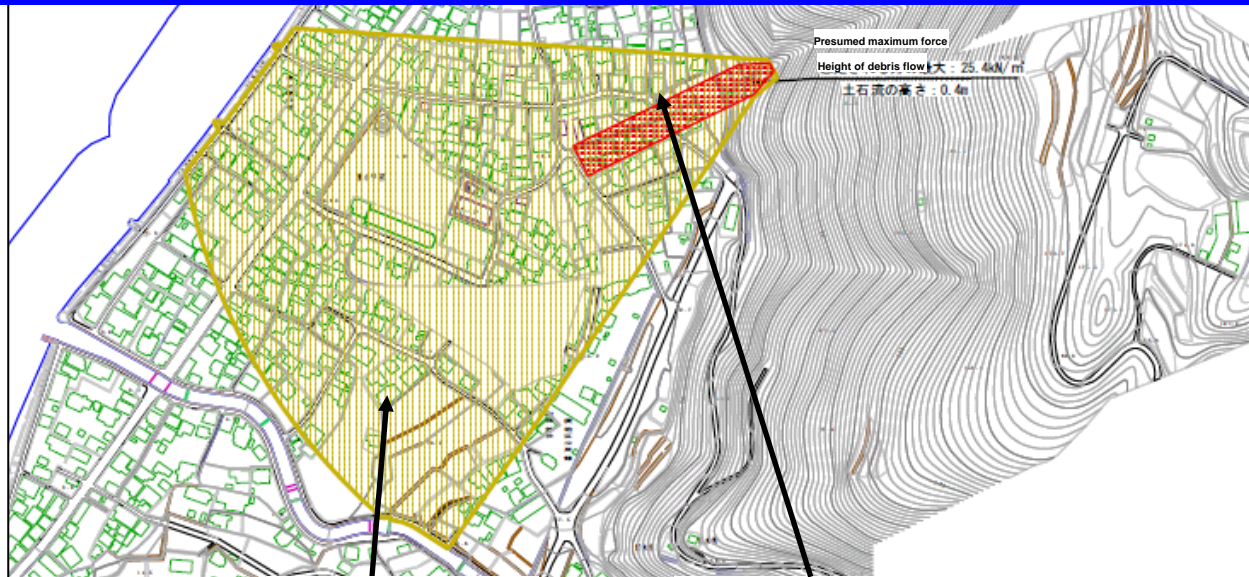


# Essences of Public Warning

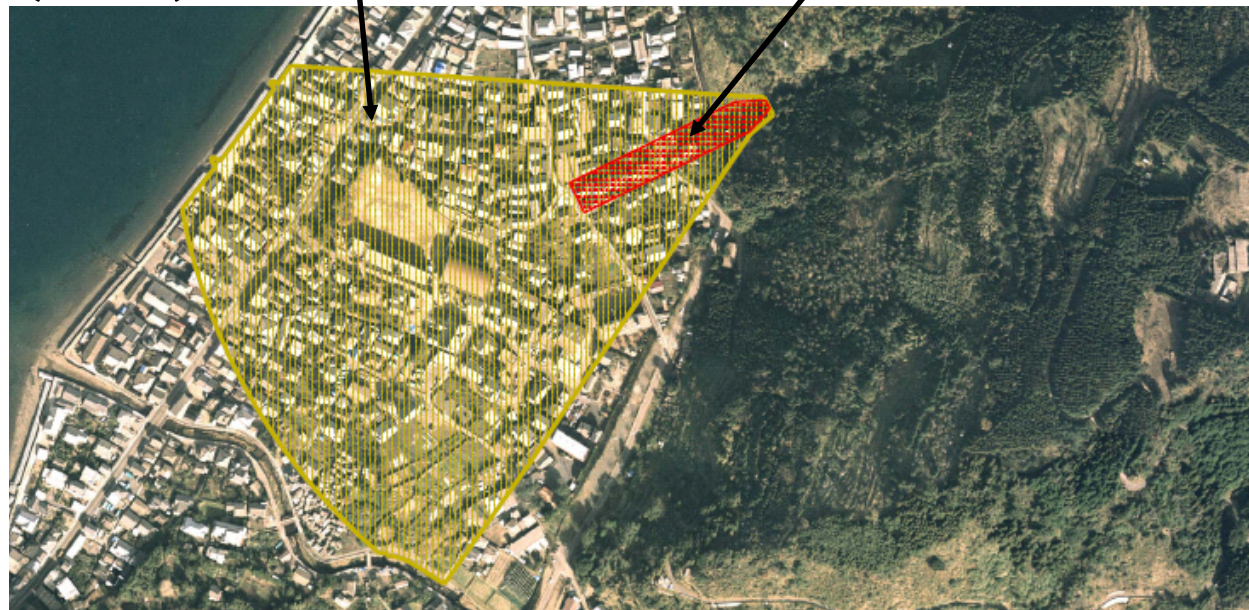
Timing  
and  
Area

AREA

# Warning area designated by the Landslides and Debris flows Prevention Law



←100m → Hazard area Special hazard area



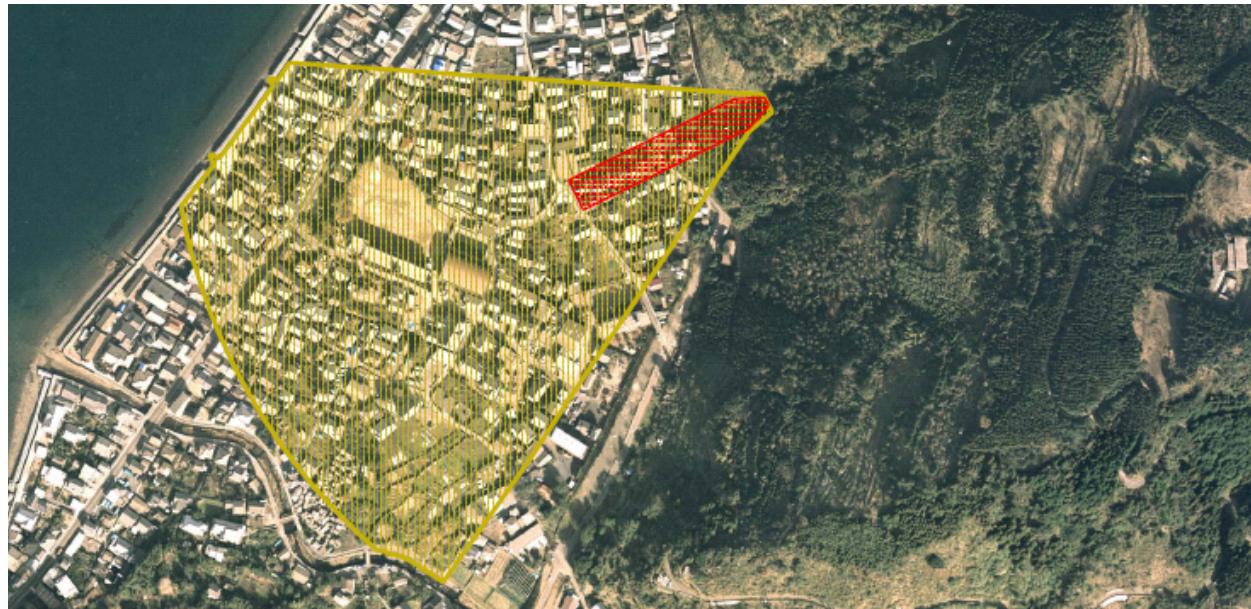


# Landslides and debris flows Hazard Area

- An area prone to landslides and debris flows shall be designated as a landslides and debris flows hazard area (Yellow Zone).
- In the Yellow Zone,
  - Early warning systems must be established,
  - Hazard map against landslides and debris flows should be produced.
  - But NO RESTRICTION ON LANDUSE

## Special landslides and debris flows Hazard Area

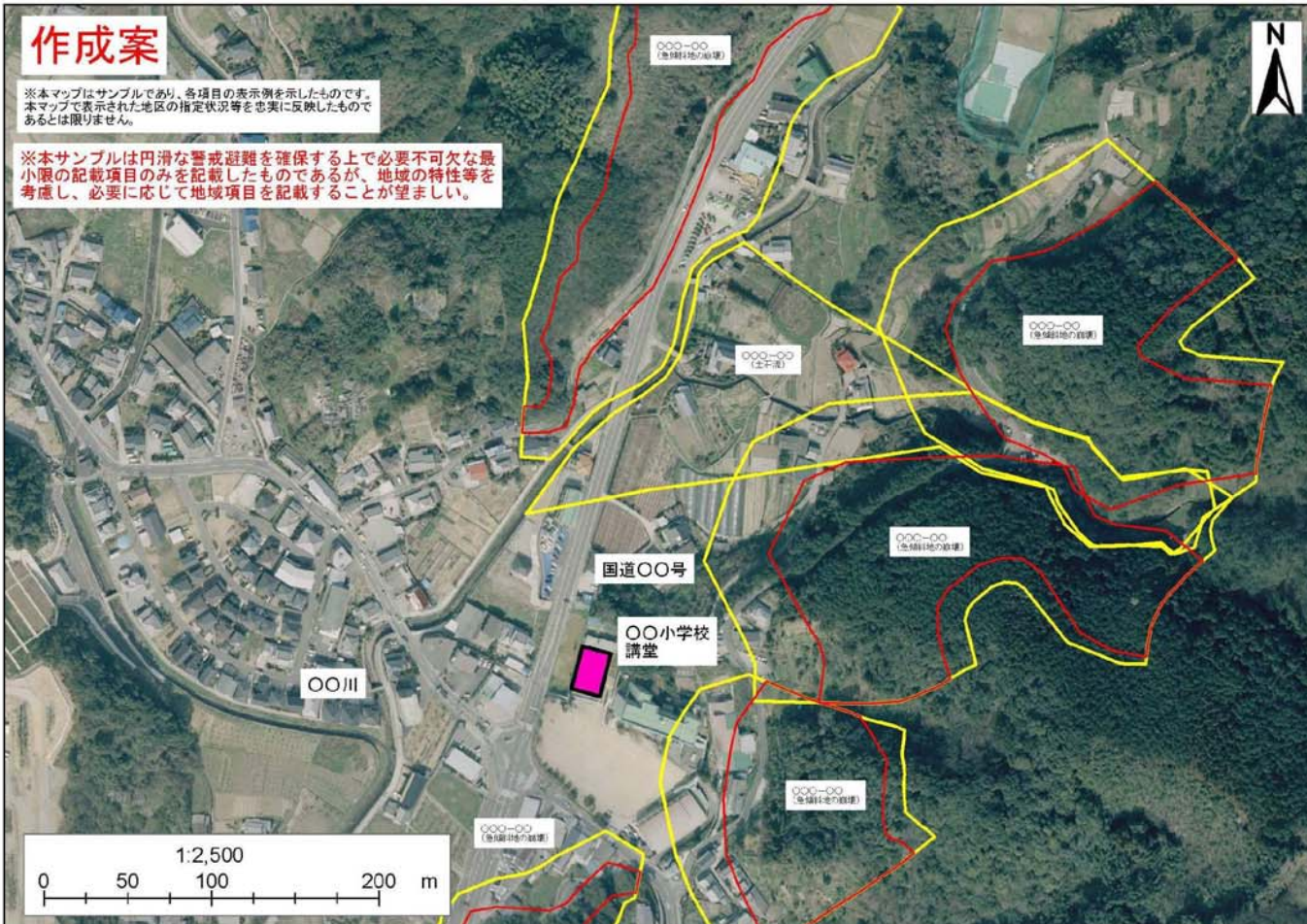
- An area in serious hazards shall be designated as **a special landslides and debris flows hazard area (Red Zone)**.



# Landslides and debris flows hazard map

## 〇〇市〇〇町〇〇地区 土砂災害ハザードマップ

問い合わせ先：  
 〇〇県 〇〇部 〇〇課 電話 〇〇〇-〇〇〇〇  
 ホームページ (http://〇〇〇〇〇〇〇〇〇)  
 〇〇市 〇〇課 電話 〇〇〇-〇〇〇〇  
 ホームページ (http://〇〇〇〇〇〇〇〇〇)



位置図 (1/25,000)

項目	記号
土砂災害警戒区域	
土砂災害特別警戒区域	
避難場所	

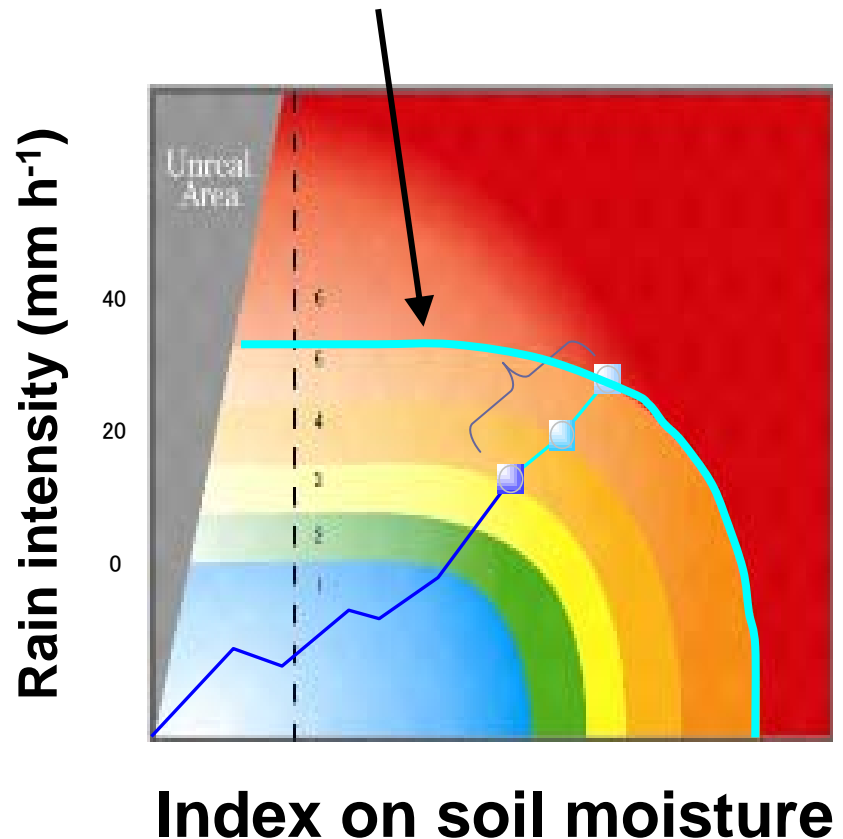
○黄色で囲まれた範囲(土砂災害警戒区域)は、「土砂災害が発生した場合、住民の生命又は身体に危害が生じるおそれのある区域」です。  
 ○赤色で囲まれた範囲(土砂災害特別警戒区域)は、「土砂災害が発生した場合、建築物に損壊が生じ、住民の生命又は身体に著しい危害が生じるおそれのある区域」です。  
 ・土砂災害警戒区域等にお住まいの方は、大雨のときには警戒避難が必要となりますので、注意してください。  
 ・また、土砂災害警戒区域以外の箇所でも土砂災害の発生する可能性がありますので、自分の住んでいる家の周辺の斜面や溪流、避難場所などをよく確認しましょう。

**TIMING**

# Warning information on landslides and debris flows (Sediment Disaster Alert)

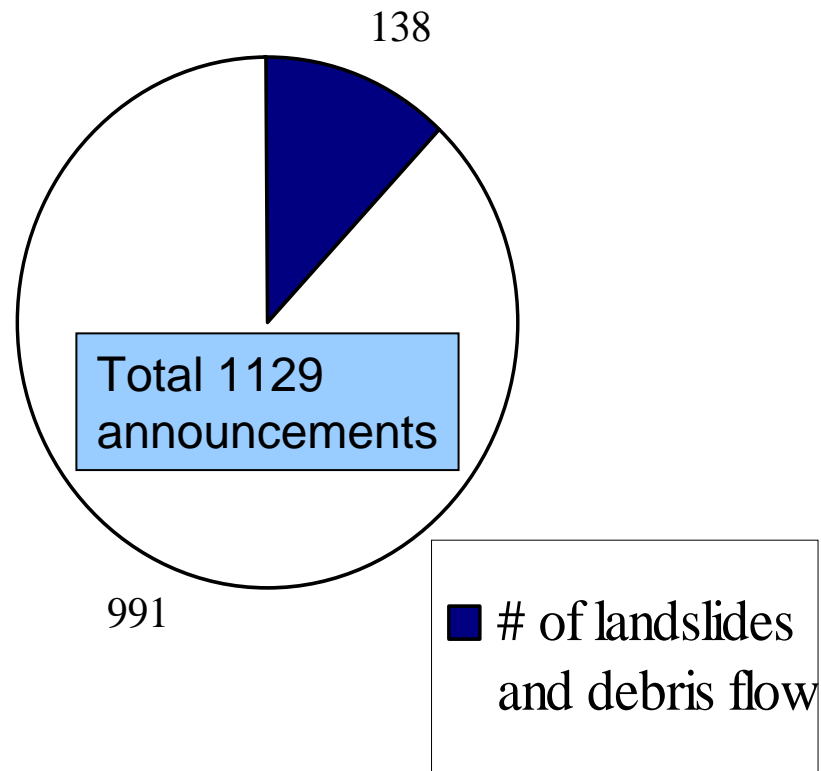
• **Warning information on landslides and debris flows (WILD)** based on rainfall intensity and duration was launched in 2008 all through Japan in collaboration with JMA.

Critical line (CL): Threshold for landslides or debris flows



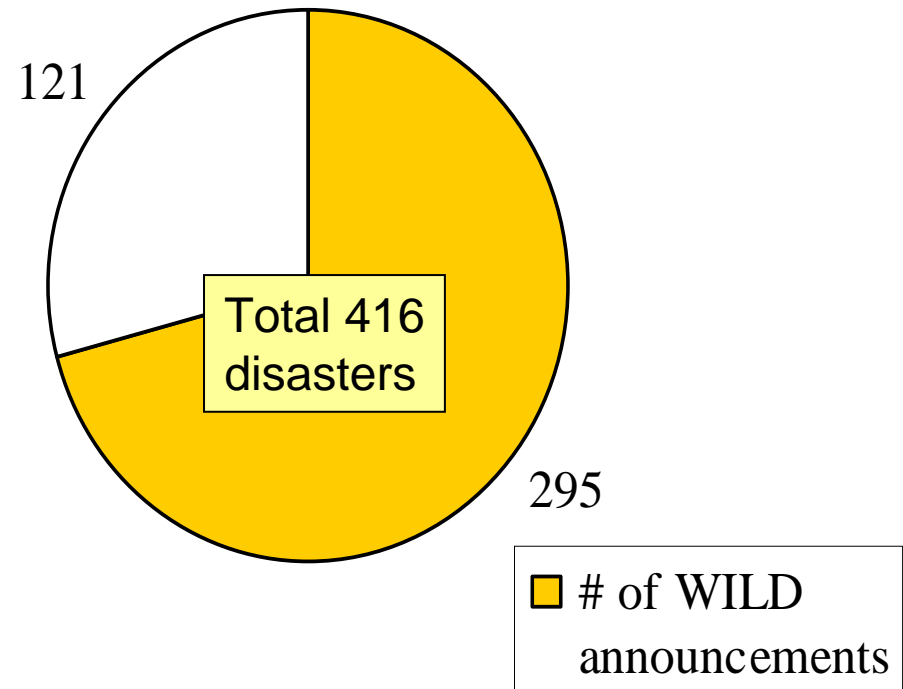
# How WILD works?

~12% of WILD announcement predicted landslides or debris flows.



**Announcement base**

~70% of landslides and debris flows was picked up by WILD.



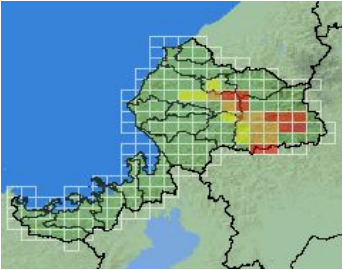
**Disaster base**

# Notify weather advisory, warnings and WILD through diverse media

【危険度情報】

土砂災害危険度情報  
(5kmメッシュ)

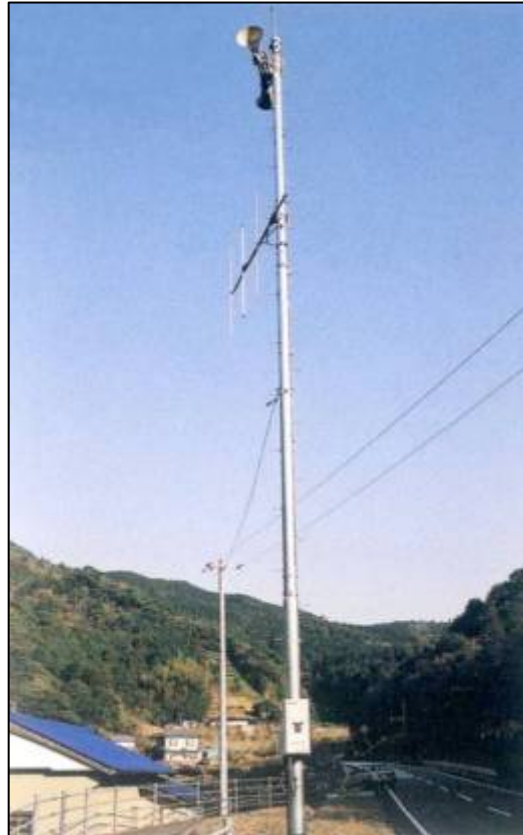
7月19日 15時00分現在



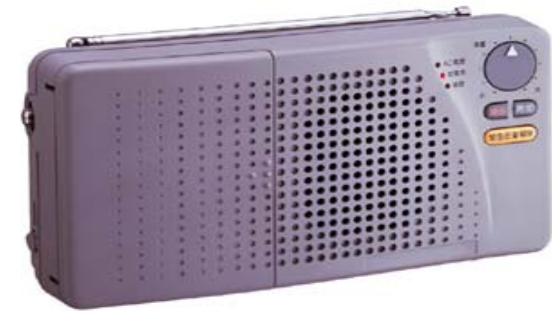
[1時間前を表示](#)

- レベル3  
(現在土砂災害警戒避難基準に達している区域)
- レベル2  
(1時間以内に警戒避難基準に達すると想定される区域)
- レベル1  
(2時間以内に警戒避難基準に達すると想定される区域)

- ・ [前の画面へ戻る](#)
- ・ [市町別発表状況へ](#)
- ・ [TOPへ](#)



loudspeaker broadcasting



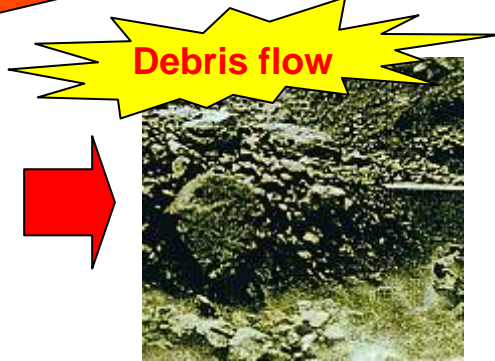
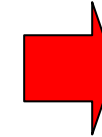
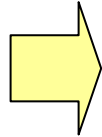
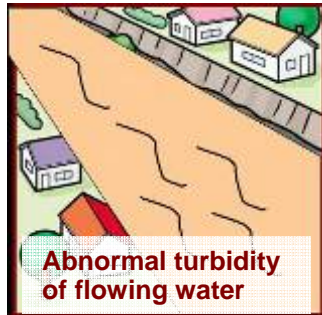
Individual receiver

Push based mobile services

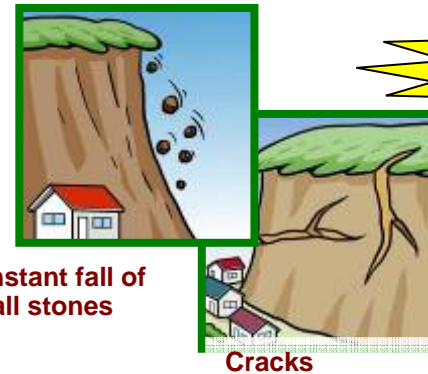
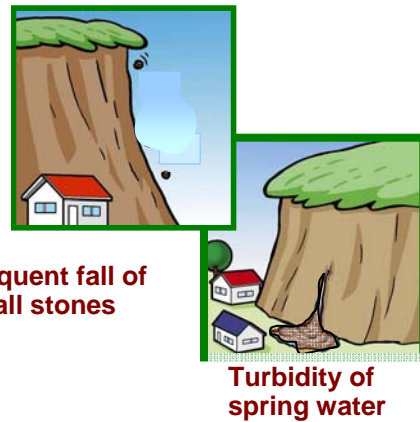
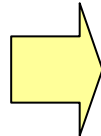
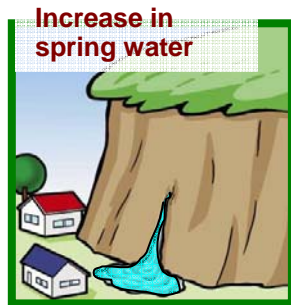
# Education on symptoms of landslides and debris flows



## ★ Debris flow



## ★ Slope failure



## ★ Landslide

