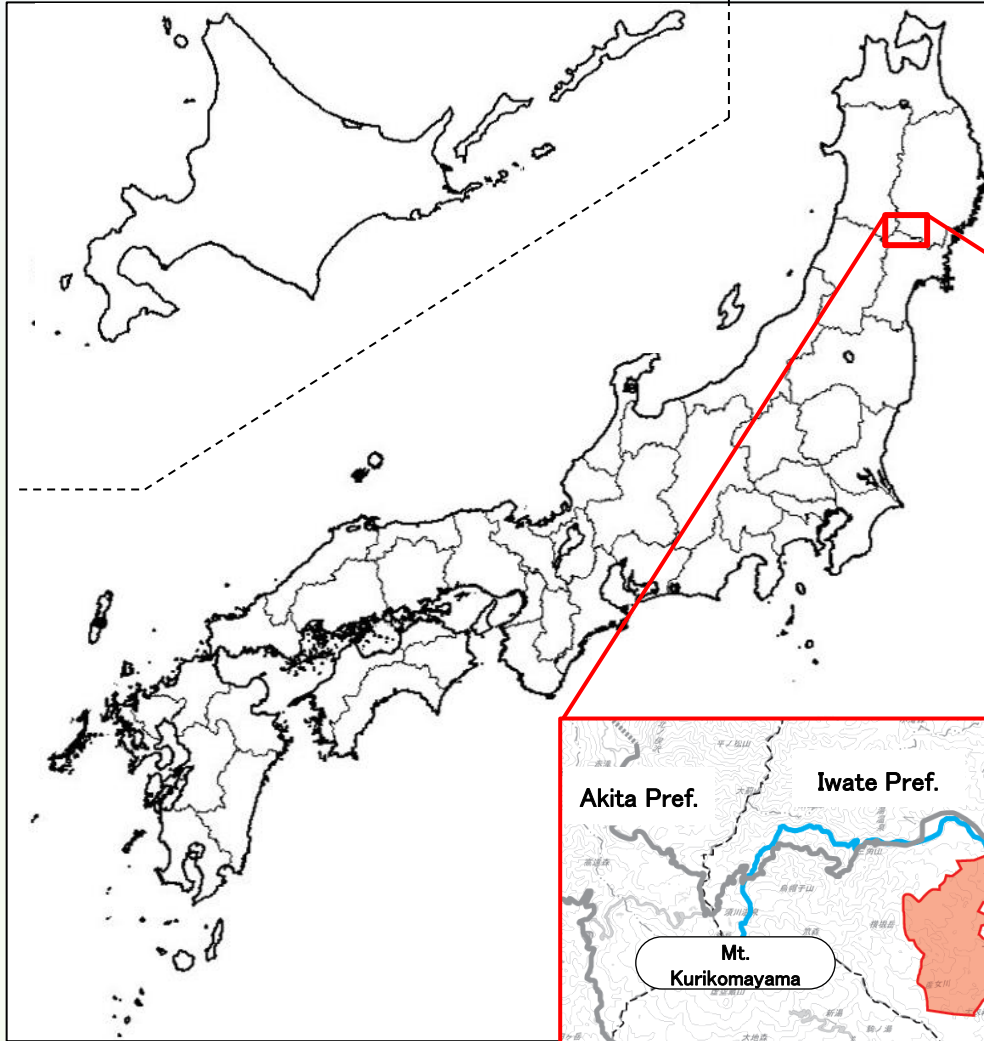


Examples of recent landslide countermeasures by conservancy projects

Kojiro Shiraki
Forestry Conservation Division, Forestry Agency, MAFF

1. Overview of target project area
2. Background to the implemented project
3. Landslide countermeasures in the Iwaigawa District
 - 3-1 Implementation status of control works
 - 3-2 Implementation status of restraining works
4. Advantageous effects of the project during the Iwate-Miyagi Nairiku Earthquake
5. Efforts made at near completion of the project
6. Efforts to improve local disaster prevention capabilities

1. Overview of target project area



[Overview of target project area]

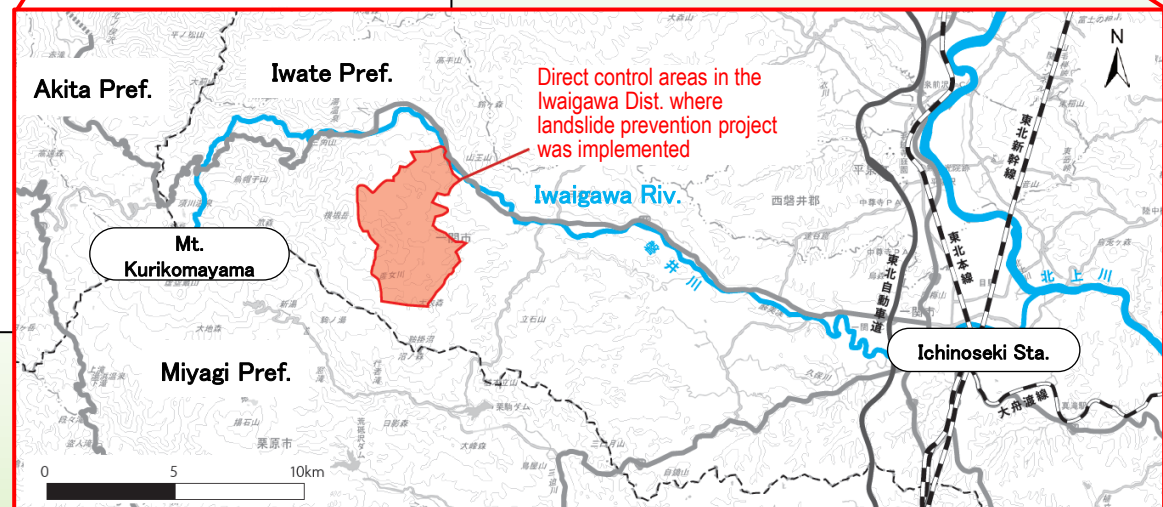
Project site: Ichinoseki City,
Iwate Prefecture

Project area: 1,700 ha

Project year: 1969 - 2018

Average annual rainfall: 2,148
mm/year

Geology: mainly Neogene
sedimentary rocks and volcanic
rocks after the late Neogene



2. Background to the implemented project

- The Kathleen Typhoon in 1947 and the Ione Typhoon in 1948 caused significant damage to the areas around Ichinoseki City.
- Measures were taken from 1949 to 1955 to restore the mountain stream devastated by these typhoons.
- Landslide activities had become active in and after 1955. To address this problem, the Forestry Agency launched a **landslide prevention project in the direct control areas in Iwaigawa District**, which was the second time measures implemented around the Iwaigawa River.
- The advantageous effect of this project was demonstrated during the Iwate-Miyagi Nairiku Earthquake in 2008.
- The Forestry Agency implemented restoration measures after the Iwate-Miyagi Nairiku Earthquake.
- When the project was near completion, the Forestry Agency held meetings of a committee of academic experts to validate the decision toward completion. In 2018, the project was formally approved.



Damage to Ichinoseki City due to Ione Typhoon (September 1948)

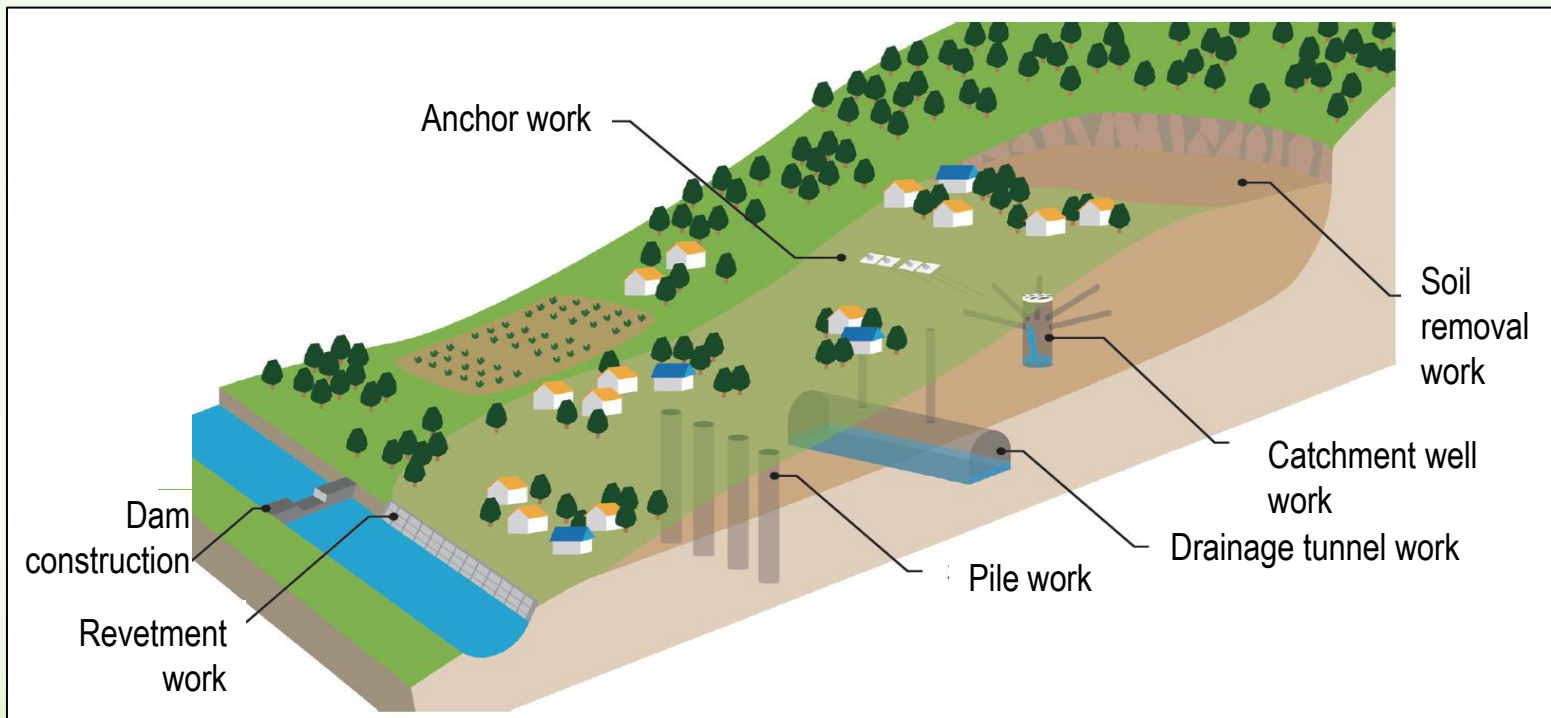
3. Typical landslide countermeasures in the Iwaigawa District

Typical landslide countermeasures

- "The **“control work”** removes or reduces the factors that cause landslides.
Examples: Catchment well work, Culvert boring work.
- **“restraining work”** directly prevents landslides by means of structures.
Examples: Anchor work, Pile work.

Implementation quantity of major countermeasures in the Iwaigawa District

| | Work | Quantity |
|-----------------------------|----------------------|-------------|
| Control work | Catchment well work | 131 wells |
| | Culvert boring work | 3,455 m |
| | Drainage tunnel work | 1,873 m |
| Restraining work | Anchor work | 200 anchors |
| | Pile work | 408 piles |
| Surface water drainage work | Water channel work | 21,580 m |



Schematic view of distributed major landslide countermeasures