REDD-plus and F-DRR Research and Development Center Japan

2024 International Seminar organized by REDD-plus and Forest-DRR Research and Development Center (FFPRI)
International Expansion of Disaster Prevention and Mitigation Technologies Through Forests

Feasibility of the Japanese Forest-based Disaster Risk Reduction (F-DRR) Techniques in Vietnam

ベトナムにおける日本のF-DRR技術の適用可能性

Takashi Okamoto (FFPRI)

岡本隆（森林総合研究所）

Today's Topics 本日の内容

- Forest-based Disaster Risk Reduction (F-DRR) and Japanese traditional techniques: "Chisan"
  森林を活用した防災・減災（F-DRR）と日本の治山事業
- Scientific field survey in a mountainous watershed in Vietnam to determine the causes of sediment discharge
  ベトナム山地流域の土砂流出要因に関する科学的調査
- Adapting F-DRR (Chisan) techniques to Vietnam
  ベトナムへの日本のF-DRR（治山）技術の適用性

Forest-based Disaster Risk Reduction (F-DRR) F-DRRとは

Eco-DRR (**Eco**system-based **D**isaster **R**isk **R**eduction) is the idea of reducing disaster impacts on humans and property by **utilizing ecosystems** as natural buffers, in conjunction with **risk-aware land use practices.**

生態系を自然の緩衝材として活用し、リスクを考慮した土地利用の実践と組み合わせることで、人間や財産への災害の影響を軽減するという考え方。

F-DRR

Forest-based **D**isaster **R**isk **R**eduction


Root systems


Forest soils

Examples of Ecosystems with DRR Functions
(partially modified from Nakamura, 2023)

Chisan: Japanese Traditional Strategy for F-DRR 日本の治山

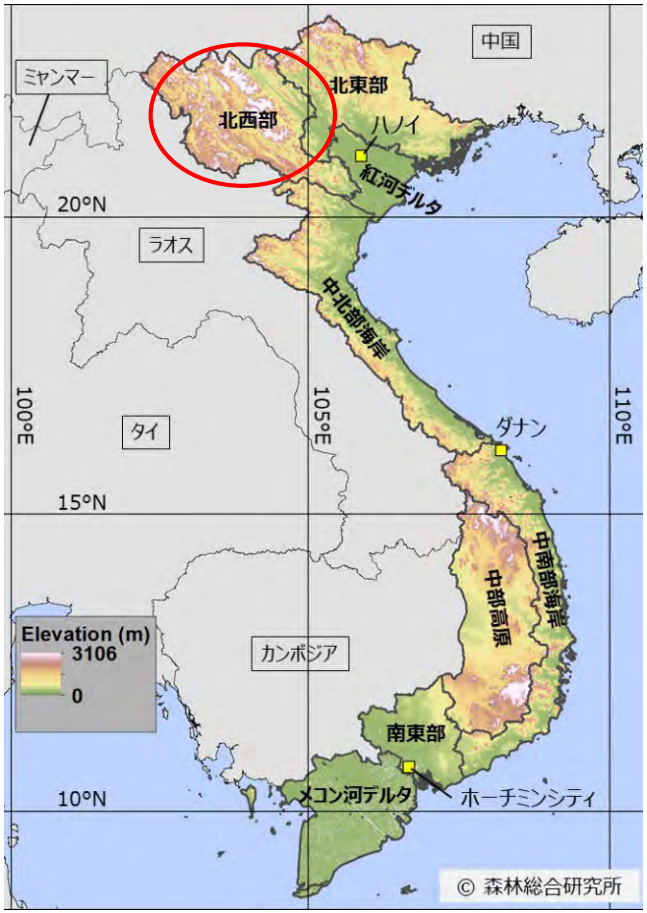
What is Chisan?

Chisan is a Japanese traditional forest conservation strategy for F-DRR. It maximizes disaster prevention and mitigation through forest management. This helps to protect lives and property from sediment-related disasters, sustain water resources, and improve our living environment.

治山は、F-DRRのための日本の伝統的な森林保全政策である。森林の適切な維持造成を通じて防災・減災を最大化することで、土砂災害から人命と財産を守り、水資源を維持し、生活環境を改善する。

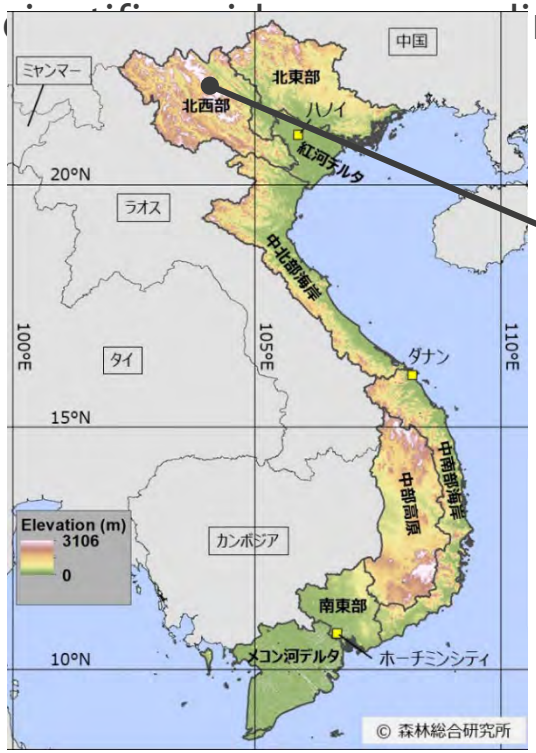
Natural Disasters in Vietnam　ベトナムの地理と自然災害

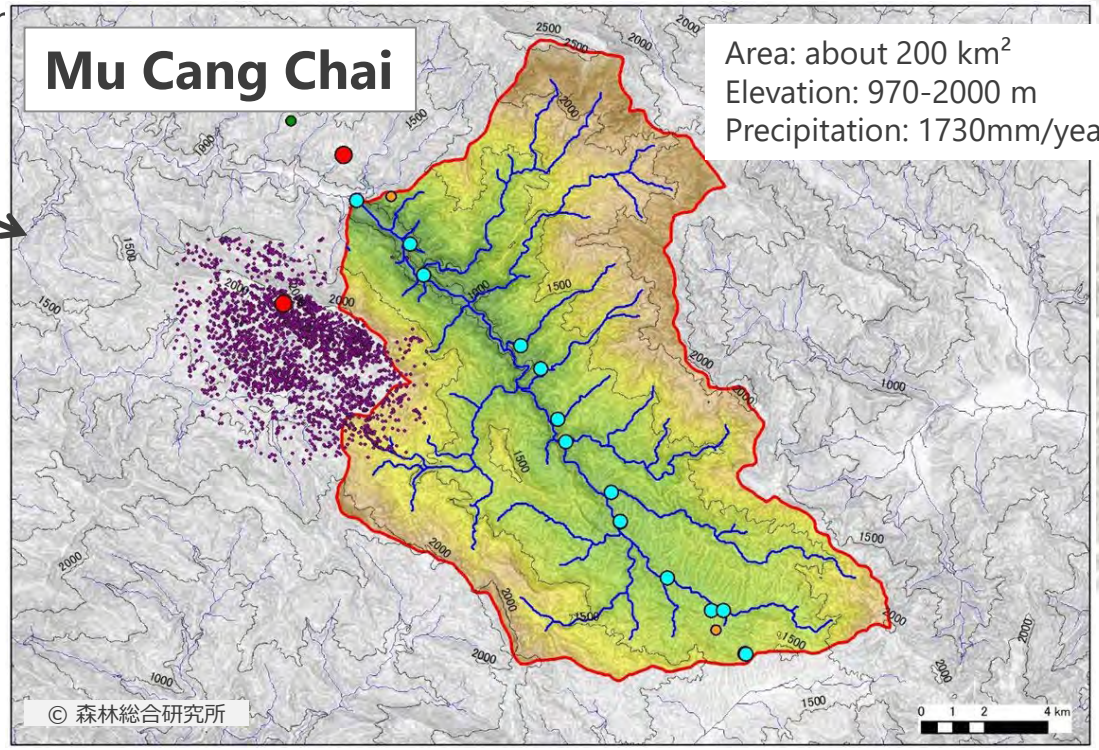
Vietnam, like Japan, is prone to natural disasters. The **northwestern part**, with its mountainous terrain rising over 2,500 meters, frequently experiences **sediment-related disasters**.



Joint Research Initiatives with Vietnam ベトナムとの共同研究

- Joint research with the Vietnamese Academy of Forest Sciences (VAFS) since 2020.
- The mountainous watershed in Mu Cang Chai, Yen Bai Province, Northwest Vietnam.
- S[illegible]r

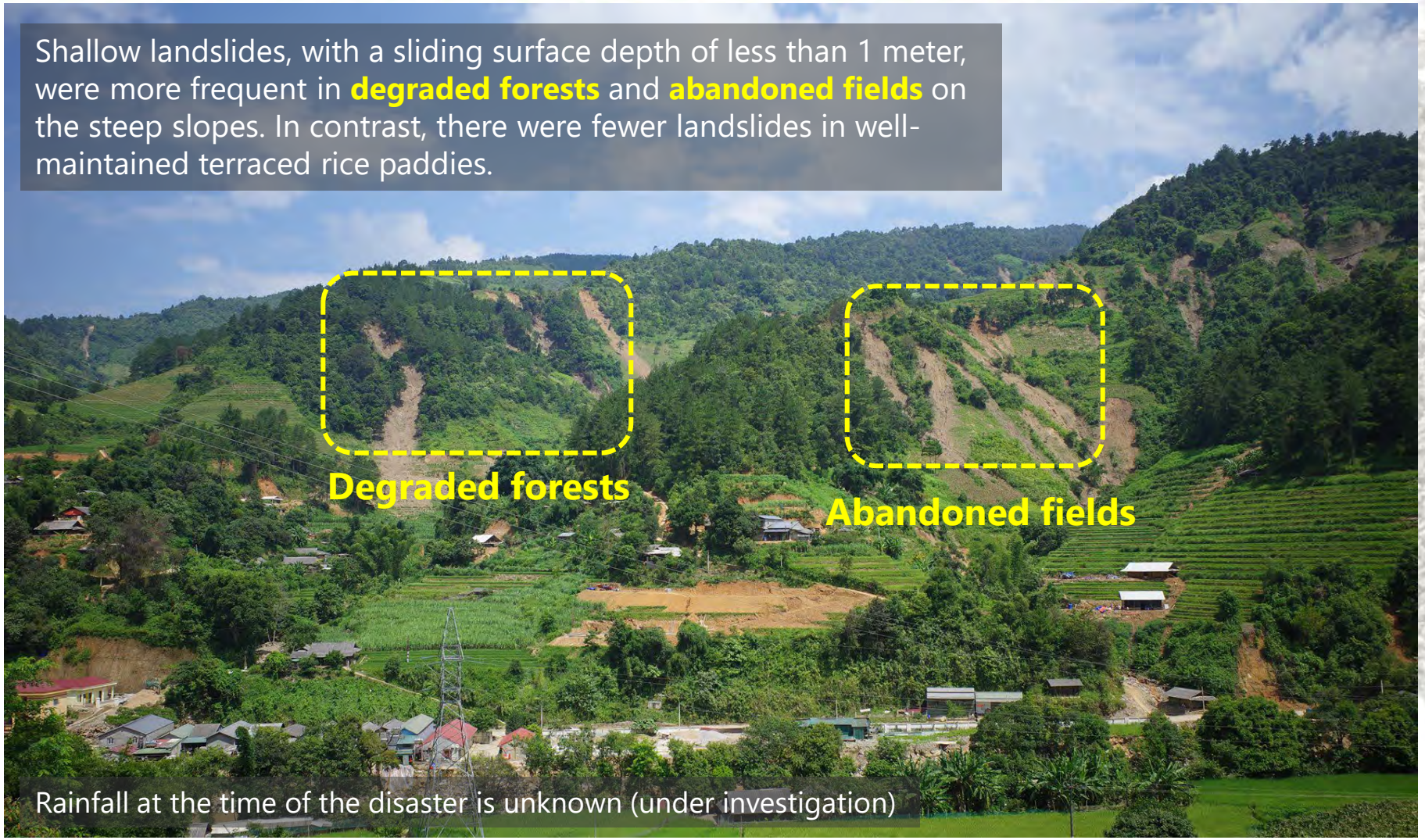




Research Watershed in Northwest Vietnam (Mu Cang Chai District)

Joint Research Initiatives with Vietnam　ベトナムとの共同研究

Landslides in Mountainous Slopes 山地斜面で発生した表層崩壊



Shallow landslides caused by heavy rainfall
near Mu Cang Chai district in August 2023

Sediment-related Disasters in Mu Can Chai ムーカンチャイ地区の土砂災害

Shallow Landslide

Deep-seated Landslide

Flash Flood

Sediment Discharge

- Field surveys for four types of sediment disasters to obtain scientific evidence
- Focusing on erosion and sediment discharge in this presentation

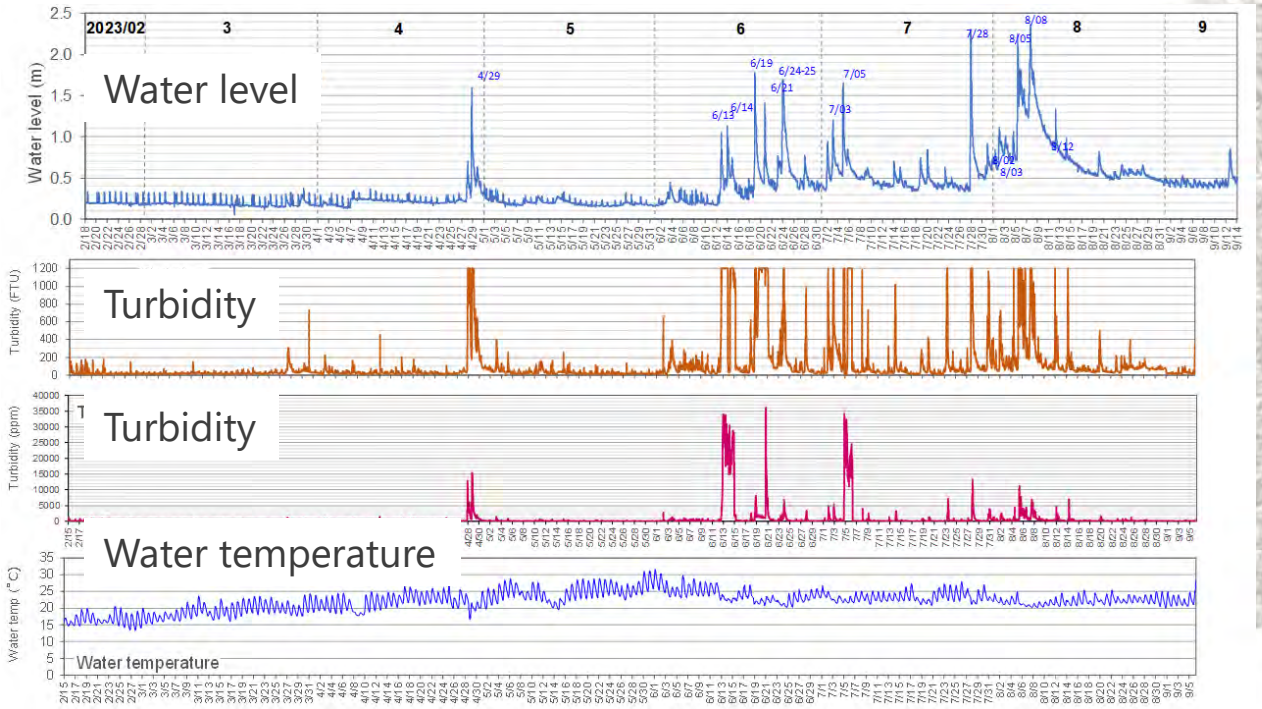
Field Surveys in Vietnam to Obtain Scientific Evidence
科学的根拠を得るためのベトナムでの現地調査

1. Monitoring of river water levels and turbidity
   河川水位・濁度の長期観測
2. Infiltration capacity testing
   地表面の浸透能測定
3. Multi-point sampling of sediment discharge
   流出土砂の多点サンプリング




Monitoring of river water levels and turbidity 河川水位・濁度の長期観測

- Quantitative data have been obtained showing an increase in water level and turbidity during rainfall. These will be utilized in future analyses.

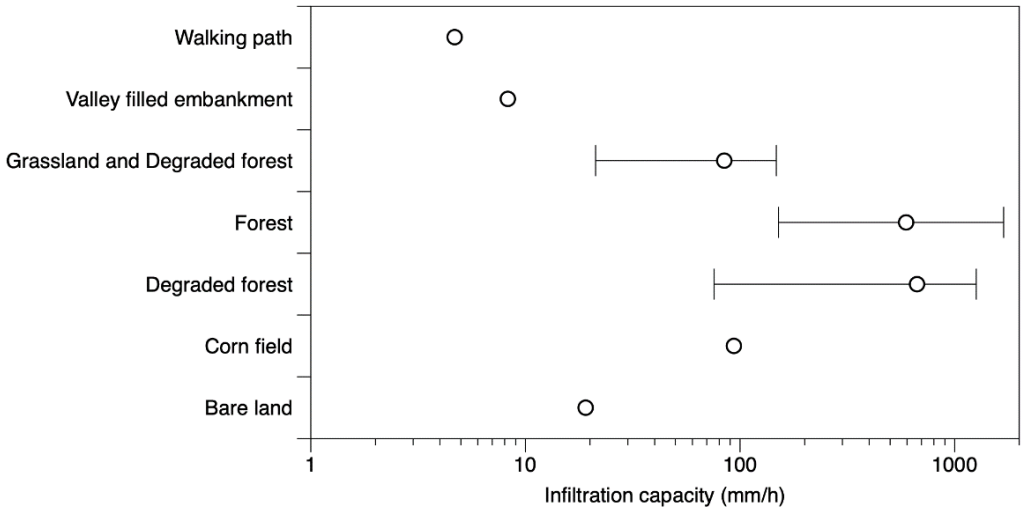


Monitoring results of the river in the research site for 8 months (Feb.2023 to Sep. 2023)

Infiltration capacity　地表面の浸透能

- **Forest land** has a high infiltration capacity over 100 mm/h, preventing surface erosion under normal rain.
- **Walking path** and **valley filled embankment** have lower capacities under 10 mm/h, making them prone to surface erosion in stronger rains.

Equipment for infiltration capacity testing



Relationship between land cover and infiltration capacity of the ground

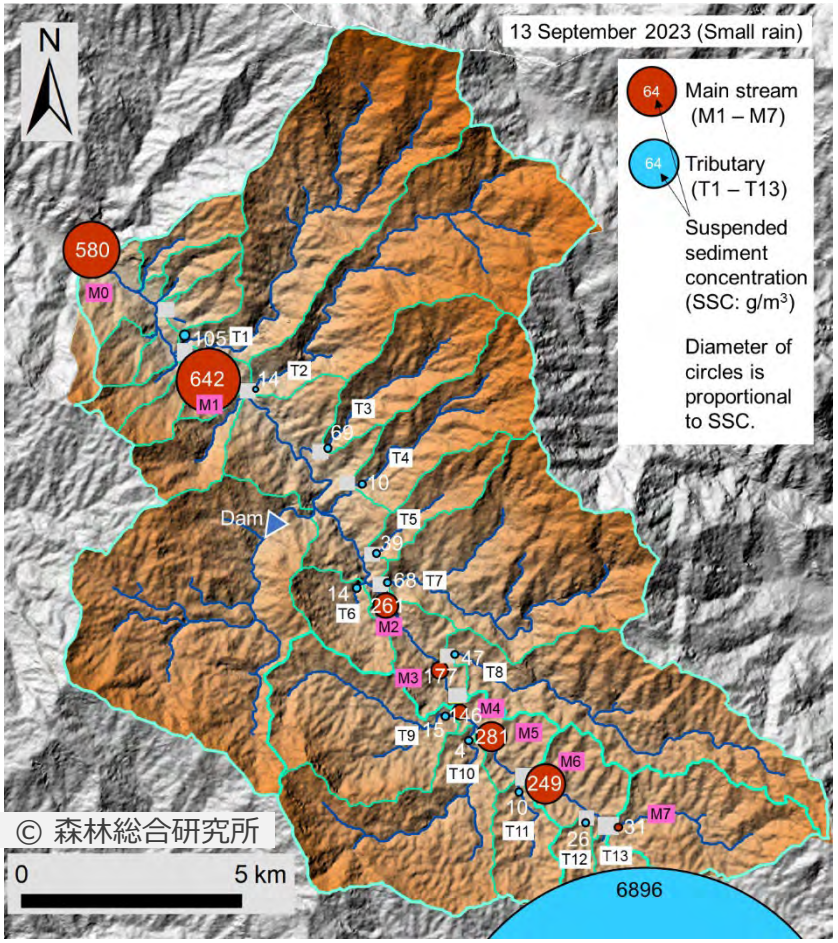
Multi-point Sampling of Sediment Discharge 流出土砂量のサンプリング

- River water was sampled at many points in the watershed and the amount of sediment contained was measured in the laboratory.
- For flow rate estimation, the river width and the distribution of depth and velocity were measured.

River water sampled

Water sampling and measurement at many points in the watershed

Where is the Source of Sediment Discharge? 土砂流出はどこから？



Suspended sediment concentration in the watershed surveyed on Sep. 13, 2023, which experienced a daily rainfall of 20mm.

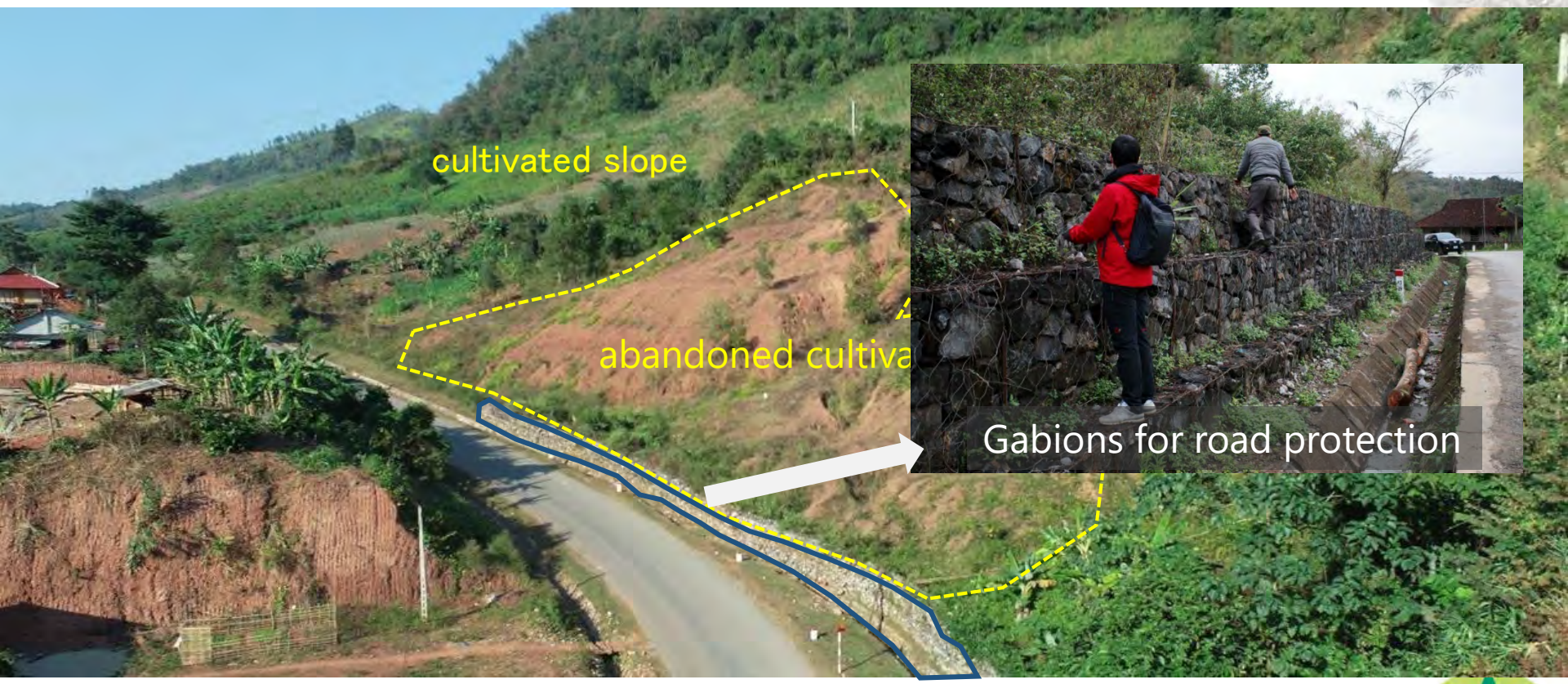
Results

- Substantial sediment discharge (6,896 g/m^3) is observed from a **large artificial embankment**.
- In this watershed, **human-induced land modifications** significantly impact sediment discharge.

The large artificial embankment

Challenges in Adapting ‘CHISAN’ Techniques to Vietnam
ベトナムへの治山技術の導入における課題

- Abandonment of cultivated slopes leads to devastated lands, increasing the risk of disasters."
- Restoring these lands to forests is key to reducing disaster risks, with great potential in 'Chisan', Japanese forest-based disaster risk reduction techniques.



Slopes Along the Roadsides in Vietnam

Challenges in Adapting 'CHISAN' Techniques to Vietnam
ベトナムへの治山技術の導入における課題

- One of the 'CHISAN' techniques, **Horizontal Step Works**, stabilizes slopes using logs and makes a good foundation for forest growth.
- Compared to concrete structures like Check Dams or Retaining Walls, it is significantly **lower in cost** and requires less technical expertise.

Use of thinning logs in **horizontal step works** for the prevention of sheet erosion and forest growth enhancement.

Challenges in Adapting 'CHISAN' Techniques to Vietnam
ベトナムへの治山技術の導入における課題

- It is crucial to explore methods for implementing 'CHISAN' techniques that consider both the **social and economic circumstances** and the **needs** of the local residents.

Devastated slope from landslide activity

KEY TAKEAWAYS

本日のポイント

Adapting Japan's Chisan (F-DRR) techniques to developing countries requires understanding local sediment disasters with scientific evidence.

Effective implementation demands matching scientific methods with local needs in developing countries.

Thank you for your kind attention.