



A STUDY ON LOCAL KNOWLEDGE IN ADAPTATION TO LANDSLIDE DISASTERS IN SRI LANKA

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OUTLINE

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1. Introduction
2. Research need
3. Objectives of the study
4. Methodology of the study
5. Case study 01 – Initial Findings
6. Conclusion

Natural Disasters

02

Natural disasters

- Natural disasters are unforeseen events with **atmospheric**, **geologic**, and **hydrologic** origins. Disasters include earthquakes, volcanic eruptions, **landslides**, tsunamis, floods, and drought.



Landslides



Flood



Drought



Earthquake

Landslides

- A landslide occurs when part of a **natural slope** is unable to support its **own weight**. For example, **soil material** on a slope with **slippery surface** underneath, can become **heavy with rainwater** and slide down due to its increased weight.
- A landslide is a **downward or outward** movement of **soil, rock or vegetation**, under the **influence of gravity**.



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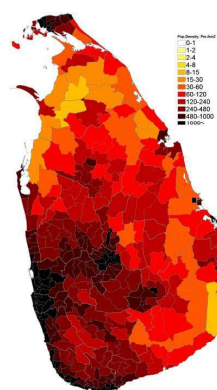
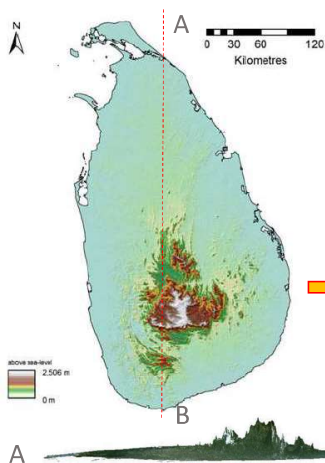
CASE STUDY 01

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Situation in Sri Lanka

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Landslides Disaster risk in Sri Lanka



- Topographic map of Sri Lanka
 - The Central high lands
 - The plains
 - The coastal belt

- Population density map of Sri Lanka
 - Population density per square kilometre (km²)

- Landslide locations in Sri Lanka

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Landslide disaster

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Basic Causes of landslides

- Weakness in the composition, material or geological structure of rock or soil formation.
- External factors, which impact the ground water regimes. Examples are ; **Heavy rain**, Changes in **ground water level** etc.
- **Earthquakes.**
- Creation of new site conditions such as **changes to natural slope** due to construction activities.

Mitigation Measures

Scientific Solutions

Scientific knowledge means : In its broad sense science refers to any systematic recorded knowledge or practice. This gives rise to the scientific method which focuses on agreed principles or process of study, including reliability and validity.



Gabion Walls

Stylite EPS Geofill

Soil Nailing

Locally Adapted Solutions

Local knowledge means : Local knowledge is the large body of knowledge and skills that has been developed outside the formal educational system. The knowledge is embedded in culture of a given location or society.

It is the basis for decision-making of communities in food security, human and animal health, education and natural resource management (Bongani et al. (2015))



Terrace fields

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Objectives of the study

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01

To identify, investigate and evaluate the local adaptation practices in landslide disaster prone central region in Sri Lanka.

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To compare and contrast the local adaptation practices at different landslide contexts in Sri Lanka and Japan (rainfall induced and earthquake induced)

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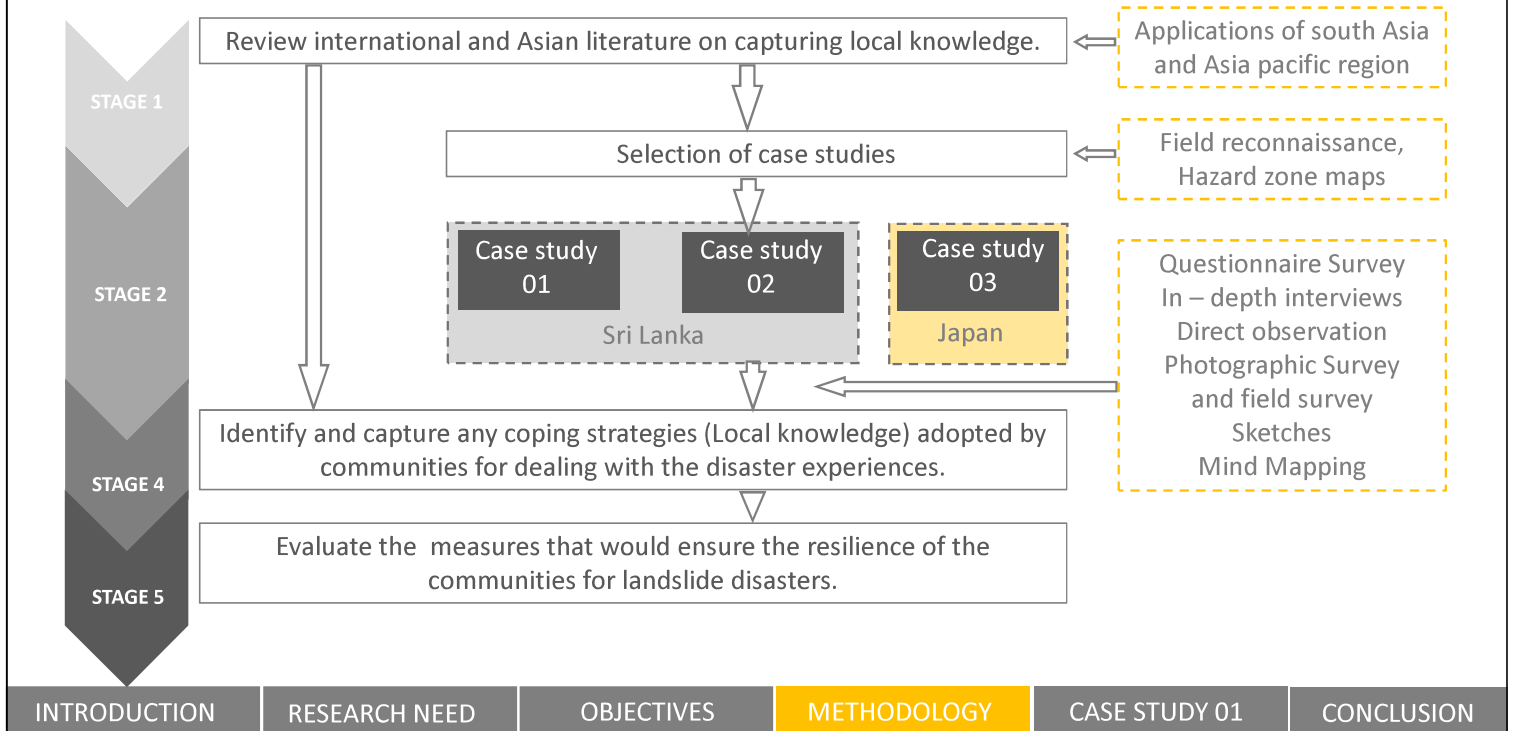
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Methodology of the study

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Case study 01 - Background

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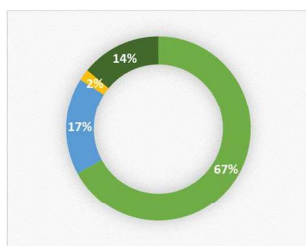
Geographically Isolated village named **"ETANWALA VILLAGE"**.

Moderate level Landslide Hazard Risk.

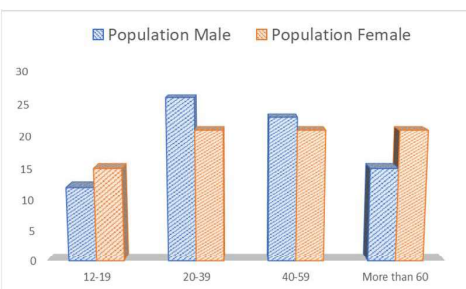
Percentage of Aging population : **23 %**

Types of Land hazards

- Debris flow
- Rock Fall

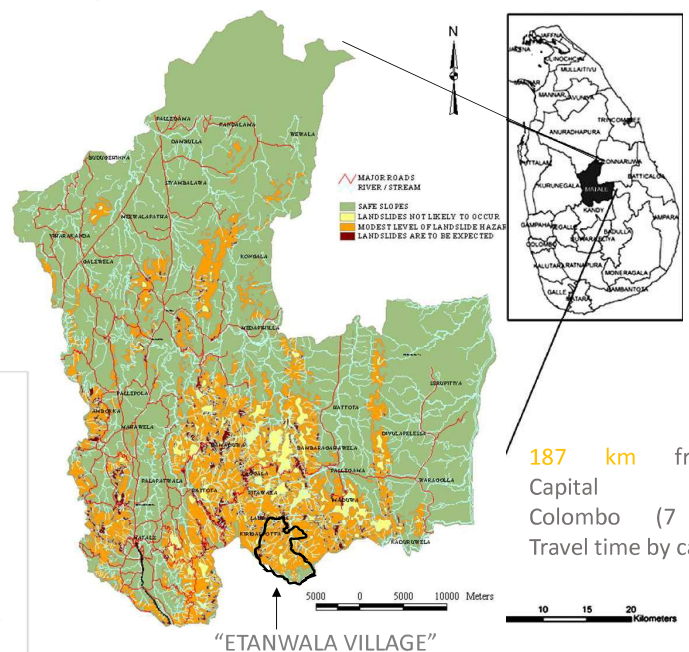


AREA – 42 km²



POPULATION - 154

Map of Landslide Hazards Zones



Source : Resource Profile – Laggala DSD, 2017

Case study 01

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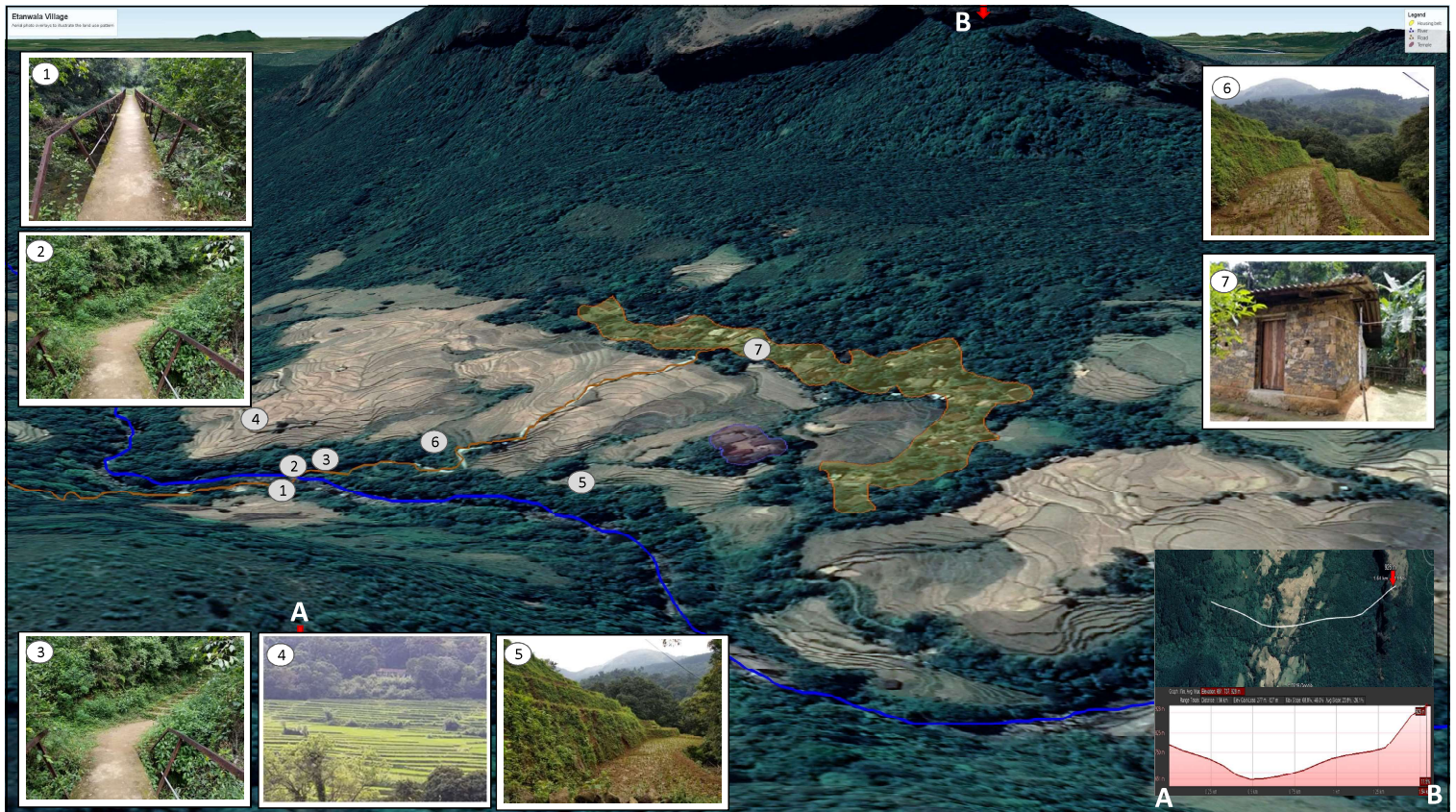
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Case study 01 - Field survey

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Survey Objective

01

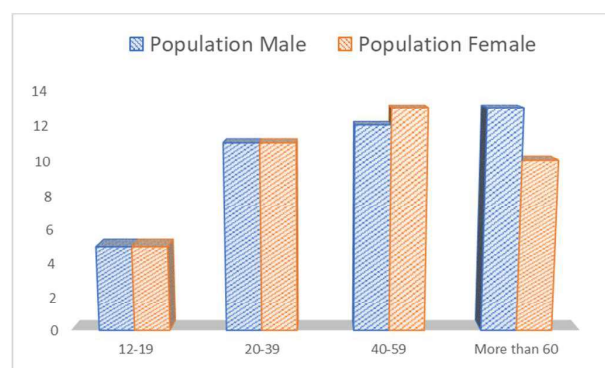
The **main objective** of this field survey is to investigate the **local knowledge adaptations** in “Etanwala village” for Landslide Disasters.

Survey Methods

02

Questionnaire survey

Total Population		52%	Sample Population	
154			80	
Male	Female		Male	Female
76	78		41	39
49%	51%		51%	49%



Semi structured interviews- discussion with experienced long-standing /old generation

Field observations

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Case study 01 - Initial findings of Questionnaire survey

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LEVEL OF AWARENESS ON ADAPTATION STRATEGIES AND ACTIONS

No	Adaptation strategy	Adaptation action	Level of Awareness on Adaptation Actions
1	Disaster Awareness	Basic awareness on Landslides	69%
2	Early signs	Unusual earth cracks	34%
3		Continuous heavy rain	87%
4	Early warning system	Warning system based on temple bell	93%
5	Knowledge transferring system	Practicing “Aththam Kramaya”	47%
6	Special Landuse pattern	Terrace paddy fields / Forest reservation	57%
7	Fencing techniques	Live fencing	80%
8	Retaining walls	Stone walls	83%

Levels of Awareness	Very High	High	Moderate	Low
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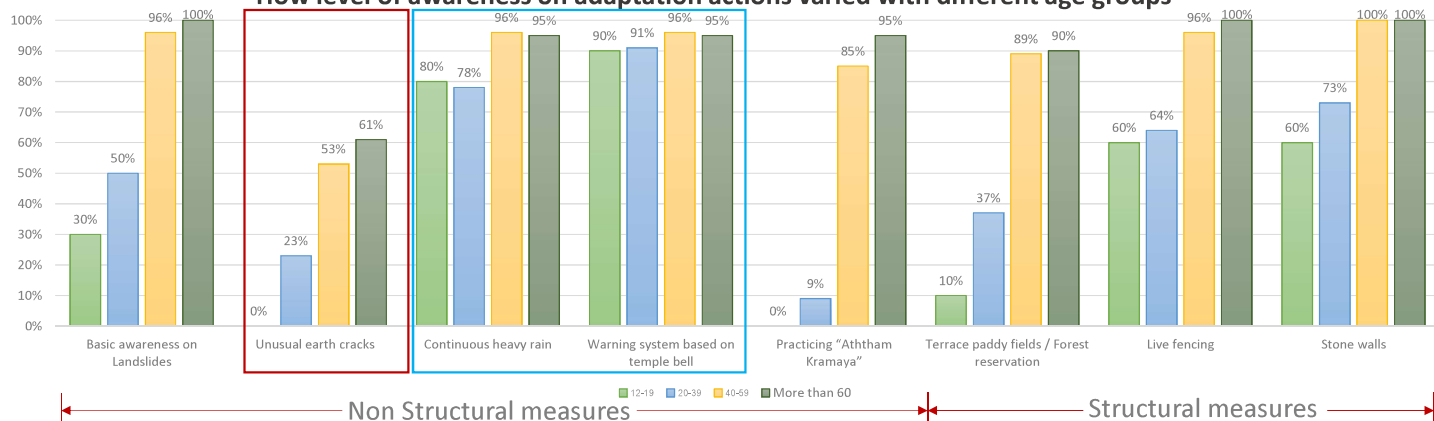
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How level of awareness on adaptation actions varied with different age groups



- Comparatively low awareness on "Unusual earth Cracks" in all four age groups with compared to other adaptation actions.
- Comparatively high awareness on both "Continuous heavy rain" and "Warning system based on temple bell" in all four age groups with compared to other adaptation actions.



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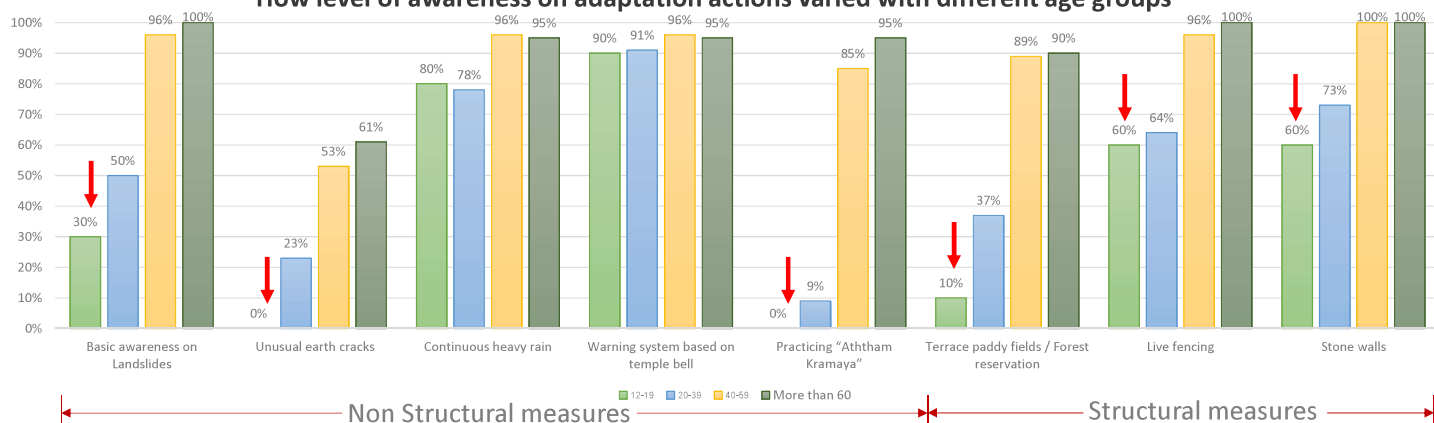
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How level of awareness on adaptation actions varied with different age groups



- Age group of 12-19 years have very low awareness for all actions other than "Continuous heavy rain" and "Warning system based on temple bell".
- As overall the Age group over 40 years have comparatively high awareness on all type of adaptation actions.



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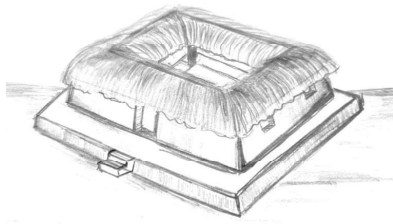
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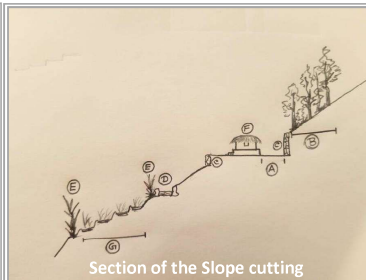
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Case study 01- Initial findings of Semi structured interviews and field observations

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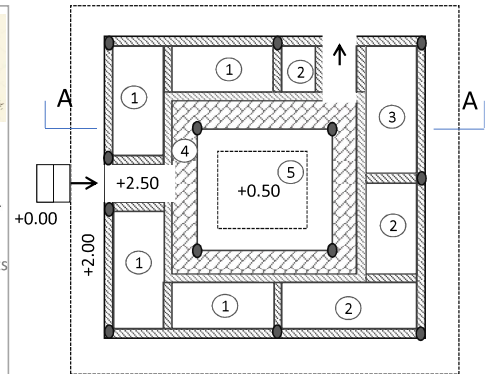


Building materials: Fine sand mixed clay and Termite clay, Wooden pillars, Stones. More than 200 years old house was still remained.

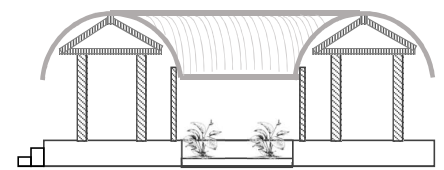


Legend

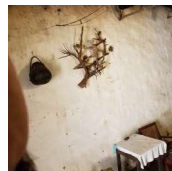
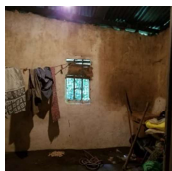
A Rear space of the house E Live fencing
B Tree belt ("Wanaroda") F House
C Stone retaining wall G Terrace lands
D Canal



1 Rooms 2 Store room 3 Kitchen 4 Veranda 5 Center Garden



Section at A-A



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Warning system

- They use **temple bells** to give early prevention signs by ringing the bells. As the temple is located at the **center of the area**, the people can get easy access to the place and escape from the risks of the disaster when they notice the sound of the bells for **emergency disaster prevention case**.

Temple bell

01



Practicing "Attam kramaya"

- This is derived from the **traditional practices**. Their main living depends upon cultivation of paddy and vegetables. As they always practice **farming by gathering and working together**, they can transfer their practices as the **tacit knowledge**.



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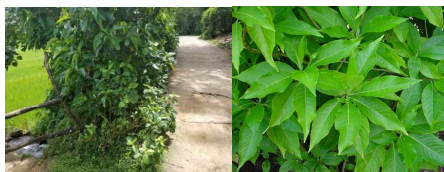
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Live Fencing

- Mainly two plant types were used for **live fencing** – to reduce the **soil erosion** as well as to improve the **soil strength**.

" Pawatta " Plant 01



All part of the plant were used for preparing different types of local **Ayurvedic medicine**

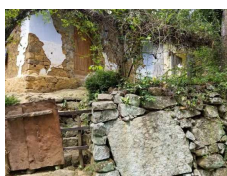
" Hana " Plant 02



Leaves of the plant were used for preparing **different types threads**

Retaining walls

- Different Sizes of **stones** used for **retaining walls** and these walls reduce the **soil erosion** as well as to improve the **baring strength**.



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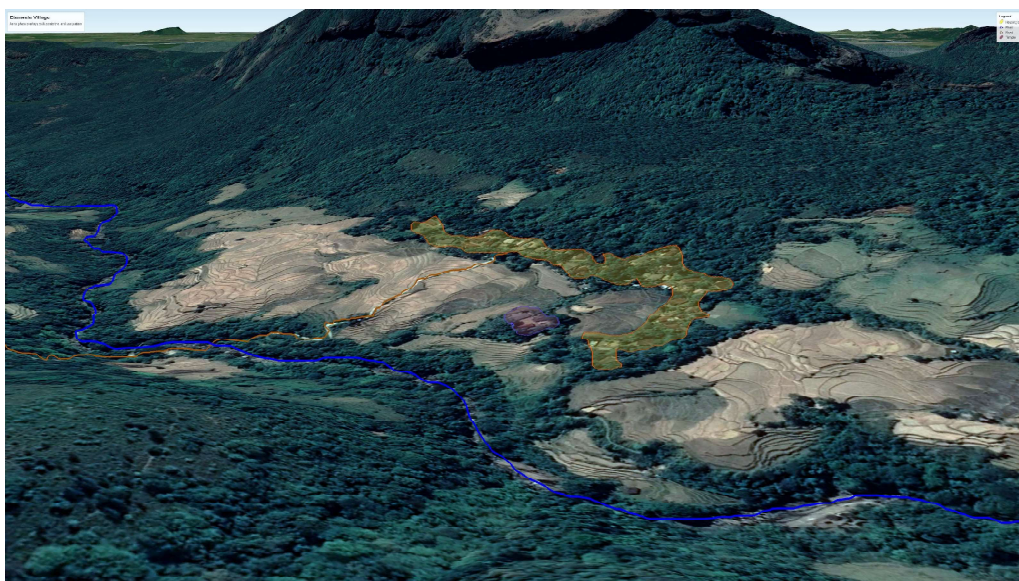
WAY FORWARD

Case study 01- Initial findings of semi structured interviews and field observations

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Landuse Management for Disaster Risk Reduction

- 90% of the **Terrace paddy fields** were located bellow the irrigation canal
- Housing belt** was located above the canal
- The forest cover above the housing belt was not damaged
- Housing belt was located well above the **river floodplain**.



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- "Ettanwala" Village itself have their own different practices for their sustainability.
- These practices have the indirect effects to reduce the landslide risks in communities.
- Due to the climate changes, most of developing countries are facing the threats of natural disasters.
- As a conclusion, in order to improve the contemporary disaster landslide prevention practices, it is difficult to establish only scientific based high-tech solutions.
- The initiatives of the adaptations of local knowledge are also vital in considering to prevent the disaster risks.
- This presentation shows how the society can attain the benefits from the combined awareness of both using scientific and local knowledge.
- For further study, the details and concreteness of the hybrid solutions will be highlighted by analysing in other landslide prone areas.

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Thank You..