INTEGRATED SEDIMENT – RELATED DISASTER MANAGEMENT IN INDONESIA

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GENERAL CONDITION OF INDONESIA ARCHIPELAGO

ISLANDS of Indonesia consist of about 13,660 ; total area more than 9.8 million square km; about half part of them are inhabited.

MAIN ISLAND, there are five main island; Sumatera, Kalimantan, Sulawesi, West Irian (Papua) and Java island.

THE MOST ISLAND of them is JAVA as call to most important and unique island of Indonesia :

- *** Capital of Indonesia (Jakarta) is in Java island.**
- *** More than 60 % of the Indonesian people are living in Java island, the only about 6.9 % of Indonesia land territory.**
- *** Java is the most dense populated island of Indonesia with about 830 psn/sq km (compare to West Irian has about 22 % of Indonesia land territory but inhabited by only about 1.18 million people, density only 4 psn/sq km).**
- *** Active volcano in Indonesia totally is about 129 (about 17 % of the active volcanoes in the world), and 35 of them (27 %) are in Java island.**

CLIMATE,

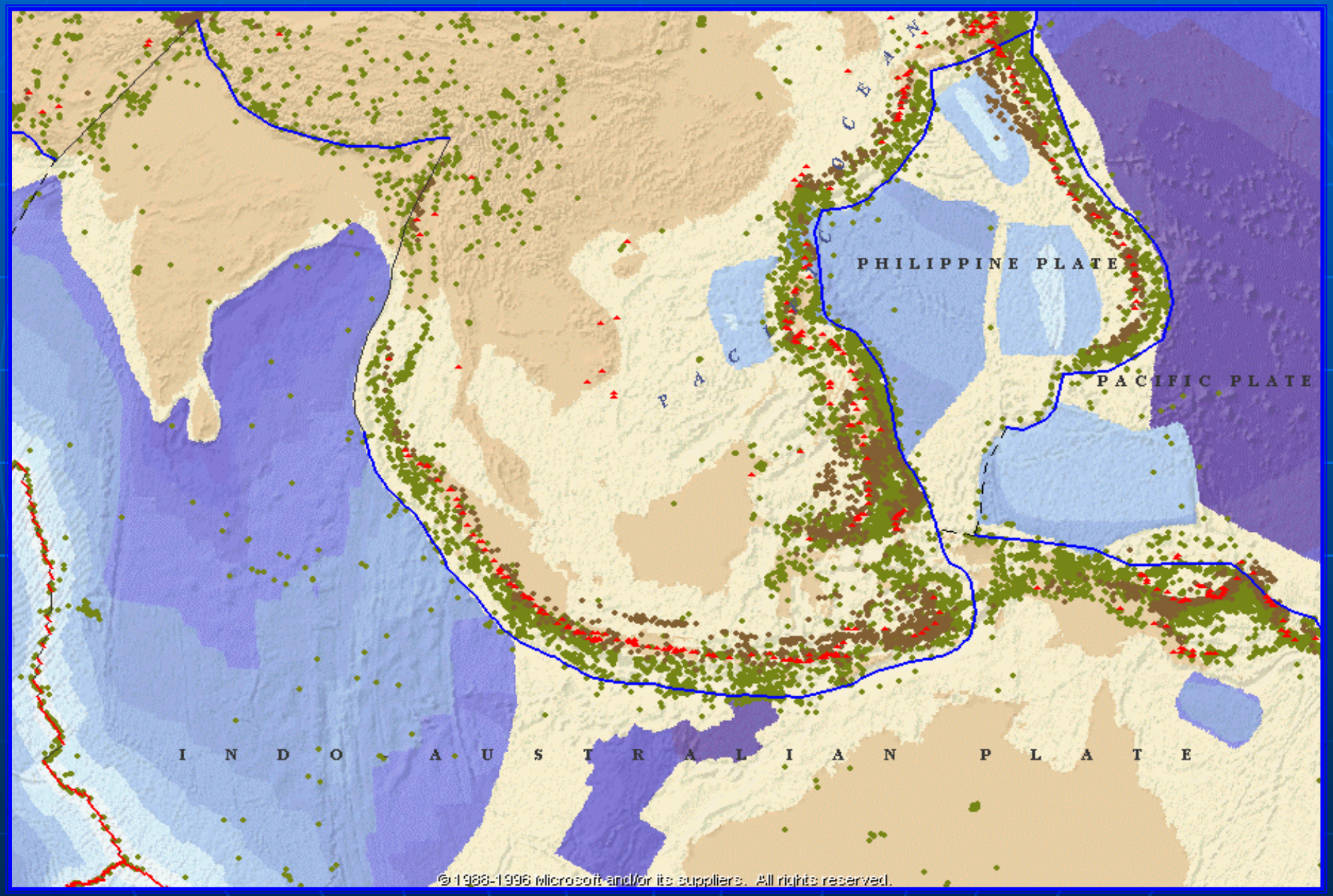
The climate is characterized into two tropical seasons *Dry* season June to September and *Rainy* season December to March.The T*ransition* period during April to May.

DISASTER THREAT

1. **Tectonic Zone, situated geographically between Asia and Australia continent and between Indian ocean and Pacific ocean, with three regional mountain system :**
   a. **The Alpine Sunda system, from Himalayas through Sumatera,Jawa, NTT ending to Banda sea.**
   b. **The East Asiatic system, part of Circum Pacific mountain system,from Philippines to Kalimantan and Sulawesi island.**
   c. **The Circum Australian system, from New Zealand to Halmahera island.**
2. **Active Volcanism, with about 17 % of total active volcanoes in the world.**

ASIA - INDONESIA - *AUSTRALIA*

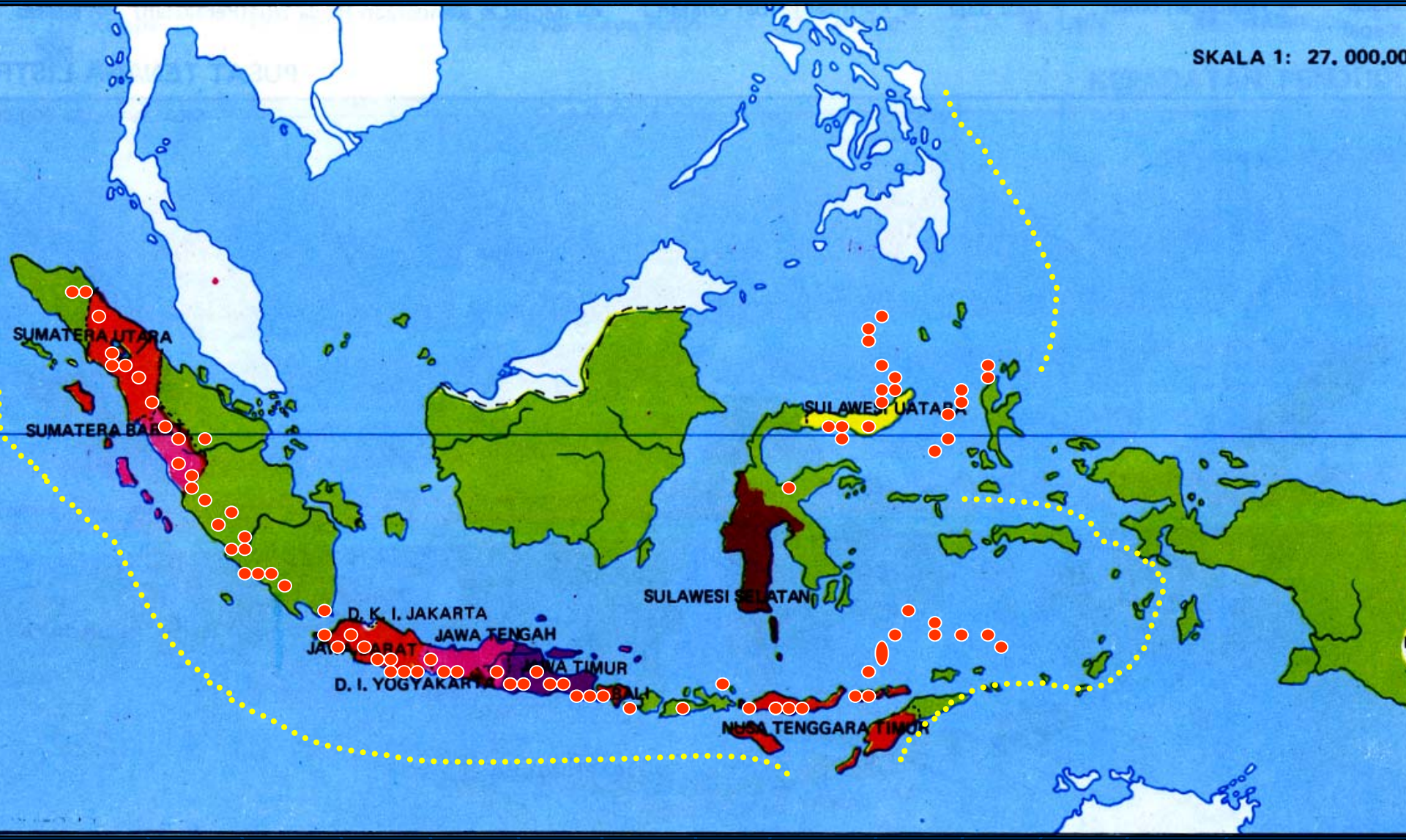
PLATE TECTONIC MAP



VOLCANOES IN THE WORLD

Distribution of Volcanoes in the world

INDONESIA ARCHIPELAGO
Location of Active Volcanoes



SEDIMENT DISASTER SITUATION IN INDONESIA

- Indonesia is subject to many different natural hazard or disaster prone area (128 active volcanoes, four earthquake belts, rainy monsoon that cause annual floods and landslide, droughts, tidal waves, etc).
- Sediment Disaster include debris flow, landslide, slope failure, etc as a kind of natural disaster are mostly happen triggering by mechanism process of water, soil and together with human activities.
- In Indonesia the sediment related issues might dealing with management for mitigation of negative impacts or disaster so called SABO.
- Due to the existence of hundreds of volcano , sediment disaster in Indonesia have occurred both in volcanic area and non volcanic area (debris flow, lahar flow, landslide, slope failure, etc).
- An integrated aspect of socio, economic and culture with introducing such indigenous technology recently is being a strategy subjected to the community in the disaster prone area in Indonesia.
- The strategy is realized with the purpose to enhance the awareness of the people on sediment-related disaster by developing human resources in a specific one or in general through *Formal Education, Non Formal Education and Community Based Awareness Raising approach.*

Current Measurement on Sediment – Related Disaster

- Flash Flood of Bukit Lawang , Langkat Regency, North Sumatera Province (Bahorok river)
- Gigantic Caldera-wall Collapse of Mt. Bawakaraeng, South Sulawesi Province (Jeneberang river)

Disaster of Bahorok river, Bukit Lawang, North Sumatera Province

Condition before disaster occurred

General Condition of the Disaster

Phenomena : Flash Flood (Banjir Bandang)
Location : Bahorok River
Bukit Lawang , Langkat Regency, North Sumatera Province
(Tourism Resort Area of Mt. Lauser National Park)

Date, Time : 21:30 November 2 (Sun) – 1:00 November 3 (Mon)

Damage : 155 victims died , more than 87 people missed.

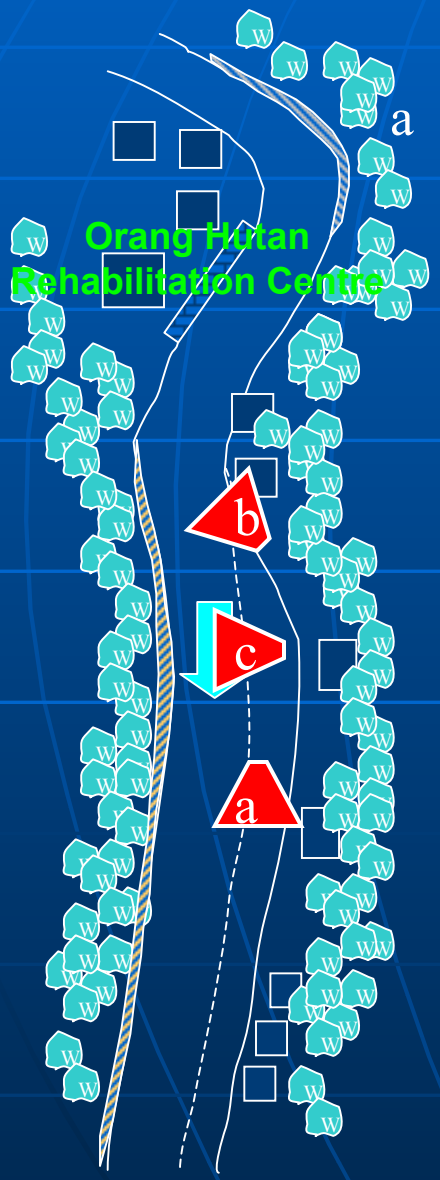
Thousands of houses, hotels and cottages were damaged.

The World Famous Orang Hutan Rehabilitation Center was damaged.

Total Losses amount to about Rp. 200- billions.

(Official Announcement by Government)

Condition after disaster occurred



b

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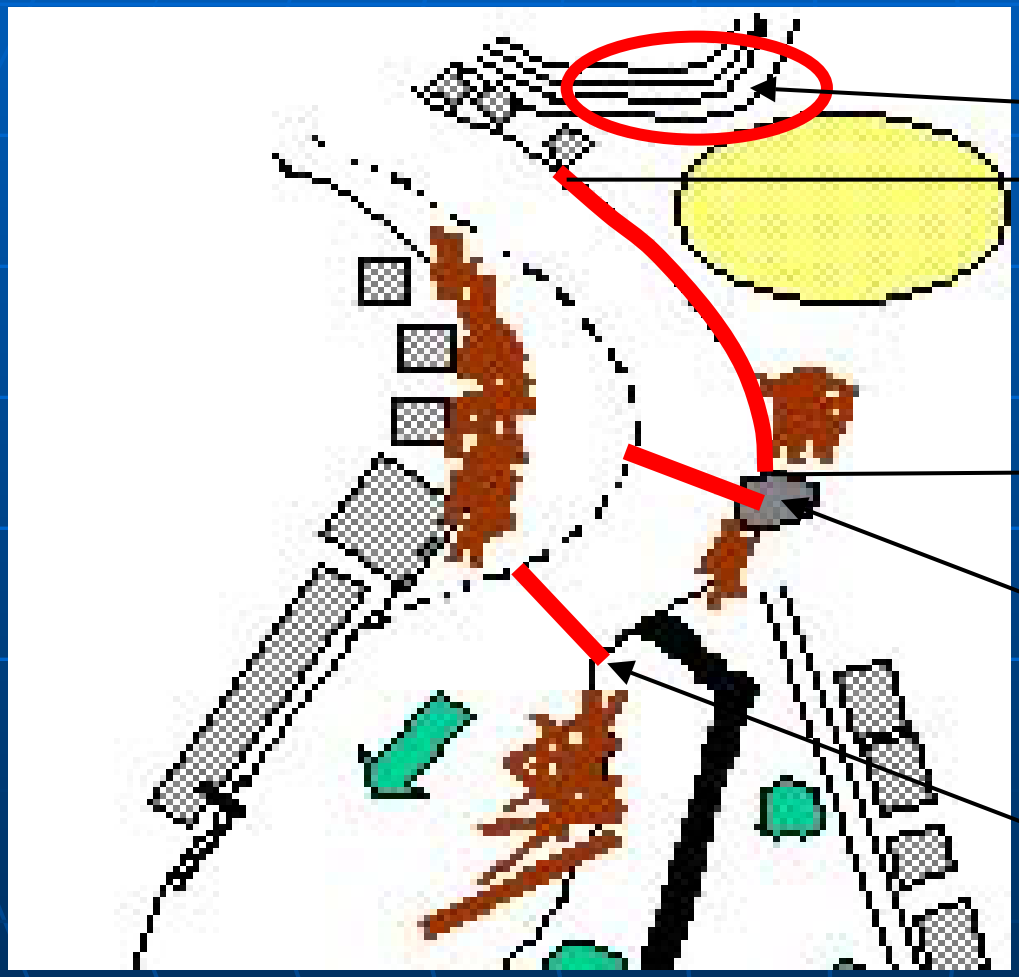
Condition after disaster occurred

a

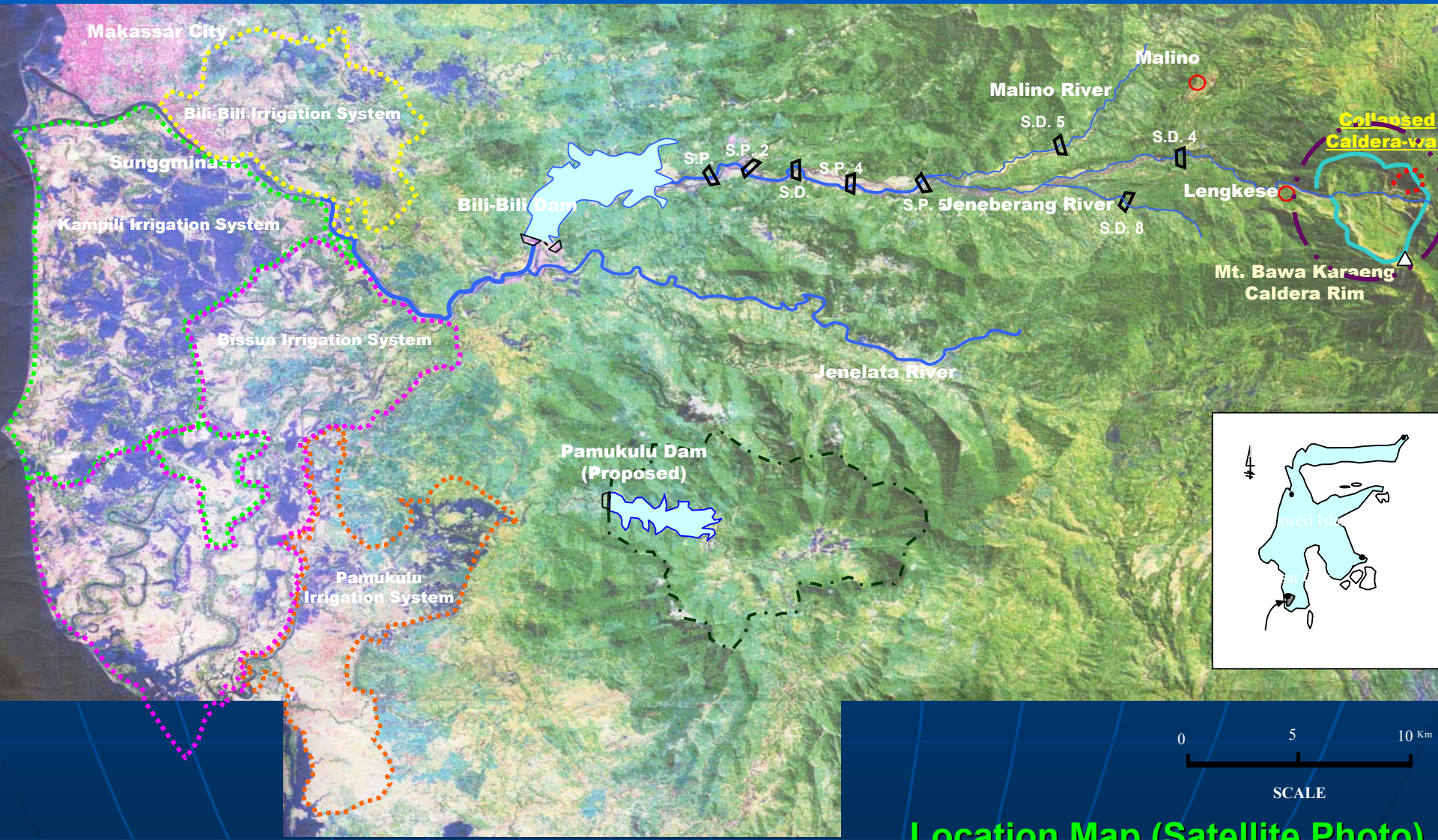
b

Condition after disaster occurred

Recommendation to Countermeasure

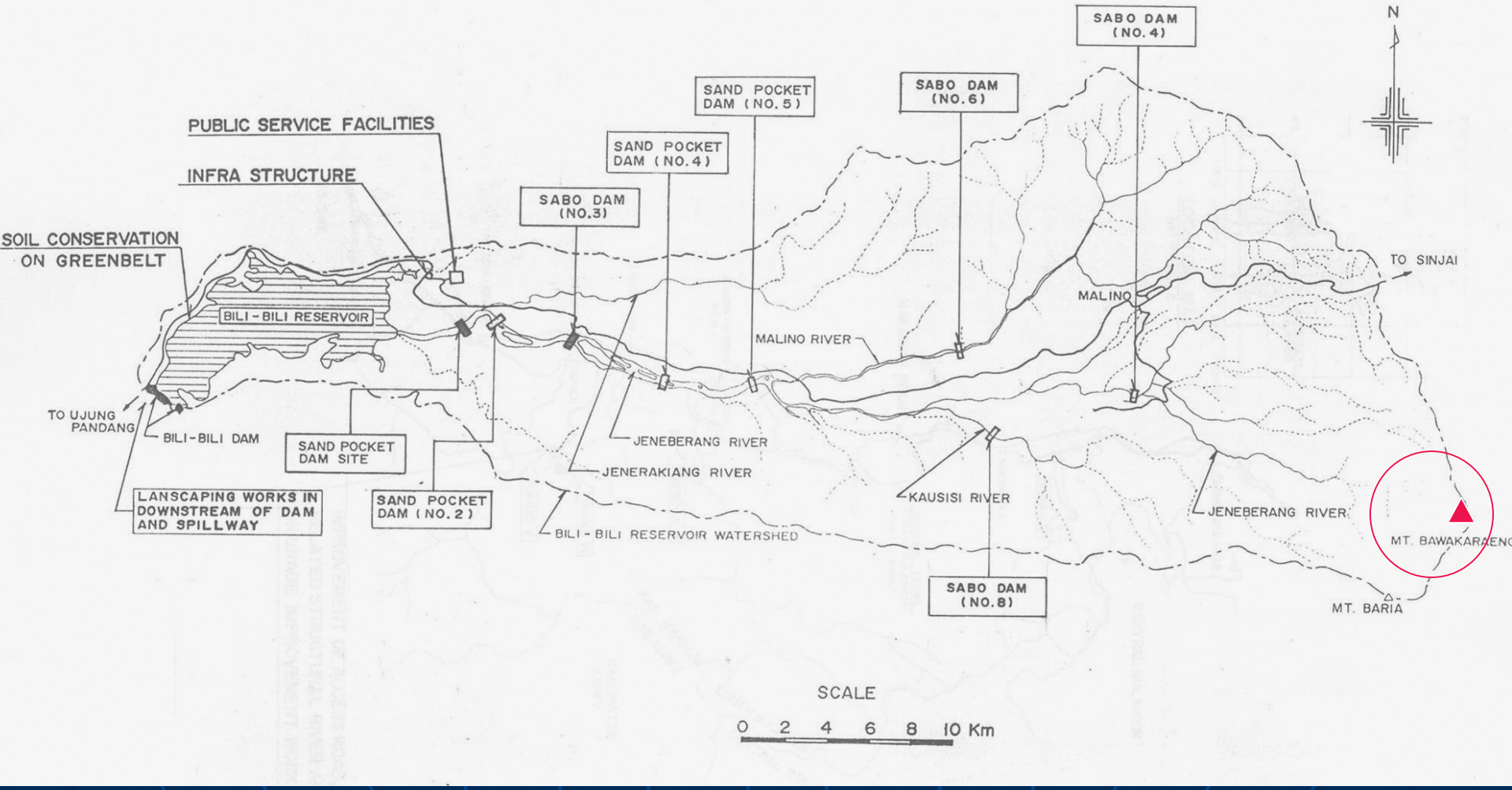


Disaster of Mt. Bawakaraeng, Gowa Regency, South Sulawesi Province



Location Map (Satellite Photo)

Location Map of Caldera-wall Collapse on March 27, 2004



Damages

- 10 causalities, 8 injured and 22 missing (as of 7 April 2004, source Posko Pattiro).
- 10 houses and one elementary school were buried in debris.
- Area (paddy field and residential) buried in debris is estimated at 1,500 ha.
- 635 cows die near the site after the Disaster.
- All village people had evacuated immediately after the disaster to Pattiro and Sicini.
- Damage caused by the disaster amounts to Rp. 22.14 billion. (as reported by Local Government)

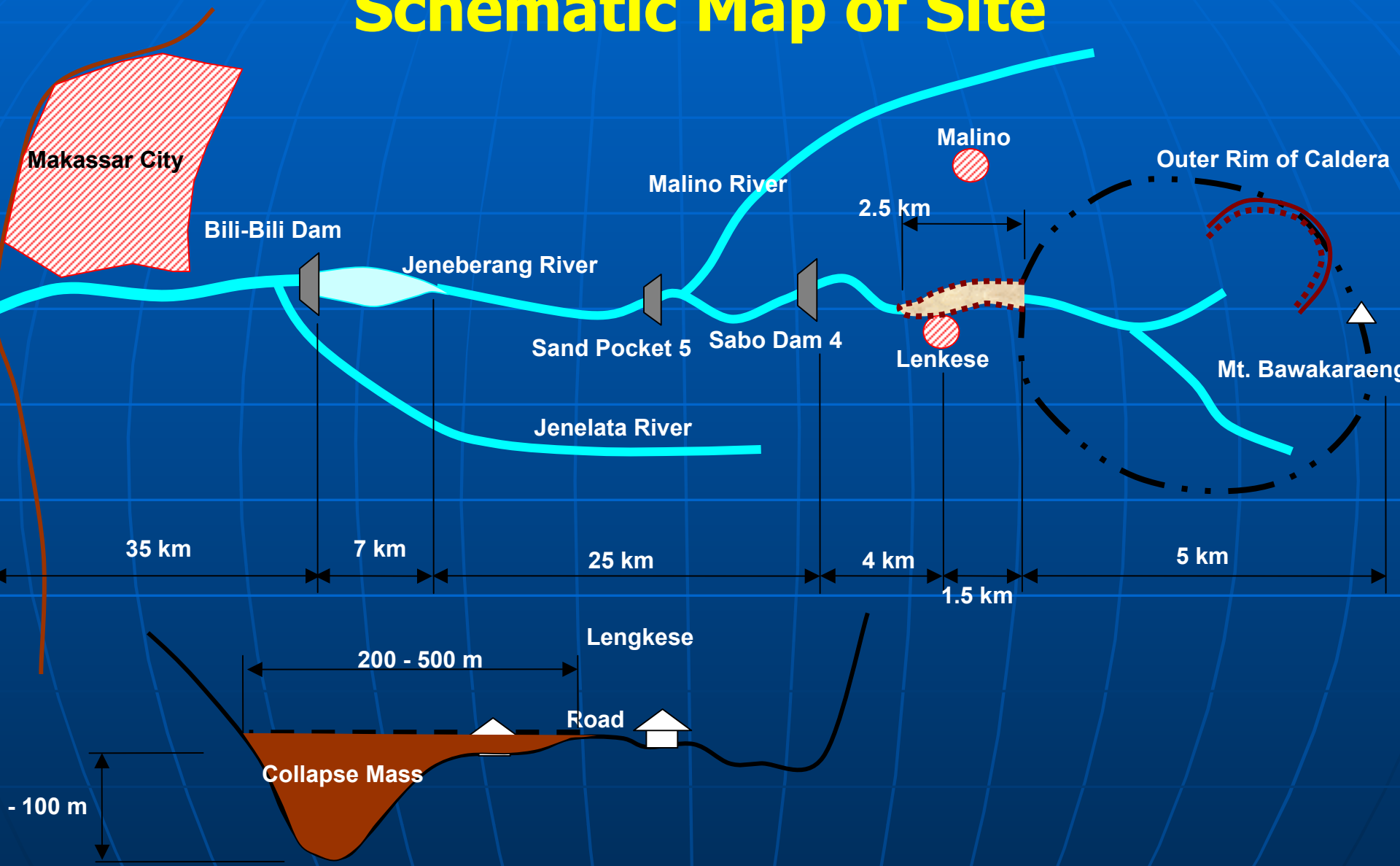
Damages at Lengkese Village

Evacuation of Village People

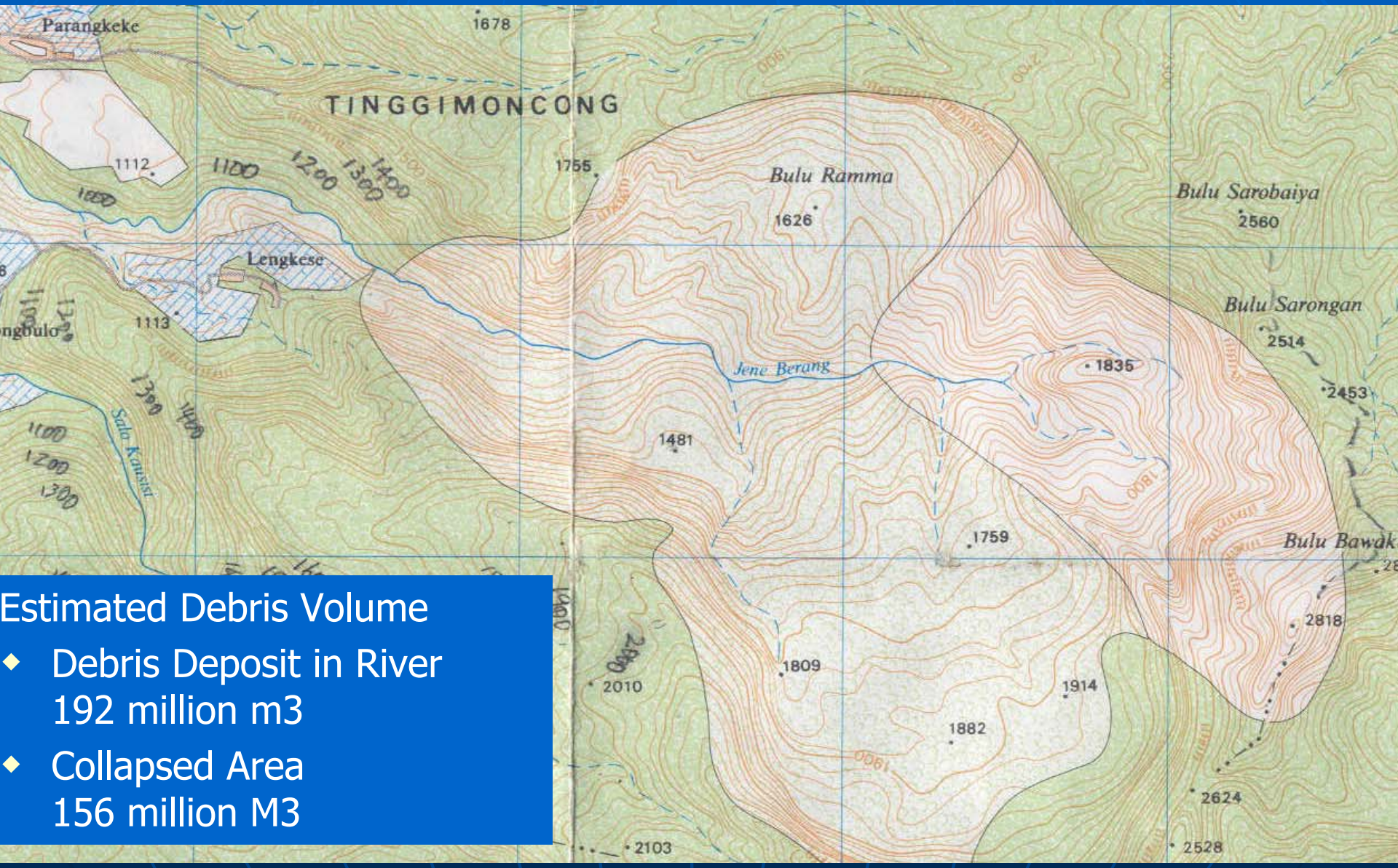
Buried Houses

Buried Paddy Field (Parangkeke)

Schematic Map of Site



Assumed Collapse Area



Estimated Debris Volume

- Debris Deposit in River
  192 million m3
- Collapsed Area
  156 million M3

Collapsed Caldera Wall (1)

Before Collapse
July 2002

After Collapse
April 2004

Collapsed Caldera Wall (2)

Before Collapse
June 1986

After Collapse
April 2004

Pushed out Debris

Recommendations of countermeasures

- Total collapsed material is estimated around *300,000,000 m^3*.
- The material covered and buried the Jeneberang upperstream
- There are still possibilities of another slope failure or landslides
- There is possibility of next movement of material to the downstream due to river flow or unstable mass weight. It is estimated that about *50,000,000 m^3* of material will flow down.
- There are six sabo dams between the end of mudflow and Bili-bili dam, but most of the sabo dam is almost full
- Continuous observation of blocking stream flows, collapsed material changing and movement, saturated condition of the material is urgently necessary to be started
- Community participation in early warning system is necessary
- Relocation of inhabitants surround the area
- Re-vegetation is urgently needed to preserve the unstable material.
- Preparation of sabo dams to slow down the flow and trapped the material before reaching the Bili-bili dam.

New - Orientation on Sabo Technology

- Sabo technology has developed in Indonesia since 1970's.
- It even obvious develops when technical cooperation on Sabo technology between Indonesian Government and Japanese Government established.
- Sabo technology was introduced in some volcanic and non-volcanic area and it has given advantages to the people who live in disaster prone area, but utilization of Sabo facilities which are potentials for other purposes to be integrated on sediment – related disaster management has not realized yet optimally to support rural development program.

- Facing the new era at present, it is necessary to have re-orientation in this particular technology with the recent trend of basic infrastructure development, to promote public partnerships.

- New orientation of Sabo technology should not only focusing to the safety of human life and infrastructures in hazard area, but should also consider to secondary utilization of facilities within the frame work of *integrated sediment - related disaster management or ISDM.*

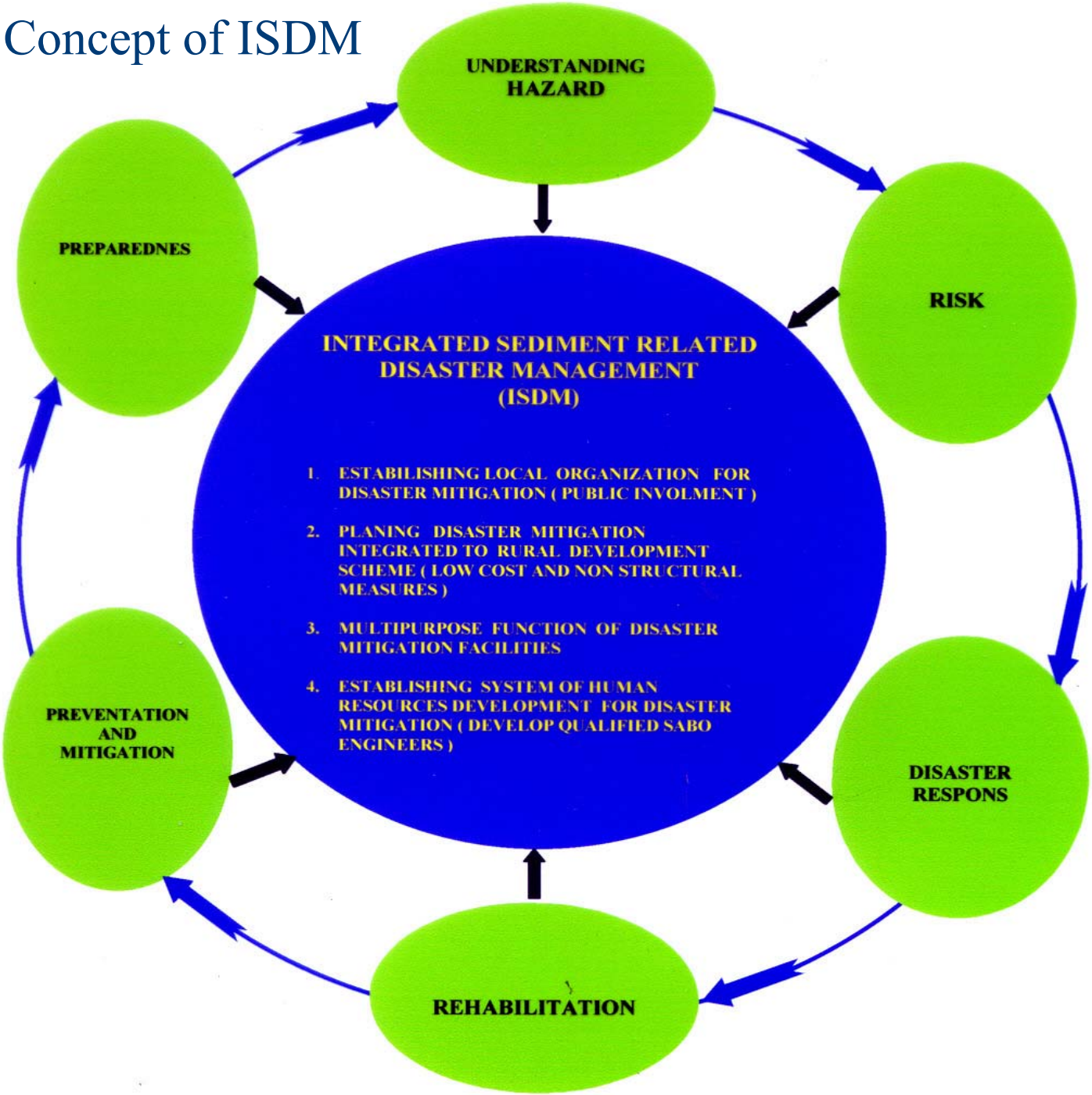
Basic Concept of ISDM

Securing the safety of communities by best synthesizing non-structural and structural measures according to the local condition, trough collaboration between the local communities and the government organization.

Concept of ISDM

- ***Public involvement*** as indispensable, there for the governmental engineers and local people will work in cooperation.
- ***Low cost and non-structural measures*** are to main measures for disaster mitigation.
- ***Multi purpose*** is a basic function to reduce the damage caused from sediment–related disaster during or after occurrence of disaster and to improve rural living standard during normal live.

Concept of ISDM



CONCLUSION

A systematic approach in collaborating manner through several activities in an integration system of technical and non technical aspect should be implemented and supported by the community and stakeholders , whereas a strategy of bottom-up approach and raising awareness of the people should be realized in a suitable way.

Sabo organization as a technical backbone on sediment disaster management of local government is necessary to be established in each disaster prone area.

To enhance human resources on sediment related disaster mitigation, a formal and non formal education include community based awareness are necessary to be introduced.

Protected our lives by ourselves on natural disaster should be consciousness rising to the people living in disastrous area trough such kind of way.

Recently, the new strategy on sediment related disaster mitigation is being realized through Sabo Technical Centre within the frameworks of Integrated Sediment related Disaster Management (ISDM) program.

Thank's for your kinds attention

- Domo arigato gosaimashu
- Terima Kasih

Good luck and see you again