BBB VISION FOR TONGA

(WORK IN PROGRESS)

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Brief History

- In Sendai Framework the Government of Japan proposed Build Back Better.
- Rebuilding back after a natural event needed to be realign to Standards and Principles
- Not only rebuilding damaged infrastructures but also spend money for local economy recover with more stronger business model.

Concept

(16 Jan. 2016, Japanese Delegate)

- According to the definition of UNISDR, "recovery" after a disaster is "the restoration, and improvement, where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors" (UNISDR, 2009).
- The "Build Back Better" concept is generally understand disasters is an opportunity to create more resilient nations and societies than before through the implementation of well-balanced disaster risk reduction measures, including physical restoration of infrastructure, revitalization of livelihood and economy/industry, and the restoration of local culture and environment.

BBB = **increase the resilience of nations and communities through integrating disaster risk reduction measures**

Share Experience JICA's idea of Build Back Better

- BBB Framework provides Tonga with systematic approach to addressing before and after disasters
- BBB although disasters does occur it provides an opportunity to rebuild back better.
- BBB provides an opportunity to prepare and realign efforts better.
- BBB provides opportunity to improve and strengthens our infrastructures.
- BBB firstly focuses on two categories structural measures:

  DRR infrastructure and

  Critical infrastructure.
- BBB secondly focuses, Early Warning System, evacuation plan, land use planning, construction technologies, seismic & wind code, etc.

DRR - Disaster Risk Reduction infrastructure

- Infrastructure that protects “critical infrastructure” by suppressing the impact of natural disasters.
- For example, Nuku’alofa seawall against storm surge & tsunami.

Critical infrastructure

- Infrastructure that are critical to the function of the nation, both governmental & non-governmental.
- For example, Legislative Assembly of Tonga, state office buildings, facilities for: communication; EWS; transport (roads, bridges, wharfs, ports, airports etc.); lifeline (water supply, electricity, waste disposal plants, etc.); hospitals & health service; and Education.
- For example: Volcanic ash fall cannot have DRR infrastructure. Each critical infrastructure to cope.

The 2022 THHH volcanic tsunami revealed the following vulnerable areas of Tonga: monitoring of hazardous natural phenomena; the capital Nuku’alofa; tourism; remote villages including isolated islands; aerial, maritime and land transport; international and domestic communication; and some livelihood issues like water supply etc.

1. Protecting the Capital:

Structural measures by pre-disaster investment including multi-protection and resilience of livelihood

2. For infrastructure we set two wave height levels.

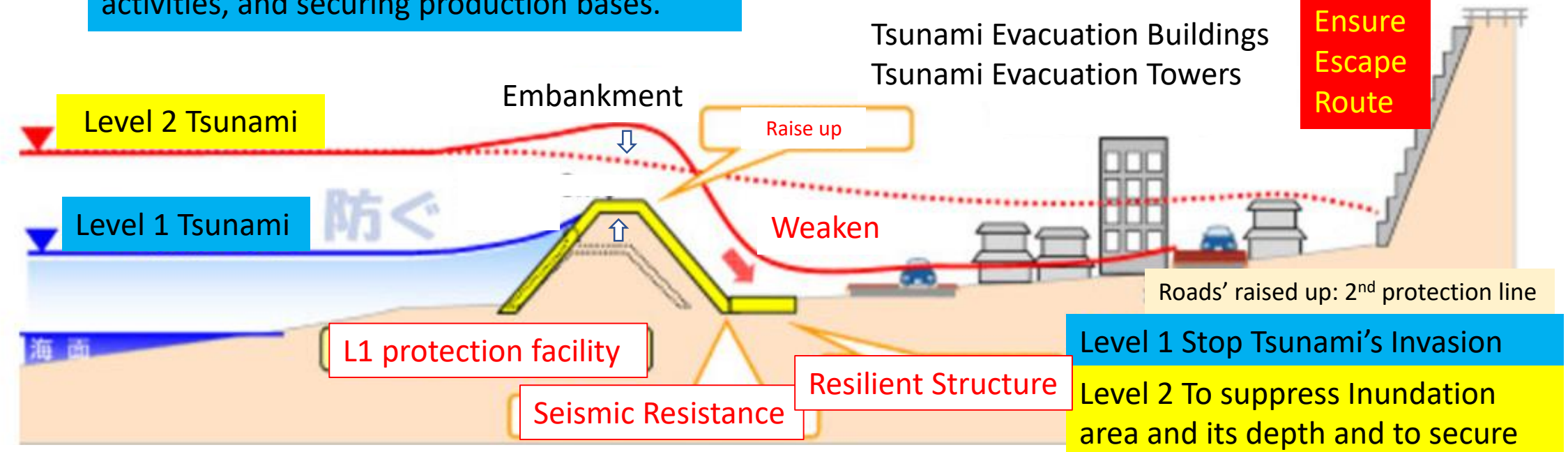
The Principle is the Establishment of Evacuation Measure to safe places

Level 1 Tsunami

Establish Tsunami protection facilities from the perspectives of protecting human lives and property, stabilizing regional economic activities, and securing production bases.

Level 2 Tsunami

Reduce damage by Tsunami protection facilities for Level-1 and promote non-structural measures, mainly evacuation for Tsunamis that exceed Level-1.



Level 1 Stop Tsunami's Invasion

Level 2 To suppress Inundation area and its depth and to secure of evacuation time

New Concept of Tsunami DRR (Shizuoka Prof.)

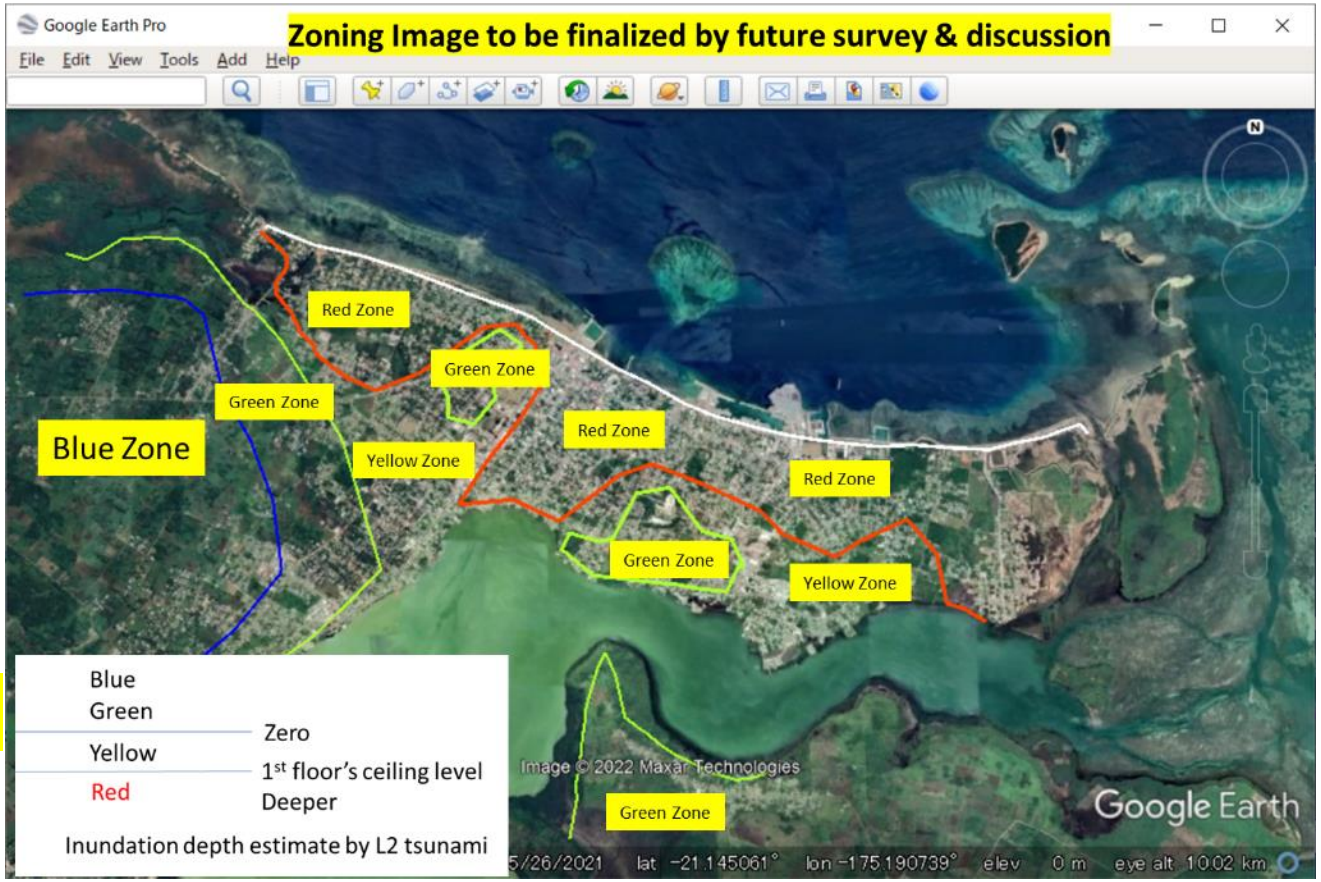
It is a controversial issue whether the 2022 HTHH Tsunami can be regarded as Level-1 or not.

AT A GLANCE

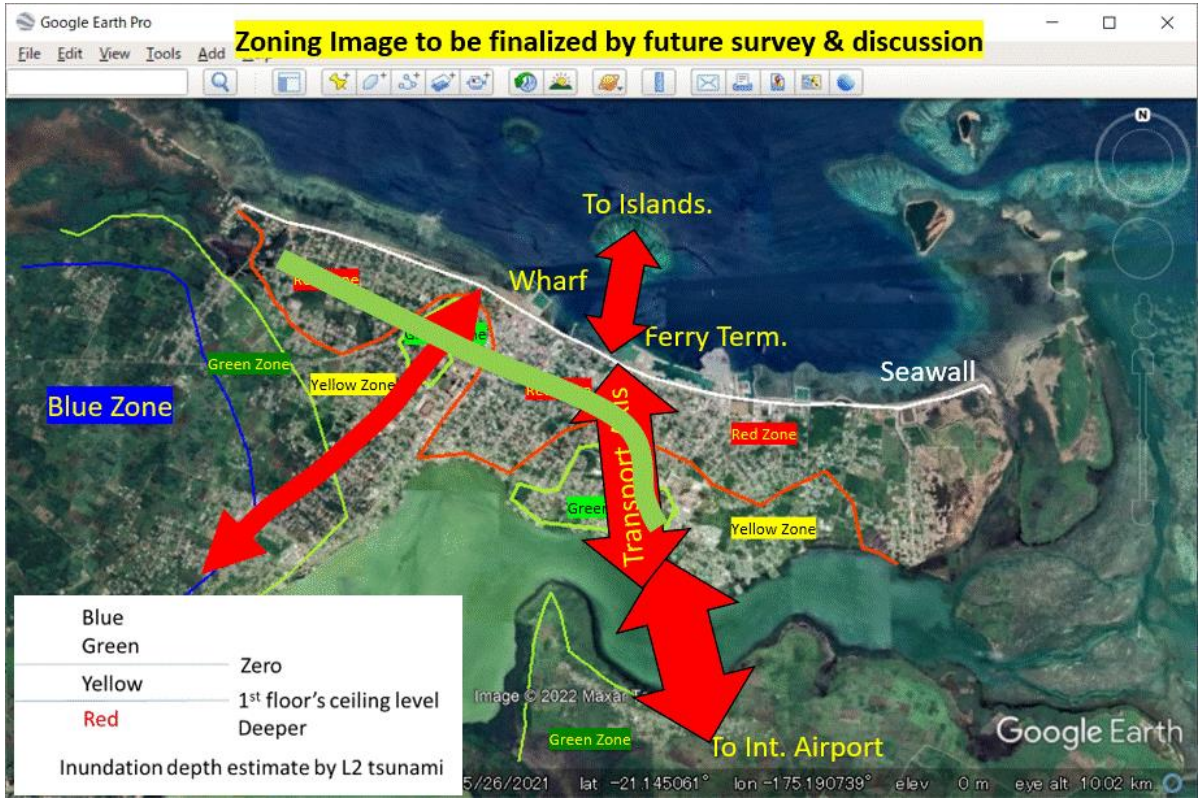
3. Image of Zoning with Inundation depth by L2 tsunami (2011 Assess.)

- Red Zone: Estimated to be inundated to deeper than, for example, the second floor level in the 2011 Assess. (Lowest area)
- Yellow Zone: Estimated to be inundated but, for example, shallower than the level of the first floor's ceiling (Low area)
- Green Zone: Estimated to be non-inundated. However, there are two island shape Green Zones in the city that are not so much higher than Yellow zone. ←Influenced by Climate Change?

Blue Zone: Hill zone that seems safer than Green Zone



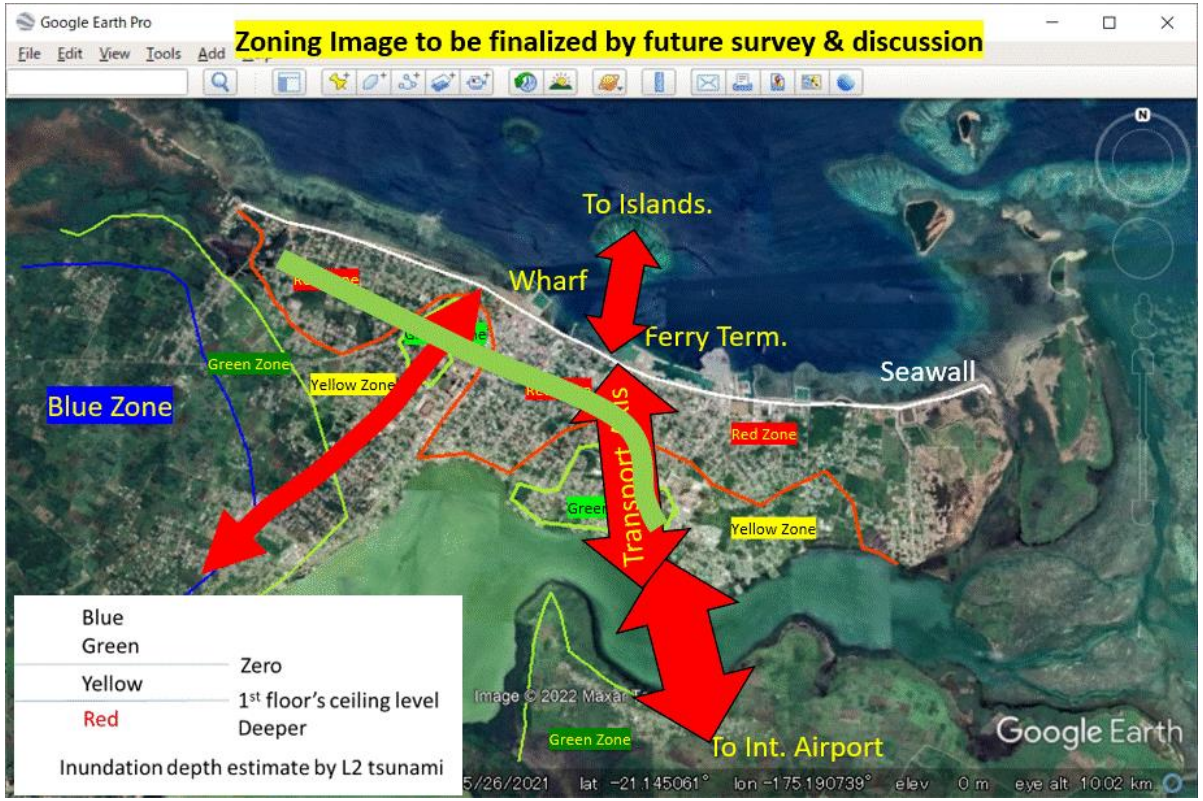
4. Image of Structural Measure



Transport axe can work as the escape routes from the island shape Green Zones, once connected. It should be raised up in low land.
Strengthening the existing seawall &/or additional structural measure (road embankments as the 2nd protection line) can narrow Red and Yellow Zones.

- Red Zone: Land use control (Only Commercial, Industrial, & Governmental Uses that work as the DRR bases) plus Tsunami evacuation buildings & towers, Raised roads. Relocation of private residences.
- Yellow zone: Land use control as above but with Essential Uses (Schools, Hospitals etc). Restriction/ recommendation of structure for private houses (RC or RCB on poles (Piloti structure) on high foundation/ mound).
- Island shape Green Zone : should be connected to "Green & Blue Zone" by escape routes with elevated roads & bridge over low land & water
- Green & Blue Zone: Candidate places for destination of relocated residences etc.

5. Image of Structural Measure: Multi-Purpose



- Securing main evacuation routes from island shape green zones with viaducts, road embankment and bridge, etc.
- Connecting the two main evacuation routes with road embankment, i.e., the second protection line, to ensure the safety of evacuation from the center of the capital.

- The southern shore of the lagoon can be a favorable resettlement site for inhabitants and companies, with access to the center of the capital and the international airport.
- Securing a transportation axe connecting the airport and ferry terminal, both in normal times and in times of disaster.
- Enable to activate trading and tourism
- Enable to relieve traffic congestion in the center of the capital.
- Integrated renewal of seawall, coastal roads, public open spaces for citizen's amenity, and urban areas through Green infrastructure on land and shore
- Construction styles in the yellow zone: to prevent complete destruction of housing and to facilitate recovery of livelihood in terms of resilient housing.

6. Tourism (Hotels & Resorts)

- Important for the national economy.
- Tend to locate close to beach by necessity and difficult to relocate.
- Safety measures, for example, tsunami evacuation tower, for every premises primarily by the responsibility of the owners.
- Restriction of structure (RC, RCB etc. on mound/ raised foundation/ Piloti)
- Green infrastructure to suppress the tsunami impact, to conserve landscape and environment, and to attract more tourists. ➔ Conservation &cultivation of forests & coral reefs
- Loan program differentiated by the grade of disaster preparedness

Vakaloa Beach Resort

Figure 6.1: Aerial view of Vakaloa Beach Resort post HTHH disaster4

7. Villages at high risk or on Washed Out Islands

- Wide variation of local conditions to be considered.
- The safest way is Relocation of residences at high hazard parts or entire village to safe places, based on a detailed hazard/ risk assessment.
- (Washed out Islands) Reconstruction of residences at safer place in the same island or in a main island, based on a detailed hazard/ risk assessment.
- Road replacement for ensuring at least two evacuation routes (if possible).
- Tsunami evacuation towers/ mound (in case that evacuation to nearby safe place cannot be assured).
- Preventive Evacuation of all inhabitants based on the information from monitoring ← Emphasis on Monitoring.
- Restriction/ recommendation of structure for private houses (RC, RCB etc. on mound/ raised foundation/ Piloti)
- Comprehensive functional strengthening of shelters if not enough space for all inhabitants in safe place.
- Green infrastructure to suppress the Tsunami/ Storm Surge impact and also to conserve landscape and environment for better QOL of inhabitant.➔ Conservation ＆cultivation of forests & coral reefs.

Mango Island (IDB Report)

Niuafo‘ou: Inhabited Volcano

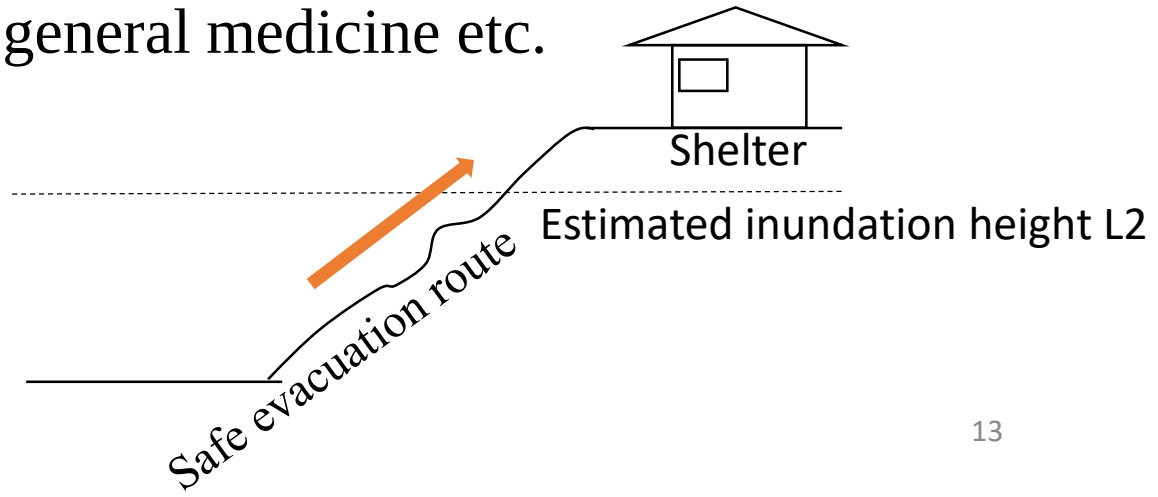
8. Functionalities of Shelters

Shelters should:

- Be safe for considered hazards, for example, higher than the estimated Tsunami height etc., for waiting until the public assistance reaches.
- Have a sufficient safety of structural & non-structural members against earthquakes, strong wind, tsunami, fire etc.
- Have an easy and safe access for all people including those requiring support and rescues.
- Have a sufficient capacity for expected number of evacuee.
- Be hygienic and comfortable.
- Be used constantly in ordinary time for maintenance and being known by local people.

Shelters should be equipped with:

- Communication facilities usable in emergency, too.
- Emergency lifesaving tools like AED.
- Basic living functionalities: toilet, lighting, fuel for cocking, beds, blankets etc.
- Independent Power Supply.
- Stockpile of drinking water, food, general medicine etc.



9. Measures for Volcanic Ash Fall

- Plan of Cleaning-up & disposing/ reusing/ recycling debris & volcanic ash
- Real time Ash Fall Forecast
- Measures for lifelines: Water Supply, Sewage, Electricity (grid or non-grid), Renewable Energy
- Measures for Agriculture & fishery
- Measures for transport & communication
- Measures for Environment

- Heavy Machinery (Sweepers, Carriers), Reuse/Recycling technologies & plant (recycled aggregate etc.)
  ←keep using them to maintain in operable condition and for training in ordinary time

- Estimate of influence and strengthening measures

10. Immediate Response System (IRS)

- Strengthening IRS

Quick Damage Survey using Satellite, Airplane & UAV etc.
➔keep using them to maintain in operable condition and training in ordinary time

Quick simulation for forecasting/ estimating ash fall, tsunami etc.

- Capacity development for Governmental Officers

Training in site & recommendations by experts (for members of NEMO, TGS, TMD etc.)

11. Transport & Communication

Resilient Transport System: Planning and Implementation

- Ensuring access to damaged area
- Strengthening International & Domestic Airports:

  Meteorological Observation
  Early Warning System
  Seismic Protection
- Strengthening Maritime Transport
- Wharf/ Ferry Terminal
  at Tongatapu, Pangai, Vavau etc.
  Oceanographic (tidal) observation
  Early Warning System
  Seismic Protection
- Strengthening Land Transport

  Roads & Bridges

  Seismic Protection

Resilient Communication & Information System: Planning & Implementation

- Resilient Basis of DX relying on ICT, for example, education and medical care on remote provided by core organizations like USP or Vaiola Hospital. Moreover, e-government, e-commerce, e-learning etc.
- Ensuring communication with isolated islands & villages.
- ←Resilient base stations for cellular & smart phone.

  Preparedness to switch immediately to satellite communication from wired one.

  Redundant submarine cables.

12. Housing: Residential & Non-residential Buildings

Residential Buildings

- Land Use Planning & Control
- Measure for Earthquakes: Following Seismic Code
- Measure for Strong Wind: Following Wind Code
- Measure for inundation: Inundation Resilient Housing Technologies & Regulations

Non-residential Buildings

- Schools

Strengthening to ensure safety

- Hospitals & Health Service

Strengthening to ensure safety and functionalities

- Governmental Offices

Strengthening to convert to a response & recovery base

Regulations &/or Guide lines

- Hotels & Resorts (Ditto)

13. Livelihood: (to achieve a better social recovery & sustainable development)

Lifeline

- Energy supply: Resilient power plant, Renewable energy
- Water supply: Groundwater management, Purification technology
- Waste & Sewage management

Health & Hygiene

- Programs for Improvement of Nutrition, Health and Welfare
  Communicable & Non-communicable diseases (Diabetes etc).

Support to Agriculture, Fishery, Industry, & Trading, of small scale

- Development and dissemination of technologies appropriate for Tonga:
  Processing Seafood, agricultural and livestock products
- Loan &/or insurance programs against natural disaster for financial security of livelihood.
- Linkage with Health problem: Vegetable farming.

What's more ?

14. The Role National Spatial Planning Authority Office (NSPAO)

- We are waiting on Cabinet approval to adopted BBB- Vision for Tonga as a working policy under the mandatory tasks of NSPA to secure the quality of development activities to build better future of the country.
- From a Town Planning Point of View, the BBB provided a framework for systematic approach to addressing disaster events in Tonga, better coordination and prioritize our resources and funds
- BBB Vision for Tonga, as a policy will not only be used during the post-disaster reconstruction period, but is also a policy that should be emphasized in normal development activities
- Core legal mandate of NSPAO; ensure all development has a plan, coordinate, provide advice on priority development, ensure public is consulted on development projects and above all ensure all Development Projects applies for a Development Consent.
- BBB Vision for Tonga projects 28 days stand down - will apply – Time limit.
- Objectives of NSPM Act 2012 (a) – (g), …provide and coordinate development of land including the protection of natural and man-made resources, enable land use and development planning and policy to be integrated with the environment, create urban structure and form for development, protect and develop public utilities, balance present and future interests, provide opportunity for public participation in planning and assessment.
- Finally, The BBB Vision for Tonga as policy will assist our reconstruction efforts to realign our standards, provide better advise to the public.

Malo aupito