

ADRC Peer Review Mission to Maldives

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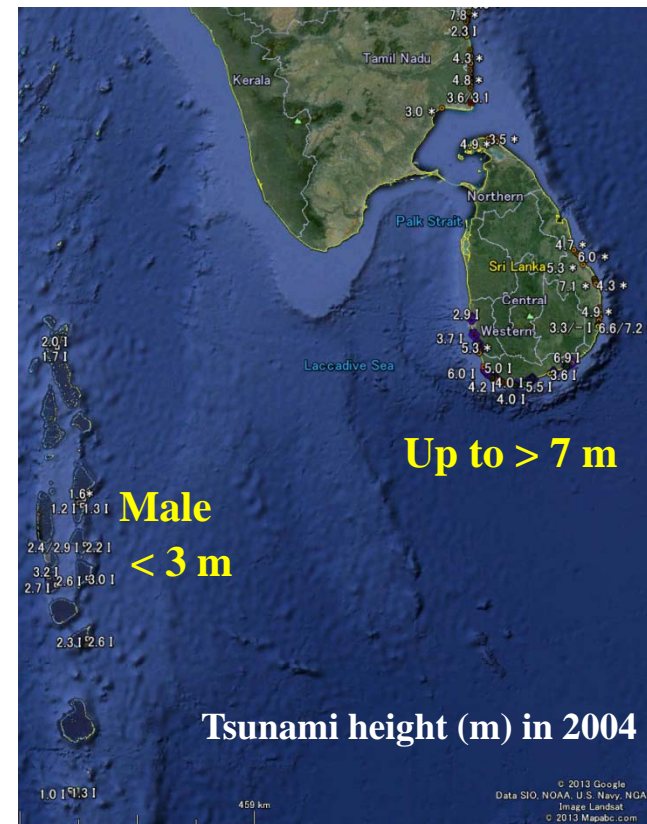
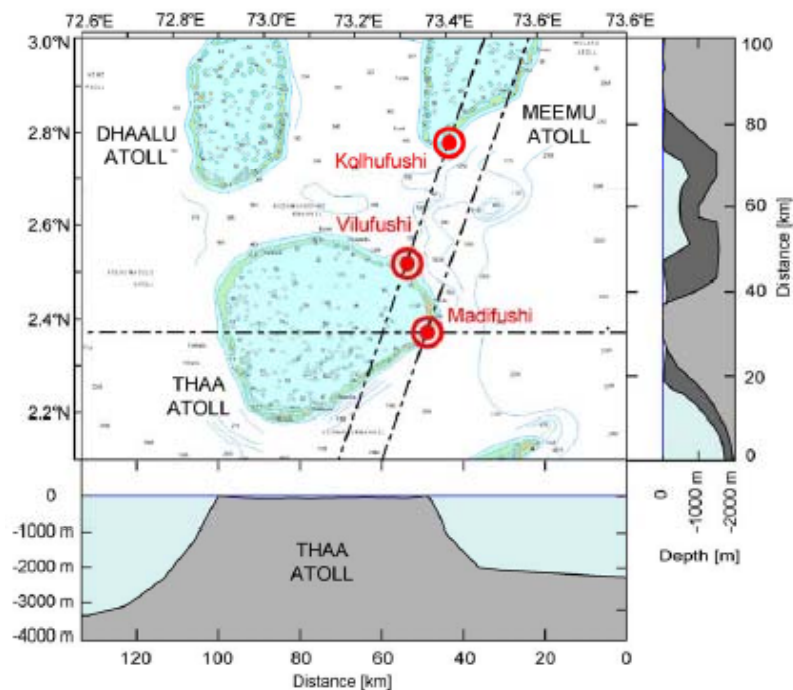
23rd – 29th December 2013



Background

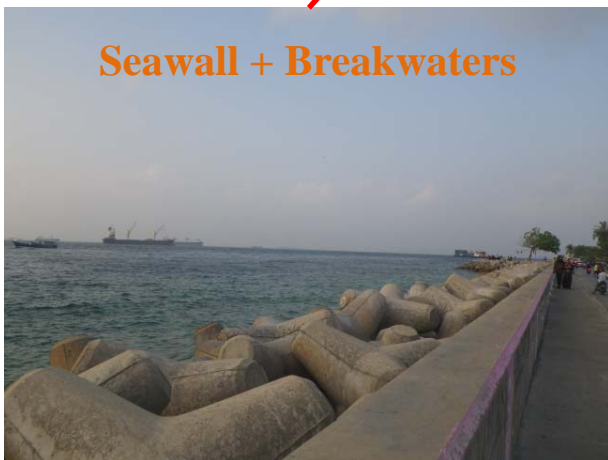
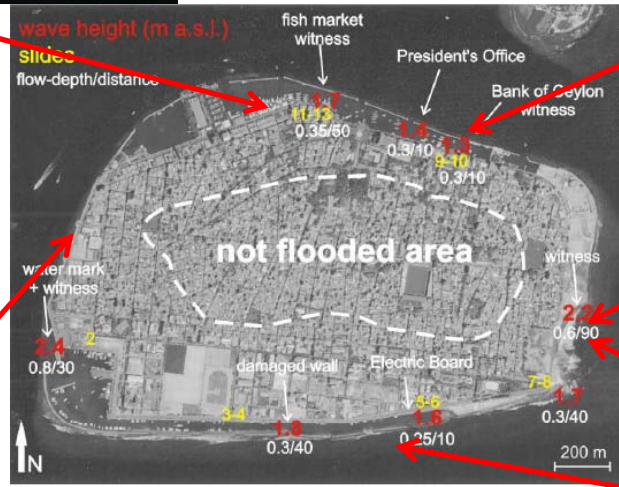
In the Maldives, the maximum tsunami heights reached up to only 4 m above sea level on Vilufushi Island. The unique topography and bathymetry, with offshore coral reefs and deep channels separating individual atolls, significantly reduced the impact of the tsunami, as compared with Sri Lanka or even Somalia—which was twice the distance from the epicenter along the main westward tsunami trajectory. Although the terrain elevations of the entire island chain are lower than 2 m, the 26 December tsunami had limited impact on the Maldives, because of the characteristic bathymetry with deep ocean channels separating the individual atolls.

In the Maldives, 88 people were killed and 24 reported missing and presumed dead after it was hit by a tsunami caused by the 2004 Indian Ocean earthquake on 26 December 2004. Two-thirds of the capital city Malé was flooded during the first hours of the day. Outlying low-level atolls were badly affected and some low lying islands, including some of the major resorts, were completely submerged at the peak of the tsunami. Since then disaster became an issue of the country and in attention of many sectors.





Coastal defense



Present vulnerability



Containers



Cars and boats



Evacuation route



Dense traffic

Results of the interviews

Ministry of Defense and National Security (MDNS)

Current efforts in managing IDP and DRR

Some facilities such as boats and helicopters can be used in case of emergency but still facing logistic problem as the country contains large number of islands and limit budget for getting new facilities.

Strengthening based on observation and analysis

MDNS is the most important visible support as they have man power and other facility to be used during the emergency. They will be one of the first team who must reach to the affected areas to solve physical problem and support the later activity. This is similar to the Ministry of Land, Infrastructure, Transportation and Tourism (MLIT) and National defense in japan. One good example from MLIT was that they could clear all main road from tsunami debris by just three days. Since then disaster support goods can be sent to disaster affected areas.

Points to be considered for further improvement based on observation and analysis

Response time is probably the most important. The shorter response time of the MDNS, the longer working time for other activities such as medical team, supporting material and volunteer work.

Findings and recommendations

Since logistic and budget are still the two most limitation for the support from the national defense, the best thing is probably to reduce the communication time during disaster. Prior rule agreement or regulation might be the most appropriate for this case. If the disaster exceed a certain level, local community should have their right to start their activities for disaster response. Local community should be strong and independent as it will take time for the support from the central government. This is similar to a small island (200 in population) that had very good response to the 2011 Japan tsunami. They have their own disaster response team to clear evacuation route from collapsed wall after the earthquake and warning team to called out and help evacuating those vulnerable persons.

Ministry of Education (ME)

Current efforts in managing IDP and DRR

Trying to implement disaster related curriculum in schools from kindergarten level and interesting in collaboration on disaster education and training based on lessons from the 2011 Japan tsunami.

Strengthening based on observation and analysis

ME has strong point of view that well educated young children will lead adult in such future disaster event. This idea is actually has some good examples such as the 2004 tsunami in Thailand as young British girl advocated more than a hundred people to evacuate and survive from tsunami. Similarly, the 2011 tsunami in Kamaishi, Japan that students in two schools decided themselves that tsunami would larger than what estimated in hazard map. Finally, all of them were safe and most casualties in the area were old people within estimated tsunami inundation zone shown in the tsunami hazard map.

Points to be considered for further improvement based on observation and analysis

We hope that the government could help to implement the disaster curriculum in schools. Adaptation of teaching materials are also important. Book and other paper based materials are good but many not be interested by children. Other stuff such as cloth wrapper and handkerchief in Japan are some effective example because children will carry these stuff together with them during their daily life.

Findings and recommendations

At this moment ME is going to a good way but they still need support from the government and collaboration from local community. Observation of disaster teaching class in Japan might help for adaptation of disaster class to be applied in Maldives.

Ministry of Tourism (MT)

Current efforts in managing IDP and DRR

They have now very good practice, i.e., a brief introduction of disaster related stuff before check in at each resort. In addition, their idea of considering the total expose population (local population plus number of tourist) is very sustainable. One example from the Great East Japan Earthquake in Sendai can be given. A school near Sendai station which is the biggest station in Tohoku region was designated as an evacuation shelter considering only local population. However, during the earthquake, there were large number of people during their business and sightseeing. As result, they experienced difficulties in taking care of evacuee of about four times larger than their estimation.

Strengthening based on observation and analysis

MT can be considered as the ministry that has more support but fragile at the same time. As tourism is the main economic of the country, MT is now taking care closely to any kind of disaster that might interrupt the tourism activities.

Points to be considered for further improvement based on observation and analysis

Information related to disaster should be well disseminated as tourists are more sensitive to media which always mainly mention on bad news. For example, during the discussion we learned that tourists worried that tsunami from Japan will affect the Maldives. One example for this is that Thai government failed to convinced Thai people to believe about information during the great flood in 2011.

Findings and recommendations

The government should be the key person for disseminating disaster information, especially for tourists. This should not be failed like the flood in Thailand or Fukushima accident in Japan. Linkage and integration between local facilities for an emergency and quantifying the real exposure is very important and will become a future challenge.

Ministry of Housing and Infrastructure (MHI)

Current efforts in managing IDP and DRR

Some problems found during the interview 1) logistic for importing construction resource from other nearby countries (India or the Middle East), 2) Lacking of skilled man power, 3) Group relocation is necessary to reduce limited cost for construction of basic infrastructure and 4) education is need for people who get compensate money but spent for different objectives. To solve one of these problems, they are now encouraging children to relocate to big island for better education. By doing this, parents also have to follow their children and construction cost for infrastructure can be reduced.

Strengthening based on observation and analysis

MHI is the main key person during long term reconstruction as their works are related to daily life. Construction of housing and infrastructure in tsunami affected areas and other areas are still on going under limited condition.

Points to be considered for further improvement based on observation and analysis

Pre-fabricated houses (both temporary and permanent) are successfully used, for example, after the tsunami in Japan. We need to educate people to understand the recent advance housing technology which is as good or the same as their traditional house.

Findings and recommendations

Information and technology sharing seems to be the most important at this stage. Training should be organized under a certain condition that they have to work for the ministry for a specific period. New building code and education on basic understanding of civil works would help for long term sustainable against future disaster.

Maldives Meteorological Service (MMS)

Current efforts in managing IDP and DRR

Although MMS does not have their own warning system and have to rely on other international services, the present warning and observation systems seemed enough at the moment.

Strengthening based on observation and analysis

In terms of tsunami warning, MMS has network linked to all four major institution that take respond in the Indian Ocean. Warning information such as expected tsunami arrival time and amplitude from these institutions is enough for such short term measure but for the long term, more detail information such as hazard map for such predicted future event may necessary.

Points to be considered for further improvement based on observation and analysis

Warning dissemination method seemed still be a problem. Communication network that can be promised to be used during the disaster should be set up together with local practice to disseminate the information with easier to understand by non-educated people. One example for each issue was the typhoon Haiyan that attack the Philippines in 2013. The government did warn local people about the storm surge but local people did not understand correctly the phenomenon of the storm surge or how it differ to normal wind wave.

Findings and recommendations

Good weather observation data and geographical data such as detail bathymetry data is important for long term hazard and risk assessment. Education for local people to make them understand the exact meaning of the warning and suitable response might become their most important and future challenge.

Local relocated residents and stakeholders in tsunami hit areas



Thulusdhoo Island

- Total population = 1,361
- Relocated population = 340
- Used to be many factories such as Coca Cola and tissue paper but were used as temporary shelter after the 2004 tsunami for 4 years
- Tsunami was about 2-5 feet
- Temporary houses were built by donation from Saudi Arabia for those who used to have their own land in previous island
- Each temporary house has 3 rooms. Sometime it is unfair because it should depends on the family size instead
- Typical disaster is storm surge, flood, tsunami and coastal erosion



Findings and needs from local relocated residents and stakeholders in tsunami hit areas (Thulusdhoo Island)

Local residents

Local residents who kindly cooperated for the interview are relocated people who lost their houses by the 2004 Indian ocean tsunami in their previous island. At first, government gave them three possible island for their relocation. All of them satisfy with their new place as it is better in terms of economic reason. Even though 9 years have passed after the 2004 tsunami, they still have high awareness and strong will in participating disaster related activities.

Stakeholders

We have talked with representative from school, health center, police and atoll council. Although local people satisfy with the present condition but still not for the stakeholders because the facility and infrastructure are still not reach the level that the government have promised. Number of population have been increasing but with still the same capacity of the capacity such as school and health center. Especially for the health center, they would like to adapt to hospital level. At this moment, there is still lacking of necessary medical tools.

Workshop with local residents

We had a chance to participate a workshop on disaster resilience. Maps produced by the participants are very useful and providing all necessary information. The level of the workshop is quite similar to what has been doing in Japan. Implementation of the map against future disaster will be challenge for them

Local relocated residents and stakeholders in Thulusdhoo



Speaker



Highest building in the island

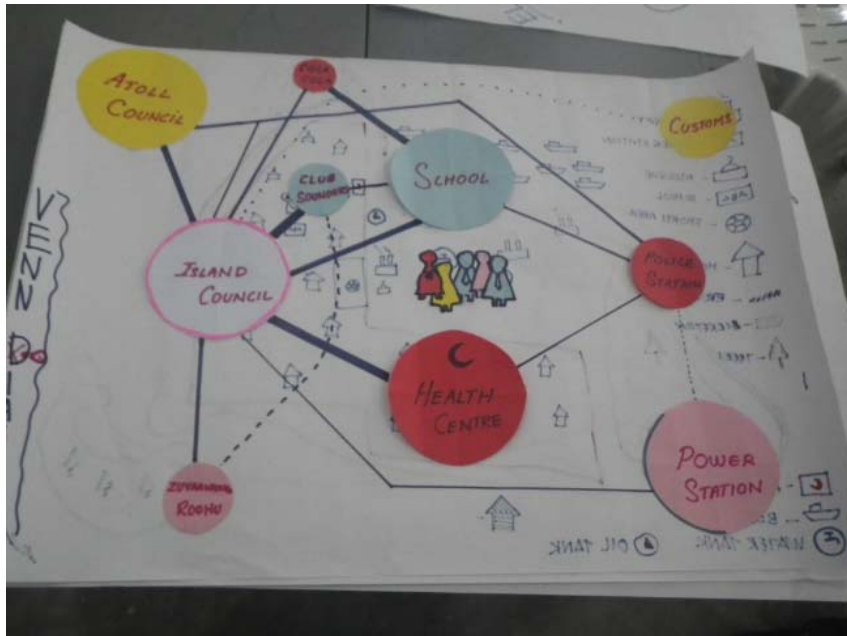


House for relocated people



Factory used to be temporary house

Workshop with local residents in Thulusdhoo



Resource map



Risk map

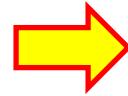


Opportunity map

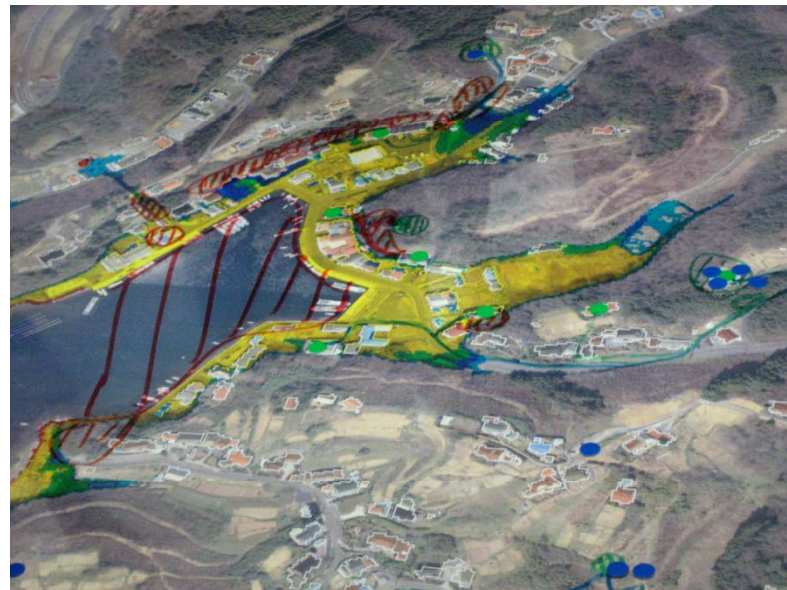
Similar with a workshop in Japan (25/5/2008)



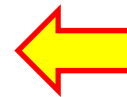
Finding evacuation routes and shelters



Estimating tsunami hazard



Overlaid on the simulated tsunami hazard map



Estimating evacuation time

Conclusions

Nine years after the 2004 Indian Ocean tsunami, some recovery and reconstruction process can still be seen. The government pointed out their target to complete these activities, in other word, zero affected people by the 26th December 2014 or the 10th year memorial day. Male, the capital city is although protected by seawalls and breakwaters which were built before the 2004 tsunami but still vulnerable to future tsunami such as (1) large number of floating debris (motorcycles, cars, boats and containers), (2) narrow evacuation routes which obstructed by many stuff and no sign for tsunami hazard and (3) evacuation information at all.

As conclusions for overall assessment, all sectors we have visited have their own way for managing IDP and DRR. Their ideas on sustainable disaster mitigation are good and similar to other countries that succeed in reconstruction after such great disaster or preparation for future disaster. However, similar problems found which are mostly the logistic as the geography of the country and budget limitation. For the logistic, the situation might be become better if some agreements have made in advance to the generation of disaster could safe response time during emergency. In addition, skilled man power is also still lacking and can be improved by such training cooperate with international experts. At the end, support from the government in terms of laws and regulations will help for the implementation of the plan for managing IDP and DRR for each government institution. Strengthening of disaster prevention at the community level will be one of the most important final goal to create disaster resilience community in sustainable way against future events.

Recommendations

1. Strong legal framework on disaster management is critical need for Maldives as most of the concerned ministries could not speed up their disaster management related interventions due to lack of legal enforcement. At the same time, strong institutional framework can also be set up after the law is enacted.
2. While disaster management is the mandate of the Ministry of Defense and National Security, the Local Governance Authority (LGAs) should be strengthened to tackle with emergencies since they are first responders before the arrival of National Defense force. There needs Community Based Disaster Risk Management programmes to widen local peoples' knowledge.
3. Trainings on Volunteer Fire Fighting of the Ministry of Defense and National Security should be geared up since the islands are dispersed and logistic is the very first challenge for the country.
4. Most of the two or three-storeyed buildings are constructed only in large islands and there is no high buildings to take refuge in case of disaster in small islands. So, it is recommended that the Government should take into considerations on creating safe shelters (Mosque or Community Hall) for small and isolated islands with less population.
5. Scientific risk assessment should be conducted for the most high risk islands with high populations (including tourist population) and with important economic infrastructures. This assessment report should also be applied by policy makers , and decision makers and planners.
6. More human resource should be mobilized in National Disaster Management Centre and other relevant ministries.
7. Maldives National Disaster Risk Management Plan should be developed for comprehensive and long-term sustainable development.

Lessons from the 2011 Japan tsunami

Lessons # 1: Tsutsujigaoka Elementary School

Number of evacuee = 2,500 !! (four times over than the estimation!!)

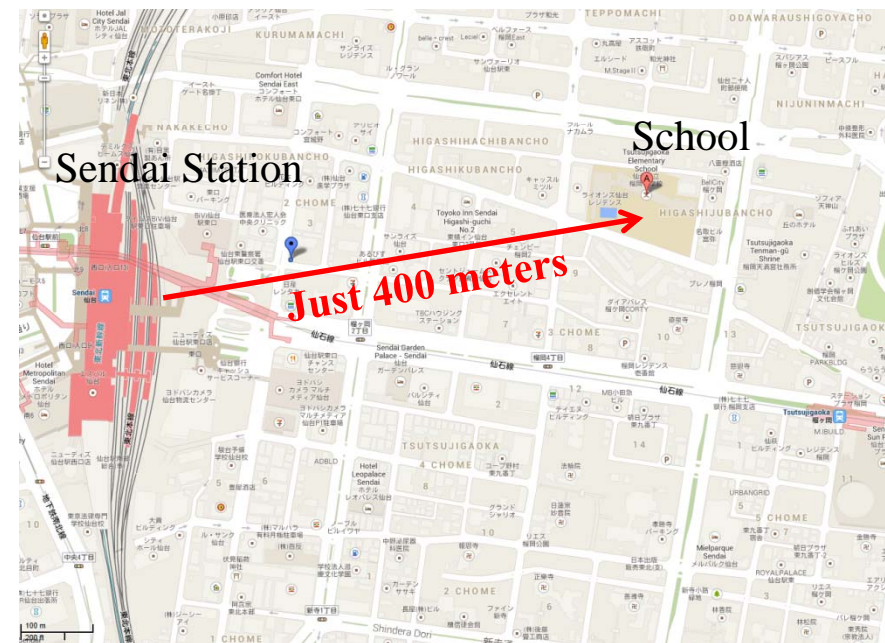
- Sendai station suffered serious damage → Failed to serve as evacuation shelter
- Just 10 min by walk from Sendai station
- Estimated no. of evacuee was only based on the local residence population which was 600
- About 1,200 meals were stored for 600 persons (1 person = 2 meals). After asking from other community, finally got 3,080 meals on the following day
- Most evacuee started leaving the school from 12th night
- The school served as evacuation shelter until 24th March



避難者で埋め尽くされた榴岡小の体育館=3月12日午前、仙台市宮城野区



榴岡小の避難訓練。周辺施設から避難者が殺到した教訓を関係機関がどう生かすかが問われている =5月16日、仙台市宮城野区



Lessons # 2: Unosumai Disaster Prevention Center

One actual disaster differ from million drills

- 34 survived and 128 or more becoming deaths
- Original evacuation places are on the high ground
- The center was newly opened on Feb 2010 and were used as a goal of tsunami evacuation drill on 3rd March 2011 or just 8 days before the event
- Tsunami reached almost the roof of the second floor
- As results, 150-200 residences selected this center as their evacuation destination



<http://www.at-s.com/news/2012/03/07/images/11.jpg>



http://www.chunichi.co.jp/article/earthquake/sonae/20120312/images/PK2012031202100063_size0.jpg

Lessons # 3: Unosumai Elementary and Junior high schools

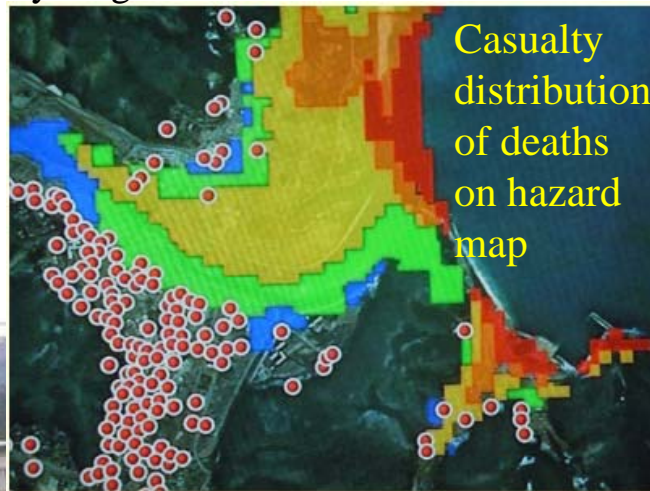
Miracle of Kamaishi...Awareness for expected event

- All nearly 3,000 students survived

Three principles

- First, don't put too much faith in outdated assumptions. "In other words, don't trust hazard maps.
- The second rule of thumb is for people to make their best efforts to deal with the situation. They urged the teachers to keep moving higher, adding that the older kids also remembered to help the younger ones.
- And finally, to take the initiative in any evacuation.

<http://mnj.gov-online.go.jp/kamaishi.html>



<http://insite.typepad.jp/.a/6a0120a6885bf1970b01543336c30e970c-320wi>



http://www.chunichi.co.jp/article/earthquake/sonae/20120312/images/PK2012031202100063_size0.jpg

Lessons # 4: Minami-Sanriku Kanyo Hotel

Hotel built on strong ground served as evacuation shelter



- High awareness due to the 1933 Showa and 1960 Chile tsunamis
- The hotel was built on hard rock foundation -> No damage at all
- Isolated for one week, less support as it was not the designated evacuation area
- The hotel capacity is 240 rooms with maximum 5 person/room
- Out of water supply system for four months but could manage to get water of 80 tons/day (300 tons needed).
- The owner's house also saved many lives as they built higher ground floor and evacuation staircase outside.



Lessons # 5: Unosumi Horaikan Hotel

Last way to survive...evacuation route up hill



- Based on experience of the 1933 Okushiri tsunami (arrived in 2-3 min after the earthquake), the hotel was built as four stories RC building intended to serve as an evacuation shelter in case of emergency for their guests and local resident.
- But still the owner worried about if they only have the building so they also built an evacuation route to a mountain behind.
- The owner once evacuated to the high ground, went down to call out for evacuation. She was in the water for a while but finally survived.
- There were 120 peoples at the beginning and continued until 26th March 2011.

