3-3. Transmitting Image of Disaster Area and Offering Image Analysis Technique

3-3-1. Basic Research on Hazard Map for Glacial Lake Outburst Flood in Bhutan

3-3-1-1. Background

Upon the request of Bhutan, one of the ADRC member countries, with the urgent need to establish countermeasures for Glacial Lake Outburst Flood (GLOF), which could be caused by climate change, the ADRC has planned a project for capacity development on community level. The basic research has been conducted since FY2009. In FY2011, the ADRC made a hazard map of Mo River, and conducted capacity development workshops in Punakha.

Fig. 3-3-1-1 Punakha

3-3-1-2. Activities

3-3-1-2-1. Hazard Map

ADRC made a GLOF hazard map of the Mo River from Gaza area to Punakha by utilizing the imagery of "DAICHI", a space satellite operated by JAXA. The area along the Mo River is affected by flooding of another Po River, which joins the Mo at nearby Punakha Dzong. In consideration of the past flooding of both rivers and the scale of existing glacial lakes, a GLOF hazard map was created by utilizing an inundated area of flooding which occurred in 2009..

ADRC made two types of hazard maps, the one is paper based, and the other is web based. The hazard maps were authorized by the Department of Disaster Management (DDM), Bhutan.

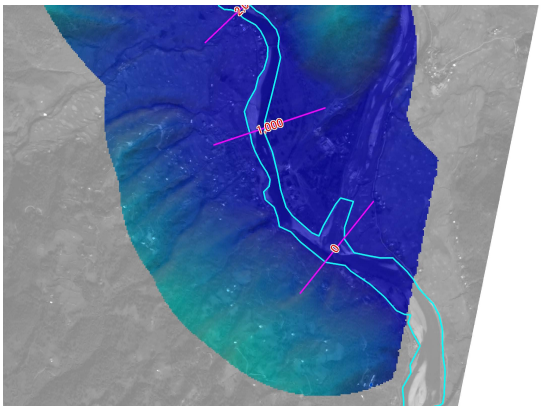

Fig3-3-1-2-1-1 Base map with topographic data by "DAICHI"

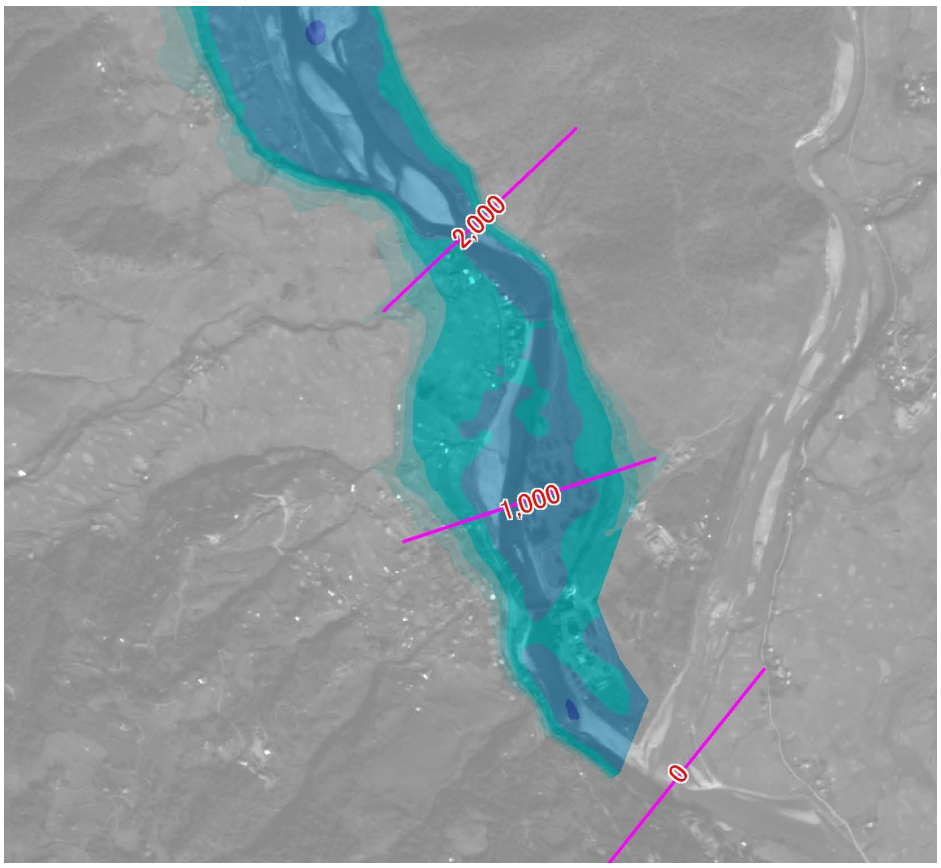

Fig3-3-1-2-1-2 GLOF Hazard map of Mo River (part)

3-3-1-2-2. River Gauge

During the field survey in FY2010, the ADRC considered to set up some river level observation stations along Mo River. The ADRC prepared a manual for making and operating river gauges and provided it to KHURUTHANG INSTITUTE OF ELECTRICAL ENGINEERING at Punakha to facilitate manufacturing, installing and operating simple river gauges at the school.

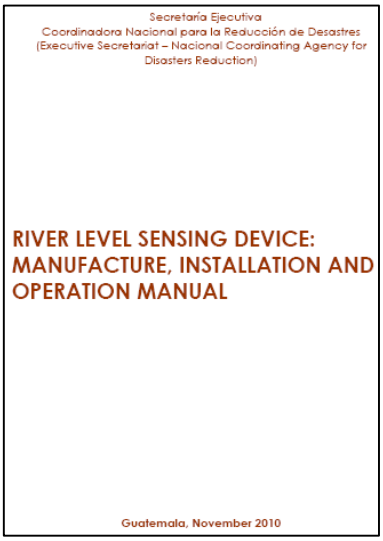

Fig3-3-1-2-2-1 River gauge making manual

Fig3-3-1-2-2-2 Image of a river gauge

3-3-1-2-3. Disaster Management Workshop

ADRC conducted the Disaster Management Workshop on 24-25 Feb. 2012 at Punakha in collaboration withDepartment of Disaster Management (DDM) Bhutan, Punakha District, and the Plus Arts (a Japanese NPO).

3-3-1-2-3-1. Disaster Prevention Education

On 24 Feb., 20 students of KHURUTHANG INSTITUTE OF ELECTRICAL ENGINEERING participated in the disaster prevention class.

Fig3-3-1-2-3-1-1 Students of KHURUTHANG INSTITUTE OF ELECTRICAL ENGINEERING

The ADRC made following lectures with video and PowerPoint presentations.

- Video of the Great East Earthquake: Bhutan has no sea, but everyone is interested in the phenomenon because the King visited tsunami affected area in the autumn of 2011. Therefore ADRC explained the damages and current situations at the affected areas briefly.
- Mechanism of Occurring Earthquake: 12 persons were killed by an earthquake in eastern part of Bhutan in 2009, but the students do not have enough knowledge about earthquakes. The ADRC introduced the mechanism of earthquakes and methods for preparedness.
- Mechanism of GLOF: A GLOF occurred at Po River in 1994, but young students have no experience and knowledge of GLOFs. The ADRC introduced the mechanism of GLOF occurrence, affection of global climate changes, and how to prepare for flooding.
- Early Warning System (EWS) by utilizing river gauges: Simple river gauges are composed of parts which can be acquired even in developing countries with basic knowledge of soldering and electrical engineering. The ADRC introduced the river gauges and linkage to EWS.
- Iza! Kaeru Caravan: It is a set of disaster risk management training tools and methods developed by Plus Arts with consideration from experiences of the Great Hanshin-Awaji Earthquake in 1995. Mr. Nagata, head of Plus Arts, made a presentation on the use of "Iza! Kaeru Caravan" tool for disaster education.

At the end of the morning session, ADRC handed over the River Gauge Making Manual and "BOKOMI guide book" made by Kobe city government for further activities in this school.

Fig3-3-1-2-3-1-2 Handing over manuals

Followed by a demonstration of "Iza! Kaeru Caravan" in the afternoon, the students were divided into seven groups for each activity, and practiced for a disaster drill to be held at a local junior high school on the next day.

The students' interest in disaster education were very high. They took notes during lectures in the morning, and participated with high concentration to the demonstration of "Iza! Kaeru Caravan". This educational activity was effective to understand the prepardness for the earthquake.

Fig3-3-1-2-3-1-3 Students during lectures

Fig3-3-1-2-3-1-4 Practices in earnest

3-3-1-2-3-2. Disaster Drill for Younger Children

According to the request from principal of a local school in Punakha, ADRC made the same lectures as Feb. 24th to 100 junior high students. Mr. Norbu, ex-trainee of JICA comprehensive disaster management course of 2009 conducted by ADRC, arranged this disaster education and drill.

Fig3-3-1-2-3-2-1 Address by Mr. Norbu

Fig3-3-1-2-3-2-2 Lecturein junior high school

After one hour lecture, “Iza! Kaeru Caravan” workshop was held in the schoolyard facilitated by students who participated on the previous day. Approximately 250 students including primary school children participated the workshop.

Fig3-3-1-2-3-2-3 schoolyard

Fig3-3-1-2-3-2-4 First Aid

Fig3-3-1-2-3-2-5 Bucket bridge

Fig3-3-1-2-3-2-6 Card game for emergency situation

Fig3-3-1-2-3-2-7 Blanket stretcher

Fig3-3-1-2-3-2-8 Paper dish

Fig3-3-1-2-3-2-9 Jack up

fig3-3-1-2-3-2-10 Emergency kits quiz

3-3-1-2-3-3. Conclusion

- Elder students performed goodfacilitation on the workshop. This “upperclassman teaches underclassman” style was effective in disaster education.
- Principal of junior high school said this kind of disaster education was the first time, and she would like to continue this activity.
- The local officer in charge of disaster education expressed that he would like to conduct this activity “learning with fun” in all Punakha area.
- DDM also admitted that they would also like to conduct this activity not only in Punakha area but all around Bhutan. ADRC and Plus Arts provided most of the materials to DDM, and asked further promotion of this activity and submission of the reports for their implementations.

3-3-2. Technical Advisory Mission (TAM) in Bangladesh

The ADRC participated in Technical Advisory Mission (TAM) in Bangladesh from 19 to 23 June 2011 coordinated by United Nations Platform for Space-based Information for Disaster Management and Emergency Response(UN-SPIDER) and Disaster Management Bureau (DMB) of Bangladesh. The key objectives of the mission include: to assess national capacity and evaluate disaster and risk reduction activities, policies and plans with regard to the use of space-based technologies, and; to facilitate access of national institutions to space-based information to support full cycle of disaster management. The mission team comprised 8 experts from UN-SPIDER, National Disaster Response Coordination Centre (NDRCC)of Bangladesh, United Nations Office for the Coordination of Humanitarian Affairs(UNOCHA), ADRC, Centre for

Space Science and Technology Education in Asia and the Pacific(CSSTEAP), Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) and Asia-Pacific Space Cooperation Organization(APSCO).

The mission team visited twelve key stakeholders, namely DMB, Directorate of Relief and Rehabilitation (DRR), Centre for Environmental and Geographic Information Services (CEGIS), Bangladesh Meteorological Department (BMD), Space Research and Remote Sensing Organisation (SPARSO), Comprehensive Disaster Management Programme (CDMP), Survey of Bangladesh (SOB), Cyclone Preparedness Programme (CPP), Institute of Water Management (IWM), Flood Forecasting and Warning Centre (FFWC), Bangladesh Telecommunication Regulatory Commission (BTRC) and Early Recovery Facility (ERF) of UNDP. The mission team met the heads and senior members of the organizations/departments and had an opportunity to have a fruitful discussion. In addition, one day workshop was organized by the TAM along with relevant organizations of Bangladesh. On the last day, a wrap-up meeting with key stakeholders was organized where outcomes of the TAM and follow-up actions were discussed. The wrap-up meeting ensured that recommendations of the mission team and outcomes of all stakeholders were shared.

Fig. 3-3-2-1-1 TAM workshop

3-3-3. Emergency Observation

From April 2011 to March 2012, 37 emergency observation requests were received and 20 emergency observations were performed. Table 3-3-3-1 provides details of the emergency observations performed during this period. When emergency requests are received, ADRC's emergency request administrator decides whether the request is appropriate and whether the observation will be performed.

Table 3-3-3-1 Emergency observation

	Country	Region	Type	Date
1	Kazakhstan	West Kazakhstan	Flood	2011/4/11
2	India	Tawang, Arunachal Pradesh	Other	2011/4/30
3	Indonesia	Garut, West Java	Flash Flood	2011/5/7
4	Kyrgyzstan	Bishkek-Osh highway	Land slide	2011/5/12
5	Tajikisitan	Northern part of Tajikistan	Flash Flood	2011/6/12
6	Kazakhstan	in the mountains near the Almaty	Tornado	2011/5/17
7	Nepal	Eastern part of Nepal	Flood	2011/7/1
8	Mongolia	Northwest part of Mongolia	Flood	2011/6/20
9	Nepal	Wide area of Nepal	Flood	2011/7/16
10	India	Wide area of India	Flood	2011/7/18
11	Kyrgyzstan	Near the border of Uzbekistan	Earthquake	2011/7/20
12	Philippines	Eastern areas of Luzon island	Flash Flood	2011/7/26
13	Japan	Sanjo-city,Niigata Prefecture	Flood	2011/7/29
14	China	Wenchuan Earthquake affected area	Mudslide	2011/8/1
15	Taiwan	Eastern areas of Taiwan	Tyhoon	2011/8/29
16	Japan	Kumanogawa-cho. Wakayama Pre.	Flood	2011/9/3
17	Pakistan	Sindh province	Flood	2011/9/15
18	India, Nepal	Northern area of India, Nepal	Earthquake	2011/9/18
19	Japan	Gifu Prefecture	Flood	2011/9/21
20	Philippines	Center-north of Luzon island, Isabela-Aurora area	Flood	2011/9/28
21	Vietnam	Mekong delta, and Central Vietnam	Flood	2011/10/4
22	Thailand	North and central area	Flood	2011/8

23	Cambodia	Mekong river and Tonlé Sap lake	Flood	2011/8
24	Myanmar	Magway Region	Flood	2011/10/21
25	Vietnam	provinces of Quang Binh, Hue, Quang Nam	Flood	2011/11/6
26	Kyrgyzstan	Bishkek-Osh High way	Snow Avalanches	2011/11/24
27	Brunei	Tutong District	Flood	2011/12/3
28	Indonesia	Mt.Gamalama in North Maluku province	Volcanic Eruption	2011/12/11
29	Philippines	Northern Mindanao around Cagayan de Oro City	Flood, Flash Flood	2011/12/16
30	China	Hong Kong	Forest Fire	2011/12/29
31	Brunei	Coastal water of Seria to Belait	Oil spill	2011/12/29
32	Fiji	Provinces of Ba and Nadroga	Flood	2012/1/22
33	Papua New Guinea	mountainous Highlands region	Land slide	2012/1/24
34	Philippines	Negros Oriental	Earthquake	2012/2/6
35	Bhutan	Lhuntse District	Wildfire	2012/2/19
36	Kazakhstan	South Kazakhstan	Flood	2012/3/1
37	Kyrgyzstan	Kazarman	Flood	2012/3/27