3-4. Sharing Risk Information of Natural Disaster by Using Satellite Image

3-4-1. Basic Research on Hazard Map for Glacial Lake Outburst Flood in Bhutan

3-4-1-1. 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 planned a project for capacity development on community level. As a feasibility study for the project, the ADRC has been implementing basic research since FY2009. In FY2010, the basic study to make hazard map of GLOF in Bhutan was conducted.

3-4-1-2. Survey

(1) MOU

The ADRC visited Bhutan in August 2010, and had a series of meetings with the Department of Disaster Management (DDM), the Department of Geology and Mines (DGM), the Department of Energy (DOE), and the Japan International Cooperation Agency (JICA), which had already begun work on another GLOF project. The ADRC also visited Punakha province, the prospective project site, exchanged views with the provincial governor and school principals, and toured the DOE's early warning center. The situations in the province were described as follows:

- GLOF occurred along the Po River in 1994, and the UNDP was already conducting a GLOF project on the Po River.
- Five glacial lakes in the upstream regions of the Mo River were identified as being at risk of GLOF flooding. But their risk level was low and constant monitoring in those areas would be difficult.
- Due to a lack of data, it was difficult to estimate the river water levels that would result from GLOF flooding.

After careful consideration of the situations, the ADRC and DDM finally agreed on a two-year cooperative project, which would:

- Focus on the Mo River, which flooded in 2009.
- Install community-based river level gauges, and develop an early warning system.
- Create a map with elevation data in the upstream areas of the Mo River.
- Create a hazard map based on past flood records in Punakha
- Conduct disaster education and training among local residents.

(2) Field Survey

The ADRC have conducted field survey two times on Punakha and Mo Rivers in August and December 2010 respectively. At first, the ADRC visited Punaka-zong area to collect information concerning past floods, a GLOF at Po River in 1994 and flood at Mo River in 2009. It was found that the water level of the Mo River in the case of 2009 was higher than an expected water level in 1994. Also the sizes of glacial lakes in the upstream Mo River were smaller than the ones of Po river. Therefore, it was decided that a GLOF hazard map would be made by utilizing a flooding area in 2009 as reference.

Fig.3-4-1-1 Punakha zong before flood

Fig.3-4-1-2 GLOF on Po river in 1994 (Copyright ICIMOD)

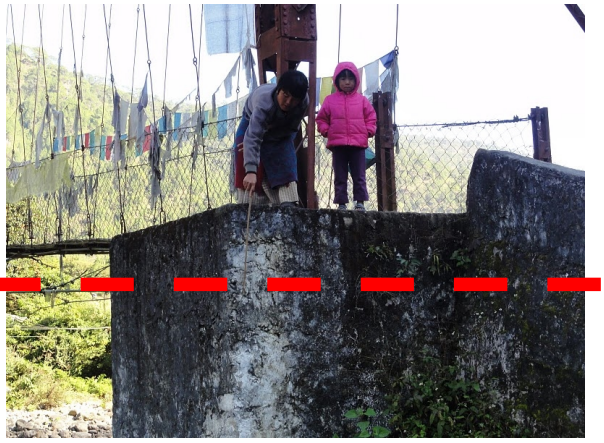

Fig.3-4-1-3 Local resident indicates the flood level in 2009

(3) Considerations for FY2011

The water level monitoring sites will be decided after discussion at a workshop to be held in 2011 to set up river gauges.

The ADRC will also create a GLOF hazard map of the Mo River by utilizing the imagery of "DAICHI", a space satellite operated by JAXA. This hazard map will be modified at the workshop by related organizations

3-4-2. Transmitting Images of Disaster-Stricken Area and Providing Lessons in Image Analysis Techniques

(1) Emergency observation

From April 2010 to March 2011, 39 emergency observation requests were received and 20 emergency observations were performed. Table 3-4-2-1 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 3-4-2-1 Emergency observation

	Country	Region	Type	Date
1	Nepal	Chitwan	Forest Fire	2010/4/4
2	Tajikisitan	Vose District	Flood	2010/4/12
3	Taiwan	Keelung	Land slide	2010/4/25
4	Tajikisitan	Vose District	Flood	2010/5/7
5	Sri Lanka	Districts of Gampaha, Colombo and Kalutara	Flood	2010/5/18
6	Bangladesh	Cox's Bazar	Land Slide	2010/6/15
7	Vietnam	Ha Tinh province, Hai phong	Typhoon	2010/7/15
8	Bhutan	Chukha Dzongkhag	Flood	2010/7/23
9	India	Assam	Flood	2010/7/24
10	Indonesia	Tanah Bumbu	Flood	2010/7/26
11	Pakistan	North Western Pakistan	Flood	2010/7/30
12	China	Zhouqu, Gansu	Land Slide	2010/8/8
13	Indonesia	Mt Karangetang in Sitaro Islands district	Volcanic Eruption	2010/8/10
14	Vietnam	Quang Tri ,QuangNgai	Flood	2010/8/24
15	Indonesia	Mt. Sinabung in the Karodistrict of North Sumatra province	Volcanic Eruption	2010/8/29
16	India	Northern India	Flash Flood	2010/9/17
17	Indonesia	Wasior district in West Papua province	Flood	2010/10/4
18	Cambodia	Pursat Province	Flood	2010/10/14
19	Vietnam	Nghe An, Thua Thien , Hue	Flood	2010/10/16
20	Cambodia	Poipet city	Flood	2010/10/15
21	Thailand	Nakhon Ratchasima	Flood	2010/10/16
22	Philippines	Isabela	Typhoon	2010/10/18
23	Japan	Amami oshima Island	Flood	2010/10/20

24	Taiwan	Suao	Flash flood	2010/10/22
25	Indonesia	Mentawai island	Tsunami	2010/10/25
26	Indonesia	Mt. Merapi	Volcanic Eruption	2010/10/26
27	Vietnam	Phu Yen, Khanh Hoa, Ninh Thuan	Flood	2010/10/31
28	Vietnam	Thua Thien Hue, Da Nang, Quang Nam, Quang Ngai	Flood	2010/11/17
29	Vietnam	Central Vietnam	Flood	2010/11/28
30	Sri Lanka	Sri Lankan whole area	Flood	2010/12/10
31	Australia	Queensland	Flood	2011/1/3
32	Sri Lanka	East part of Sri Lanka	Flood	2011/1/11
33	Brunei	Tutona	Flood	2011/1/21
34	Sri Lanka	North, North Central and Eastern provinces	Flood	2011/2/3
35	Philippines	Visayas and Mindanao	Flood	2011/2/3
36	NewZealand	Christchurch	Earthquake	2011/2/22
37	Japan	East part of Honsyu Island	Earthquake	2011/3/11
38	Myanmar	Northern part of Myanmar, Near the border of China	Earthquake	2011/3/24
39	Thailand	Nakornsritammarat	Flood	2011/3/26

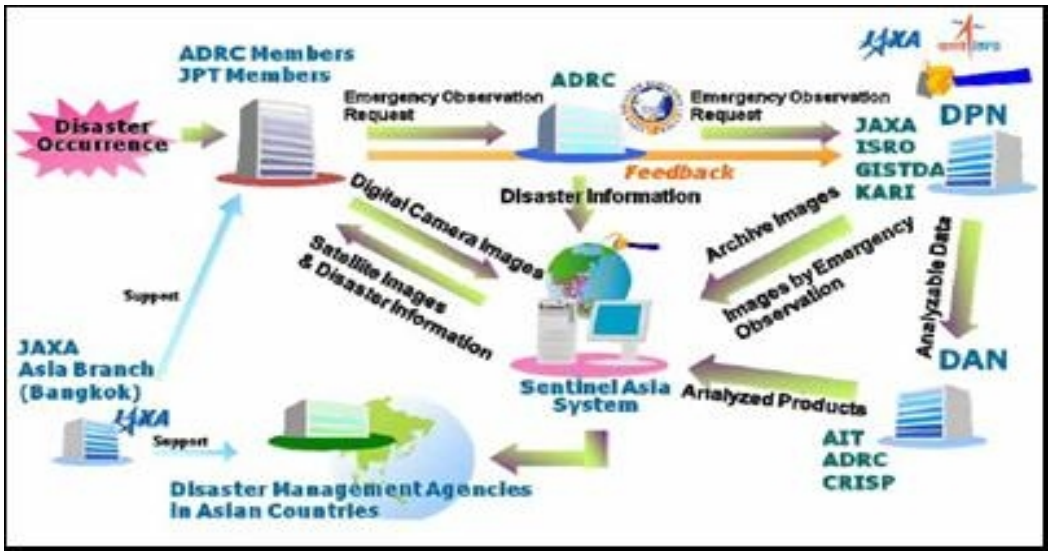

Figure 3-4-2-1 flow of the emergency observation request

(2) Seminar and International Conference on Sentinel Asia

Sentinel ASIA Joint Project Meeting (JPTM) was held in Manila, the Philippines on 5-8 July 2010. It was organized jointly by Japan Aerospace Exploration Agency (JAXA), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and Department of Science Technology (DOST), Gov. of the Philippines. 71 people from 22 countries (36 organizations) and 5 international organizations participated in the meeting.

The ADRC functions as a single window to receive emergency observation request for their screening and onward transmission to space agencies in the framework of Sentinel ASIA. At the meeting, ADRC reported the status of the emergency observations which were implemented last year, the results of survey on how provided satellite data was utilized in each country, and the current situation of the ADRC GLOF project. The themes of discussion in this meeting are as follows:

- Progress of Sentinel Asia step2
- Current situation of each JPT member
- Activities of Forest fire Working Group
- Activities of Flood Working Group
- Activities of Glacier Lake Outburst Flood (GLOF) Working Group
- Collaboration with Sentinel Asia and International Disaster Charter

The ADRC will continue to promote the use of satellite data for disaster risk reduction in Asia in cooperation with Sentinel Asia secretariat.

Figure 3-4-2-2 Group Photo