3

the workshop sessions

Twenty-four presentation were given in eight sessions.

Session One

Binayak Bhadra, Director of Programmes and Deputy Director General of ICIMOD chaired the first session.

1. *How floods in Bangladesh have affected land, lives, livelihoods, and the economy since times past*

As a country of rivers, floods that affect up to 68% of the land area are common in Bangladesh. Since 1954, some 7,700 people have died as a result of flooding and the country has suffered economic losses of US$ 14,250 million. Bangladesh has developed an institutional set up for coordination between all ministries involved to manage disasters. Based on past experiences, strategies have been developed to control floods, on encroachment, for information on warning systems, on advanced technology for sedimentation, and for developing a clear policy for infrastructure development. Since the cause of floods is not contained within the country, the importance of cooperation with India and Nepal is well recognised. *(Mohsina Yasmin)*

2. *Flood and disaster reduction in China*

An example was given of the 'Big Flood' in Yangtze in 1998 that killed 5,511 people and damaged property worth 300 billion Yuan (US$ 36.6 billion). Between 1989 and 1999, floods in China have caused damage annually equivalent to 3.8% of GNP. China has since developed advanced technologies to monitor and give early warnings to prevent and reduce damage with the aim of reducing losses from 4% GNP this year to 0.5 % GNP in 100 years time. *(Wang Angsheng)*

3. *Newly emerging flash flood disasters in Thailand*

A case study was highlighted of a flash flood in Phetchabun Province on 11 August, 2001. A flash flood lasting only one hour killed 131 people, affected 1,749 families, and damaged 13,171 ha of land. The flash flood resulted from landslides that occurred 20 km away. This situation is uncommon in Thailand and caught out the communities who were unprepared to cope with the disaster. The Asian Disaster Preparedness Centre (ADPC), established to assess causes of landslides and floods and devise rescue operation plans, was called in to provide advice and collect information. Lessons learned from this disaster include the needs for flood forecasting and early warning systems, for multi-agency cooperation, and for integrated watershed management concepts along with land use planning. The focus should be on preparedness and mitigation rather than search and rescue. *(Apichai Thirathon)*

Summary

The Chair noted three important aspects that emerged from the presentations and discussion:

a) Disaster forecasting and mitigation help people to cope better with floods.
b) Building infrastructures can backfire if standards for infrastructures are not reviewed to control damage.
c) Irrespective of preparation, disasters take place. Generalised systems do not help for heterogeneous mountain regions. Intense precipitations are very new and not well understood by science. These are key areas for research in the future.

Session Two

Wang Angsheng, Director of the Center for Disaster Reduction, Chinese Academy of Sciences, China, chaired the second session.

4. Flood risk assessment and flash floods in Yunnan Province, China

A detailed account was given of the methodology used for flood hazard and risk mapping using GIS to integrate and analyse large amounts of disparate information and provide an output map that delineates flood risks. In this way potentially vulnerable areas can be identified that should be avoided for habitation and risks can be taken into account during construction planning. This method of flood risk assessment is a valuable tool for planners and engineers involved in regional planning and construction. (*Zhu Jing)*

5. Causes, consequences, and management of flash floods in the Indian Himalayas with special reference to Uttaranchal

In almost every monsoon season, there are incidents of flash floods in the Indian Himalayas resulting from blockage of river channels by debris flows or landslides, creation of a landslide dammed lake, and subsequent breaching of the unstable natural dam and outburst of the trapped water. Glacial lake outburst floods, which have a similar etiology, are also more likely to occur during the monsoon season. Dams often breach as a result of a sudden massive increase in water following a cloudburst, and a heavy cloudburst can result in sudden flooding of vulnerable areas even without the added affect of a dam burst. Increasing population has led to an increase of settlement and agriculture in previously avoided flash flood and cloudburst flood prone areas. It is necessary both to increase understanding of the triggering factors and potential for landslides and floods, to use techniques of mountain risk engineering to reduce the hazards, to enforce restrictions on settlement in such areas to reduce risks, and to develop early warning systems, with a particular focus on the transboundary situation. *(Varun Joshi)*

6. Flood hazard and risk mapping in selected VDCs in the Terai region of Nepal

To some extent, this presentation paralleled that of Zhu Jing on China. Floods, riverbank cutting, river shifting, and siltation are common natural hazards in the low-lying Terai region of Nepal. Losses and damage are increasing as a result of rapid population growth with resultant encroachment into hazard prone areas, rapid growth in infrastructures, and the increasing sediment load resulting from increased erosion in the hills. A GIS approach was used to organise data and create flood (and

flood-related) hazard and risk maps. The maps prepared using the GIS approach fitted well with the social hazard maps prepared by local people. This method can be used to identify hazard prone areas and to quantify the elements at risk to different magnitudes of hazard in the Terai region. (*Moti Lal Ghimire*)

Summary

All three speakers emphasised the need for database awareness, bioengineering, and warning and zoning systems. GIS was an appropriate tool for developing flood hazard and risk maps. Risk is essentially the hazard (likelihood of an event occurring) multiplied by the amount of damage that the event would do (to people, utilities, farms, and so on). Even where hazards cannot be reduced, the risks can be considerably reduced by ensuring that people, buildings, and utilities are not located in vulnerable areas. The papers indicated that GIS are increasingly used as tools to organise databases and predict risks in the region.

Session Three

The third session was chaired by Meen B.P. Chhetri, Director of Narcotics Control and Disaster Management, Ministry of Home Affairs, Nepal.

7. Flood forecasting and warning system in the Philippines

Flood and its attendant hazards is one of the most severe, widespread, and destructive hydrological hazards in the Philippines. Floods, which in earlier days were part of a natural adjustment of the river system, are now major disasters because of increased settlement and activities in the floodplain. The presentation gave insights into the reorientation in approach of the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA). This has involved a move away from the structural approach used prior to 1990, to the non-structural awareness-oriented community-based flood forecasting and warning system employed since 1997. Through various training programmes for different people, including children through school curricula, and developing coordination among all agencies of the government and media, PAGASA has managed to prepare communities to deal with floods cost effectively. The importance in working with rivers rather than controlling rivers, to use a quote from Water Resources International, was emphasised. One way forward is to reduce damage by using non-structural approaches to keep people away from water rather than a structural approach to keep water away from people. *(Susan Ramos Espinueva)*

8. Developing a framework for regional cooperation in flood forecasting

An update was presented on the magnitude of flood damage and its impact in the HKH region, and the efforts being made towards regional cooperation in flood forecasting and information sharing. An action plan was developed at a high level meeting in May 2001 organised by ICIMOD and the World Meteorological Organization (WMO) and cohosted by the Department of Hydrology and Meteorology, HMG. Several international agencies will support the efforts to ensure continuous dialogue among the countries of the HKH to build trust. The aim is to be able to access updated information and real time hydrological and meteorological data on floods and for flood forecasting from a regional website. *(Mandira Shrestha)*

9. Failures of natural dams in Pakistan

The presentation summarised the historical records of natural dams blocking the Indus river, the greatest river of Pakistan, or its tributaries during the last 200 years. In most cases the dams were formed by advancement of glaciers (ice dams) but on a few occasions major landslides or debris flows have also formed large dams across the river. Some dams drained naturally, while others burst abruptly generating catastrophic floods down stream. There have been fewer events since 1935, thought to reflect the general recession of glaciers in the region. There is an urgent need for hazard assessment maps of the northern areas of Pakistan, for a monitoring system for glacier advancement and glacial lakes, and for assessment of the potential impacts of such events if large dams are constructed upstream of the Tarbela dam. *(Basit Masud)*

10. Water-induced disasters and countermeasures in Nepal

Floods, landslides, and avalanches are responsible for most of the property loss and a proportion of the deaths resulting from disasters in Nepal. The Disaster Mitigation Support Programme Project (DMSP) of JICA in Nepal is looking at a variety of countermeasures for water-induced disasters including raising awareness through education, street drama, seminars, and advocacy; mitigating disasters through low-cost technology, plantations, and river training with involvement of communities; preparing for flood disasters through the use of information technology and GIS; and disaster and emergency rehabilitation work. *(Koji Kamee)*

Summary

The Chair noted Nepal's efforts in flood forecasting and mitigation to reduce loss of life and property, which so far had only been possible in the case of Tsho Rolpa. He stressed the need for regional cooperation in flood forecasting to control damage across the region. However, high-level commitment is required at the political level, going beyond the act of seminars.

Session Four

The fourth session was chaired by Apichai Thirathon of the Asian Disaster Preparedness Center (ADPC).

11. International cooperation for disaster reduction: the Asian Disaster Reduction Center

The ADRC was established in 1998 in Japan following the Great Hanshin Awaji Earthquake in Kobe in 1995. There are 23 member countries, all of whom benefit from research and information sharing, capacity building, and cooperation in the field of disaster reduction. Activities have included a training programme in Nepal. ADRC has also established a website designed to serve as a clearing-house for anyone seeking information on disaster reduction. *(Satoru Nishikawa)*

12. Glacial lake outburst floods and infrastructure development in Nepal

The presentation highlighted GLOF events with insights into six well-studied cases in Nepal: Lower Barun, Imja, Thulagi, Tam Pokhari, Dig Tsho, and Tsho Rolpa. These case studies gave a clear idea of the magnitude of damage that GLOFs are likely to create in the HKH region in the future, as their number increases in the wake of global warming. The need for caution with large infrastructure projects in the region was also stressed.

Recently an 'Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Floods in Nepal and Bhutan' was prepared and published in two volumes. GIS mapping and analyses were used to identify the potentially dangerous glacial lakes in the two countries. The books describe what needs to be done to minimise risks – for example lowering the lake levels before outbursts occur. *(Pradeep Mool)*

Session Five

The fifth session was chaired by Basit Masud, Principle Geologist of National Engineering Services, Pakistan.

13. Mechanisms of rapid landslide motion

Rapid long run-out landslides can be precipitated by various events including earthquakes and heavy rainfall. Detailed understanding of the mechanisms is still limited. The presentation highlighted results obtained using long-span extensometers and GPS to monitor two potential rapid motion landslides, at Lishan in China and Machupicchu Citadel in Peru. In Lishan electronic extensometer sensors are wired to a PC inside a tunnel at the toe of the slope. Data acquired by the PC is transmitted to the Lishan Landslide Monitoring Station through a telephone line. These sites were studied with UNESCO/IUGS as part of an approach to prevent landslides at cultural heritage sites. The application of realtime kinematic GPS to landslide monitoring, being tested in Japan, was also explained. The proposal is to use quick RTK-GPS surveys for periodic mass monitoring of slope stability at sites at risk. *(Hiroshi Fukuoka)*

14. Natural dam created by a rapid landslide, flash flood from the dam failure, and mitigation of impact in Tibet, China

In spring 2000, due to a rapid melting of snow and ice in upper Zhamulongma watershed, 200 million cubic metres of debris slid a distance of 8 km at high speed, to form a natural dam, and subsequent lake, in the valley of the Yigong river. Upstream and downstream flooding threatened thousands of inhabitants and vast areas of farmland. Six hydrological observation stations were established to monitor discharge of the stream flow into the dam-lake. Information gained enabled the creation of a risk mitigation plan that included evacuation of all residents in the potential flooding areas, hydrological observation, and slope instability analysis downstream. Under great time pressure, a ditch 24m deep was dug through the lowest position of the dam to mitigate flooding. Outflow was still less than inflow, however, and the same month the dam was breached following partial collapse of the ditch, resulting in a high-speed flash flood 50m high which reached Medong 200 km downstream in 3.5 hours, and created new landslides and destroyed many bridges. As a result of the previous mitigation measures, there were no deaths in China. However, In Arunachal Pradesh in India over 50,000 people were rendered homeless by the flash flood, with 30 deaths reported, and a huge economic loss. This event highlights the pressing need for inter-country flooding warning systems and for developing a mechanism for sharing the costs and benefits of mitigation measures. (*Li Tianchi*)

Summary

The discussions highlighted the necessity of using a highland-lowland interactive system approach in the region. Disasters act as eye-openers for decision makers and help them

realise the need for collaborating with other countries in the region. The joining together of UNDP and ICIMOD in disaster mitigation work has been very important and is an example of the recent positive change.

Session Six

The sixth session, on Community Managed Disaster Mitigation, was chaired by Suresh R. Chalise, Senior Advisor of ICIMOD.

15. Hazard and risk mapping

It is estimated that between 1983 and 2000, landslides in Nepal resulted in 5,800 deaths, with an annual loss of property worth 20% of GDP. Two methods for GIS based landslide hazard and risk mapping were tested in the first phase of the PDM programme: a bivariate statistical (landslide index) method and a modified Mountain Risk Engineering (MRE) method (expert-based rating method). Areas in four districts were selected for testing. The bivariate statistical method was found to be more representative than the modified Mountain Risk Engineering (MRE) method in terms of observed landslide distribution, but there were some limitations as there was insufficient information available to include all the parameters recommended in the MREH. The maps can be used to identify areas with a different degree of hazard, at least at the pre feasibility level, and to lay the basis for preparation of disaster preparedness plans. Hazard and risk mapping is necessary so that resources for mitigation can be effectively utilised; they can be used as a guideline for land-use and mitigation measures. *(Rajesh Thapa)*

16. Capacity building of community institutions to prepare for hazard management

One of the major components of the PDMP is to develop the institutional capacity of local communities to incorporate disaster management. The paper highlighted the challenges of capacity building of community institutions to prepare for hazard management. The entry point should be awareness raising and social mobilisation. Under the PDMP, men and women in selected communities are participating in needs assessment, programme design, implementation, and monitoring. Communities are very willing to participate in activities as hazards affect their lives seriously. Local participation contributes more than half of all project costs. The challenge is to convince communities of the need for institutional development, not just infrastructure, and to overcome the fact that in general post disaster activities are more attractive and publicised than pre-disaster mitigation measures. Effective disaster management requires good understanding of local knowledge, institutions, and social dynamics, but activities based on indigenous knowledge, local materials and limited local resources alone are not adequate. *(Man Bahadur Thapa)*

17. Community development and disaster management

The paper gave insights into the institutionalisation of a disaster management system and community development processes in one community in Nepal, with local government, line agencies, NGOs, and JICA contributing their expertise. The purpose was to develop a model village community-based disaster management system that would ensure safer livelihoods and reduce poverty in the village. Disaster management is combined with natural resource management, community development, infrastructure for the prevention of landslides, and income generation.

(Bishnu D. Shrestha)

Summary

The papers clearly showed that in Nepal disaster management could be very successful when the principles of community-led development, transparency, empowerment, gender sensitivity, coordination with all stakeholders, sustainability, and socioeconomic self-reliance are adopted. This approach should be replicated elsewhere in the region.

Session Seven

The seventh session was chaired by Satoru Nishikawa, Deputy Executive Director, Asian Disaster Reduction Centre (ADRC), Japan.

18. Indigenous knowledge of disaster management

There is a rich pool of indigenous knowledge on landslides and flooding and measures for mitigation among communities in Nepal. However the pool of knowledge is eroding and is being replaced with borrowed outside knowledge and expertise that is imposed on communities. Indigenous knowledge on mitigating landslides includes early warning signs, agro-forestry, fencing, terracing, and mixed and intercropping methods. Indigenous measures to mitigate flooding include housing location and construction measures, river bank strengthening, afforestation, and construction of ponds to collect water during the rainy season. Indigenous knowledge needs to be re-evaluated for and incorporated into disaster management and mitigation. It should be combined with rather than replaced by modern scientific knowledge and hi-tech solutions. *(Youba Raj Luintel)*

19. Disaster and development: a gender perspective

The paper highlighted the efforts of the PDMP in addressing issues related to gender in disaster management, and the role of women in coping with disasters. A study in four districts showed that women bear a larger amount of pain and suffering during and after any disaster. In the project areas women contribute significantly to the mitigation measures, often contributing more than men, and in some cases have assumed a leadership role and coordinated community mobilisation. Many women were very aware of the overall development needs of their communities and pointed out the need to integrate community development with disaster mitigation, but overall they had a greater need for input as a result of their lower literacy and awareness levels. The positive impacts shown by raising the awareness of women as well as men through training and exposure, and involving women in decision-making, clearly indicate that there is a great need to focus support on women as well as men. Women's active and full participation in disaster management in Nepal will be crucial for its success. *(Man B. Thapa)*

20. Disaster management strategies of the Government of Nepal

A detailed presentation was given of the Government of Nepal's institutional set up, and its role and the problems it faces in coping with disasters and rehabilitation work in Nepal. Policies and programmes related to natural disaster relief work are formulated and implemented through the Central Disaster Relief Committee, its sub-committees, and its District and Local Committees. The problem is a complex one

and requires a concrete, effective, practicable, and proactive policy. During crisis periods, local people help themselves before government can respond, thus the most pressing need is for political commitment, and effective and efficient policy implementation. Enhancing public awareness for disaster reduction and people's response capacity is of vital importance to achieve goals. (*Meen B. P. Chhetri)*

21. Causes, impacts and mitigation measures for floods

Every year Nepal experiences floods of varying magnitude during the monsoon season. This is a natural phenomenon, but increasingly the situation is exacerbated by development activities, changing land use, improper land use practices, and ad hoc river control works that fail to look at the larger picture. At the same time, the risk to lives and property is increasing as more people and structures are located in vulnerable areas. Socio-economic factors contribute in a variety of ways to flood vulnerability. HMGN has prepared an 'Action Plan on Disaster Management' that specifies the priority activities to be undertaken in the field of disaster management, including mitigation. This paper highlighted the causes of floods, their impacts, the mitigation measures being practiced, and the assigned roles of the various government and non-government agencies. A range of recommendations was shared which would help Nepal to respond to floods better. Planning and activities must focus on the management and enhancement of the whole riverine environment using a watershed approach, and not just the exploitation of river resources, for flood control measures to be effective. Flood disaster prevention should be seen as development work in its own right. *(Damodar Bhattarai)*

Session Eight

The last paper presentation session was chaired by Mohsina Yasmin, Senior Assistant Secretary of the Ministry of Chittagong Hill Tracts Affairs in Bangladesh.

22. Women amidst disasters

The paper gave insights into the gender perspectives of disasters and how women bear the higher costs of disaster. This is mainly the result of the discrimination that exists in societies; disasters are also deeply intertwined and cross-cut by gender concerns. Natural disasters frequently cause women and men to lose their capacity to sustain their families' livelihoods through loss of homes, seeds, livestock, and tools. Men often leave their families behind in search of employment. Women are left to carry the burden of the family alone. Highlights were shared from the Expert Group Meeting on 'Environmental Management and the Mitigation of Natural Disasters: a Gender Perspective', held in Ankara one month previously. 'Gender myths', like the common perception of women as passive victims of disaster, undermine recognition of the actual and potential role that women play. There is a need to see natural disasters in a much wider socio-economic context. Disasters only make more visible the underlying vulnerabilities and inequities that already exist. *(Sumitra M. Gurung)*

23. The complex of risks and vulnerabilities in mountain areas

Mountain areas have specific attributes like accessibility, fragility, marginality, diversity, and niche advantages. Using these as a base, the paper discussed how the risks and

vulnerabilities in mountain areas are mounting in the context of a globalised economy, and that mountain areas are on the losing side in global advance. The unequal terms for integration and mainstreaming of mountains have had a negative impact on many vulnerable mountain communities. There is a need for a regionally differentiated integrated coping strategy for mountain areas to enable wise and effective adaptation to globalisation. Such a strategy should include recognition of, and dissemination of knowledge about, the options and opportunities created by globalisation. *(Narpat Jodha)*

24. Community risk and vulnerability analysis

The extent of vulnerability and loss of communities' livelihood, property, and resources were highlighted using a case study on community risk and vulnerability in eight pilot village development committee areas in Nepal, two in each of the four PDMP pilot districts. Between 85 and 99% of total loss was from water-induced disasters; common events had recurred at intervals of 5 to 13 years, major events at intervals between 12 and 26 years. Between 25 and 92% of households were exposed to disasters, with a higher percentage in Terai areas. The average annual loss was equivalent to between 1 and 6% of total household income. The major threat was to land, followed by buildings and other infrastructure. The great majority of exposed value was private, but rural communities lack insurance schemes. Low literacy, low off-farm income, poor housing, poor service facilities, and poor accessibility all contributed to a low capacity for response and recovery. Communities should be involved in all aspects of mitigation and development processes. There is a need for appropriate local institutions with a provision for training and an operational fund, for a flood warning network with highland lowland links, and to emphasise maintenance of existing control structures as well as new measures. *(Narendra Khanal)*