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ICIMOD

Fourth Regional Hands-on Training on
Community Based Flood Early Warning System

About ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD) is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalaya (HKH) – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream and downstream issues. ICIMOD supports regional transboundary programmes through partnerships with regional partner institutions, facilitates the exchange of experiences, and serves as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop economically and environmentally-sound mountain ecosystems to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now and in the future.

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Fourth Regional Hands-on Training on
Community Based Flood Early Warning System

15–19 April 2019, Lalitpur, Nepal

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Background

The Hindu Kush Himalayan (HKH) region is a dynamic and complex mountain landscape which is known to be extremely fragile and prone to natural hazards like floods, glacial lake outbursts, droughts, landslides, avalanches, and earthquakes. These natural hazards are further exacerbated by the phenomenon of climate change. Floods and flash floods are the major climate-induced natural hazards that threaten the lives and livelihoods of downstream communities, especially in the monsoon season. Floods in small rivers and tributaries can be disastrous if the government and other agencies concerned do not pay due attention.

In order to address the risks posed by floods and enhance the resilience of the vulnerable communities, ICIMOD piloted the Community Based Flood Early Warning System (CBFEWS) in different river tributaries in Afghanistan, India, and Nepal. For its contribution on the ground, the CBFEWS project received UNFCCC's "Momentum for Change: 2014 Lighthouse Activity Award" under the ICT Solutions category in COP20, Lima, Peru.

The CBFEWS, now equipped with telemetry, comprises different tools and plans that form an integrated system for detecting and responding to flood emergencies. These tools and plans are prepared and managed by the communities themselves. The system also includes an instrument that measures the river water level at five-minute intervals. A CBFEWS equipped with telemetry can relay its recordings through the Internet in real time. It alerts the community about increasing water levels and simultaneously uploads the measurements to the Internet cloud to achieve telemetry. Based on the measurements and warnings generated by the instrument, information is disseminated to downstream communities through various means, including telephone, SMS, email, and remote alarms triggered via SMS. The current telemetry-based instrument has evolved from different innovative flood early warning instruments built over a long period.

In this context, the Fourth Regional Hands-on Training on the CBFEWS was held in Kathmandu from 15–19 April 2019 (Annex 1), with participants from Afghanistan, India, Nepal, and Pakistan. This training programme built on the knowledge and experiences from the previous three hands-on trainings, including on wireless and telemetry-based instruments. The training curriculum was designed around the CBFEWS framework involving four key elements: risk knowledge and scoping; community-based monitoring and early warning; communication and dissemination; and resilience and capacity building. The training consisted of different sessions, involving hands-on exercises with the actual instrument. It aimed to enhance the knowledge and capacity of the participants pertaining to the CBFEWS and its complete implementation on the ground. It provided conceptual and technical knowledge to the participants that would enable the effective use of the different CBFEWS tools and instruments correctly and effectively. The framework and design of the CBFEWS and its instruments are credited to ICIMOD with support from Sustainable Eco Engineering (SEE) as the manufacturer of the instrument.

Objectives

Broadly, the Fourth Regional Hands-on Training on the CBFEWS centred on imparting comprehensive knowledge about all the necessary aspects of implementing the CBFEWS, along with hands-on practice in operating the telemetry-based instrument in order to widely disseminate early warning messages about floods. The specific objectives of the training programme were:

- To provide an overview of floods and flash floods in the HKH region.

- To highlight the social and gender aspects of the CBFEWS.

- To highlight the concept of early warning and its four key elements in the context of the CBFEWS.

- To conduct exercises in site selection, risk scoping, and establishment of communication channels.

- To provide hands-on practice in assembling, disassembling and operating the instrument via the "learning by doing" mode.

- To provide field-based practice in installing and calibrating each component of the instrument.

- To provide lessons in monitoring, fault-finding, and rectification; and in maintaining and replacing parts of the instrument.

- To invite discussions in order to identify the key stakeholders and mobilize them effectively.

- To provide a common platform for participants of different nationalities to share experiences and forge relationships.

Participants and resource personnel

The fourth training programme was attended by 12 participants from 4 countries – 3 from Afghanistan, 2 from India, 5 from Nepal, and 2 from Pakistan. They represented communities and organizations, including governmental and non-governmental partners and local caretakers, who look after the CBFEWS instruments in their locality (Annex 2). The resource persons who conducted the training included: Arun Bhakta Shrestha, Dhrupad Choudhury, Neera Shrestha Pradhan, Vijay Khadgi, Pradeep Dangol, Sundar Rai, Narendra Bajracharya, and Dipankar Shakya from ICIMOD; and Mahendra Man Shakya, Shailendra Shakya, Hel Kumar Shrestha, and Saroj Bajracharya from SEE (Annex 3).

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The training event ran for five days with multiple sessions, each focusing on meeting specific objectives and then the overall objective of imparting knowledge for the complete implementation of the CBFEWS. The first day covered the scoping, risk assessment and communication aspects of the CBFEWS, along with the gender facet. The second day was dedicated to familiarizing the participants with the CBFEWS instruments and giving them hands-on practice in assembling, operating and disassembling the instruments. The morning of the second day also saw discussions on the implementation maps prepared by the participants. On the third day, the participants carried out field-based installation of the instruments and dealt with different scenarios that occur on the field. On the fourth day, the sessions were on social mobilization, and technical implementation and operation; these sessions were followed by an evaluation exercise and a visit to the CBFEWS demo site at Khokana. On the fifth and last day of the training, the participants prepared action plans; this was followed by the closing ceremony where certificates and awards were distributed.

Day 1

Inaugural session

The training officially began with welcome remarks delivered by Neera Shrestha Pradhan – Senior Water and Adaptation Specialist, Programme Coordinator of SWaRMA at ICIMOD's Kanchenjunga Hall. She mentioned that a total of 63 individuals had participated in the first three hands-on training programmes. She emphasized the fact that the training module was based on the "learning by doing" method, and exhorted all participants to be actively involved in all the sessions. She also thanked David Molden, Director General, ICIMOD, Arun Bhakta Shrestha, Regional Programme Manager for River Basins and Cryosphere, ICIMOD, Dhrupad Choudhury, Chief Scaling Operations, ICIMOD, for their presence and continuing support to the CBFEWS activities.

David Molden, as the chair of the session, welcomed the participants. He said that he was excited to get participants from different countries to attend the training. He mentioned that the region was prone to climate change-induced disasters and that flash flood was one of the prominent disasters. He remarked that the CBFEWS was one of the successful activities of ICIMOD, and has had a positive impact on the ground. Emphasizing the importance of the training programme, he mentioned that such learning and experience sharing would bear fruit and pave way for a better future for the region. He stated that the training programme was a good platform for the participants where they could learn from each other's experiences. He extended his best wishes to all the participants for a fruitful training stint.

After welcoming the participants, Arun Bhakta Shrestha highlighted the objectives of the training programme. He mentioned that due to climate change, strange and extreme climatic events were taking place, and these needed to be tackled using different approaches. He dwelt on the different aspects of flash floods – types, causes, and management approaches. He mentioned that out of the two approaches – structural and non-structural – towards flash flood risk management, non-structural measures were more sustainable as they were not known to do any harm to the environment and the ecosystem; however, it had also its limitation in that it would only be able to save lives and prevent small-scale property losses, but not big infrastructural damages. So, he said, both structural and non-structural measures had an important role to play in managing flash floods. Highlighting the importance of the CBFEWS, he said that while many advanced flood-forecasting facilities existed, they were not accessible to the communities that required them. Stating that the CBFEWS was a very important means to deal with flash floods, he pointed out the fact that it was also a simple and cost-effective system. He said that the system could be used in flash flood-prone rivers in the HKH region. He expressed the hope that the training programme would be successful and that the participants would learn not only how to install the system but also to repair it in case of any malfunction or damage.

After welcoming all the participants, Dhrupad Chowdhury's speech focused mainly on ICIMOD's vison of extending and upscaling the use of the CBFEWS. He emphasized that the CBFEWS was helping communities in coping with the risk of floods and flash floods. He also mentioned that the lessons learnt from Assam (India) came in useful to be adopted in Afghanistan and Nepal too. He informed that after the CBFEWS was initiated by the Himalayan Climate Change Adaptation Programme (HICAP), it was implemented by the Koshi River Basin Initiative. Now, the system, he said, was getting regional approval, with it being replicated in Pakistan, India, and Afghanistan. He stated that the CBFEWS could not only save lives, but also strengthen the relationship between upstream and downstream communities. In conclusion, he wished a successful and fruitful training programme for all the participants.

Presenting the conceptual framework of the CBFEWS, Neera Shrestha Pradhan dwelt on the different successful experiences in implementing the system. She emphasized that local communities are the first responders to floods and women comprise the most vulnerable group. She said that the uniqueness of the system lay in the fact that it could give real-time warning. Explaining its implementation mechanism, she pointed to four major steps: risk knowledge, early warning, communication, and response capability. She then presented a success story of the CBFEWS at the time of the Ratu River flood in 2017 when the CBFEWS installed in Lalgadh, Nepal, was able to send warnings to the downstream community in Bhittamore (India), whereby the loss of lives of people and livestock could be prevented. She stated that while the CBFEWS was an instrument that could detect floods, it could also bring people and organizations together – the upstream (caretaker) and downstream (warning recipient) communities, and governmental and non-governmental bodies. Thus, for this system to succeed, she said that it was important that each stakeholder carried out their respective roles and responsibilities effectively. She also mentioned ICIMOD's CBFEWS winning a UNFCCC award.

The session also saw another brief address by David Molden. He said that the CBFEWS was a low-cost technology that worked towards the welfare of the local communities. He emphasized that regional cooperation was the key to ensuring the success of this early warning system on floods. Stating that he looked forward to hearing the participants' stories and experiences, he thanked them for attending the training programme.

Finally, Neera Shrestha Pradhan facilitated the individual introductions of the participants and the resource personnel.

Gender Aspects of CBFEWS

The session addressing the gender aspects of the CBFEWS witnessed what was called the "bindi game", hosted by Gender Specialist Aditya Bastola and ICIMOD Institution Development Analyst Min Bahadur Gurung. The game aimed to elucidate how isolation occurred in a society and explained what the concept of gender means. The participants were requested to close their eyes and a coloured bindi was placed on each of their foreheads. Then, they had to form groups consisting of individuals with bindis of the same colour. The largest group, with green bindis, was formed the fastest, followed by smaller groups sporting yellow and blue bindis. The only one wearing a red bindi stood isolated. From this exercise, the participants learnt that one's identity was assigned by the people around them and that society was composed of different identities. The large groups felt stronger and more powerful, while the isolated participant had to fend on his own as no one had accepted him into their group.

Later, a video documentary was screened capturing the lives of the flood-affected people of Teesta, Bangladesh. The discussions that followed focused on how people of different gender social groups were differentially affected by floods due to their varied roles and the norms and values of their society. It was felt that programmes and policies needed to change to address these issues.

The session concluded with another video documentary – this one was about reaching out to the most vulnerable population in the Ratu watershed; it showed how the CBFEWS was reaching the most vulnerable community when it mattered the most.

Scoping, risk assessment, and communication

The session on scoping, risk assessment, and communication was facilitated by Vijay R. Khadgi, Flood Early Warning and Energy Analyst; Pradeep Man Dangol, Senior Research Associate; and Sundar Rai, Independent Consultant. It focused on risk scoping and assessment, networking and communication channels, and response capacity and resilience. The concept of risk was clearly defined and illustrated, and the means to assess it were highlighted. This involved the identification of the risk areas, the key structures, and the safety zones. This was followed by discussions on networking and communication channels and how information on early warning about floods could flow downstream and to all the relevant authorities without any hindrance. The next topic of discussion was on building a community's' response capacity and resilience through disaster response plans, public awareness programmes, and response capacity enhancement with trainings, drills, identification of safety zones and routes, as well as clear and precise predefined warnings.

The participants then engaged in a "desk scoping" exercise in region-wise groups wherein they identified upstream and downstream communities, key structures, risk areas, safety areas and the tentative placement locations of the CBFEWS instruments on the maps of their respective regions. This identification was based on the knowledge provided about risk scoping and assessment (Annex 4). Next, the participants prepared a social map identifying the major settlements, the vulnerable communities, shelter zones, and safe routes. Finally, a communication channel for each of the regions was prepared. In this channel, the early warning information on floods originated at the caretaker's end; he or she who would disseminate it to the first recipient in the flood vulnerable community and then to all the relevant stakeholders in a systematic manner, including but not limited to disaster response forces, government authorities and local radio or television stations for mass dissemination (Annex 5). The facilitators from ICIMOD and SEE guided the participants to complete the exercise. Upon completion, the participants presented their scoping and planning results, which would help in developing a tentative plan for CBFEWS implementation in their regions.

Thus, the first day of the training involved familiarization with the participants. Further, it included discussions on the socioeconomic aspects of the CBFEWS, site selection criteria, risk assessment along rivers, topological discussions, gender equality and social inclusion, dissemination of information, and the assignment of roles in the flood early warning system. Following the discussions, the participants completed a desk scoping exercise on the waterbodies located in their respective regions; for this, four groups were formed for the Panjshir River, Sihsper Glacier, Gagan River, and Khando River.

Day 2

Introduction to instruments

The second day of the training started with the participants gathering at the Hka-Ka-Bo-Razi Hall and each of the groups presenting the results of the scoping exercise that had been completed the previous day. Then discussions took place on the following areas: placement of the river monitoring system; the role of the local caretaker; identification of vulnerable settlements, safety zones, and evacuation routes; and the setting up of a communication channel involving the major institutions and key actors in the flood early warning system.

The participants then proceeded for a tour of ICIMOD's Godavari Knowledge Park, which would also serve as the site of the technical training. They toured the park and its myriad displays of biodiversity, products and innovative schemes for a sustainable mountain life.The CBFEWS demo site with its wireless and telemetry-based instruments and the flood scenario demo drew particular attention. The participants then regrouped at the Hka-Ka-Bo-Razi Hall for the technical instrumentation session facilitated by Narendra Bajracharya, Senior Admininistrative Associate/ Maintenance Coordination and Dipankar Shakya, CBFEWS Associate. Narendra Bajracharya began by presenting a block diagram that showed the workings of the CBFEWS. He went on to describe how the CBFEWS was actually implemented on the ground through illustrations that showed how measurements of the water level were made, processed, uploaded through cellular connectivity, and then presented on the Internet. He emphasized the key points in the adoption of the CBFEWS, which included network coverage with data facility, server space, mass SMS provision, and most crucially, a well-trained and enthusiastic caretaker.

Technical session

The technical session covered all the technicalities involved in the effective installation of the CBFEWS instrument. The session was facilitated by SEE. Dipankar Shakya led the session with support from Shailendra Shakya, System Engineer, SEE; Hel K. Shrestha, Electronics and Communication Engineer, SEE; and Saroj Bajracharya, Senior Technician, SEE. The facilitators began by describing the outlook of each component of the system – the Data Acquisition Unit (DA Unit), Data Upload Unit (DU Unit), and Alarm Unit (AU) – and their underlying operating electronics. They provided an illustration of how the DA Unit would be installed at a river bank to measure the water levels. The DA Unit could be installed up to three kilometres away from the DU Unit with a clear line of sight between the antennas. The support structure for the DA Unit could range from a stainless-steel tower to walls and bridge piers or whatever would be most viable for an installation site. The facilitators then introduced the mechanical and electronic tools used in the installation of the instruments. One of the most important tools was the multimeter. With instructions from the facilitators, the participants checked the major functions of the multimeter, namely voltage, continuity, and polarity. Next, the facilitators expanded on the key procedure of installing a SIM card for cellular connectivity. The facilitators then demonstrated the actual installation of the instruments, explaining each step. They emphasized that the DU Unit should be installed first, followed by the DA Unit, and then the AU, following step-by-step instructions in the training manual. Special attention was paid to the sensor installation, which requires precise tools. The facilitators explained the science behind the workings of the sensor and its precise calibration and attachment. The participants were actively engaged in the session and showed keen interest on the calibration of the sensor and data management in the cloud servers. The facilitation team demonstrated the operation of each unit so that the participants could understand what the instrument was doing and what the signals and messages provided by the instrument meant. They explained when and how the sirens on the DU Unit and AU would be triggered and the differences in their purpose, nature, capacity, and mechanisms. Additionally, the remote firmware update capability and its workings were elaborated to the participants.

Hands-on practice

This session allowed the participants to practice the lessons learnt in the previous session. The participants were divided into three groups so that they could practise how to install the instrument. Each group was assigned a supervisor to oversee the process and ensure that the participants were setting up the instruments correctly. The participants then began setting up the instrument units on their own, following the instructions presented in the previous session and by referring to the step-by-step instructions in the manual. They freely used the tools and equipment at their disposal and thus gained a clear understanding of the instrument and the technical complexities of putting it together. Each of the DA, DU u and the AU units were assembled, and all their functionalities tested for a clear understanding. The participants took keen interest in correctly installing the sensor to get accurate measurements. Thereafter, the facilitation team proceeded to trigger the GSM-based AU through SMS. It was thus demonstrated that the AU requires only a mobile network and the knowledge of the correctly worded SMS message.

Reflections and discussions

Following the hands-on practice, the participants regrouped to view the uploaded data from their respective DU units on the Internet and to reflect on what they had learnt. The session started with a discussion on the proper care and maintenance of the instrument, and instructions on viewing the data on the Web-user interface. Once the uploaded data was viewed on the Web page with each group's unique station code, then the participants put forth their remaining queries about the setup and installation.

Day 3

Briefing on field installation

On the third day, the participants gathered for a briefing session before practising installation on the field. The session covered the activities for the day and instructions and advice on the field setup of the CBFEWS instruments. The participants listed out the necessary equipment required for installation on the field and were then divided into two teams.

Field installation practice

A small stream, Kodhku Khola, located approximately six kilometres south-east from ICIMOD's headquarters was identified as the site for the practice of instrument installation. The site was ideal as it closely resembled the kind of rivers that the participants would be dealing with in their respective countries. The field installation started with a scoping along the riverbank. After this exercise, the participants discussed which site would be ideal for the instrument setup and selected the best site on the bank of the Kodhku Khola. Using the tools and accessories provided for installation, they enthusiastically installed the instrument. The shin-deep water, the open environment and the cool, cloudy weather offered them a refreshing experience during the field-based instrument setup.

The process of level transfer in order to identify and mark maximum flood levels and the details of sensor height calibration and adjustment for flood warnings were discussed and demonstrated until all confusions were cleared. The level transfer process was quite engaging for the participants as they jointly transferred the level from the standard gauge to their support structure where the water level sensor was placed. The data was continually uploaded to the Internet cloud by the telemetry-based instruments, and the participants viewed it on their mobile phones after the installation.

Fault-finding and rectification

Once the field practice was completed, the participants gathered for a session on identifying faults in the instrument when it wouldn't follow the expected behaviour and for correcting those faults when they occur on the field. Based on a systematic easy-to-follow table in the manual, the participants were provided instructions on rectifying possible deviations in instrument behaviour. The session was led by Shailendra Shakya with support from SEE facilitators, and it sought to prepare the participants for different scenarios that might occur during field deployment. The participants took turns to pick different scenarios from the table for fault-finding, and the team elaborated on the scenarios and their solutions.

Day 4

Social mobilization parallel session

The social mobilization session enabled the participants to identify the key stakeholders for mobilization, the challenges involved in their mobilization, and the possible procedures to address the challenges. The session was led by Neera Shrestha Pradhan and Aditya Bastola.

The team from Afghanistan identified the stakeholders at four levels: community; district; provincial; and national. They then picked out the issues involved in mobilizing the stakeholders – these had to do with considerations about finances, coordination, responsibility, awareness, and security. The team from India identified many major stakeholders that needed to be mobilized – including vulnerable communities, tola/habitat leaders, ward members, village mukhiyas, frontline government workers, governmental functionaries at the block level, active groups in the block such as youth, the Red Cross and religious groups, the disaster management authority at the district level, elected representatives, state-level actors like the Bihar State Disaster Management Authority, and national-level bodies like the National Disaster Management Authority. The team further presented a mechanism on how these stakeholders could be mobilized. It also dwelt on challenges – such as the rapid spread of diseases following a flood – and how they could be dealt with. The team from Nepal listed out the stakeholders at different levels – community, palika, district, provincial, and national. It also illustrated how the social mobilization of the

stakeholders would be carried out. As for the challenges, the team pointed to political interference, the vested interest of the stakeholders, high demand/expectation, and the limited resources and capacity of the stakeholders; it then presented a way to overcome these challenges. The team from Pakistan, too, identified the stakeholders at different levels – local, district, provincial, and national. It also put out a plan to mobilize the stakeholders – by developing a national policy and strategy, campaigning at the national level, and by conducting a series of meetings with all the stakeholders. As regard the key challenges, the Pakistan team listed out the lack of a feasibility study, government will/priority, local will/priority, political will, and social and financial constraints. It also illustrated a way to meet these challenges.

Technical implementation parallel session

The technical group was split into two so that attention could be evenly distributed among them and everyone would get enough time to practise on each of the instrument units. The instrument setup was slightly tweaked to include deliberate errors and the teams were tested to identify the faults and rectify them. After the participants successfully rectified the errors, they were provided specialized instructions on replacement of parts within a unit's electrical and electronic subsystems, such as charge controller, battery, solar panel, siren, and SIM card; they were also given guidance on handling the different screws and fixtures in each of the units. Further instructions were provided on performing checks and minor repairs in the instruments.

Then the remote firmware update functionality was demonstrated in detail. The parameters of the system were changed remotely, and the results were viewed by the participants.

Evaluation

After days of providing instructions on the implementation of the CBFEWS, it was time to test if the participants had absorbed the instructions and lessons. The light-hearted evaluation session aimed to verify if the technicalities involved in completing the CBFEWS implementation and handling its instruments had been properly imparted. The evaluation, facilitated by Dipankar Shakya and Shailendra Shakya and coordinated by the SEE team, included two segments. The first segment comprised an objective test where the participants were requested to select the correct answer among the options provided. The second segment comprised a session named "Find the Expert" which involved solving real field scenarios with the aid of instructions provided in the past few days. Based on the cumulative points scored during each segment, an excellent performer would be awarded a prize at the closing ceremony. All participants scored very well in the first objective evaluation. In the second evaluation, the participants showcased excellent and sound understanding of the system through active and enthusiastic involvement.

Reflection and feedback

The final session of the training saw the participants reflecting on their experiences in the past four days; they also provided feedback on the training module. Deepak Jha from Nepal commented that the practical lessons made it easy for him to understand technical concepts, as he had a non-technical background. Rajesh Jha from Nepal stated the importance of the CBFEWS at the community level and added that his organization would install the system at the Khando River, Nepal. Another participant from Nepal, Rakesh Jha, stated that through proper implementation of the CBFEWS in the vulnerable areas, many lives could be saved. Yet another participant from Nepal, Sarita Bajracharya, expressed her gratefulness, saying that she had gained both theoretical and practical knowledge from the training. Homayoun Khoshnod from Afghanistan found the CBFEWS to be a good system to be implemented at the community level. Muhammad Nadeem Khan from Pakistan said that he was grateful for the cross-boundary interaction platform provided by ICIMOD; he expressed confidence in his knowledge about both the theoretical and practical aspects of the CBFEWS.

Khokana – Department of Hydrology and Meteorology demonstration site visit

Following the evaluation session and lunch, the participants were taken on a field trip to the Department of Hydrology and Meteorlogy (DHM) demonstration site at Khokana to observe the telemetry-based CBFEWS

instruments in operation. Khokana is an old Newari village located south-west of the ICIMOD headquarters, about 2.5 kilometres away as the crow flies. The participants walked through the scenic fields to the riverside demo site. Following a short briefing by Narendra Bajracharya and Dipankar Shakya about the background and past performance of the installed telemetry-based CBFEWS at Khokana, the participants proceeded to view the DA Unit overlooking and measuring the Bagmati River. Then they observed the DU Unit in operation at the house of the designated caretaker, as it uploaded timely measurement samples to the cloud. Following the observations, a short discussion was held on site selection, antenna placement, and instrument performance.

Day 5

Closing session and way forward

The closing session of the Fourth Regional Hands-On Training on the CBFEWS was held at the Hotel Greenwich Village meeting hall and was facilitated by Neera Shrestha Pradhan. The session was chaired by Basanta Shrestha, Director, Strategic Cooperation, ICIMOD. The session began with Narendra Bajracharya speaking briefly about the entire training programme. He expressed satisfaction at the enthusiasm shown by the participants from all the countries – Afghanistan, India, Nepal and Pakistan. He said that the experience gained from all the trainings till date would be helpful in improving the overall training module. He also acknowledged the crucial role the participants played in the successful implementation of the CBFEWS in their respective regions, and expressed confidence in their capacity to implement the CBFEWS.

In her presentation, Neera Shrestha Pradhan gave a recap of the entire training programme, encompassing all the activities that took place and the key messages from the participants. She stated that the training aimed to provide comprehensive technical and theoretical knowledge about flood early warning systems and that it lay special emphasis on hands-on practice so as to encourage "learning by doing". She pointed out that the training modules included the CBFEWS framework, scoping, monitoring, dissemination, networking, and preparedness. She reflected on the gender session, especially on the bindi game that highlighted the importance of giving equal representation to all genders. This, she said, would enhance the effectiveness of disaster risk reduction initiatives, and would also encourage women to become caretakers of the CBFEWS instruments. She proceeded to highlight the major activities and achievements of each of the sessions of the training.

Certificate and award distribution

During this session, Basanta Shrestha distributed certificates to all the participants. The participants could be seen joyously receiving their certificates and acknowledging their active role in making the training a success.

This was followed by the award ceremony that honoured the best performer during the training. The winner was picked based on the ''Find the Expert" evaluation session. By a very close margin, the trophy was awarded to Lt Col (Retd) Muhammad Nadeem Khan from the National Disaster Management Authority, Pakistan, by Basanta Shrestha. Thereafter, Basanta Shrestha congratulated the participants and stated that it was a privilege for ICIMOD to serve the region and provide a platform for regional cooperation.

Vote of thanks

The final vote of thanks was delivered by Vijay Khadgi of ICMOD. He acknowledged the donors who supported the training and thanked ICIMOD's implementing partners in the CBFEWS initiative. He also thanked the participants for their active involvement, and SEE for manufacturing the parts of the CBFEWS, and ICIMOD's CBFEWS and gender teams for facilitating the training. Finally, he acknowledged the support provided by the management and administration, and the logistics, travel and motor-pool teams in making the training a success.

After the closing session, a half-day was provided for the participants to explore Kathmandu.

Conclusion

The five-day Fourth Regional Hands-on Training on CBFEWS was successfully completed, thanks to the enthusiastic involvement of the participants from Afghanistan, India, Nepal, and Pakistan, and the unstinting efforts and support of the training facilitation teams from ICIMOD and SEE, as well as the assistance of implementing partners, ICIMOD management, and donors. Apart from being actively involved in the training programme, the participants provided encouraging feedback and suggestions for improvement (Annex 6). The CBFEWS team is keen and hopeful that the shared knowledge, experiences, and lessons learnt at the training will help in the successful and impactful implementation of the CBFEWS in the region.

Annexes

Annex 1 – **Agenda of the training**

Agenda

Day 1: Monday, 15 April 2019

Venue: Kanchenjunga Conference Hall, ICIMOD Headquarters

Time	Particulars	Remarks
8:30 9:00–9:30	Pickup from hotel Participants reach ICIMOD for registration	Indu
Session 1: Opening Session Session Chair: Dr David Molden, Director General, ICIMOD; Facilitator: Dr Neera Shrestha Pradhan Rapporteur: Mr Sundar Rai/Mr Dipankar Shakya		
9:30–10:30	- Welcome remarks by Director General (10 mins) - Objective of the training, and impact of flood and flash flood on the HKH, by Dr Arun B. Shrestha, Regional Programme Manager, River Basins and Cryosphere, ICIMOD (10 mins) - EWS in the context of Afghanistan, by Mr Mohammad Tayib Bromand, Ministry of Energy and Water, Afghanistan (10 mins) - ICIMOD's vision of outscaling and upscaling CBFEWS, by Dr Dhrupad Choudhury, ICIMOD (10 mins) - Conceptual framework of CBFEWS and sharing experiences, by Dr Neera Shrestha Pradhan, Senior Water and Adaptation Specialist, ICIMOD (10 mins) - Clarification and closing by the chair (10 min)	
10:30–11:00 Group photo and tea/coffee		
11:00–11:30	- Introduction and expectation of the participants	Vijay
Session 2: GESI Session Facilitator: Dr Aditya Bastola/Mr Min Bahadur Gurung Rapporteur: Sundar Rai/Dipankar Shakya		
11:30–13:00	- Gender aspects of CBFEWS (30 mins) - Reaching the most vulnerable – documentary (10 mins) - Experience sharing/stories/case studies (20 mins) - Discussion and clarifications (30 mins)	Aditya/ Min
13:00–14:00 Lunch		
Session 3: Elements of CBFEWS Facilitator: Mr Vijay R. Khadgi, Rapporteur: Sundar Rai/ Dipankar Shakya		
14:00–17:00 Tea/coffee served	- Presentation and discussion (1 hour) - Risk knowledge – social and physical aspects [Sundar/Pradeep] - Site selection criteria [Vijay] - Communication channel and key stakeholders [Sundar] - Roles and responsibilities [Sundar] - Response capability and resilience building [Sundar] Group work (1 hour) - Plenary presentation and discussion (1 hour)	Vijay/ Sundar/ Pradeep/ Narendra/ SEE/ Dipankar Vijay Neera
Reception Dinner hosted by ICIMOD (18:00–20:30) at Hotel Summit		

Day 2: Tuesday, 16 April 2019

Venue: Godavari Knowledge Park

Time	Particulars	Remarks
8.30	Pickup from hotel	ICIMOD
Session 4: Instrument Introduction Facilitator: Mr Narendra Bajracharya Rapporteur: Sundar Rai		
9:30–12:30 Tea/coffee	- Reflections on previous day's sessions by participants (15 mins) - Demonstration of CBFEWS at demo site (30 mins) - Introduction of instrument and its parts - Know your tools - Know its functions - Installation procedure - Calibration of instrument - Testing the instrument - Operating and monitoring the instrument - Maintenance of the instrument - Remote firmware update - Fault identification and rectification - Replacing parts and components	Sundar/Narendra Narendra/ Dipankar/SEE
12:30–13:30	Lunch	
13:30–16:30 Tea/coffee	Hands-on practice	Narendra, Dipankar, and team
16:30–17:00	Reporting back by participants	Neera/Dipankar

Day 3: Wednesday, 17 April 2019

Venue: Jharuwarasi River Site

Time	Particulars	Remarks
Session 5: Field Visit (instrument testing on the field)		
8:30	Reaching hotel	Narendra, Dipankar, and team
8:30–9:00	Briefing on previous day's sessions at Hotel Greenwich Village	
9:00	Departure for the field	
10:00–12:30 Refreshments served (11:00)	Instrument testing	
12:30–13:30	Lunch at Hotel View Bhrikuti, Godavari	
13:30–15:00	Instrument test continued	
15:00–15:30	Refreshments served at Hotel View Bhrikuti	
15:30–17:00	Fault identification and rectification	
17:00	Return	

Day 4: Thursday, 18 April 2019

Venue: Khokana Demo Site and Kanchenjunga Conference Hall

Time	Particulars	Remarks
Session 6: Field Trip to Khokana		
9:00	Pickup from hotel	
9:45	Reached Khokana demo site	Bus
9:45–11:30	Site visit	Dipankar/Sundar
11:30–12:30	Lunch at Kathmandu Coffee, Bhaisepati	Indu
12:30–13:30	Reach ICIMOD	
Session 7: Group Work (Kanchenjunga Conference Hall, ICIMOD Headquarters)		
13:30–14:30	Group 1: Instrument installation Group 2: Social mobilization	Narendra/ Vijay/ Aditya
14:30–15:00	Tea/coffee	
15:00–16:00	Evaluation "Find the expert" – queries on CBFEWS answered by participants	Vijay/Dipankar
16:00–17:00	Reflections on the training, lessons learnt, and way forward with an action plan	Neera

Day 5: Friday, 19 April 2019

Venue: Hotel Greenwich Village, Pulchowk

Session 8: Closing Session Session Chair: Mr Basanta Shrestha, Director Strategic Cooperation, ICIMOD Facilitator: Dr Neera Shrestha Pradhan	
9:00–9:30 Tea/Coffee, cookies	Registration
9:30–11:00	Closing Session - Briefing on the regional hands-on training, by Mr Narendra Bajracharya, Senior Administrative Associate, Maintenance Coordination, ICIMOD (10 mins) - Reflections on the training, by Dr Neera Shrestha Pradhan (15 mins) - Take-home messages by participant representatives (20 mins) - Certificate distribution to the participants (20 mins) - Closing remarks by the session chair (8 mins) - Vote of thanks by Mr Vijay Khadgi, ICIMOD (7 mins)
11:00- 11:30	Travel claim clearance for participants supported by ICIMOD
11:30–13:00	Lunch followed by a free afternoon

Annex 2 – **List of participants**

List of participants

Afghanistan

1. Homayoun Khoshnod
    Flood Forecasting Engineer,
    Ministry of Energy and Water
    Email: Homayounkhoshnod14@gmail.com

2. Mohammad Hussain Rezai
    Hydro-Meteorological Engineer,
    Ministry of Energy and Water
    Email: hussainrezai2011@gmail.com

3. Nawid Ahmad Rahguzar
    Intern, Flood Monitoring, ICIMOD
    Email: n.rahguzar@gmail.com

India

4. Sunil Kumar Sharma
    Programme Manager, DRR
    Yuganter
    Email: aseedsunil@gmail.com

5. Palak Pandey
    Assistant Programme Officer,
    Yuganter
    Email: palakpandeyindia@gmail.com

Nepal

6. Deepak Kumar Jha
    Executive Director, Sabal Nepal
    Email: deepak@sabalnepal.org.np

7. Baidyanath Yadav
    Field Officer, Sabal Nepal
    Email: bnmaithil@gmail.com

8. Rajesh Jha
    DRR Officer,
    Tilathi-Koiladi Rural Municipality
    Email: rajesh.rss76@gmail.com

9. Rakesh K. Shah
    Project Manager, C-TBR
    Lutheran World Relief
    Email: rshah@lwr.org

10. Sarita Bajracharya
    Social Mobilization Officer,
    Sustainable Eco Engineering Pvt. Ltd
    Email: susecoeng@gmail.com

Pakistan

11. Lt Col (Retd) Muhammad Nadeem Khan
    Deputy Director (Logistics),
    National Disaster Management Authority
    Email: nadeem155@gmail.com

12. Muhammad Ali
    Assistant Director,
    Gilgit Baltistan Disaster Management Authority
    Email: alitajik85@gmail.com

Annex 3 – **List of resource personnel**

ICIMOD

1. Dr Arun Bhakta Shrestha
2. Dr Dhrupad Choudhury
3. Dr Neera Shrestha Pradhan
4. Mr Aditya Bastola
5. Mr Min Bahadur Gurung
6. Mr Vijay R. Khadgi
7. Mr Pradeep Dangol
8. Mr Narendra Bajracharya
9. Mr Sundar Kumar Rai
10. Mr Jitendra Bajracharya
11. Ms Indu Chitrakar

12. Mr Dipankar Shakya
13. Mr Samden Sherpa
14. Mr Jeevan Tamang

SEE

1. Mr Mahendra Shakya
2. Mr Shailendra Shakya
3. Mr Saroj Bajracharya
4. Mr Hel Kumar Shrestha

Annex 4 – Site scoping (country-wise exercise)

Panjhsir River, Afghanistan
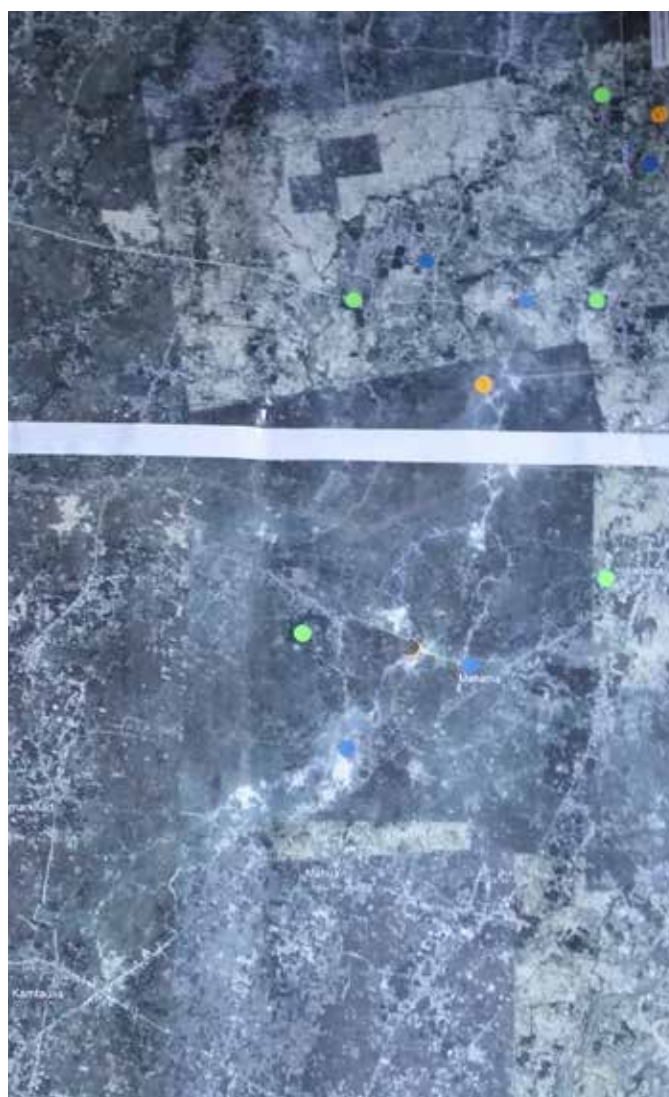
Gagan River, India/Nepal

Khando River, Nepal

Shisper Glacier, Pakistan

Annex 5 – **Communications channel (country-wise exercise)**
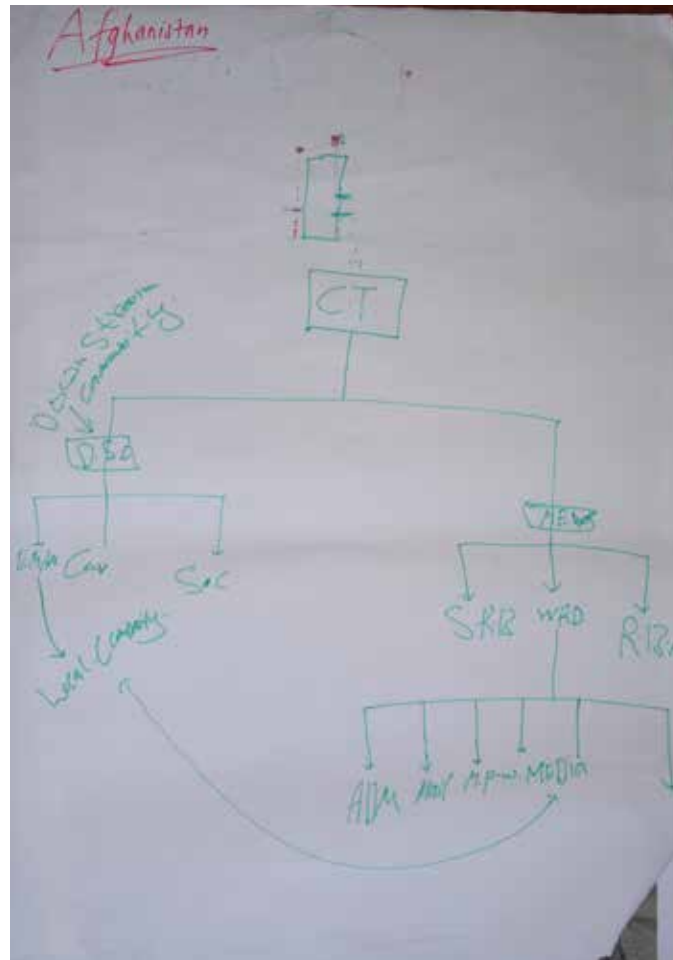
Panjhsir, Afghanistan
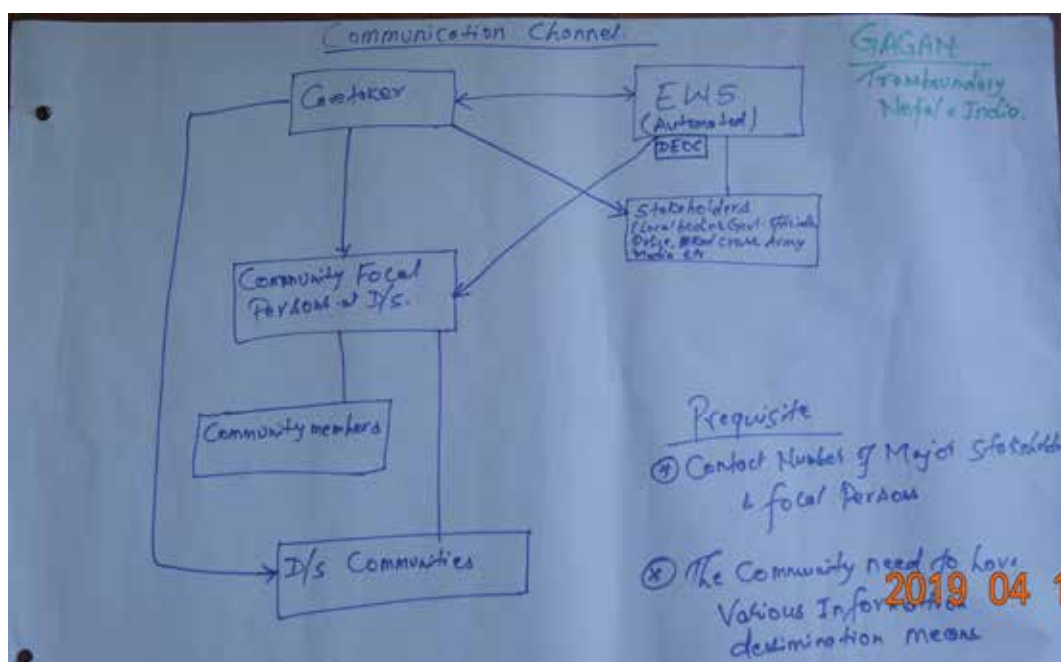
Gagan, Nepal
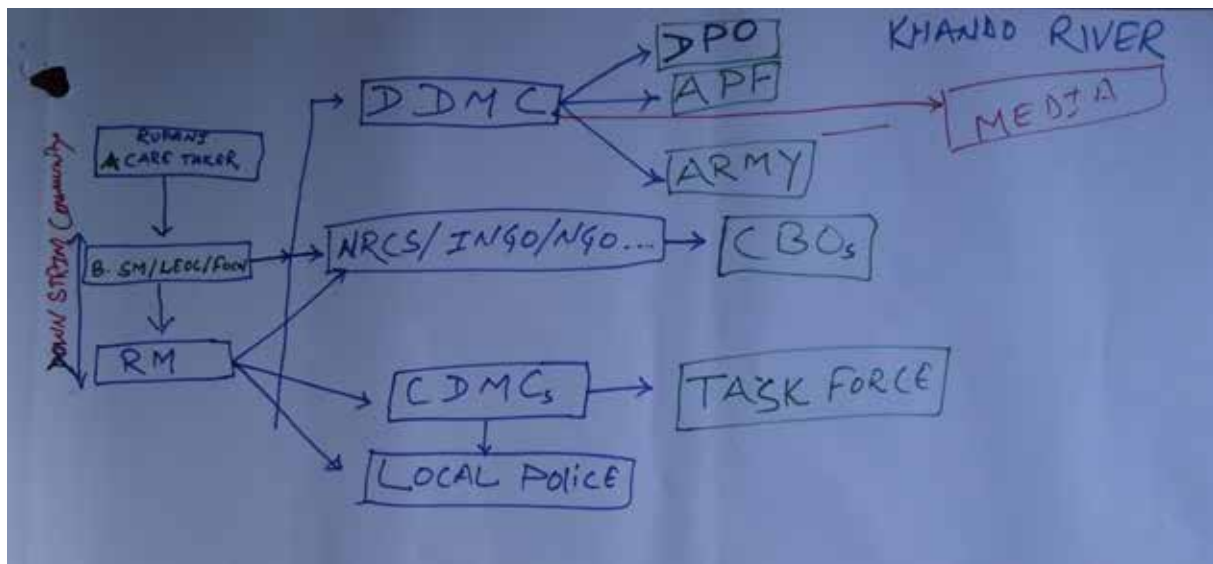
Khando, Nepal
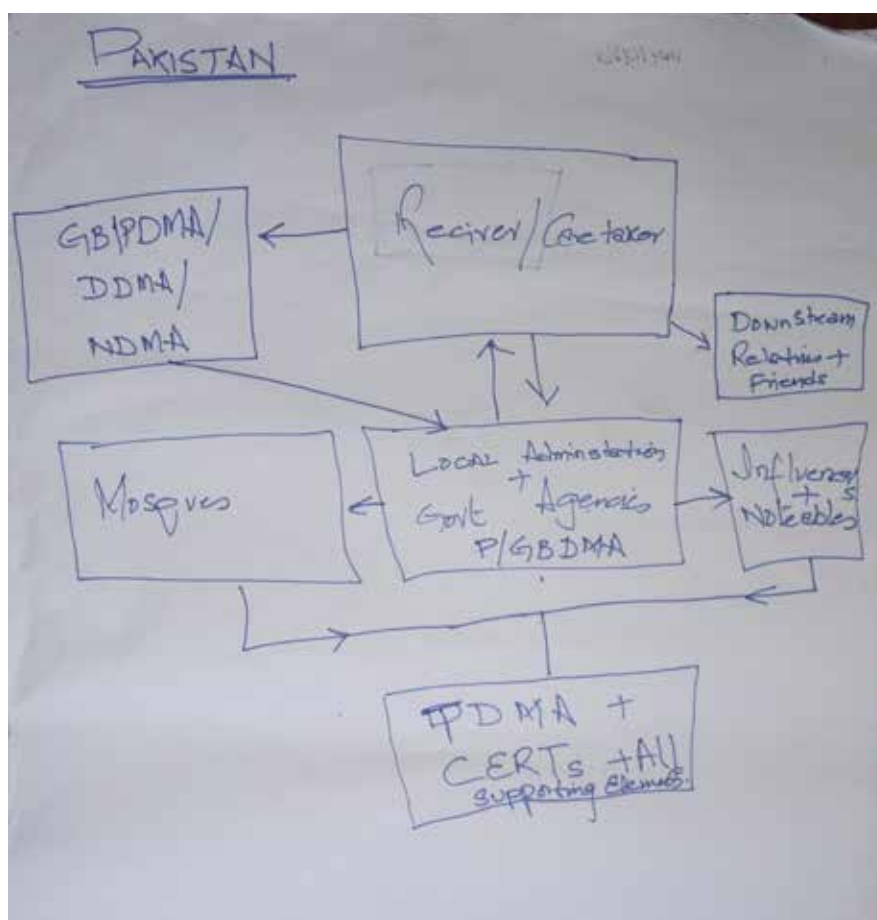
Shisper, Pakistan

Annex 6 – **Key stakeholders and mobilization challenges (country-wise)**

Afghanistan

Social Mobilization – INDIA

1. Key Stakeholder's:-

A. Local level :– Mukhiya / ward members / School teachers
Aganwadi / NGo's / Asha / CBO'S / VDMC
(women, Children, elderly, handicapped, Marginalized people)
Mahila Mandli to WASH issues)

B. District level :– District Municipality
↓
Zila Parishad / District PRI' officials
↓
CBO'S (Unicef , NGo / Red Cross /
↓
Youth task force. (DM)
↓
Medical unit → local media,
DDMA (District Disaster Mgt. Authority)

C. National State :– NDMA
↓
SPMA / BSDMA / ~~BDMA~~

How do we Mobilize :.

Local :. 1. Meeting. with the local influential Person of the village & discuss the objective.
↓
Select the site of – Common Place.
↓
Participatory discussion on the issue
↓

District :. 1. Meeting the DM & have one day.
orientation prog. on the issue./objective

2. One day orientation of all stakholders.

State :. Meeting with the BSDMA / DMA / officials
orientation one day.

Challenge :. 1. wash issue { Hygiene { women adolescent girls
drinking water.

2. Elevated Place
3. Spread of diseases like (Diarhoea / Cholera /

Over come :–
* installation of CBFEWS *
a. Chlorine tablesst / halogen
b. Toilets (mobile Trench)
c. identify the local resources
d. Media / Local & Hospital camps.

Nepal

Pakistan

KEY STAKEHOLDERS

1. **LOCAL:**
   i) A C — Assistant Commissioner
   ii) Nambardar
   iii) Religious head
   iv) School Head

2. **DISTRICT:**
   i) DM — District Magistrate
   ii) DDMO — District officer
   iii) SSP — Superintendent of police
   iv) Religious Head
   v) Political Leader

3. **PROVINCIAL:**
   I) PDMA — Provincial Disaster Management Authority
   II) C M — Chief Minister
   III) C S — Chief Secretary
   IV) IGP — Inspector General of police
   V) Political Entity

4. **NATIONAL:**
   I) PM — Prime Minister
   II) NDMA
   III) FM — Finance Minister
   IV) IM — Home Minister
   V) Members NA
   VI) IGP

MOBILIZATION STRATEGY

i) National Policy & Strategy
ii) Compaign at National Level
iii) Series of meetings with the stakeholders (All)

KEY CHALLENGES

i) Feasibility Study
ii) Govt will / priority
iii) Locals will & priority
iv) Social & Financial constraints
v) Political will
vi) Resentment from public / opposition

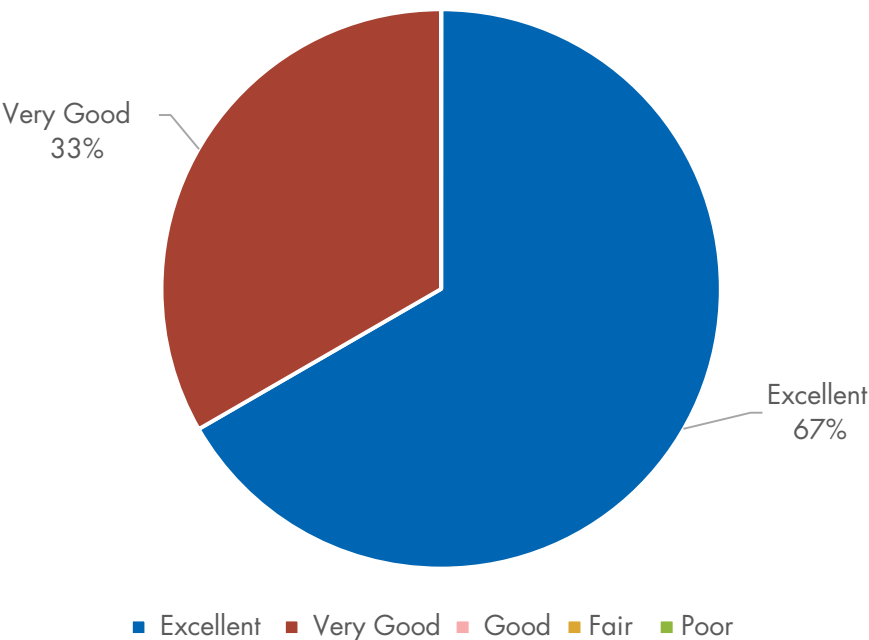### HOW TO OVERCOME:

i) Political Concesus
ii) Extensive promotion through print / E-media
iii) Third party evaluation
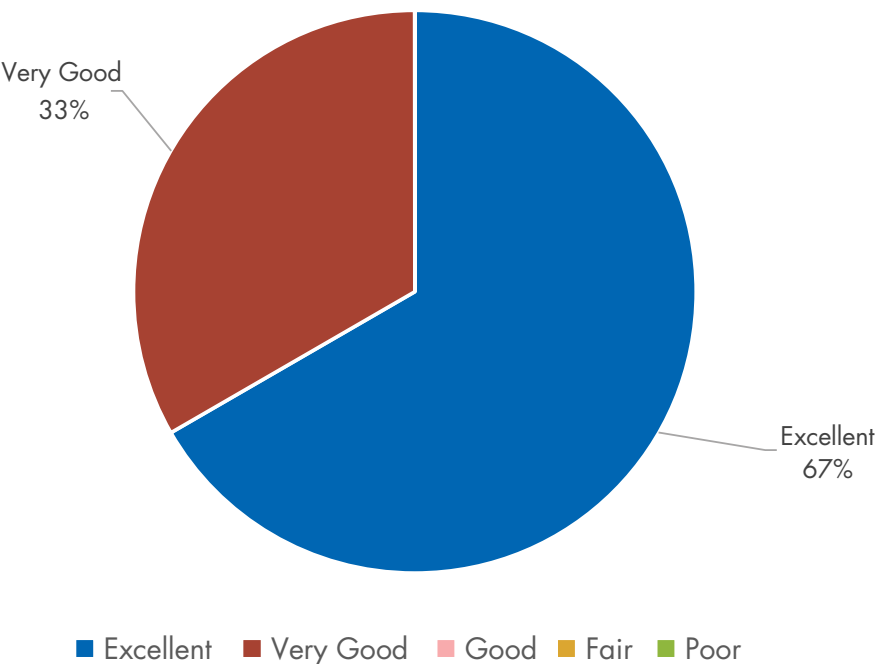iv) Mobilization of the political & local masses

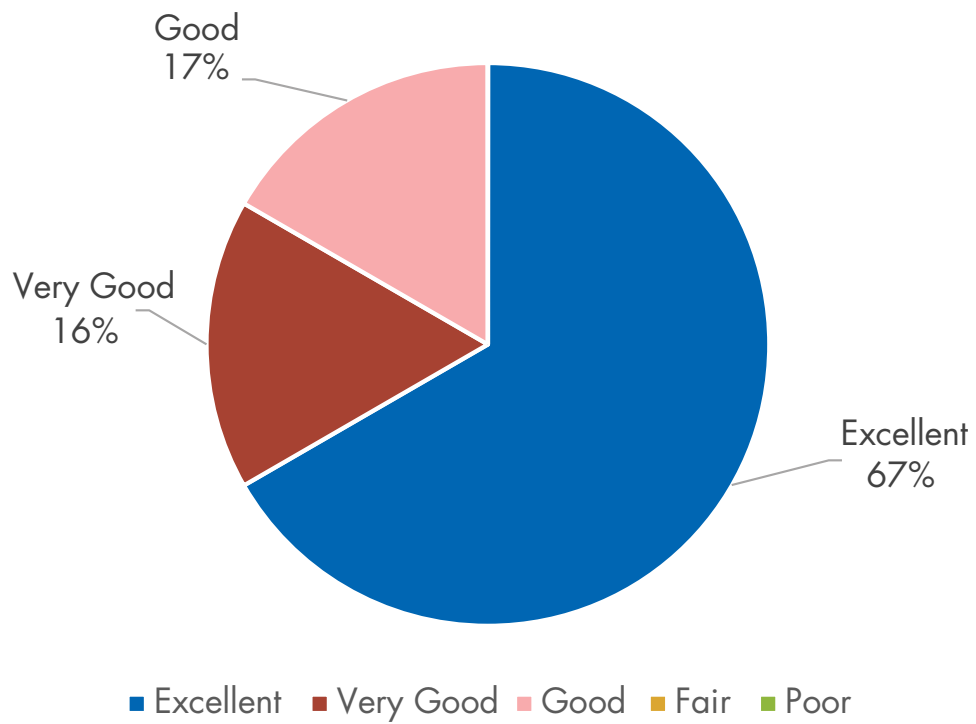# Annex 7 – **Training evaluation report**

Curriculum
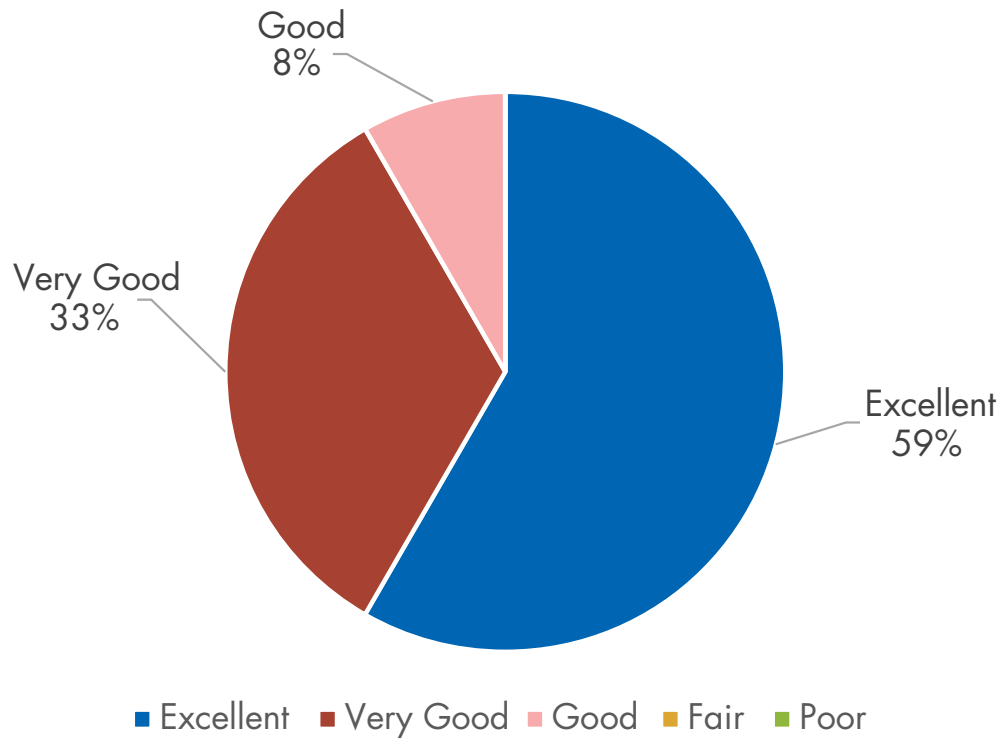
Course content was relevant and adequate

Very Good
33%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor

Objectives for each topic were relevant and followed

Very Good
33%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor

Materials distributed were adequate and useful

Good
17%

Very Good
16%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor

The course was organized well and easy to follow

Good
8%

Very Good
33%

Excellent
59%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor

Resource persons

Overall quality of instruction

Good
8%

Very Good
9%

Excellent
83%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor

Presentations were interesting and practical

Good
8%

Very Good
17%

Excellent
75%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
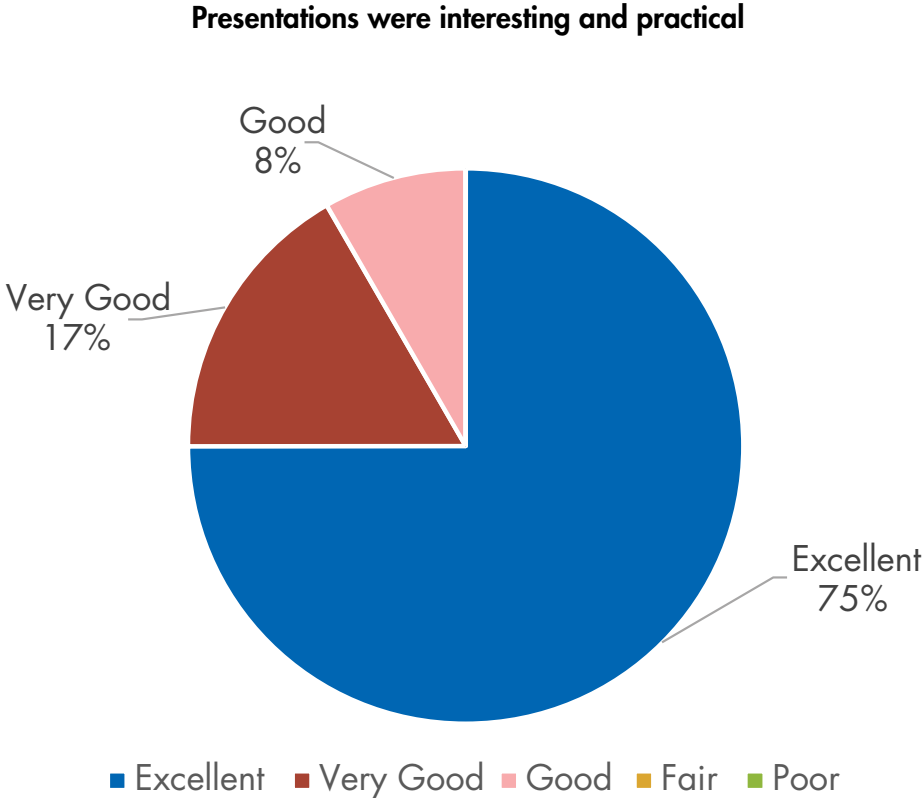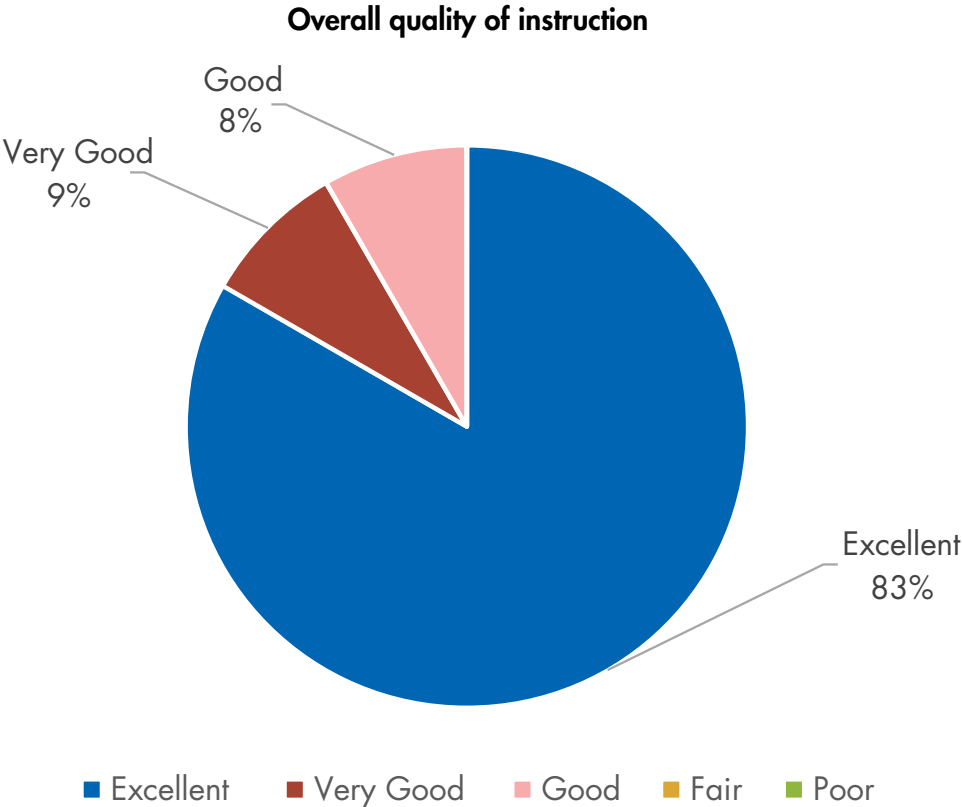
Adequate time was provided for group work

Very Good
33%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
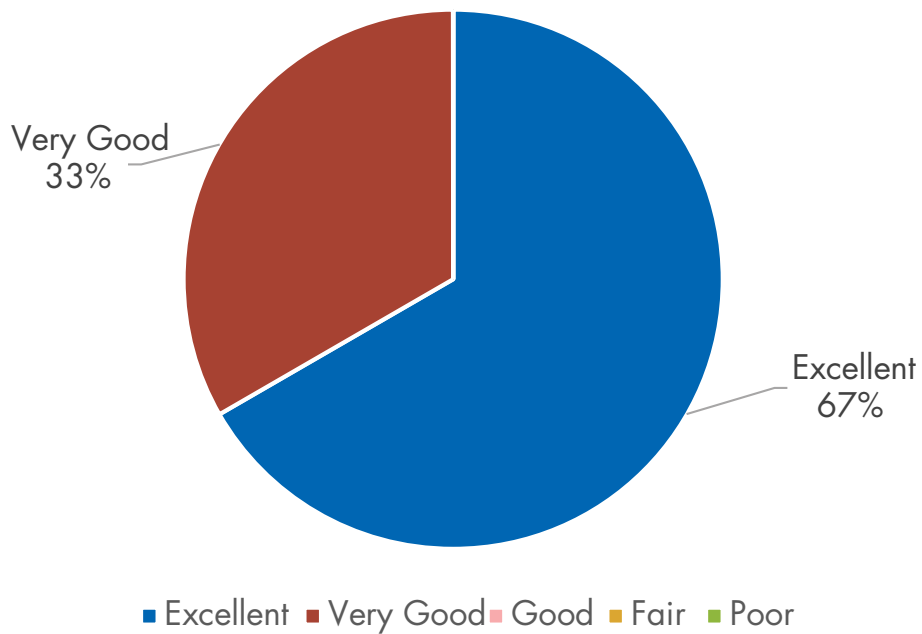
Participation and interactions were encouraged

Good
17%

Very Good
8%

Excellent
75%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
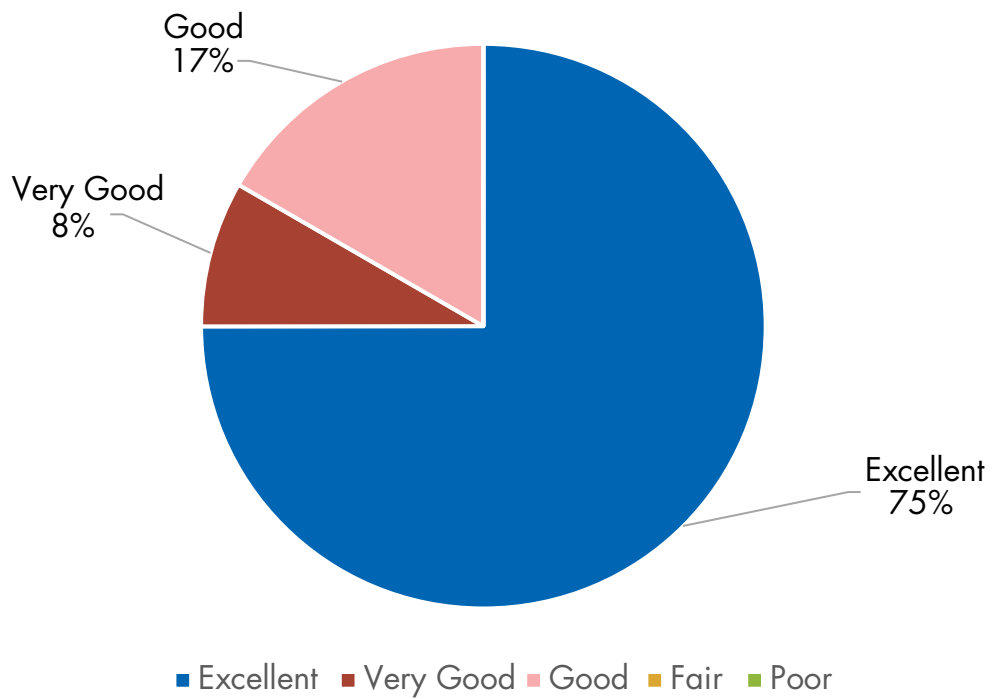
Adequate time was provided for questions and clarifications

Fair
8%

Good
17%

Excellent
42%

Very Good
33%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
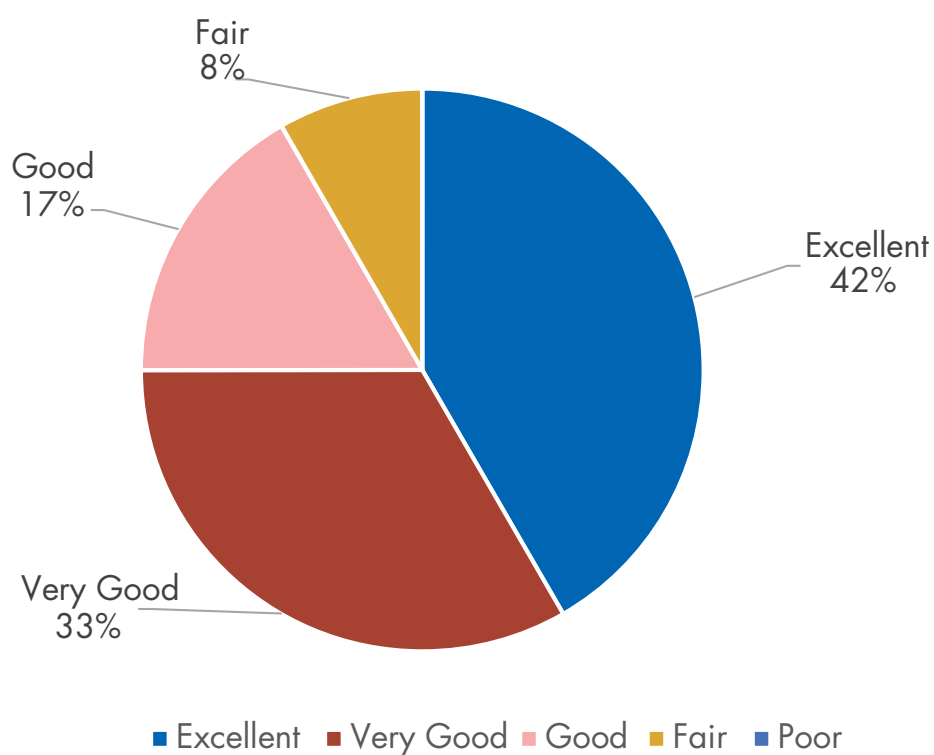
Adequate time was provided for exercises

Good
17%

Very Good
25%

Excellent
58%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
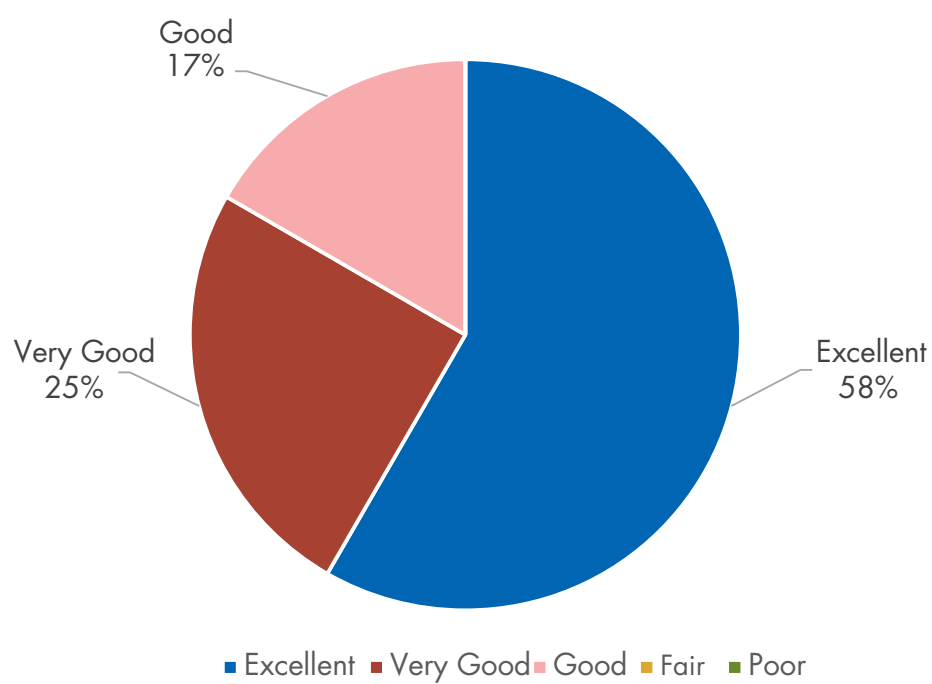
Resource persons adequately addressed the concerns of participants

Very Good
33%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
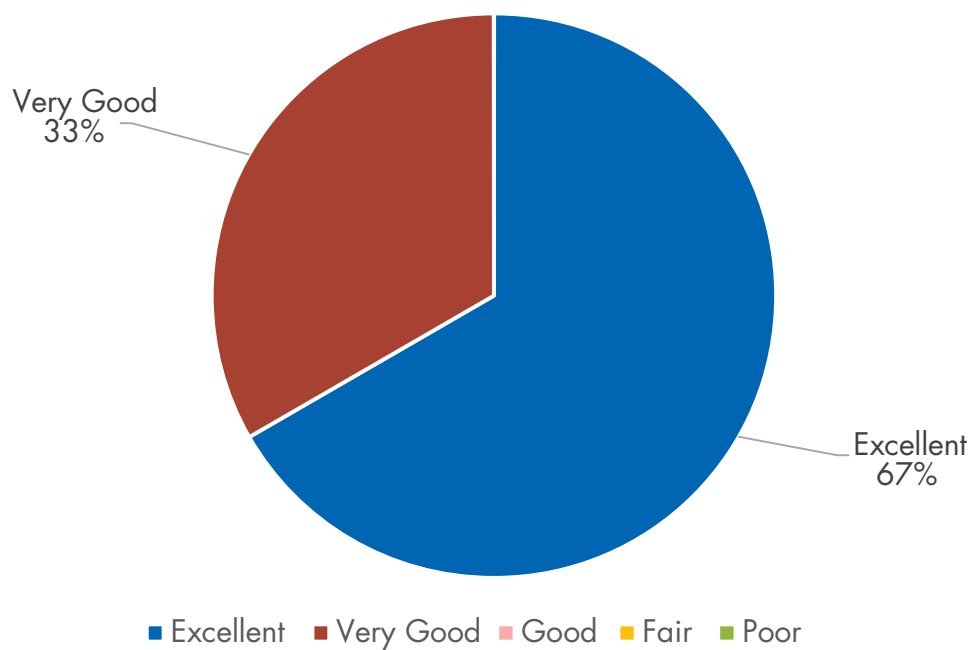
Training-specific questions

Overall training rating

Very Good
42%

Excellent
58%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
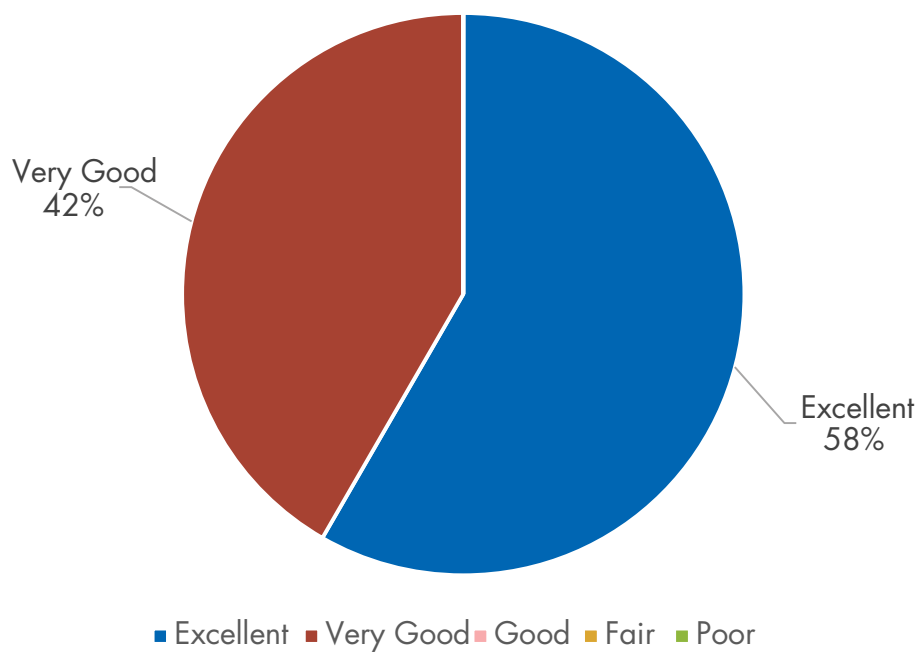
Training helped me gain theoretical knowledge on CBFEWS

Good
25%

Very Good
8%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
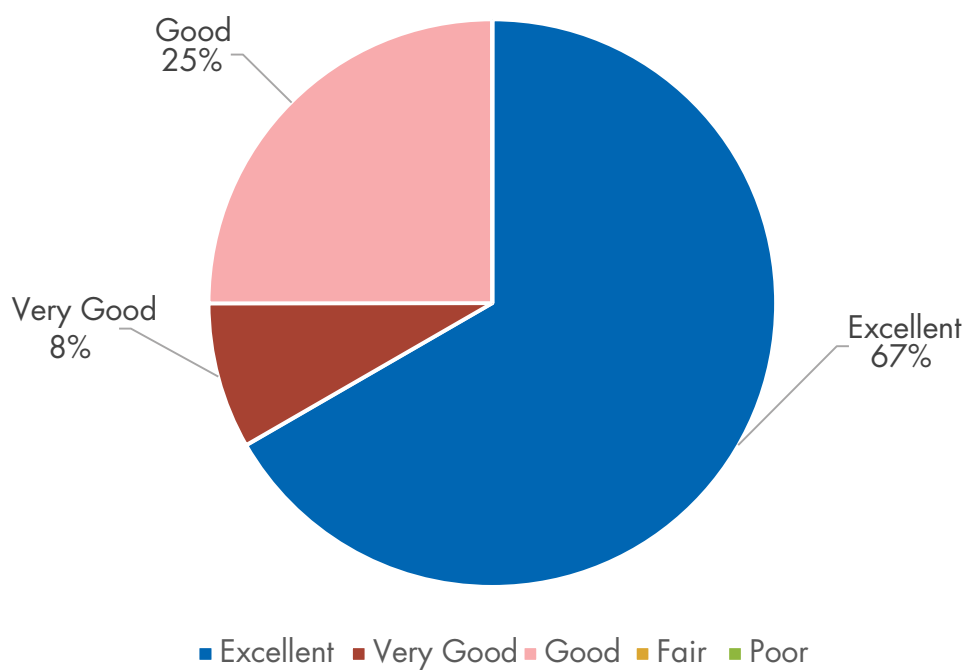
Training helped me gain practical knowledge on CBFEWS

Very Good
33%

Excellent
67%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
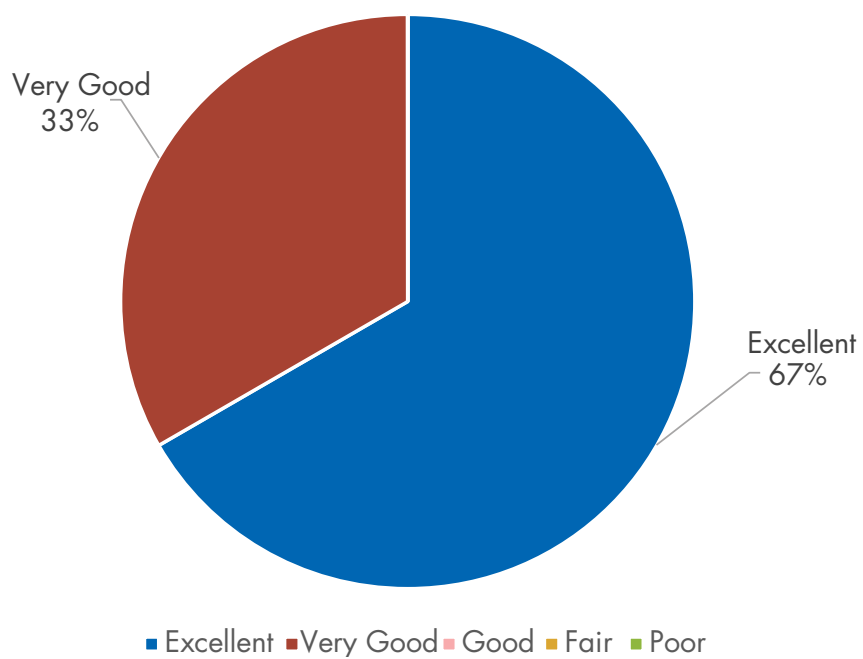
What is your impression about instrument testing on the field

Very Good
25%

Excellent
75%

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor
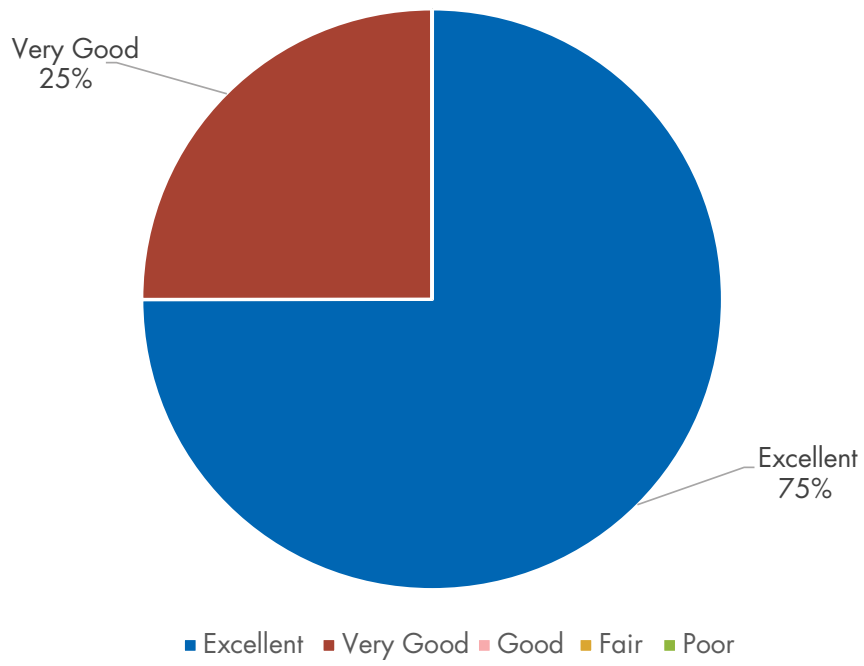
Additional comments

1. Did the course meet your expectations?

   90% Yes, due to the practical and comprehensive nature of the course, even an individual with low IQ can understand it to the maximum.

   10% Partly, due to difficulty in understanding the languages used, i.e., English and Hindi.

2. Learnings from the course
   a) Sound knowledge about CBFEWS
   b) Site scoping and selection, risk assessment
   c) Practical technical knowledge about instruments
   d) Significance of gender roles in preparedness
   e) Identification of stakeholders

3. What did you find the most useful? What did you find the least useful?

   Most useful:
   - Knowledge about disaster risk reduction in community
   - Practical knowledge and field visits
   - Knowledge on CBFEWS implementation
   - Hands-on part of the training
   - Gender role in disaster preparedness

4. What topics would you like to see changed or added to the course?
   - More elaboration on gender and social aspects
   - Training needs to be conducted every year to increase the knowledge
   - Model for information on EWS dissemination to community in the case of transboundary rivers
   - Even more practical demonstrations

5. What topics do you need more information on?
   - Regarding the data upload processes
   - Error finding and rectification
   - Working of the internal processes of the instrument
   - Methods of early warning dissemination
   - Flood mapping
   - Flood frequency and duration analysis
   - Data storage and cloud data management for analysis
   - Mechanism to synchronize the CBFEWS data with other similar data like in DHM

6. How will you implement the knowledge gained?
   - Sharing the knowledge gained from the training
   - Effective communication with the implementing partners
   - Engagement in community awareness
   - Ensuring effective CBFEWS implementation in flood vulnerable sites
   - Explore opportunities for installation of CBFEWS in the relevant communities

7. Other comments
   - Training was fruitful and excellent
   - Updates regarding improvements and upgrades to the CBFEWS instrument

Annex 8 – **Photographs from the training**

Neera Shrestha Pradhan delivering welcome remarks

David Molden delivering welcome remarks

Arun Bhakta Shrestha delivering welcome remarks

Dhrupad Choudhury delivering welcome remarks

Team from Afghanistan

Team from India

Team from Nepal

Team from Pakistan

Aditya Bastola facilitating the gender session

Gender exercise: The bindi game

Sundar Rai facilitating the risk scoping session

Pradeep Dangol facilitating the risk scoping session

Vijay Khadgi facilitating the risk scoping session

Site selection exercise

Site scoping exercise

Risk assessment exercise

Communication channel exercise

Demonstration of CBFEWS at demo site, Godavari

Technical briefing session

Knowing the tools

Hands-on practice

Instrument setup

Instrument calibration

Instrument testing

Field-based exercise

Field-based assemblage

Field-based calibration

Field-based exercise

Field-based testing

Field discussion

Fault rectification and discussion

Social mobilization exercise

Stakeholder identificaiton exercise

Discussion on challenges in stakeholder mobilization

Group discussion

Instrument repair

Replacement of instrument parts

Evaluation session

Khokana demo site visit

Khokana demo site visit

Closing session

Closing remarks

Certificate distribution

Certificate distribution

Certificate distribution

Certificate distribution

Certificate distribution

Award ceremony