

## **Training Report: Capacity Building Training on Hand-Operated Portable Water Filtration Unit**

**Date:** 16-20 December 2024

**Venue:** Living Mountain Lab, Godavari



### **About the event**

The Capacity Building Training on Hand-Operated Portable Water Filtration Unit was successfully conducted from 16 to 20 December 2024 at ICIMOD's Living Mountain Lab, Godavari. Organized under ICIMOD's Action Area on Managing Cryosphere and Water Risks, the training aimed to introduce and demonstrate the hand-operated portable water filtration unit developed by the Pakistan Council of Research in Water Resources (PCRWR). This event was a follow-up to ICIMOD's Director General's visit to Pakistan, emphasizing technology transfer and capacity building for safe drinking water solutions in underserved and disaster-affected areas.

The training was designed to provide participants with a thorough understanding of how to design and develop low-cost, manually operated drinking water filtration units. It equipped participants with the practical knowledge needed to operate and maintain these units using locally available materials. Both theoretical and hands-on sessions were included to ensure participants gain a balanced understanding of the filtration process, as well as the skills necessary to operate the units effectively.

ICIMOD procured two sets of these filtration units from PCRWR. Both of the sets were tested, assembly and used during the training purpose. One set will be setup at the Living Mountain Lab (LML), while the second will be installed at a field site for practical use.

## **Background**

Access to clean and safe drinking water is a critical necessity, particularly in remote and disaster-prone regions where traditional water purification systems are unavailable. The hand-operated Portable Water Filtration Unit offers a practical and effective solution to address these challenges. Recognizing the potential of this technology, PCRWR propose a joint initiative to conduct capacity-building training on the use and maintenance of Portable Water Filtration Units.

PCRWR, under Pakistan's Ministry of Water Resources, leads research on water resource management. The country's water crisis, worsened by population growth, climate change, poor management, and pollution, highlights the need for urgent action. The 2022 floods in Pakistan impacted over 33 million people, destroying water infrastructure and leaving many reliant on contaminated water, posing severe health risks.

In response to this critical situation, PCRWR, in collaboration with development partners, introduced low-cost, hand-operated water filtration units designed for use in emergencies. These units were deployed in flood-affected areas like Jaffarabad, Sohbatpur, Jacobabad, DG Khan, and Chaman. By using manual force to push floodwater through filters, these units effectively removed harmful contaminants such as bacteria, viruses, and sediments, all without the need for electricity. PCRWR assisted its partners in replicating and installing these units at over 100 locations, ensuring communities had access to safe drinking water and helping to prevent the spread of waterborne diseases.

## **Objectives**

1. Build the capacity of participants in operating, maintaining, and applying hand-operated portable water filtration units.
2. Encourage the adoption of portable filtration technology to improve water quality in disaster-prone and underserved areas.
3. Install and demonstrate a pilot water filtration unit at the Living Mountain Lab and capacitate participants to install another set at a field site in Nepal.

## **Facilitators and Participants**

### **Facilitators:**

1. Shakeel Badshah, Research Officer, PCRWR
2. Muhammad Mushtaq, Technician, PCRWR

### **Participants:**

- **Sustainable Eco Engineering (SEE), Lalitpur Nepal**
  1. Mahendra Man Shakya, Executive Director
  2. Pawan Khadgi, Mechanical Technician
  3. Sushil Shrestha, Electrical Technician
- **Sabal Nepal, Rajbiraj, Nepal**
  4. Deepak Jha, Executive Director

5. Aasish Kumar Gupta, Technician

- **Living Mountain Lab, ICIMOD**

6. Jeevan Tamang
7. Birendra Tamang
8. Saman Tamang
9. Resma Tamang
10. Sukman Tamang

### **Summary of Activities**

On 15 December 2024, pre-training preparations were undertaken, including a market survey to identify locally available filter components and tools, and the collection of necessary mechanical equipment for filter development. Unfortunately, the same design mechanical pump used was not available in the market but a different model with similar functionality was available.

The training commenced on 16 December 2024 with an opening session facilitated by Dr. Faisal M. Qamer, Intervention Manager – IRBM, followed by opening remarks from Dr. Hifza Rasheed, Director General of PCRWR.



Opening session

A technical presentation by Mr. Shakeel Badshah, PCRWR, provided insights into solution design, disaster applications, and water quality monitoring in emergencies. The technical presentation involved development of filter units, including the preparation of stands, welding, and installation of components such as strainers, filters, and filtration units.



Shakeel Badshah, Research Officer, PCRWR presenting the technical aspects of the hands operated filtration pump

Additionally, participants had the opportunity to explore the innovations and technologies piloted at the Living Mountain Lab, gaining insights into cutting-edge solutions for sustainable development.



Over the training period, participants engaged in the assembly, development and testing of filter units under the guidance of PCRWR experts. Practical demonstrations covered stand preparation, mechanical part installation, and the operation of filtration units. Participants discussed for operational adjustments and maintenance, concluding with sessions on troubleshooting and ensuring the sustainable use of filtration units.



Assembly and testing of filtering unit

Unfortunately, due to challenges in custom clearance and getting the equipment lately, the quality test of the water couldn't be conducted, however in coming days, with support of LML the quality of filtered water will be tested.



Visual comparison showcasing the transformation of water quality: (Left) Turbid, contaminated water before filtration; (Right) Clear, safe, and drinkable water after treatment using the Hand-Operated Portable Water Filtration Unit

### **Key Outcomes**

#### **1. Capacity Building:**

- Participants acquired theoretical and practical knowledge of filter unit operation and maintenance.

- Enhanced understanding of low-cost water filtration technology for disaster scenarios

## 2. **Installation and Demonstration:**

- Successfully installed and demonstrated a filtration unit at Living Mountain Lab.
- Participants equipped to replicate the process at a field site in Nepal.

## 3. **Technology Transfer:**

- The training facilitated the transfer of PCRWR's energy-less water filtration technology to Nepal, addressing the need for reliable, safe drinking water solutions in remote areas.

## **Feedback and Recommendations**

### • **Feedback from Participants:**

- High satisfaction with the hands-on approach and expert facilitation.
- Participants appreciated the practical focus on local material use and practical use of the technology.

### • **Recommendations:**

- Conduct follow-up trainings to reinforce skills.
- Expand the program to other regional member countries.
- Include advanced modules on water quality testing and community-level deployment strategies.

## **Conclusion**

The training successfully demonstrated the potential of low-cost, hand-operated water filtration technology to address critical water quality challenges in underserved and disaster-prone areas. It laid the groundwork for further collaboration and scaling of this innovative solution in ICIMOD's regional member countries.