Rainwater Harvesting Enables Adaptive Capacity of Community Schools in Kathmandu Valley

SUMMARY: Water scarcity is a climate induced problem of community schools in the Kathmandu Valley, and rainwater harvesting (RWH) is a practical adaptation solution to it. By collecting and storing rooftop rainwater, schools now have an improved water supply for drinking, sanitation, and cleaning, with excess water being used for groundwater recharge. This intervention has reduced dependence on costly transported water, improved hygiene and sanitation, and supported better student attendance, particularly among girls. It has also raised awareness among teachers and students about rainwater harvesting technology, ground water recharge and water conservation, making schools the center of water adaptation.

Shree Jana Uddhar Secondary School, Gamcha, Budhanilkantha Municipality

CLIMATE CHANGE IMPACTS: The Kathmandu Valley, situated in the mid-hill region of Nepal, is highly vulnerable to the impacts of climate change. Although the Valley receives, on average, between 1600 and 2000 mm of rain annually, rainfall distribution has become increasingly erratic over the last three decades. Prolonged dry spells followed by short, intense rainfall events have led to recurrent urban flooding, soil erosion, and deficit of groundwater recharge. Seasonal water shortages are now a critical challenge for households, institutions, and especially schools, where drinking water and sanitation needs are directly linked to students' health and learning conditions. Rising temperatures have further worsened the problems by raising water demand while degrading fresh water, ecosystems and water availability. All of these challenges draw attention to the urgent need for adaptation measures, including technology transfer and installations to enable ground water ecosystems and improve sustainable water access in schools while safeguarding kids' resilience, education, and health.

Rapid Sand Filter, Shree Janajagrity Secondary School, Jagadol, Budhanilkantha Municipality

IMPACT STORY: Rainwater harvesting systems have been installed at eight community schools in the Kathmandu Valley. Annually, with a total roof catchment area of 18275 sq.m., 2436000 liters of rainwater, otherwise directly discharged into city drainage contributing to urban flooding, are harvested. The harvested water is used for drinking, and sanitation, while excess water is directed to recharge groundwater table. The RWH has reduced dependency on costly transported water, in our school enhanced school hygiene, particularly benefiting female students. "There would be scarcity of water, but now thanks to RWH there is ease for female students like me", says Ms Aayusma Pandey, a student of class eight of Shree Jana Uddhar Secondary School in Budhanilkantha Municipality, Kathmandu. This interventions benefit 6567 students. The interventions demonstrated that rainwater harvesting was a cost-effective, scalable solution for ensuring water security and climate resilience at community schools of the Kathmandu Valley.

Contribution to Climate Change Adaptation	Co-benefits	Beneficiaries	Supporting Conditions
• Ensure reliable water supply and reduce dependency on transported water. • Recharge ground water and contribute to reducing local urban floods. • Keep school campus green. • Cost-effective , scalable solution to ground water recharge & flood control. • Provide hands-on experience on climate technology to students and teachers.	Enhances health and well-being of students and teachers through the access to clean water and better sanitation. Improves attendance rate, particularly, of girls, due to improved hygiene facilities. Contributes to urban water management by reducing stress on municipal water supply.	6567 students (55.17% girl students) benefit directly from the interventions. In addition, teachers and non-teaching staff also benefit.	The school administration, students, teachers, and parents actively participated in planning, overseeing the installation, maintaining the system, and promoting awareness about local action for climate adaptation.

Recharge Pit, Aadarsha Janapremi Basic School

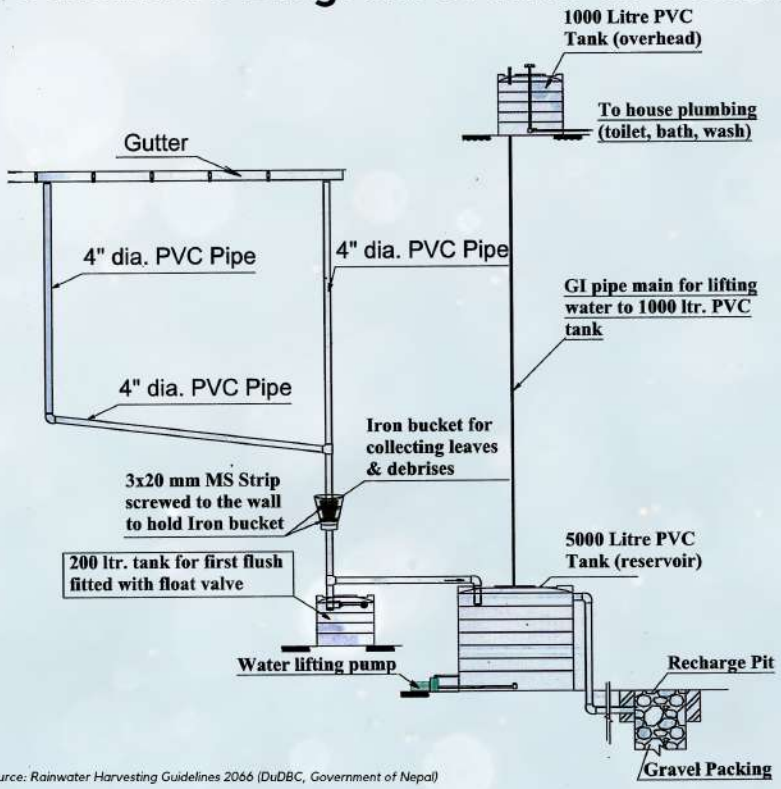
Ground Water Recharge Trench, Shree Balkumari Secondary School

Student Engagement

Methodology

A Survey was conducted on each of the schools to assess roof catchment, run-off potential and determine suitable location for storage tanks and recharge pits. Thereafter rooftop collection and storage system was designed including filtration unit. Then gutters, conduit, storage tanks and ground water recharge pits were installed. A training session was conduted on system operation and maintenance for students, teachers and school management committee.

Schematic Diagram of RHS at Communtiy Schools in Kathmandu Valley



Source: *Rainwater Harvesting Guidelines 2066 (DuDBC, Government of Nepal)*

Maintenance Tips

1. **Roof & Gutter Maintenance**
   Regularly clean the roof and gutters, install and maintain guards or mesh, and ensure proper slope to prevent clogging and allow smooth water flow into the system
2. **First Flush System and Filter**
   Before each rainy season begins, clean the first flush diverter and valves to prevent storing dirty rainwater, and wash sand or mesh filters every 2–4 weeks while replacing or cleaning filter media (gravel, sand, charcoal) at least annually.
3. **Storage Tanks and Recharge Pit**
   Keep the storage tank closed and cleaned annually, install an overflow to recharge pits, and regularly desilt, clean and check recharge structures to prevent blockages, waste dumping, and contamination.
4. **Water Quality Monitoring**
   Test water quality at least annually (more often for drinking purposes) and disinfect using boiling, chlorination (0.1 mg per liter), or UV treatment before consumption.

Community Schools with Rainwater Harvesting System in Operation, with the support from Urban EbA Project	Latitude	Longitude
Shree Balkumari Secondary School, Sunakothi, Lalitpur Metropolitan City	27.630263	85.320502
Shree Aadarsha Saul Yuwak Secondary School, Karyabinayak, Lalitpur Metropolitan City	27.632827	85.303780
Shree Patan High School, Patan Dhoka, Lalitpur Metropolitan City	27.678333	85.321375
Shree Janapremi Primary School, Kausaltar, Madhyapur Thimi Municipality	27.672447	85.361747
Shree Jalupa Secondary School, Baniyatar, Tokha Municipality	27.748747	85.318683
Shree Chandeshwori Secondary School, Tokha, Tokha Municipality	27.771441	85.329047
Shree Kalidevi Secondary School, Tarakeshwor, Tarakeshwor Municipality	27.788922	85.311463
Shree Jana Uddhar Secondary School, Gamcha, Budhanilkantha Municipality	27.762544	85.365438
Shree Janajagriti Secondary School, Jagadol, Budhanilkantha Municipality	27.747355	85.376597

Kathmandu Valley Development Authority

Project: Urban Ecosystem-based Adaptation for Climate Resilient Development in the Kathmandu Valley, Nepal

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