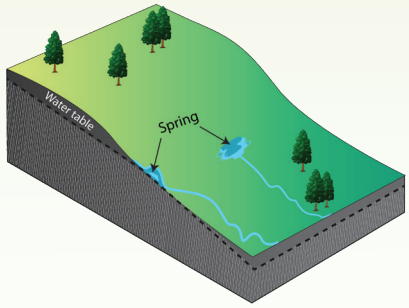
HIMALAYAN SPRINGS : A BRIEF UNDERSTANDING

Springs

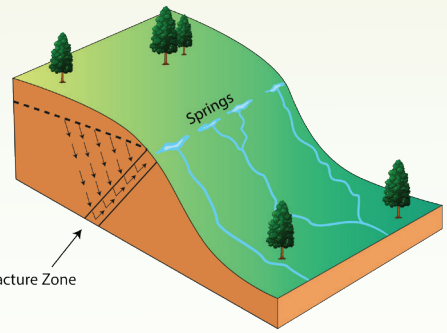
Srings are groundwater discharge points that appear where a water-bearing layer (aquifer) intersects with the ground surface and water seeps out of rock pores, fissures, fractures, or depressions.[1]

Types of Springs[1]-



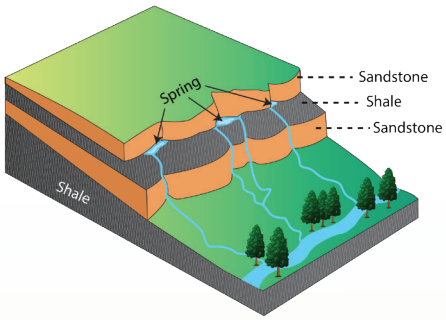
1

Depression Springs emerge at topographic lows where the water table intersects the ground surface. Springs can also emerge at the base of large trees generally as a result of the roots penetrating the aquifer and change of slope.



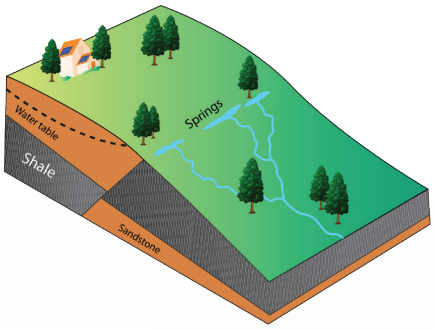
2

Fracture Springs occur as a result of permeable fracture zones appearing in low permeability rocks. Movement of groundwater is mainly through the fractures which tap both shallow and deep aquifers.



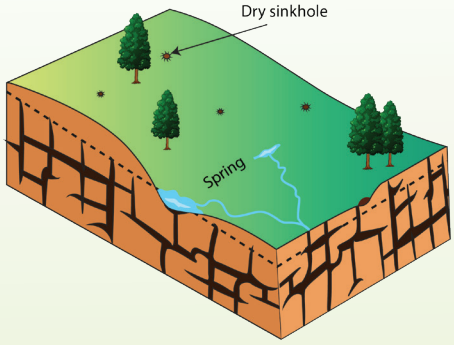
3

Contact Springs emerge at places where relatively permeable rocks overlie rocks of low permeability.



4

Fault Springs are found where groundwater at depth is forced up a fault to the fault opening by hydrostatic pressure.



5

Karst Springs occur where water flows through the cavities and openings in limestone that form as a result of dissolution of rock material and then emerges at the base of the limestone layer.

Adopted from C.W. Fetter, Applied Hydrogeology, 1988

---

[1] Shrestha, R.B., Desai, J., Mukherji, A., Dhakal, M., Kulkarni, H., Mahamuni, K., Bhuchar, S. & Bajracharya, S. (2018). Protocol for reviving springs in the Hindu Kush Himalayas: A practitioner's manual. ICIMOD Manual 2018/4. Kathmandu: ICIMOD

What is Springshed?

Springshed is a critical area that helps in the recharge and revival of springs by capturing and retaining rainfall through natural and manmade features.[3]

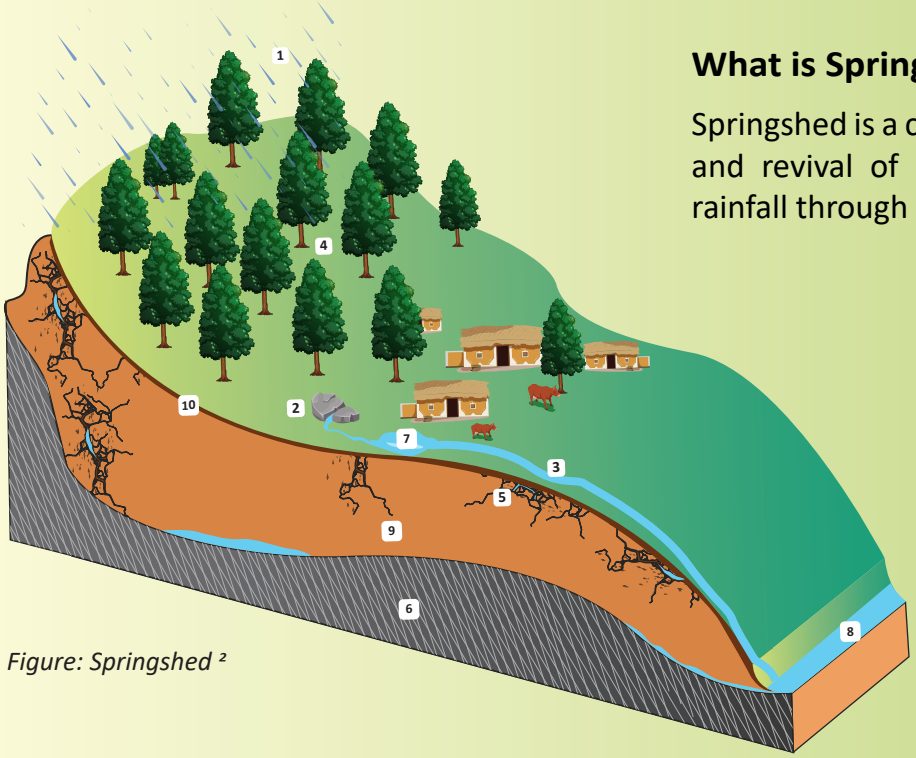


Figure: Springshed [2]

1. Rainfall
2. Spring (groundwater discharge)
3. Runoff
4. Spring recharge zone
5. Groundwater flow
6. Bedrock
7. Pond
8. Stream
9. Aquifers
10. Top soil

Aquifers are any saturated geological formation or rock formation that stores and transmits groundwater.[1]

Watershed

Watersheds are best described as the units of the land surface that drain water to a common point through a system of interconnected stream channels. The system of interconnected stream channels is called the 'drainage network'. The common point is usually the watershed outlet, the point where the highest order stream (that is, the major river or stream in the network) leaves the watershed. [1]

Appropriately identifying the springshed is critical for successful spring revival and management since it focuses not only on surface topography but also on groundwater and aquifer characteristics.

Need for Springshed Management

Springs are the main source of water in the Himalayan Region. Evidences indicate that a vast majority of springs are showing diminishing discharge, becoming seasonal, and completely drying up. Climate change and unplanned development practices are likely to exacerbate the issue. This important wealth of the Himalayas needs better management through scientific and socially acceptable mechanisms.

---

[2] ICIMOD, Springshed management in the Himalaya, 2021

[3] Provision of Potable Drinking Water in Mountains through participatory Springshed Management, Jal Jeewan Mission, Har Ghar Jal (2020). Department of Drinking Water and Sanitation, Ministry of Jal Shakti, Government of India, New Delhi.

Nature Based Solution

Rooftop Rainwater Harvesting [4]

Rooftop Rain Water Harvesting is the technique through which rain water is collected from the roof catchments using drain pipes/gutters fixed to the roof edge, which is then stored in reservoirs. Harvested rain water can be stored in sub-surface ground water reservoir by adopting artificial recharge techniques to meet the household needs through storage in tanks.

Major Components of Rooftop Rainwater Harvesting -

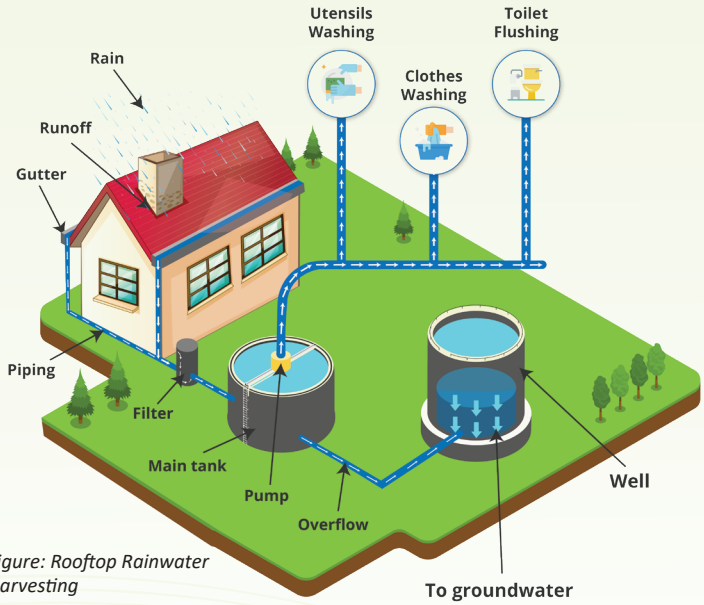


Figure: Rooftop Rainwater Harvesting

(Adopted from UCBMSH.org)

Roof catchment- The roof of the house is used as the catchment for collecting the rainwater

Down pipes- Down pipe is the pipe that carries the rainwater from the gutters to the storage tank. Down pipe is joined with the gutters at one end, whereas the other end is connected to the filter unit of the storage tank

Gutters- Gutters are channels fixed to the edges of roof all around to collect and transport the rainwater from the roof to the storage tank

Filtration of water- To retain larger debris such as leaves can be installed in the down-pipe or at the tank inlet. Simple gravel-sand filters can be installed at the entrance of the storage tank to filter the rainwater coming in to the harvesting tank.

Storage tank- A storage tank is used to store the water that is collected from the rooftops. Storage tanks are usually constructed above ground level to facilitate easy detection of structural problems/leaks, easy maintenance and cleaning, and easy withdrawal of stored water. They are provided with covers on the top to prevent contamination of water from external sources.

Success Story

In a small village called Gajar in Nainital District, Uttarakhand, Rooftop Rainwater Harvesting has made life much easier for Rama Devi. Her daily trips to the naula for the family's water needs have reduced significantly. *"This year has been easier. Especially during the monsoon season, we're dependent on the naula only for our drinking water needs. Everything else is taken care of by the collected rainwater."* With no piped water supply system yet in place for the household, Rama Devi has spent her life rationing water and standing in long queues waiting for water with other women from the village. With the rainwater harvesting system in place and with the spring recharge work ongoing in the naula, she is hopeful for the future. But the road to a life of water security is still long. The summer months, when there is no rain, are the hardest. The discharge rate of the springs also reduces significantly. *"During summers, it takes around 1-2 hours to fill one bucket of water sometimes. I have to go to the naula several times a day because then we're dependent on the naula for all our household needs."*

Catch the rain, where it falls, when it falls

National Water Mission, Ministry of Jal Shakti launched campaign "Catch the Rain" in 2020 & 2021 to nudge the states and all stakeholders to create Rain Water Harvesting Structures (RWHS) suitable to the climatic conditions and sub-soil strata, with people's active participation.

[4] Central Ground Water Board (CGWB), Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India.

Key Agencies Working on Springshed Management in Uttarakhand

- GB Pant National Institute of Himalayan Environment (GBP NIHE), Kosi-Katarmal, Almora. (https://gbpihed.gov.in/index.php)
- Indian Institute of Technology (IIT), Roorkee. (https://www.iitr.ac.in/)
- National Institute of Hydrology (NIH), Roorkee. (http://www.nihroorkee.gov.in/)
- Wadia Institute of Himalayan Geology, Dehradun. (https://www.wihg.res.in/)
- Uttarakhand Forest Department. (https://forest.uk.gov.in/)
- Central Ground Water Board. (http://cgwb.gov.in/)
- Advanced Center for Water Resources Development and Management (ACWADAM). (https://www.acwadam.org/)
- Central Himalayan Rural Action Group (CHIRAG). (https://chirag.org/)
- Himotthan Society. (http://www.himmotthan.org/)
- People's Science Institute (PSI). (https://peoplesscienceinstitute.org/)
- Centre for Ecology Development and Research (CEDAR). (https://www.cedarhimalaya.org/)
- Center for Business and Entrepreneurial Development (CBED). (https://cbedce.org/)
- An Association for Development, Harmony and Action Research (AADHAAR). (https://aadhaarassociation.org/)

Collaborating Organisations

Centre for Ecology Development and Research (CEDAR)
Central Himalayan Rural Action Group (CHIRAG)

Supported by

National Mission for Himalayan Studies (NMHS)
Govind Ballabh Pant National Institute of Himalayan Environment (GBP NIHE)

Project Staff

Dr. Vishal Singh - Principal Investigator,
Dr. Badrish Mehra - Principal Investigator,
Dr. Anvita Pandey - Co-Principal Investigator,
Mr. Abhishek Likam, Ms. Swati Singh, Mr. Bhopal Bisht
Mr. Narendra Raikwal

Designed by

Tillstar Entertainment

Illustrated by

Kapil Bisht

For more details, please visit
www.cedarhimalaya.org