



सत्यमेव जयते

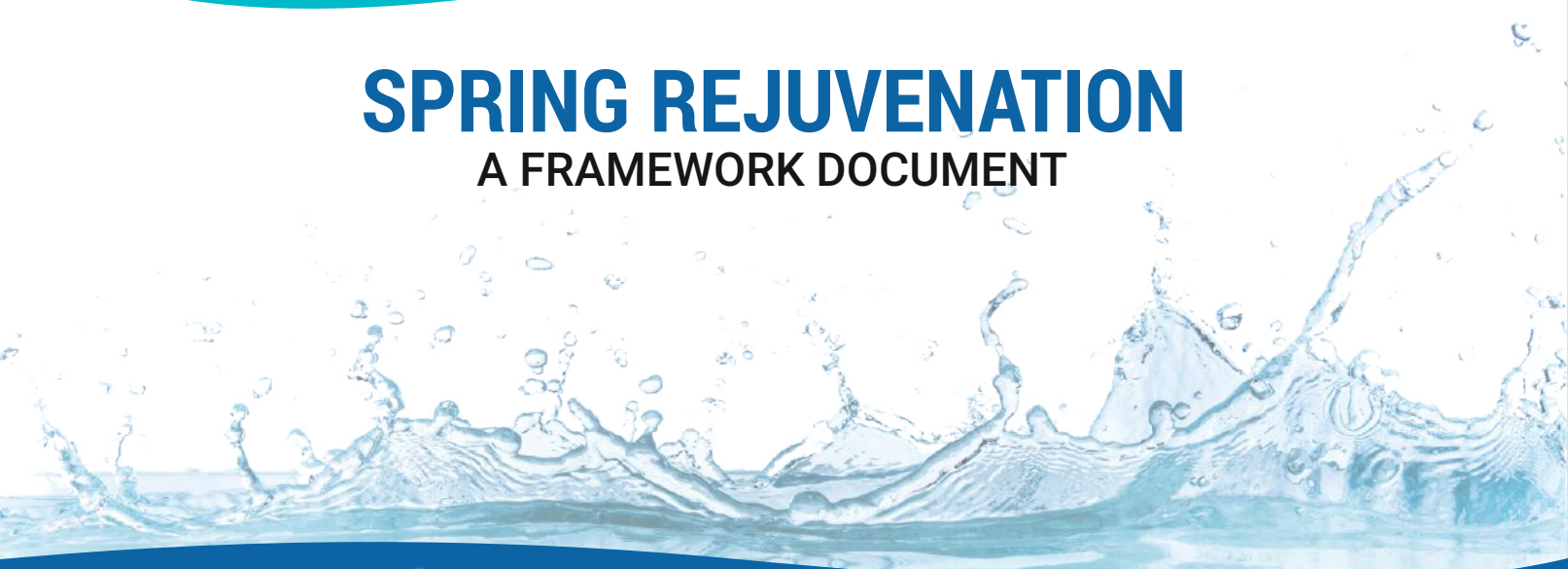
Government of India
Ministry of Jal Shakti
Department of WR, RD & GR



BHAGSU NAG SPRING, DHARAMSHALA

SPRING REJUVENATION

A FRAMEWORK DOCUMENT



NATIONAL HYDROLOGY PROJECT

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1. BACKGROUND

Springs are the primary source of water for the rural households in the hilly region. Despite the key role that they play, springs have not received their due attention and are today facing the threat of drying up. Spring discharge is reported to be declining due to increased water demand, changing land use patterns, ecological degradation and erratic trends in precipitation. These springs are known as *dhara*, *mool*, *kuan* in the central and eastern Himalayas and *chashma* and *naula* in the western Himalayas.

There is, hence, an urgent need to restore, revive and sustain springs. Lack of knowledge, understanding and awareness on springs has further compounded the problem while also inducing elements of conflicts and haphazard development. Land-use changes, rapid urban expansion and growing commercial consumption are affecting forests and impacting spring water availability.

The water from the Himalayan rivers is not readily accessible to the densely populated villages and towns in the mid-hills (900 – 2000m). These fast flowing rivers cut deep gorges and flow several hundred meters below, while the glaciers are far above this critical eco-zone of the mid-hills. In mid-hills of the Himalayas, communities depend on rain-fed springs and streams for meeting their water requirements.

2. MAGNITUDE OF THE PROBLEM

A large section of the population of the Himalayan Region depends on natural spring water for fulfilling their domestic and livelihood needs such as drinking water, sanitation and irrigation. The dependency of majority of the population on spring water implies that with changing climatic conditions and rainfall pattern, a large number of villages, hamlets and settlements are facing potential drinking water shortage. In fact, half of the perennial springs have already dried up or have become seasonal and thousands of villages were currently facing acute water shortage for drinking purposes about 8-10 years ago, a figure that may be relevant even more so today.

What is even more important to note is the fact that while glaciers are easily considered to be the source of the mighty Himalayan rivers, most of them are fed by springs. The non-glacial rivers clearly show how hundreds of springs provide the flows in stream and river channels even during the dry season. Any significant depletion in such spring flows at river origins' will surely impact the flow of rivers. Hence, a high dependency on one hand and an increasing sensitivity to depletion on the other, make Himalayan springs a source that has become greatly vulnerable in the current context, despite their being part of a strong heritage, tradition and culture in the region. It becomes important to recognise spring water depletion as a nationally pertinent problem and to address it straightaway through preventive and corrective measures.

It is estimated that springs and underground seepages provide about 90 per cent of the hilly states domestic water needs besides being used for irrigation, livestock and cultural purposes. Hence, there is an urgent need to revive or regenerate springs and underground flows and to ensure sustainable and equitable use of the augmented groundwater resources in these mountainous regions.

At a larger national scale, a gross estimate of nearly 200 million Indians depending upon spring water across the Himalayas, Western Ghats, Eastern Ghats, Aravallis and other such mountain ranges - implies that more than 15% of India's population depends on spring water.

3. INITIATIVES FOR SPRING REJUVENATION

3.1 Recently, efforts have been made to preserve and save springs from drying up; consequently, efforts to recharge them are also gaining momentum. Initiatives have been taken by a few State governments, Civil Society Organizations / NGOs who are actively contributing towards programmes to promote awareness of the importance of springs, and to build capacities to protect, develop and manage “springsheds” across the country.

3.2 The first systematic initiative was undertaken through the Dhara Vikas Programme by the Rural Management & Development Department (RM&DD), Government of Sikkim. This initiative was geographically targeted in the drought-prone rain-shadow areas of South and West districts of Sikkim. With funding support from MGNREGS, a spring revival initiative (*Dhara Vikas*) was launched in the State, an initiative that was built on the foundations of building capacity, implementing the concept of recharge and conservation through a scientific process and through a community participation model. The programme involved multiple partnerships and collaborations and was perhaps the first collaborative programme on water of its kind. Supplementing the natural groundwater recharge, by first identifying the recharge area of the aquifers feeding the springs and then taking up artificial recharge works like digging trenches and ponds to catch the surface flow and enhance the infiltration formed the core component of this programme. This has resulted in recharging 1035 million litres of groundwater annually covering 637 ha and revival of 60 springs and 4 lakes in 20 drought-prone Gram Panchayats.

3.3 Other Initiatives

3.3.1 People’s Science Institute - Springs and Participatory Groundwater Management in Sirmour District of Himachal Pradesh: used the concept of Participatory Groundwater Management (PGWM) to manage spring water in the Thanakasoga – Luhali Panchayat area in Himachal Pradesh through a comprehensive spring shed management approach. Both, the discharge and quality of spring water have improved significantly. The net water augmented through a combination of recharge and demand management is estimated to be of the order of 30,000 m³ per year.

3.3.2 Central Himalayan Action Research Group (CHIRAG) - Springs Revival through Para – Hydrogeologists: developed a team of para-hydrogeologists who mapped springsheds, monitored spring discharge and quality and identified a spring typology for the region of work that led to piloting recharge and demand management measures that helped impact more than 100 springs in three districts of Kumaon region. CHIRAG collaborated with ACWADAM to develop capacity of their spring team and facilitate the team of para-hydrogeologists in mapping springs, catchments and aquifers to develop a systematic approach to spring-water management in the Kumaon region.

3.3.3 HIMMOTTHAN - Mission Spring Revival: have taken the concept of spring shed management largely in Uttarakhand and also in Nagaland. Improved water security through systematic springshed management measures and distribution of spring water under the concept of WASH have been made under this initiative.

3.3.4 Himalaya Seva Sangh - Campaign For Springs: has used socio-cultural tools to create awareness and sensitization of communities for spring water conservation and restoration in Uttarakhand. HSS also works closely with NGOs in Jammu and Kashmir.

3.3.5 Govt. of Meghalaya - Capacity Building for Spring Revival: initiated work to map 60,000 springs and create a first-cut plan for spring water management on 5,000 springs in 11 districts over the next four years. This initiative is also supported through capacity building and hand-holding under the Springs Initiative, involving Arghyam, PSI and ACWADAM.

3.3.6 Rural Development Department, Government of West Bengal - Springshed Management in the Hill Districts of West Bengal: initiated a pilot on 631 springs in four hill districts of Northern Bengal. This programme is supported by Prasari and BRLF, with technical assistance from ACWADAM.

3.3.7 Vishaka Jila Nav Nirman Samiti (VJNNS): initiated work on Gravity Fed Water Supply Systems (GFWSS) in the Eastern Ghats for providing water security to tribal population in these regions as the existing water sources had water contamination issues leading to poor health. VJNNS also created filter tanks at natural spring sources and channeled the water to tribal villages using pipelines.

3.3.8 Grampari - Springbox model for water security: The spring based water security approach in Western Ghats of Maharashtra ensured protection through springboxes, rejuvenation based on springs hydrogeology, and resource - aquifers based governance through community participation. This approach in 19 springs provided water security to equal number of villages, while larger outreach has been to 60 villages through the springshed management work. It also helped to address the issues of quantity, quality, conflicts and enabled coordination and governance at local scales.

3.3.9 Keystone Foundation: An eco-hydrological model with interdependent and interconnected components of springs, forest, groundwater, wetlands and biodiversity in the Nilgiri's. In this location, implementation has been taken up in 20 springs locations which provided immediate water security to 20 villages, while also restoring forest, wetlands and groundwater systems which support larger bio-diverse habitats and downstream communities.

3.3.10 Government of Nagaland: pilots, supported by PSI and ACWADAM, have been initiated with Department of Land Resources (DoLR) and ECS. A rejuvenation plan for 100 springs has been drawn up in partnership with Rural Development Department, NEIDA with support from other NGOs.

3.3.11 Government of Mizoram: - A pilot has been initiated with Forest Department as the nodal agency for rejuvenation of 100 springs, with WSPs of 20 springs. It is supported by GIZ with PSI and ACWADAM as technical support agencies.

3.3.12 Other Interventions:

- **NABARD:** NABARD has also developed a programme on springshed management that is similar to watershed management. The regional offices at Karnataka, Maharashtra and North East have initiated some project on springs with local NGO partners.
- **Ministry of Tribal Affairs (MoTA):** Ministry of Tribal Affairs (MoTA), with the support of UNDP and other CSOs had designed a programme called the 1000 springs initiative for the tribal belt following a pilot in Orissa.
- **National Mission on Himalayan Studies:** Water security through community based springshed development in the Indian Himalayan Region under the National Mission on Himalayan Studies (NMHS) includes inventorization of 300 springs. As a pilot, rejuvenation of springs will be carried out for 50 springs in each of the 6 selected districts (2 each in Nagaland, Uttarakhand and Arunachal Pradesh). The initiative will be led by People's Science Institute (PSI) Dehradun, in partnership with the Land Resources Department, Government of Nagaland, IIT Roorkee, WWF-India and Arghyam.
- **NITI-Aayog Report on Springs in the Indian Himalayan Region –** NITI Aayog published the report of the Working Group on Inventory and Revival of Springs in the Himalayas for Water Security in 2018. The report was part of the larger deliberations on sustainable development in the Indian Himalayan Region and was a result of a continuous process of dialogue and discussions involving all the lead institutions working on spring-water management in the Indian Himalayan Region. The report provides short, medium and long term proposals for a National Programme for Springshed Management for the Indian Himalayan Region.

4. ROAD MAP FOR SPRING REJUVENATION

4.1 Though the task of revival of Himalayan springs is gigantic, it can be achieved through a systematically coordinated, combined national, state and local level initiatives involving all possible stakeholders and partners including governments, community and people at large.

4.2 Studies conducted by RM&DD, Government of Sikkim have showed that revival of springs is possible by taking up artificial ground water recharge works in the recharge area (springshed) of the aquifer. Based on the experiments, an eight-step action plan was designed which provides a step-by-step procedure for reviving Himalayan springs. These eight steps are as follows:

- i Comprehensive mapping of springs and springsheds.
- ii Setting up of a data monitoring system.
- iii Understanding socio-economic and governance systems of springs.
- iv Hydrogeological mapping.
- v Creating a conceptual hydrogeological layout of the springshed.
- vi Classification of spring type, identifying mountain aquifer and demarcating recharge area.
- vii Developing springshed management and governance protocols and
- viii Impact assessment.

4.3 Springs being groundwater, the principles of groundwater management and Common Pool Resources (CPR) applies to them as well. A strong infusion of hydrogeology was introduced through some of the early pilots stated in sections above. A hydrogeological approach to spring-revival and springshed management, complimented by socio-ecological inputs, engineering surveys and a strong decentralised governance in mountain water security makes springs resilient to climate variability and helps communities access water throughout the year and manage it better. Demystification of knowledge, embedding the understanding of water as a common pool resource and management of the resource by local communities and community resource persons through appropriate institutional levels, forms the core aspects of this approach. Water security plans which include recharge augmentation, demand management and resource governance are developed through a consultative process with all stakeholders and the community. A community that understands the scientific and governance aspects of springshed management can take responsibility over its resource and plan long-term management protocols to ensure safe and adequate water for both lifeline and livelihood activities.

4.4 In addition, there is also a need to address the demand side challenge in times of limited resource availability, by augmenting the efficiency of water use. At a local scale, this implies the involvement of the community, educating various stakeholders, especially the communities depending on spring water as well as those located in the recharge zone about resource protection, preventing contamination of the aquifer that supplies water to springs and land use management and control. Hence, social, economic and ecological sciences must also compliment hydrology and hydrogeology in the management of the precious spring water resource in the mountains.



4.5 Spring rejuvenation/development may broadly involve the following sets of activities:

- *Assessment of the hydrogeological controls on the springs (at micro level)* - conduct hydrogeological assessments to identify spring types and determine their connectivity with surface water and shallow or deep groundwater aquifers.
- *Recharge potential of the spring through spring-shed development measures (at micro level)* - In the Himalayan sub region, recharge does not necessarily follow a ridge-to-valley approach, but a valley-to-valley pattern. This suggests that investments in recharge without understanding the recharge-discharge areas could be misguided and are unlikely to deliver a full return on investment. It is also a possibility that only a part of the catchment area contributes to recharge, thereby obviating the need to consider the entire catchment area for recharge.
- *Maintenance and protection of springs* – are to protect the catchment of the spring and the spring head from pollution. An inspection of the ground upstream (catchment) of the spring is essential to ascertain that there is no danger of pollution or, if there is, what measures can be taken to prevent it.
- *Effective monitoring of the spring discharge and water quality during planning, implementation and impact assessment stages* – essential for knowing the impact of the interventions undertaken. Active participation of the community at all stages, including during the stage of knowledge generation, is critical for the success of any spring rejuvenation programme.



Spring Water Collection



Staggered Contour Trenches



Measurement of Spring Discharge

5. LEARNING FROM PAST EXPERIENCES

Some of the common challenges in programmes are the following:

- Community participation is key for long term sustainability of the program.
- Only supply side interventions are executed which may increase the water discharge for a short term but does not solve for water security in the long term.
- The convergence of schemes, efforts and funds remains a challenge.
- The knowledge remains in the hands of the experts and is not adequately transferred to the local community making the community dependent on the govt/experts.
- Availability of dedicated water resource personnel at the Panchayat or the village level will significantly improve the long term efficacy of the interventions.
- The existing programmes should have adequate funding for HR and capacity building of all the stakeholders in the programme.
- The programmes do not have adequate emphasis on the data collection. In absence of data, it is difficult to measure the impact of the interventions and learn from what worked and what did not work and learn from those experiences.

6. ROLE OF DIFFERENT STAKEHOLDERS

6.1 Ministry of Jal Shakti is the coordinating agency for spring rejuvenation. A pilot project has been proposed for spring inventory and rejuvenation in Tehri Garhwal district of Uttarakhand. It is envisaged that a scheme for spring rejuvenation in the Country would be taken up based on the experiences of the pilot project. In fact, many other ministries such as Ministries of Rural Development, Tribal Affairs, Urban Development, DoNER etc. could also adopt regions for implementing programmes on spring-water management.

6.2 Comprehensive mapping of springs and data monitoring and research: Central organisations (Central Ground Water Board, Geological Survey of India, Survey of India, National Remote Sensing Centre, National Institute of Hydrology, Wadia Institute of Himalayan Geology etc.) along with State Governments, Academic / Research Institutes, Civil Society Organisations (CSOs) having proven ability of mapping.

6.3 Social and Governance aspects: State Governments and CSOs.

6.4 Model for springshed recharge: CGWB, State Governments and CSOs.

6.5 Developing springshed management plans and governance protocols: State Governments, CSOs, CGWB.

6.6 Measuring hydrogeological and social impacts: CGWB, CSOs and State Governments.

6.7 Capacity Building: CGWB, State Governments and CSOs

7. SPRING REJUVENATION DESIGN PRINCIPLES

7.1 Spring rejuvenation should allow for design and execution autonomy but converge on the outcomes. Several states have already initiated programmes/initiatives in their respective states. While there are commonalities, the solutions and methodologies are unique to the local hydrogeological, social, cultural and capabilities of the respective states. Basically, spring rejuvenation calls for mapping of the springshed, identification of recharge areas, pinpointing sites for appropriate recharge structures, construction of recharge structures through convergence of activities under MGNREGS, PMKSY-WDC and related Schemes of State Governments. Experience from Sikkim and Nagaland shows that leveraging of MGNREGS funds is sufficient for construction of recharge structures.

7.2 Sustainability should be the core focus in the programme design to solve for water security for a long term. This means:

- **Participation:** To consciously and actively engage the community during the entire programme by reducing the threshold to participation and make the interactions smooth and seamless.
- **Long Term Assets:** The programme should leave long term assets (institutional and physical) across the ecosystem that would last beyond the program.
- **Leverage local knowledge:** The design should leverage both science and local knowledge.

8. EXPECTED OUTCOME

- Rejuvenation / regeneration of springs leading to adequate quantity and quality of water for drinking and irrigation purposes.
- Maintaining e-flow in mountain rivers.
- Empowering communities to manage their water resources.



**GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
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