



International Journal of Agriculture Extension and Social Development

ISSN Print: 2618-0723
 ISSN Online: 2618-0731
 NAAS Rating (2026): 5.04
 IJAESD 2026; 9(9): 982-984
www.extensionjournal.com
 Received: 20-06-2026
 Accepted: 13-08-2026
 Published: 26-09-2026

Purvaa Ghosh

PGD in RM, Xavier Institute of
 Social Service (XISS), Ranchi,
 Jharkhand, India

Impact of spring rejuvenation on the status and wellbeing of women in Uttarakhand

Purvaa Ghosh¹

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i9m.4303>

ABSTRACT

Rapid urbanization, land-use changes, and altered precipitation patterns have exacerbated water stress across the Indian Himalayan Region (IHR). Natural mountain springs (*dharas* and *naulas*) serve as the primary source of drinking and domestic water for rural households in Uttarakhand. Traditionally, the burden of water collection falls disproportionately on women and young girls. Drying springs force women to spend multiple hours daily fetching water across steep terrains, compounding time poverty and physical drudgery. This study evaluates the impact of hydrogeologically guided spring rejuvenation (spring-shed management) on the socio-economic status, time allocation, and overall well-being of rural women in Uttarakhand. Based on a telephonic survey and virtual Focus Group Discussions (FGDs) with 50 female respondents across 24 villages in Pauri, Pithoragarh, Dehradun, Almora, and Nainital districts during the COVID-19 pandemic, the findings reveal that successful spring rejuvenation reduces daily water collection time by two to three hours. This reduction in water drudgery allows women to redirect their time toward productive socio-economic activities (e.g., tailoring, enterprise through Self-Help Groups, livestock management, and kitchen gardening), childcare, personal health, and community leadership. Rejuvenated springs transform women from passive victims of water scarcity into empowered hydro-geological stewards and active decision-makers in rural water security.

Keywords: Spring rejuvenation, Spring-shed management, Water drudgery, Gender dynamics, Time poverty

1. Introduction

In mountainous regions across the globe—and particularly in the Indian Himalayan Region (IHR)—natural groundwater springs (*dharas* for gravity springs and *naulas* for shallow harvested wells) represent the life-line of rural communities, supplying over 80% of drinking and domestic water needs (NITI Aayog, 2018; Tambe *et al.*, 2012) [1, 2]. However, changing rainfall patterns, environmental degradation, deforestation, and unscientific infrastructure development have critically impaired groundwater recharge mechanisms (Kumar *et al.*, 2014; Ranjan *et al.*, 2019) [3, 4]. Consequently, thousands of mountain springs are either drying up completely or turning seasonal, exhibiting severe discharge reductions during the critical lean season from March to June (Joshi, 2006; Vashisht, 2017) [5, 6].

Gender roles in the Himalayan region dictate a strict division of water-related responsibilities. While men primarily oversee productive water uses like major canal irrigation or industrial applications, women and young girls hold sole responsibility for domestic water collection, storage, and management (Crow *et al.*, 2002) [7]. In the rural hill districts of Uttarakhand, women shoulder 70% to 100% of the daily domestic water collection workload (Sugden *et al.*, 2014) [8]. When localized springs fail, women are forced to traverse treacherous mountain terrain across long distances, spending between two to four hours daily to collect basic survival water.

This daily burden induces significant "time poverty" - a structural condition where the severe lack of available time prevents individuals from acquiring education, developing skills, resting, or engaging in income-generating enterprises (Tambe *et al.*, 2012; Mahamuni *et al.*, 2018) [2, 9]. Furthermore, the physical burden of carrying heavy water vessels (*gagars*) on head or hips causes long-term musculoskeletal disorders among hill women.

Hydrogeologically guided spring rejuvenation—utilizing watershed restoration, contour trenching, afforestation, and recharge area management—offers an effective solution to revive degraded aquifers (Kulkarni *et al.*, 2015) [10]. While the hydrological benefits of spring-shed management are documented, its socio-economic impacts on gender empowerment and women's daily time allocation remain under-studied. This paper examines how spring revival reduces water-fetching drudgery and alters socio-economic outcomes for rural women in Uttarakhand.

Corresponding Author:
Purvaa Ghosh

PGD in RM, Xavier Institute
 of Social Service (XISS),
 Ranchi, Jharkhand, India

2. Materials and methodology

2.1 Study area

The study was conducted across rural landscapes in five districts of Uttarakhand: **Pauri Garhwal, Pithoragarh, Dehradun, Almora, and Nainital**. A total of 24 rural villages were selected where communities depend predominantly on natural springs (*dharas* and *naulas*) for domestic water supplies, and where hydrogeological spring-rejuvenation interventions had been undertaken prior to data collection.

2.2 Sampling and data collection

Data collection took place during the COVID-19 pandemic restrictions. Due to travel limitations and social distancing mandates, data were gathered using telephonic interviews, structured video calls, and remote Focus Group Discussions (FGDs).

A total of **50 female respondents** were selected using a purposive sampling strategy. Selection criteria were primary water collectors for their respective households and had lived in the village prior to and following the implementation of local spring rejuvenation projects.

2.3 Data analysis

A structured questionnaire was deployed to collect both qualitative and quantitative data regarding pre- and post-rejuvenation scenarios. Indicators analyzed included:

- Daily water collection duration (hours/day).
- Utilization of saved time (leisure, income generation, domestic care).
- Self-perception of confidence, autonomy, and community participation.
- Perceived environmental and structural challenges to long-term spring maintenance.

3. Results and discussion

3.1 Impact on water collection time and drudgery reduction

Prior to spring rejuvenation, respondents reported spending an average of 2.5 to 4.5 hours daily fetching water, with significant spikes during the summer months (March to June). Post-rejuvenation data indicate a uniform reduction in water collection duration across all surveyed villages. Rejuvenation projects stabilized water discharge throughout the lean season, eliminating the need for long queues and trips to distant water sources.

- **Average daily time saved:** 2 to 3 hours per household.
- **Travel distance reduction:** Reduced from 1–3 kilometers to immediate local availability (often within 50–150 meters).
- **Physical health impact:** Lower incidence of chronic back/neck pain and fatigue reported by respondents.

3.2 Self-esteem, confidence, and empowerment

All 50 respondents (**100%**) reported a positive psychological shift following the restoration of their local water sources (**Figure 1**). The liberation from daily physical exhausting routines increased self-es-

teem and empowered women to participate actively in community governance.

Women shifted from passive beneficiaries of water supply to active managers of local hydro-geology. Several respondents stepped into leadership roles as community mobilizers and active members of *Para-Hydrogeologist* networks or local *Water User Committees*, driving local awareness on spring-shed protection.

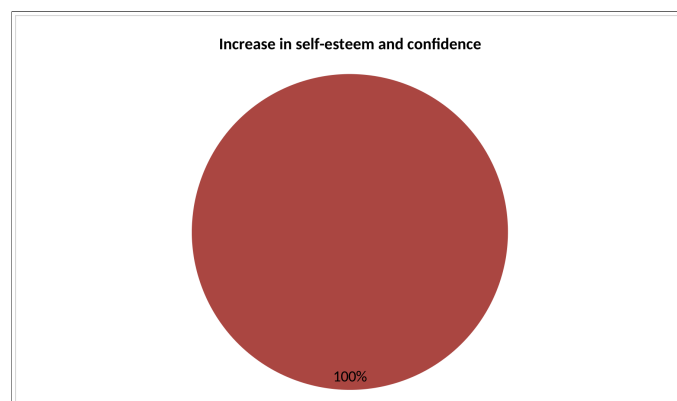


Figure 1. Self esteem and confidence

3.3 Leisure and saved time utilization

The revival of natural springs effectively addressed time poverty among rural women. Time lost previously to fetching water was systematically reinvested into economic, social, and domestic activities (**Figure 2**). Surplus discharge from revived springs enabled micro-irrigation for kitchen gardens, allowing households to grow organic vegetables for self-consumption and localized sale, augmenting household income and dietary diversity.

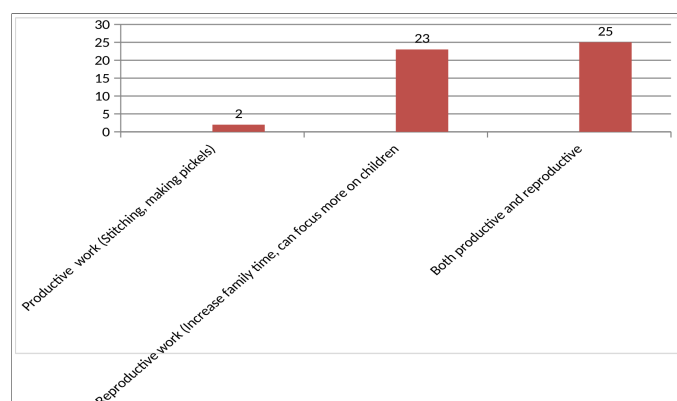


Figure 2. Leisure time Utilization

3.4 Perceived future challenges to spring rejuvenation

Despite the positive outcomes, respondents identified critical anthropogenic and environmental threats that endanger the long-term sustainability of rejuvenated springs (**Table 1**).

Table. Challenges to Spring Rejuvenation

Perceived Threat / Challenge	Percentage of Respondents (%)	Description and Impact
Deforestation and Vegetative Loss	38%	Degradation of recharge catchment areas reduces infiltration and groundwater storage.
Community Mobilization Issues	46%	Difficulty in sustaining collective community action and sensitizing residents on long-term spring-shed protection.
Unplanned Infrastructure Development	16%	Road building, building construction, and urban expansion disrupting local subsurface fractures and aquifer pathways.

Addressing these threats requires integrating socio-ecological management with scientific hydro-geological mapping, alongside ongoing

community education programs.

4. Conclusion

Natural spring degradation in the Indian Himalayan Region imposes severe physical and economic burdens on rural women. Hydrogeologically guided spring rejuvenation directly mitigates water drudgery, reducing daily collection times by two to three hours. This dynamic addresses time poverty, enabling women to reallocate time toward income-generating activities, group enterprises, child-care, and personal well-being. Furthermore, involvement in spring-shed management elevates women's social status from passive sufferers of water scarcity to active water stewards and community leaders. To sustain these gains, state policies must institutionalize gender-inclusive spring-shed management programs while protecting critical aquifer recharge zones from unregulated infrastructure and deforestation.

References

1. NITI Aayog. Report of Working Group I: Inventory and Revival of Springs in the Himalayas for Water Security. Government of India, New Delhi; 2018.
2. Tambe S, Kharel G, Arrawatia ML, Kulkarni H, Mahamuni K, Ganeriwala AK. Reviving dying springs: Climate change adaptation experiments from the Sikkim Himalaya. *Mountain Research and Development*. 2012;32(1):62–72.
3. Kumar US, Ansari MA, Deodhar A. Isotopic, hydrologic and geomorphologic approach for the rejuvenation of few drying springs in mountainous region of Dhouli Rao and Kandela, Himachal Pradesh, India. *Arabian Journal of Geosciences*. 2014;7(7):2667–2677.
4. Ranjan P, Pandey RK. Reviving, development and protection of springs to increase water security in the Himalayan region. *Proceedings of 5th International Conference on Computer and Management Skills (ICCM)*. 2019.
5. Joshi BK. Hydrology and nutrient dynamics of springs of Almora-Binsar area, Indian Central Himalaya: Landscapes, practices and management. *Water Resources*. 2006;33(1):87–96.
6. Vashisht A. Use of mathematical techniques for determining the reliability of springs. In *Hydrological Modeling*. Springer, Cham; 2017:145–158.
7. Crow B, Sultana F. Gender, class, and access to water: The multi-dimensionalities of power and poverty. *Society and Natural Resources*. 2002;15(8):709–724.
8. Sugden F, d'Silva S, Clement F, Ramesh N, Philip V, Bharti L. A framework to understand gender and structural vulnerability to climate change in the Ganges river basin: Lessons from Bangladesh, India and Nepal. *International Water Management Institute (IWMI) Working Paper* 159. 2014.
9. Mahamuni K, Kulkarni H. Grounding springwater management in the Himalayas. *Water Security and Governance in India*. 2018:112–128.
10. Kulkarni H, Mahamuni K, Badiger S, Shrestha S. Hydrogeological governance of springs in the Himalayas. *ACWADAM Technical Report*. 2015.

How to cite this article: Ghosh P. Impact of spring rejuvenation on the status and wellbeing of women in Uttarakhand. *International Journal of Agriculture Extension and Social Development*. 2026;9(9):982-984. doi: <https://www.doi.org/10.33545/26180723.2026.v9.i9m.4303>