

**Depleting Water Resources as Non-Traditional Security Threat:**

**A Study of Drying Natural Springs in**

**Darjeeling District, West Bengal**

Thesis Summary Submitted

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# Introduction

## 1.1 Introduction

With the emergence of water out of the domain of natural sciences, it has emerged as an important source of enquiry by social scientists from the late 1980s (Thapliyal, 2011). Initially, renewable resources such as water, wind, solar, etc., were not considered critical for depletion (Thapliyal, 2011; Majeed et al., 2024). While water is traditionally accepted as a renewable resource (Marsh, 2023), it is not available unlimitedly. About 70 per cent of the world is covered with sea and ocean water. Of this, fresh water accounts for only 3 per cent, out of which two-thirds is in the form of icecaps and glaciers, and 1 per cent is found as ground water, which means 1 per cent of fresh water is available in rivers and lakes for human consumption (Ohlsson, 1995). Although the United Nations General Assembly acknowledged the right to safe and clean drinking water and sanitation in 2010 (UNGA, 2010) as a human right, it has not brought any significant change at the grassroots level even after 10 years of acknowledgment. The necessity of water for survival cannot be denied, since there is no alternative to water. With time, the use of water resources has increased and diversified because of the growth of technological know-how and population growth, urbanisation, and industrialisation (Wester, Mishra, Mukherji & Shrestha, 2019). Homer-Dixon (1999) have argued that scarcity of renewable resources like water can pave the way for civil violence, insurgencies and even ethnic clashes, and things might worsen in the coming decades as there will be increase in the scarcities of cropland, freshwater and other natural resources, especially, in the developing countries throughout the world. Johns Hopkins of Public Health, in their report published in the year 1998, estimated that 485 million people living in thirty-one countries have been through a water crisis or water stress (Bouguerra, 2003). Water has been regarded as one of the strongest natural preventive medicines accessible to governments to mitigate infectious disease. Investment here is to killer diseases, such as diarrhoea what immunisation has proved to be to measles, a life-saver (UNDP, 2006). It should be noted that diarrhoea deaths in 2004 were some six times higher than the average yearly deaths in war-torn conflicts in the 1990s (UNDP, 2006). The Human Development Report 2006 reports that more than 1.8 billion children lose their lives every year due to not having access to safe and clean water, which leads to diarrhoea and other water-related diseases (UNDP, 2006). But intellectual space for an alternative understanding

of security was opened only at the end of the Cold War (Rothschild, 1995). Water security has gradually come into the limelight as a high politics issue, making a gradual transition in the post-Cold War period. The transformation of environmental issues in general and water resources specifically from low politics to high politics is in line with the trend of broadening agenda of the security concept which is at the core of the practice of statecraft and all transformations on the international security agenda to the extent that principal actors view the issue as a high politics problem (Phanprasit, 2010).

In contemporary times, water can be seen as a non-traditional security threat because it is at the centre of a converging set of global challenges, including maintaining the food-energy-health chain across the globe (King, 2016). Initially, in the 1990's water security was linked with specific human security issues, including military, food, and environmental security. It was post the second World Economic Forum of 2000, water security was considered as an access and affordability of water, as well as human needs and ecological health (Cook & Bakker, 2012). Water entered the sphere of security studies when it had an impact on people's lives, the political security of the country, or invited confrontations between countries at the altar of peace and stability, thereby harming a country's social, political, and environmental security (Thapliyal, 2011). The World Economic Forum (WEF) declared in 2009 that "water security is the gossamer that connects the web of food, energy, climate, economic growth, and human security problems the world economy will confront in the next decades," making it a global risk (WEF, 2011). Water security, whether at the home or global level, means that everyone has access to enough safe water at a fair price to live a clean, healthy, and productive life while also preserving and improving the environment (GWP, 2000).

The scarcity of freshwater is increasing rapidly throughout the world, which has led to the question of whether, during the next decade, water shortage would emerge as one of the most significant non-traditional security concerns for international security (FAO, 2019). Water scarcity is not only a water sector issue, but it is a societal one. The shortage of basic water also restricts the social and economic development of a society. The most affected by poor quality water and waterborne diseases are the poor and marginalised individuals in developing or underdeveloped nations. Hence, there is a requirement to introduce policies and programs for water in other sectors as well (Ahn, 2024).

India is home to 1.4 billion people (Silver et al., 2023), which is almost 17 per cent of the world's population (PIB, 2024), and has access to only 4 per cent of the world's freshwater resources. Latest data show that in the year 2021, the average annual per capita water availability was 1,486 cubic meters, and this is estimated to further go down to 1,367 cubic meters by 2031 (Ministry of Jal Shakti, 2024). A country is regarded as water-stressed if the annual per capita availability is below 1,700 cubic meters, and water-scarce when it goes below 1,000 cubic meters. This is calculated based on the Falkenmark Water Stress Index (Falkenmark, 1989). With India being 132<sup>nd</sup> in the world in per capita water availability, the country is currently classified as “water-stressed” same report further states, between 1950 and 2024, India's per capita availability of surface water has gone down by 73 per cent (Ahmad & Singhal, 2025). Though India has come a long way in creating water infrastructure and resources, yet rapid growth in the industrial and agricultural sectors, along with population growth and uneven water distribution, has led to water demand over supply (UNICEF et al., 2013)

Within the broader water crisis in India, the Indian Himalayan Region (IHR) presents a unique situation with its own set of challenges different from those of mainland India. Although the region is the source of many of the major rivers, people in the mid and eastern Himalayan hills rely mostly on natural springs to fulfill their domestic, agricultural, and livestock water requirements. Natural springs serve a vital hydrological role (usually less understood and studied) in generating streamflow in non-glacier catchments as well as supporting winter and dry-season flows within most Himalayan basins (Scott et al., 2019). According to Tambe et al. (2009), 80 per cent of rural Sikkim villages rely on spring water, making it the primary supply of water for rural livelihoods in the IHR. In the region, the majority of rivers have springs as their base flow, as spring water supplies 64 per cent of the irrigated land in IHR (Rana and Gupta, 2009).

As discussed above people of the hilly region are mostly dependent on natural springs, there are 3 million springs in the Himalaya region for ensuring their water security and they are having their existence for many years is slowly on the verge of drying up (Tambe et al., 2009) which would have a direct impact on day to day lives of people living in the region. Though the Himalaya is blessed with countless perennial rivers, the mountain people who depend mostly on spring water have started facing drinking water scarcity with alarming frequency (Tambe et al., 2009). Despite their significance in water security of Himalayan

communities, playing a vital role in the livelihoods of such communities (NITI Aayog 2018; Thapa et al., 2024; Tambe et al., 2013; Khadka et al., 2019). Several studies that have been undertaken in the Himalayan region have demonstrated that spring discharge is declining or springs are drying up, contributing to water shortages and enhanced vulnerability among marginalised communities across the region (Tambe et al., 2009; Pandit et al., 2024; Thapa et al., 2024; Khawas & Sharma, 2022). Several factors have been identified contributing to Reduced spring flow, which includes increasing groundwater abstraction, topsoil degradation, erratic rainfall patterns, changes in land cover and use, forest fires, earthquakes, and infrastructure projects like building new roads (Khawas & Sharma, 2022; Chinnasamy and Prathapar 2016; Sharma et al 2016). Even after having so much importance, there lies a dearth of scientific knowledge on the hydrological cycle of springs, which further adds a layer of challenges to the mitigation plans (NITI Aayog, 2018).

The Himalayan Region receives much more average annual rainfall in comparison to the rest of the country. Even after receiving so much rainfall, most of the springs are seeing a steady decline in the discharge volume over the years. WRI (2019) study conducted between 1990-2014 shows the Himalayan Region is experiencing (4-8cm/year) of average groundwater decline (UNESCO, 2021), which is having a direct impact on the water security of the region. To contextualise here, the understanding of water security is broadly referred to as a condition where there is a sufficient quantity of water meeting quality standards at an affordable price, for sustaining both the short-term and long-term livelihoods, human well-being, socio-economic development, and ecosystem services (UNESCO, 2012). Identification of security issues from the traditional notion is easier, as they equate it with military issues and the use of force. It gets difficult when a non-military issue is brought into the debate of securitisation. Buzan, Wæver & Wilde (1998) contend that to securitise a matter means to put a matter forward as being urgently and existentially important, that is so crucial that it must not be subjected to the usual bargaining of politics but is to be addressed firmly by the top leader, side-lining other issues. Securitisation of water could be done via four mechanisms described as Water Sources, Water Infrastructure, Water Services, and Water as Socio-economic activity (UNESCO, 2021). Tennberg (1995) speaks of a concept set forth by Thomas Homer-Dixon in the environment scarcity thesis that attributes the deficit of renewable resources, along with the negative social situation, to be one of the factors leading to violent conflict, normally with deeper implications for state security. Therefore, water

security under the dwindling spring discharge scenario across the Himalayas is drawing attention towards understanding the spring systems and to analyse the water security as a non-traditional security threat. It is important to understand the consequences that these changes bring about to the day-to-day lives of the people and their water-related interactions. Against this backdrop, this study attempts to examine the water issue linking them with water security in the context of the Darjeeling Himalayan region.

## **1.2 Objectives**

- To review ideas, concepts, and debates around water resources in development and security studies
- To review the nexus between water resource depletion and non-traditional security threats
- To examine water insecurities in India and the implementation of related legislation, policies, and schemes at the national and state levels
- To assess the drying water resources of the hilly region of the Darjeeling district as a non-traditional security threat

## **1.3 Research Questions**

How are water resources factored into the development and security discourse in India?

What are the existing legislations, policies, and schemes to deal with water issues?

What are the hindrances to the implementation of different water schemes initiated by the government?

What are the critical issues and challenges faced by the people of the hilly region of Darjeeling district due to the drying up of the natural springs?

## **1.4 Research Methodology and Database**

### **1.4.1 Study Area**

This study covers the hilly region of the Darjeeling district. This research is an attempt to understand the water issues of the hilly region. Natural springs being the main source of water in the hilly region, this study has examined the impact of drying natural springs on the

water security of the region over the years. The plain region of the district was not taken into consideration for this research, as the region is not directly dependent on the natural springs. Blocks falling under the hilly region of the Darjeeling district were considered the main area of this research.

**Table 1.1. Description of Study Area**

**Darjeeling Hills**



Sl. No.	Block	No. of Villages	No. of Household	Total Population	Male Population	Female Population	SC Population	ST Population
1	Darjeeling Pulbazar	43	27,470	126,935	63,828	63,107	5,863	36,563
2	Rangli Rangliot	29	15,304	70,125	35,025	35,100	3,893	23,187
3	Jorebunglow Sukhiapokhri	42	25,468	113,516	56,232	57,284	6,415	34,088
4	Kurseong	65	20,892	94,347	47,030	47,317	8,271	29,232
5	Mirik	21	9,962	46,374	23,394	22,980	3,619	14,280

**Rangli Rangliot Block**



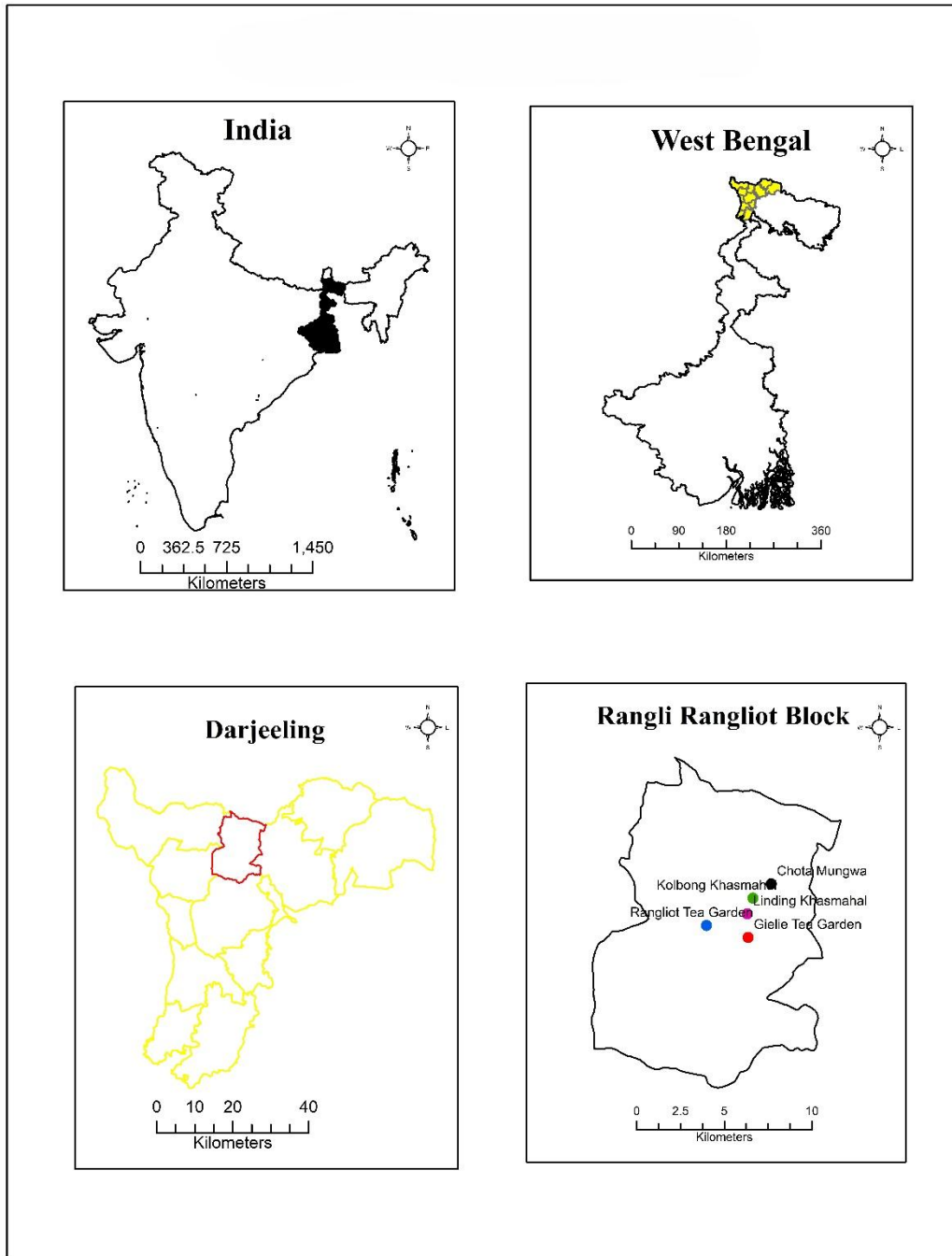
Sl. No.	Identified Villages	Total Household	Household Surveyed
1	Kolbong Khasmahal	126	24
2	Chota Mungwa	161	32
3	Linding Khasmahal	126	24
4	Rangli Rangliot Tea Garden	558	112
5	Gielle Tea Garden	776	155
7	Total	1747	347

**Profile of the Villages**



Category	Soriang Khasmahal	Percentage	Kolbong Khasmahal	Percentage	Chota Mungwa	Percentage	Rangli Rangliot Tea Garden	Percentage	Gielle Tea Garden	Percentage
Total Population	1,538	NA	602	NA	807	NA	2,616	NA	3,410	NA
Female Population	791	51.4	305	50.7	411	51	1,386	53	1,759	51.57
SC Population	36	2.34	131	39.37	78	9.67	100	3.83	112	3.28
ST Population	1,250	81.27	237	21.76	332	41.14	852	32.05	870	25.52

Source: Census Report, 2011



**Figure 1.1. Location Map of Study Area**

### **1.4.2 Data Collection and Analysis**

For this research, one block has been taken as the main area. The block was identified by looking into their dependency on natural springs. From a selected block, 15% of villages

were taken into consideration, and in selected villages, information was gathered with the help of a schedule from 20% of the total households, through a household survey using purposive sampling targeting the water users of the natural springs. Purposive sampling is used as a strategy in which informants are selected deliberately to gather important information that cannot be obtained from other choices (Maxwell, 1996). This research aims to collect information from people who are dependent on natural springs as the source of water in their day-to-day lives. Godambe (1982) argues that it is of utmost importance to be certain of the knowledge and skill of the informant when doing purposive sampling, as inappropriate informants will render the data meaningless and invalid. In this backdrop, purposive sampling has been used to determine people who are dependent on natural springs, and they have remained an important source of desired information for the sake of this research.

**Table 1.2. Methods of Data Collection**

Methods of Data Collection	Source
<p><b>A household survey</b> has been conducted with the help of a schedule in the proposed area study to understand water issues at the ground level. 15% of the villages from the selected block have been surveyed, and 20% of households in each selected village have been considered for the household survey. The household survey was conducted to collect data on daily water use, time taken to fetch water, distance of the spring from which water is collected, tap facilities at home, benefits of different government schemes, etc.</p>	Primary Sources
<p><b>Focus group discussions</b> have been conducted with key stakeholders and water users in the proposed study area. Focus group discussions are used for generating information on collective views, and the meanings based on their life experiences and beliefs (Mishra, 2016). One focus group discussion was conducted in each selected village. First discussion was conducted with senior citizens to understand traditional dimension of natural springs in the village, with young generation (20-30 age group) to get their views on emerging water issues in the village and discussion was conducted with Samaj head, Panchayat members and other key stakeholders like members of NGO's, political leaders etc.</p>	
<p><b>Interviews</b> are considered one of the most important strategies for collecting qualitative data and are used as a major data collection technique across various disciplines (DiCicco-Bloom and Crabtree, 2006). For this study, semi-structured</p>	

interviews have been conducted with different stakeholders related to the research, following open-ended questionnaires, keeping in mind the comfort of the respondent so that they don't become reluctant to answer them.

Literature related to Water Security, Non-Traditional Security, and Water Legislation in India has been reviewed to understand the water issues from different dimensions. Available central and state governments' reports, along with reports of key agencies, has been also analysed to understand the policies with regard to water resources.

**Table 1.3. Framework for Data Collection**

<b>Methods of data collection</b>	<b>Targeted Respondent</b>	<b>No. of Respondent</b>
<b>Household Survey</b>	15% of villages from the identified block, targeting water users of natural springs from the selected village, through a household survey using purposive sampling targeting the water users of the natural springs. Caste factor, tribal issues, and gender factor have also been considered while conducting the HH survey with the targeted respondents.	20% of the total households from each selected village of identified blocks for the study.
<b>Focus Group Discussion</b>	Senior citizens, young generation (20-30 age group), heads of samaj, members of panchayat, and political leaders.	One discussion in each village. 6 respondents per group. 50% of the representation has been given to women in each group.
<b>Interview</b>	Government officials (which includes officers from the Block Development office, PHED representatives, and GTA representative), Elected representatives (Sabhasads and Panchayat Members), Various experts and NGO's working in this theme.	6 Government officials, 4 elected representatives, and 8 experts and members of NGO's.

### 1.4.3 Research Approach and Analysis

There are three types of research approaches: qualitative, quantitative, and mixed methods. Qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem (Creswell & Creswell, 2017). The quantitative research approach emphasises objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and

surveys (Babbie, 2010). The mixed-methods approach, on the other hand, is a process in which the researcher integrates qualitative and quantitative methods of data collection and analysis to best understand the research problem than either approach alone (Clark & Ivankova, 2015). For research under consideration, a mixed methods approach aptly fits as both the techniques of data collection have been proposed. Qualitative data has been collected through interviews and focus group discussions, and quantitative data has been collected through House Household Survey with the help of a closed-ended schedule.

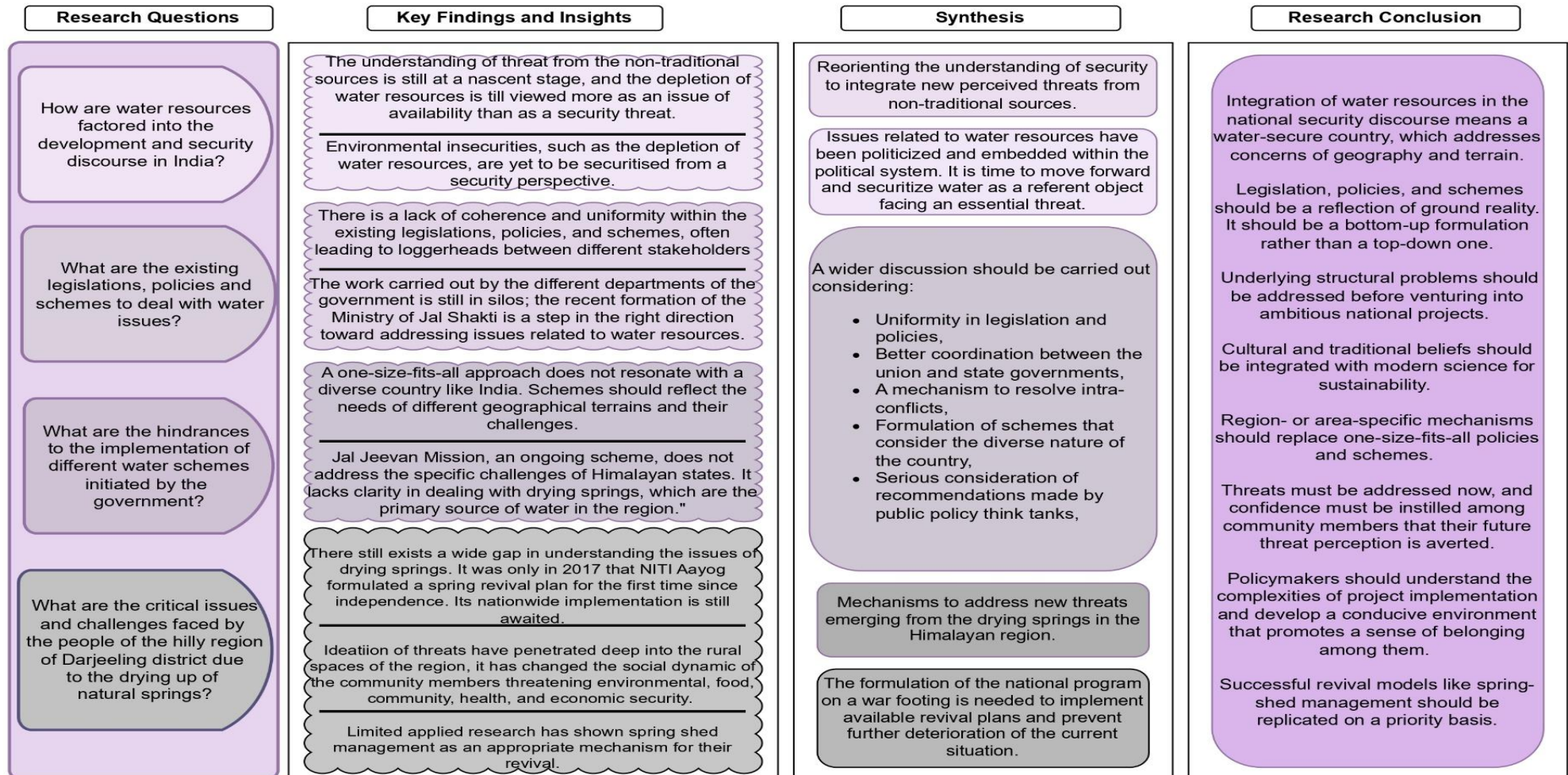
Data collected from the field has been analysed using simple statistical tools and techniques. The analysed data is presented with the help of diagrams and graphs. Household surveys (n=347), Focus Group Discussions(n=5), and Structured and Semi-Structured Interviews(n=10) has been translated and transcribed with help of bilingual individuals as needed.

**i. Focus Group Discussion:** FGD is a way of collecting data which, under normal circumstances, involves engaging a small group of people in an informal group discussion, ‘focused’ around a particular topic or set of issues (Wilkinson, 2004). Conversation analysis within a qualitative data analysis technique has been used for analysing data collected from focus group discussions. Heritage (2004) argues that this form of analysis appears to be justifiable for focus groups because an underlying assumption of this technique is that it is primarily through interaction that people build social context. Conversation analysis allows researchers to analyse an array of actions and emotions such as joking, frowning, agreeing, debating, criticising, and using sarcasm. Conversation analysis focuses more on the participants' analysis/understanding of the interaction than on the researcher's analysis/understanding (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009).

**ii. Structured and Semi-Structured Interview:** Data collected from both Structured and Semi-Structured interviews has been analysed using thematic analysis. This data analysis method enables the researcher to identify commonly recognised patterns and relationships to meaningfully answer the research questions of the study. Braun and Clarke (2013) argue that this method involves seven steps: transcription, reading and familiarisation, coding, searching for themes, reviewing themes, defining and naming themes, and finalising the analysis.

**iii. House Hold Survey:** Quantitative data collected from the HH surveys has been cleaned using Excel and analysed using Statistical Package for the Social Science (SPSS).

**Figure 1.2. Schematic of Findings, Synthesis, and Research Conclusion**



## 1.5 Analytical Reflection on Research Findings

This research was designed with the overarching aim of expanding the present knowledge of security. To include how the new form of security threats is perpetuating in the Himalayan region could be conceptually brought under the debate within the ambit of the NTS framework. The research focused on elaborating upon how the drying springs are a multifaceted problem and, over the years, have emerged as a serious security threat to this country from the northern geography. That happens to be the Himalayan landscape. This was carried out systematically with the case studies drawn from across the globe as secondary sources and it was supplemented with the primary data collected from the study area with the help of household surveys, FGD's and interviews of community members and different stakeholders who are associated with this current distress brought by the drying springs.

### **a. Research Question 1.** How is water resource factored into the national security discourse?

The security discourse in India still revolves around a threat that has been perceived from conventional sources like the military or warfare. This has been even contested at various instances, citing the cases of major setbacks like the Indo-Sino war of 1962; nevertheless, the smiling Buddha, a nuclear proliferation of the 1970's showed India following the path of traditional security. Which continues even today, the priority has been given to developing and enhancing hard power, which is often seen as a tool of deterrence. This was even reflected in the speech of the former National Security Advisor of India at the 14<sup>th</sup> Asian Security Conference in New Delhi, where he cautioned against broadening the concept of security; he emphasised it did not help expand too much, as it dilutes the very essence of security. This is more or less a reflection of the thought process of understanding security in India. New threats that are on the rise do not find their place in the national security discourse. NTS in India is still at the nascent stage, wherein the research is very limited to change the outlook on these issues. In the context of resources, particularly water resources, this issue has found a place on the national agenda and has remained a national priority over the years. However, it remains largely absent from the security discourse. This could be understood with the help of securitisation model as discussed in chapter 2, water resource in India until 1980's was not part of the political system as it was not visible in the public speeches of the politicians thus it was 'non-politicised' entity which didn't warrant state's interference to cope with it.

Water resources in the 1980s were a long way from being recognised as scarce assets warranting political attention or action for electoral benefits. Unless a resource becomes scarce to the point where it can garner votes, it typically does not enter the “speech” or “act” of political parties, both corresponding to the perceived urgency of an issue. This started changing slowly in the 1980s, initially with the introduction of the National Drinking Water Mission (NDWM) in 1986, as awareness about water scarcity increased.

Water resources slowly started to be mentioned in political speeches and subsequently found a place in the political agenda. They began to find a mention in both political rhetoric (“speech”) and policy implementation (“act”), paving the way for national programs aimed at ensuring water availability to the general public. This period marked the ‘politicised’ second stage of the securitisation model. Even today, water resources continue to be part of this stage, just one step short of full securitisation. At present, water issues are at the centre stage in both political speech and action. Schemes that once focused on the sections of the society, now started targeting precisely households and individuals (e.g., the Jal Jeevan Mission), reflecting a per capita approach. Though water resources have not yet entered the final stage of the securitisation model—where an issue is officially recognised as a matter of national security—they are approaching that threshold.

**b. Research Question 2.** What are the existing legislations, policies, and schemes to deal with water issues?

India is a democratic nation where the people are supreme; therefore, it is the voice of the people that echoes in the decision-making in the form of policies, laws, and schemes. The federal nature of the nation gives water primarily as a state subject in the Seventh Schedule of the Indian Constitution. Yet the Union Government controls some areas, thereby complementing state efforts from time to time through national legislation, policies, and schemes. Chapter 3 of the study discusses in detail the provisions of the current law, policies, and schemes, and the issues of availability and management of water. Lack of coherence and consistency among various laws, policies, and schemes is one of the primary issues in the current system of governance, which hinders effective and coordinated governance. For instance, India has developed three National Water Policies, the most recent in 2012, but nothing in any of them refers to springs, springshed management, or groundwater-spring interaction. The Himalayan region is only mentioned in the context of environmental concerns during planning processes. This governance challenge is not just restricted to policy

papers. Ministries and departments function in silos with parallel schemes in operation, resulting in confusion and inefficiency on the ground upon implementation. For example, in the study area, various schemes are being implemented by the different ministries, which include the Ministry of Panchayati Raj, the Ministry of Rural Development, the Ministry of Tribal Affairs, the Ministry of Health and Family Welfare, and the Ministry of Agriculture and Farmers' Welfare.

Surprisingly, some households have two or three tap water connections, but none have a regular water supply since springs have dried up. The common murmurs that echo in the villages are therefore 'a tap without water.' There has been, nevertheless, a gradual move to offset this fragmentation by the creation of the Ministry of Jal Shakti, which seeks to bring together several water-related departments at the level of one administrative unit.

**c. Research Question 3.** What are the hindrances to the implementation of different water schemes initiated by the government?

India, being a vast and diversified country, has tremendous opportunities, but then also has its constraints. Planning and implementation of schemes in such a vast and diversified landscape is a humongous task. Policies are thus made on a large, generalised level. This tends to overlook far-flung geographical areas, as these cannot be easily accommodated in the modalities of national schemes. This pattern has been observed over the years and is discussed in Chapters 4 and 5, which outline examples and issues experienced by officials and other stakeholders in the roll-out of national schemes. One of the primary issues that arises from this debate is the mindset of policymakers that a "one size fits all" solution will suffice, irrespective of geographical variation and context-specific needs. Water-related schemes, in particular, have been primarily designed to meet the needs or challenges of the plains or mainland. Which often do not resonate with the other forms of geographical landscape, such as mountainous or tribal regions. This led to poor outcomes and missed targets. Therefore, there is an urgency to include diverse perspectives in policy formulation, which may include even a bottom-up approach, ensuring national schemes are designed to meet regional ground realities. These should include local cultural beliefs and traditional knowledge, which are regarded by the community members of these societies and have been successfully used to conserve natural resources for generations. In connection with my research, it has become evident that drying springs are a major concern in the region, significantly contributing to water scarcity and insecurity. Even though the Jal Jeevan

Mission, an ongoing national scheme, has understood the problems of the Himalayan region, it is detached from ground realities. This disconnect has led to new social tensions in rural areas, as the scheme often focuses on expanding water distribution from existing sources, many of which are themselves rapidly depleting. This jeopardises the already fragile water distribution system. There is an urgent need to overhaul the current approach. The focus has to be on the rejuvenation of drying springs. After all, simply linking household tap installations does not assure water supply, especially if the depletion of spring sources continues unchecked.

**d. Research Question 4.** What are the critical issues and challenges faced by the people of the hilly region of Darjeeling District due to the drying up of the natural springs?

Drying springs have emerged as a critical concern that has been directly impacting millions of community members who depend upon them. The members of the community have already experienced profound distress and growing desperation with the ongoing decrease in spring discharge, leading to an escalation of issues of a complex nature in rural Himalayan environments. The voices within the region illustrate this sense of abandonment, with many feeling they are no longer heard by decision-makers. The ideation of “threats” has gradually penetrated the rural consciousness, with communities beginning to see spring depletion as a new and form of societal threat—one that was largely unaccounted until recent years. Per capita water use has fallen well below the national mandate, affecting not only human populations but also livestock and wildlife. This has created new forms of social tension surrounding access to water, changing local social dynamics. In this context, the government's vision of an Atmanirbhar Bharat (self-reliant India) and Vocal for Local comes under extreme pressure. More and more people have started leaving agriculture and opting for blue-collar employment, evident in a steep fall in the net sown area during the last two decades. Chapter 6 of this research discusses the challenges posed by drying springs in detail, and Chapter 5 describes the various causes for the same. Despite the seriousness of the problem, the risk of spring depletion has barely been observed in national policy formulation. It was in 2017 that NITI Aayog prepared the first national springs revival plan, more than 70 years after independence. Similarly, it was only in 2022 that the Central Groundwater Board conducted its first groundwater estimation in Himalayan districts like Darjeeling, beyond the old ‘20 per cent slope.’ This timeline reflects the low priority accorded to the issue at the national level, where policies are generally made. However, there have been some indications

of a shifting paradigm in recent years. For example, the policy change from the “Look East” to the “Act East” policy is an indication of growing attention to Northeast India. This momentum has to be carried forward by carrying out NITI Aayog’s suggestions for the rejuvenation of Himalayan springs in a holistic national plan.

## **1.6 Integrated Synthesis and Conclusion**

### **i. Key findings and research insights**

This research has attempted to unravel the least understood water system in India, which has indirectly been contributing to and supplying to major chunk of the Indian plains. The limited knowledge of springs, which exists in the ivory of education, has led to an understanding that water comes from the tap and or the dam has eroded the very idea of water formation in the Himalayan region, which remains key for uninterrupted water supply. The ignorance of springs in the larger context of watersheds, aquifers, rivers, and reservoirs has propelled the wider ignorance, which is reflected in larger gaps in policy and practice in developing a national plan for the strategic management of springs in India. The investigation carried out in my research has aligned the threat emanating from the depletion of water resources with the existing conceptual framework linking local issues with the globally accepted concepts to mainstream the voices, issues, and challenges faced by the community members of this region. Chapters 5 and 6 have elaborated on the very nature of challenges, which have been a reflection of the ignorance received by them over the years. As the nation is preparing to fulfill per capita water consumption of 55 LPCD and here is the region where the people are forced to limit their per capita consumption much below the mandate which is expected to fall further below as shown in the projection with the ongoing rate of spring discharge decline and sadly this not expected to change even after the implementation of the ongoing scheme. My investigations on this have identified the threat perceptions among the community members, This reflection is an indication of the larger security concerns brewing in the entire Himalayan region, which has been presented through a case study of Darjeeling hills. As shown in Figure 7.1, findings are well defined, which is reflected throughout my research thesis. For the clarity of understanding to readers, here I list the key major quantitative findings:

- In the study area, per capita water consumption stands at 42.57 LPCD, which is below the national mandate of 55 LPCD for the rural areas.

- Springs are experiencing a steady decline. Monitoring of three springs in the study area has shown a decline of 15 per cent over the last four years.
- If the current rate of spring discharge continues, per capita consumption could decrease by 15.86 per cent by 2031.
- At present, 80 per cent of women are engaged in fetching water, spending an average of 730 hours per year. This burden is expected to increase
- Social tensions have risen among community members, with 43 per cent of respondents reporting disputes or conflicts related to water resources.
- The region has seen a 56.53 per cent decline in paddy cultivation in the last two decades, and drying springs have been identified as the major contributor.
- On average, 53 per cent of households depend on a single spring as their primary water source.
- In the last thirty years, at least one spring has completely dried up, and one has become seasonal in the region.
- Physical, chemical, and microbiological analysis conducted on the two springs shows the traces of microbial activity, which raises serious health concerns.
- Around 30 per cent of the respondents have perceived environmental insecurity, and 28 per cent of respondents have perceived economic insecurity with the drying of the springs.

The findings suggest that drying of the springs has brought serious security concerns, which should not be ignored and should find a place in the national security discourse. Further policy policymakers and government officials should reflect these challenges emerging from the Himalayas in the national schemes, paving the way to timely mitigate, which aptly fits in the framework of disaster risk reduction. The case studies drawn in my research are a symbolic representation of the entire Himalayas; thus, the findings should be seen and understood from a broader horizon, which encompasses a vast geographical terrain, which is very significant from India's strategic and security point of view.

## **1.7 Research Limitations and Future Research Directions**

### **i Research Limitations**

This research has several limitations. It focuses particularly on the rural spaces of the Darjeeling hills and, in doing so, does not include the issues and challenges faced by community members living in urban areas. The omission of urban spaces may have led to the exclusion of additional dimensions that could substantiate the understanding of the overall issues and challenges. Therefore, some of the findings are context-specific and may not resonate at a broader level, highlighting the need for future studies that may include perspectives from the urban spaces for a more adequate representation. As found with the case study-based research, this somewhat limits the findings of this research for the larger context. Moreover, the availability of spring data, particularly regarding spring discharge rates and water quality, is limited. Expanding this data set in future research could help unravel deeper structural problems linked to spring depletion and water insecurity in the Himalayan region.

### **ii. Research Directions and Recommendations**

This research aims to contribute to the limited existing literature on the depletion of water resources and non-traditional security threats. By drawing on case studies from rural areas of the Darjeeling hills, this study adds to a body of work that has long been under-researched in both academic and policy discourses. As previously discussed, the focus has been on a rural setting within the Eastern Himalayas, a region that has not received sufficient research or policy attention. The findings indicate the emergence of a new paradigm in security threats originating from the Himalayas, particularly through the lens of drying springs, which remain vital lifelines for millions inhabiting the Indian Himalayan Region. This reflects the need for future research to expand the geographic scope towards the larger Himalayan range, further strengthening the discourse on non-traditional security threats and advocating for the inclusion of such issues in the national security framework. This research has also highlighted several critical challenges, reflecting a historically ignorant approach by the policymakers. The insights generated here can serve to broaden the existing security framework to incorporate pressing challenges arising from the rural spaces of the Himalayas. For practitioners, the spring shed management model discussed, particularly those involving traditional, community-based institutions, could be vital in improving water security and

delivering everlasting, sustainable, ground-level change. Based on the findings of this research, the following recommendations are proposed to address the challenges posed by the current water distress:

- The existing notion of security must be revisited to incorporate new variants of threats that have arisen over the years. Problems like water resource depletion need to be properly addressed.
- Springs and spring-shed management need to be integrated into national water policies. Surprisingly, three current policies have overlooked this aspect.
- A granular, long-term dataset of spring discharge should be created. This will, in the long term, assist in developing a water security and Spring-shed management plan for the region.
- There must be coherence and uniformity in existing legislation, schemes, and programs. This remains one of the biggest issues for the governance and management of water resources in India.
- There is a lack of research on this subject. A larger, coordinated effort is urgently needed to carry out empirical research on springs. Springs are not merely sources of water—they represent a larger ecological and cultural heritage that demands attention and inclusion in broader discourse.
- Policy-making in the Himalayas must be a bottom-up process, because this region is inhabited by indigenous people who have been the traditional custodians of these precious resources over generations.
- Successful models like spring-shed management for rejuvenating springs must be taken up on a national scale, on a priority basis for the Himalayan states/region.
- Springshed management needs to be incorporated into the Himalayan Disaster Risk Reduction framework at the regional level to ensure sustainable water security. A transboundary approach is necessary because the water towers of Nepal and Bhutan have a significant impact on the availability of spring water in the Indian Himalayan region.
- National programs such as Jal Jeevan Mission (JJM) need to be designed for the specific needs of the Himalayan region. Traditional knowledge and cultural beliefs need to be combined with modern science to make it sustainable. Budgetary provisions need to emphasise spring-shed management over convergence with MPLADS, MLALADS, or CSR.

## **1.8 Concluding Remarks**

Understanding of depletion of water resources or drying of the springs from the prism of security discourse is still at the nascent stage, but its rapidly evolving across the globe. The overarching goal of this research was to understand how the drying of springs is emerging as a non-traditional security threat and could be positioned within the realm of wider understanding of security discourse. The aim of the research was well established and has been demonstrated throughout this research work.

The thesis introduces an important topic into the academic discourse for the consideration of academicians, policymakers, and practitioners. This work anticipates further fueling the discussion and ensuring that the recommendations put forth are reflected at the national level, addressing the serious concerns demonstrated by this thesis. It is high time for policymakers, security thinkers, and strategists to understand the threat emanating from the Himalayas of India. The threat that has been embroiling the region is not the traditional one sponsored by the long-time adversaries on the northern border, which requires hard power to overcome. Rather, it is a non-traditional threat, directly challenging vital resources, which requires changes at the policy level. If not taken seriously, this could pose a significant threat to the water security of the entire Indian subcontinent; therefore, in terms of research, policy, and implementation, springs ought to be a national priority.