सत्यमेव जयते

स्प्रिंग की प्रथम गणना रिपोर्ट
FIRST SPRING CENSUS REPORT

VOLUME - II, PART II

ANDHRA PRADESH, ASSAM, GOA, MAHARASHTRA, MANIPUR,
ODISHA, RAJASTHAN, TELANGANA, TRIPURA, WEST BENGAL



भारत सरकार
GOVERNMENT OF INDIA
जल शक्ति मंत्रालय
MINISTRY OF JAL SHAKTI
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION

Report of the
First Census of Springs
(Volume -II, Part-II)

(Andhra Pradesh, Assam, Goa, Maharashtra, Manipur, Odisha, Rajasthan, Telangana, Tripura, West Bengal)



Government of India
Ministry of Jal Shakti
Department of Water Resources, River Development and Ganga Rejuvenation
Minor Irrigation (Statistics) Wing

सी आर पाटील
C R Paatil



सत्यमेव जयते

जल शक्ति मंत्री
भारत सरकार
Minister of Jal Shakti
Government of India

MESSAGE

Springs play a vital role in local communities, providing essential resources for drinking water, irrigation, and livestock care. Beyond their practical importance, springs hold cultural and spiritual value, often regarded as sacred by the local populations. However, overexploitation and the impacts of climate change threaten the sustainability of these water sources. Protecting and restoring springs through community-driven management and scientific interventions is crucial to ensuring water security and maintaining the delicate ecological balance of mountainous regions. Springs are not only natural resources but lifelines for both biodiversity and humanity.

To effectively manage these vital resources, it is essential to establish a systematic database and implement periodic monitoring. Such data is invaluable for the development of springshed management projects and for advancing scientific understanding of spring systems. Since 1986-87, the Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, has been conducting a Minor Irrigation (MI) Census under the centrally sponsored scheme 'Irrigation Census'. Six MI censuses have been completed, with the First Census of Water Bodies conducted in convergence with the 6th MI Census during the period 2019-2022.

In light of the growing need for springshed management to enhance water recharge and increase water yield in mountainous regions, the Ministry of Jal Shakti is undertaking the first-ever nationwide Spring Census. This census will encompass all springs across the country, with geo-tagged data collected digitally. This ambitious initiative is critical for safeguarding the nation's water resources and ensuring future water security.

The State-wise Report of the 1st Census of Springs (Volume II) for six States/UT, namely, Bihar, Karnataka, Kerala, Ladakh, Sikkim and Tamil Nadu was published on the occasion of India Water Day, 2026. The present Report of the 1st Census of Springs (Volume II, Part-II) is in respect of the States of Andhra Pradesh, Assam, Goa, Manipur, Maharashtra, Odisha, Rajasthan, Telangana, Tripura and West Bengal and will serve as a foundational reference for policymakers and implementing agencies to ensure the effective planning and execution of springshed management interventions in these States.

I extend my sincere congratulations to the Minor Irrigation (Statistics) Division, DoWR, RD&GR, Ministry of Jal Shakti, for bringing out this highly useful and comprehensive document in collaboration with the scientists of the National Institute of Hydrology, Roorkee and technical support from NIC.

I am confident that this report will benefit States, UTs and the Central Government Departments, academic and research institutions, non-governmental organisations, and other stakeholders, and will contribute significantly towards the conservation and rejuvenation of these pristine water resources, thereby ensuring their sustainable flow for future generations.

C R PAATIL

जल शक्ति अभियान
संचय जल, बेहतर कल

Office : 210, Shram Shakti Bhawan, Rafi Marg, New Delhi-110 001
Tel: No. (011) 23711780, 23714663, 23714200, Fax : (011) 23710804
E-mail : minister-jalshakti@gov.in

डॉ. राज भूषण चौधरी
Dr. Raj Bhushan Choudhary

सत्यमेव जयते

जल शक्ति राज्य मंत्री
भारत सरकार
नई दिल्ली-110001
MINISTER OF STATE FOR JAL SHAKTI
GOVERNMENT OF INDIA
NEW DELHI - 110001



Message

Springs are the lifeline of the people residing in the mountainous regions of our country and approximately 200 million Indians, constituting around 15% of the country's population, depend on springs for their daily water needs. These springs are widely distributed across the mountainous areas, nourishing countless small and large streams that support the growth of civilization, agriculture, industry and economic activities in our nation. Protecting and restoring springs through community-led management and scientific interventions is crucial for water security and ecological balance in mountainous regions. Springs are vital not just for human use but also for biodiversity.

Recognizing the importance of springs for water as well as ecological security, now the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR), Ministry of Jal Shakti, Govt. of India has placed these traditional water resources as highest priority for sustaining the sources across the country. However, it has been observed that non-availability of basic scientific data on these traditional water resources are the major causes due to which springs could not receive due importance in the policy and planning. Therefore, the development of a scientific database and further identifying the vulnerable springs, becomes imperative for managing water requirements for various developmental and household needs.

To address the need for improved springshed management and enhanced groundwater recharge, the Department of Water Resources, River Development and Ganga Rejuvenation (DoWR, RD&GR), Ministry of Jal Shakti, Government of India, successfully undertook the first nationwide Spring Census. This landmark initiative has generated a comprehensive, geo-tagged database of springs across the country and represents a significant step towards safeguarding India's water resources and strengthening long-term water security.

The State-wise Report of the 1st Census of Springs (Volume II) for six States/UT namely Bihar, Karnataka, Kerala, Ladakh, Sikkim and Tamil Nadu was published on the occasion of India Water Day, 2026. The present Report of the 1st Census of Springs (Volume II, Part-II) is in respect of the States of Andhra Pradesh, Assam, Goa, Manipur, Maharashtra, Odisha, Rajasthan, Telangana, Tripura and West Bengal and will serve as a foundational reference for policymakers and implementing agencies to ensure the effective planning and execution of springshed management interventions in these States.

The completion of the First Spring Census for the above States/UTs is the result of months of dedicated and sustained efforts by the officials of the Minor Irrigation (Statistics) Division and the scientists of the National Institute of Hydrology, Roorkee. I congratulate the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, for conceptualising and implementing this important programme.

(Dr. Raj Bhushan Choudhary)

215, श्रम शक्ति भवन, रफी मार्ग, नई दिल्ली -110 001, 215, Shram Shakti Bhawan, Rafi Marg, New Delhi-110 001
दूरभाष : (011) 23708419, 23718759, Tel. : (011) 23708419, 23718759
ई-मेल/E-mail : mos-mowr@nic.in

अर्चना वर्मा, भा.प्र.से.
सचिव
ARCHANA VARMA, IAS
Secretary



सत्यमेव जयते

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION

FOREWORD

Springs are the visible expression of groundwater and constitute the primary source of drinking water for millions of people living in the mountainous regions of India, including the Indian Himalayan Region, Western Ghats, Eastern Ghats and Central Indian highlands. These springs support domestic needs, river baseflow, biodiversity and local livelihoods. However, climate change, population pressure, deforestation and unplanned development have severely impacted their recharge zones, leading to drying and seasonal behaviour of many springs. Despite their importance, springs remained inadequately documented and insufficiently integrated into water resource planning due to the absence of a systematic database.

Recognising this critical gap, the Department of Water Resources, River Development and Ganga Rejuvenation (DoWR, RD&GR), Ministry of Jal Shakti, Government of India, accorded high priority to spring conservation and launched the First Spring Census with technical guidance from the Steering Committee on Springshed mapping and management.

The Ministry has published a State-wise Report of the 1st Census of Springs (Volume II) for six States/UT, namely, Bihar, Karnataka, Kerala, Ladakh, Sikkim and Tamil Nadu on the occasion of India Water Day, 2026. The present Report of the 1st Census of Springs (Volume II, Part-II) is in respect of the States of Andhra Pradesh, Assam, Goa, Manipur, Maharashtra, Odisha, Rajasthan, Telangana, Tripura and West Bengal and will serve as a foundational reference for policymakers and implementing agencies to ensure the effective planning and execution of springshed management interventions in these States.

This State-wise Report of the 1st Census of Springs (Volume II, Part-II) is an important outcome of that effort and provides a robust scientific basis for planning and implementing springshed management interventions in these states.

I commend the officers of DoWR, RD&GR and the experts associated from NIH, Roorkee with this initiative for their sustained efforts in completing this pioneering exercise. I am confident that this report will serve as a key reference for State Governments and implementing agencies and will significantly strengthen evidence-based policy, scientific planning and coordinated action for conservation and rejuvenation of springs, thereby contributing to long-term water and ecological security in mountainous regions of the country.

(Archana Varma)

श्रम शक्ति भवन,रफी मार्ग, नई दिल्ली-110 001 / Shram Shakti Bhawan, Rafi Marg, New Delhi-110 001
Tel. : 011-23710305, 23715919, Fax : 011-23731553, E-mail : secy-mowr@nic.in, Website : http://www.mowr.gov.in

Navanita Gogoi



Priyanka Kulshreshtha



सत्यमेव जयते

भारत सरकार/Government of India
जल शक्ति मंत्रालय/Ministry of Jal Shakti
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
DEPTT. OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
लघु सिंचाई सांख्यिकी / MINOR IRRIGATION (Stat.)

Preface

Recognizing the increasing concern over springs depletion, a Working Group of NITI Aayog emphasized the need for a systematic national inventory and mapping of springs. A national inventory is essential to assess the current status of springs across the country, identify vulnerable and critical springs, and ensure their protection during infrastructure development and expansion activities. It would also enable the preparation of robust, actionable Detailed Project Reports (DPRs) for the effective implementation of Springshed Management Programmes in the future. Measurement and mapping of springs constitute the first and most critical step toward conserving this vital resource, particularly in the context of unplanned construction and climate change-induced hydrological variability.

Keeping in view the strategic importance of springs in ensuring water security in mountainous regions, the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD&GR), Ministry of Jal Shakti, initiated the first-ever Springs Census in the country. The 1st Springs Census has been undertaken, along with the 7th Minor Irrigation (MI) Census and the 2nd Census of Water Bodies under the Centrally Sponsored Scheme "Irrigation Census".

The objective of the Springs Census is to generate reliable, standardized, and geo-referenced data on springs across the country to support evidence-based planning, scientific springshed management, and informed policy formulation at the State and National levels.

On the occasion of World Water Day, Volume II of the Report of the First Spring Census was published for early-completing States and a Union Territory—Bihar, Karnataka, Kerala, Ladakh, Sikkim and Tamil Nadu. The present Report of the 1st Census of Springs (Volume II, Part-II) is in respect of the States of Andhra Pradesh, Assam, Goa, Maharashtra, Manipur, Rajasthan, Telangana, Tripura and West Bengal and will serve as a foundational reference for policymakers and implementing agencies to ensure the effective planning and execution of springshed management interventions in these States. All the data has been captured through an Android-based mobile application and managed through a centralized web platform control at the Block, District, State, and Central levels.

A special word of appreciation to the then Secretary, DoWR, RD&GR, Shri V.L. Kantha Roa and the then Additional Director General, Mrs. Pally Kundu, who have been source of inspiration to all of us and have given leadership qualities in the conduct and completion of entire census process.

(Navanita Gogoi)

(Priyanka Kulshreshtha)

कमरा नं. 2, दूसरी मंजिल, बी विंग, लोक नायक भवन, नई दिल्ली–110003
Room No. 2, 2nd Floor, B Wing, Lok Nayak Bhawan, New Delhi-110003
ई–मेल / Email: adg-mowr@nic.in, टैलीफोन/Phone : 011-24691080

Table of Contents

Sl. No.	Chapters	Page No.
1.	Chapter-I: General Background	1-3
2.	Chapter-II: Methodology for 1st Census of Springs	4-5
3.	Chapter-III: State/UT wise Reports	6-55
	3.7 Andhra Pradesh	7-10
	3.8 Assam	11-15
	3.9 Goa	16-20
	3.10 Maharashtra	21-25
	3.11 Manipur	26-30
	3.12 Odisha	31-35
	3.13 Rajasthan	36-40
	3.14 Telangana	41-45
	3.15 Tripura	46-50
	3.16 West Bengal	51-55
Annexure-I : Schedule for 1st Census of Springs		56-58
Annexure-II : Scrutiny Check Points		59
Annexure-III : Validation Check Points		60

Chapter-I

General background

1.1 Background

Springs, defined as natural discharge points of groundwater emerging at the surface, constitute a critical source of water in the mountainous regions of the country. These springs provide drinking water, domestic supply, and livelihood support to a substantial segment of the population. The dependence on springs is particularly significant in the Indian Himalayan Region (IHR), the Western Ghats (Sahyadri range), the Eastern Ghats, and parts of Central India including Satpura and Vindhya ranges.

As per the estimates of the Working Group constituted by NITI Aayog in its report titled "Inventory and Revival of Springs in the Himalayas for Water Security" (2018), 15 percent (about 200 million) of the country's population relies directly or indirectly on spring water to meet its water requirements.

Consequently, the 23rd Report (2022–23) of the Parliamentary Standing Committee on Water Resources urged the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD&GR) to take necessary measures for revival and sustainable management of springs in the mountainous regions of the country, where a significant population depends exclusively on spring water for drinking, domestic, and agricultural needs.

Accordingly, DoWR, RD&GR constituted a steering committee on "Springshed Mapping of Indian Himalayan Region (IHR) Including Mountainous Regions of the Country and Springshed based Watershed Management Plan" to expedite the springshed management work in the country. The Committee assessed the existing framework for springshed management in the country and identified the absence of a systematic mechanism, uniform formats, and standardized techniques for spring and springshed mapping as the primary constraint. To address this critical gap, the Committee prepared a Resource Book on "Springshed Management in the Mountainous Regions of India", which serves as a technical guidance document for agencies and departments undertaking spring and springshed mapping across the country.

1.2 Importance of Springs in Mountainous Regions

The strategic importance of springs in these regions underscores their role in sustaining water security, ecological balance, and rural livelihoods. In hilly and mountainous terrains, human settlements are predominantly located along ridgelines due to strategic, safety, and climatic considerations. Rivers generally flow through deep valleys, while glaciers and other perennial sources lie at higher elevations, making water abstraction from such sources technically challenging and economically unviable. Under these conditions, local springs function as the primary, and often the only, source of water for drinking, domestic use, and to some extent for agricultural activities for mountain populations.

Springs also play a crucial role in sustaining baseflows of rivers during lean seasons, thereby maintaining downstream hydrological regimes. It is widely acknowledged that, a substantial proportion of rivers in mountainous regions derive a part of their dry-season discharge from spring-fed systems. Consequently, springs constitute a critical natural asset for ensuring water security and mitigating scarcity in mountain ecosystems.

1.3 Need for Spring Mapping

Recognizing the increasing concern over spring depletion, Working Group–I of NITI Aayog emphasized the need for a systematic national inventory and mapping of springs. Such an inventory is essential to assess the current status of springs across the country, identify vulnerable and critical springs, and ensure their protection during infrastructure development and expansion activities. It would also enable the preparation of robust, actionable Detailed Project Reports (DPRs) for the effective implementation of springshed management programmes in the future.

The rationale for spring mapping is guided by the principle that "what is not measured cannot be managed." Accordingly, measurement and mapping of springs constitute the first and most critical step toward conserving this vital resource, particularly in the context of unplanned construction and climate change–induced hydrological variability.

1.4 Launch of the First Spring Census

Considering the strategic importance of springs and the crucial need for its measurement, mapping and systematic national inventory, the DoWR, RD&GR launched the first-ever Spring Census of the country. The Spring Census was undertaken concurrently with the 7th Minor Irrigation (MI) Census, the 2nd Census of Water Bodies and the 1st census of Major and Medium Irrigation Projects under the Centrally Sponsored Scheme "Irrigation Census" with the reference year 2023–24.

The objective of the Spring Census was to generate reliable, standardized, and geo-referenced data on springs across the country to support evidence-based planning, scientific springshed management, and informed policy formulation at the State and National levels. The First Spring Census was conducted entirely in digital mode, with auto filled State/District/Sub-District (Development Block) / village LGD codes in the mobile app of the enumerator. The hierarchy used in LGD codes is State/ District/ Sub District (Development Block)/villages in rural area and State/ District/ Town/Ward in urban area. The data was captured through an Android-based mobile application and managed through a centralized web platform control at the Block, District, State, and Central levels.

The mobile and web applications for the Spring Census were launched by Shri C. R. Paatil, Hon'ble Minister of Jal Shakti, on 03 April, 2025.



Fig. 1.1 Launching of the Web and Mobile Applications for the 1st Census of Springs by the Hon'ble Union Minister and the Hon'ble Minister of State for Jal Shakti

1.5 Definition of a Spring

A spring is a focused discharge of naturally occurring groundwater on the Earth's surface. In general, springs can be seen either as free flow or seep spring.



Fig. 1.2(a) Free flow spring

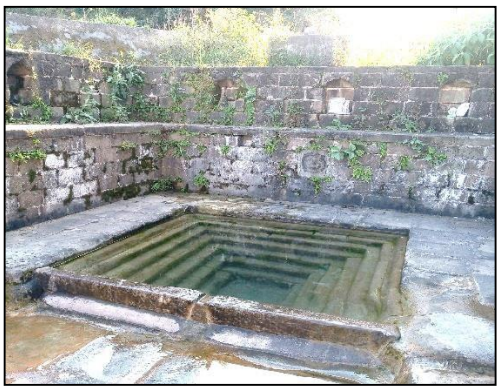


Fig. 1.2(b) Seep Spring

The detailed information on spring like type of spring, nature and discharge from spring, temperature, dependency on spring, prominent land cover, resource threat and degree of threat etc. were collected during the census. The Schedule for 1st Census of Springs is given in the Annexure-I.

Chapter-II

Methodology for the First Census of Spring

2.1.1 The first Census of Springs was conducted entirely digitally through a mobile application, eliminating the need for paper-based data collection. The ultimate unit of enumeration was the village in rural areas and ward in urban areas. To ensure smooth execution, nodal departments in States/UTs designated State Level Officers (SLOs), District Level Officers (DLOs), Block Level Officers (BLOs), and Enumerators. The SLO was responsible for creating user accounts at the district level, which was cascade down to block-level officers, who will then assign villages to enumerators. Each village/ward was assigned to a single enumerator, ensuring no duplication.

2.1.2 The enumerator began by surveying all springs by the village. Spring located in the forest was entered under the nearest village. The mobile application, functioning in both online and offline modes, was used for data collection, requiring enumerators to capture latitude/longitude and images of each Spring.

2.1.3 Six regional training workshops were conducted including hands on training in field visit. Following the regional workshops, State-level and District-level training programmes were organized by the States with the support of Central teams. In addition, several online sessions were conducted to build proficiency among State agencies in the use of the mobile and web applications. A dedicated Help Desk was also established by NIC to ensure continuous technical support to the implementing agencies.

2.2 Field work

2.2.1 The First Spring Census was conducted under the overall charge of the nodal department of the concerned State/UT. In certain States, the fieldwork was undertaken directly by the nodal department, while in others it was entrusted or outsourced to agencies considered appropriate by the respective State/UT Governments, keeping in view the available infrastructure and field capacity.

2.2.2 The primary task of data collection was carried out by enumerators in both rural and urban areas. An honorarium for enumerators was prescribed according to the category of the State, taking into account variations in topography and accessibility.

2.3 Scrutiny

2.3.1 To enhance data quality and ensure timely completion of work, officials from the State at the Tehsil (sub-district), Block, District, and State Headquarters levels, as well as officers from the Central Government, undertook regular field visits and inspections during the data collection period and interacted closely with field functionaries. Based on the analysis of potential measurement errors, selected parameters were identified as scrutiny check points and validation check points.

Subsequently, a dedicated Scrutiny and Validation Portal was developed and integrated with the web-based application, enabling States to systematically identify springs that did not meet the prescribed scrutiny and validation criteria. The State accordingly rectified the deficiencies observed in respect of such records. In certain cases, particularly where a spring did not pass specific validation checks, detailed justifications were provided by the concerned State authorities. The parameters adopted for scrutiny and validation check points are given in Annexure–II and III.

2.4 Progress Monitoring

2.4.1 The progress of the First Census of Springs was monitored on a real-time basis through a web portal (dashboard). A dedicated team at the Central level as well as at the State/UT Headquarters proactively monitored the progress of work and resolved issues, if any, on a priority basis. To strengthen the monitoring mechanism, a multi-layer monitoring system was adopted at the Centre, State, District, and Sub-district (Tehsil)/Block levels.

2.4.2 At the Block level, the Block Level Officers (BLOs) had access to the dashboard, which displayed the list of villages categorized as completed, in progress, or not started. At the District level, the District Level Officers (DLOs) were able to view the status of all blocks assigned to them, as well as the status of individual blocks and the villages within those blocks. At the State level, the State Nodal Officers (SNOs) had access to a dashboard displaying the status of all districts, as well as the status of specific districts and the blocks and villages within those districts. At the Central level, the dashboard displayed the status of all States, as well as the status of specific States and their corresponding Districts, Blocks, and Villages.

2.5 Help and Support

2.5.1 A dedicated call centre and web-based helpdesk are available for resolving queries by the field functionaries. A web-based helpdesk module was incorporated in the web portal, and BLO/DLO and SLO can raise queries through the system.

Chapter - III

State/UT wise Reports

The first ever spring census was launched in April 2025. In this State Report, ten States that completed their census work have been considered: Andhra Pradesh, Assam, Goa, Maharashtra, Manipur, Odisha, Rajasthan, Telangana, Tripura and West Bengal. A glance report on key findings of this Census in respect of these States is summarized below.

3.7 Andhra Pradesh

The State of Andhra Pradesh is situated on the south-eastern coast of India. It is bounded by Odisha to the northeast, Chhattisgarh and Telangana to the north and northwest, Karnataka to the west, Tamil Nadu to the south, and Bay of Bengal to the east.

The state features a varied landscape including the Eastern Ghats, the coastal plains, and the fertile deltas of the Godavari and Krishna rivers. The climate is generally tropical, characterized by hot summers and a significant monsoon season bringing rainfall to the coastal and interior regions. Major rivers include the Godavari, Krishna, Penna (Pennar), and Tungabhadra.

The geographical area of Andhra Pradesh is about 162,975 sq. km, and the total population is 49,506,799 as per the 2011 Census of India (adjusted for the post-bifurcation state boundaries). Administratively, the state is divided into 26 districts. Agriculture is a primary occupation, with major crops including paddy, groundnut, cotton, sugarcane, and tobacco.



Fig. 3.7.1 A spring located near the village of Rudravaram in Rudravaram sub-district of Nandyal District, Andhra Pradesh State.

3.7.1 Major findings of the census

In the First Spring Census, 34 springs were enumerated, all of which are located in rural areas. Springs are widely distributed in the hilly, forested and upland regions of Andhra Pradesh, particularly along the Eastern Ghats. Prominent spring occurrence is reported in districts such as Annamayya (13), Ananthapuramu (9), and Tirupati (9), where favourable geological conditions, rugged terrain, and fractured hard-rock aquifers facilitate the emergence of springs (Fig. 3.7.2). For many rural and tribal communities of these districts, springs constitute an important source of drinking water.

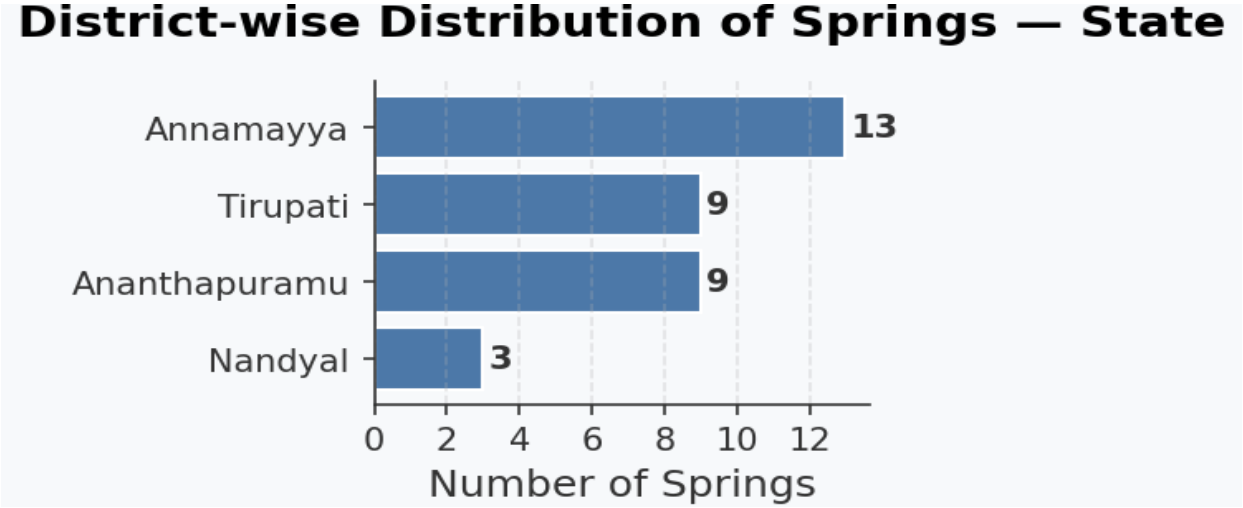


Fig. 3.7.2 District-wise distribution of spring

In terms of flow type, 100% (34) of the springs are of seep type. Out of the total enumerated springs, all 34 (100%) springs are seasonal, and no spring is reported as dried. With respect to ownership, 100% (34) of the springs are under public ownership (Fig. 3.7.3).

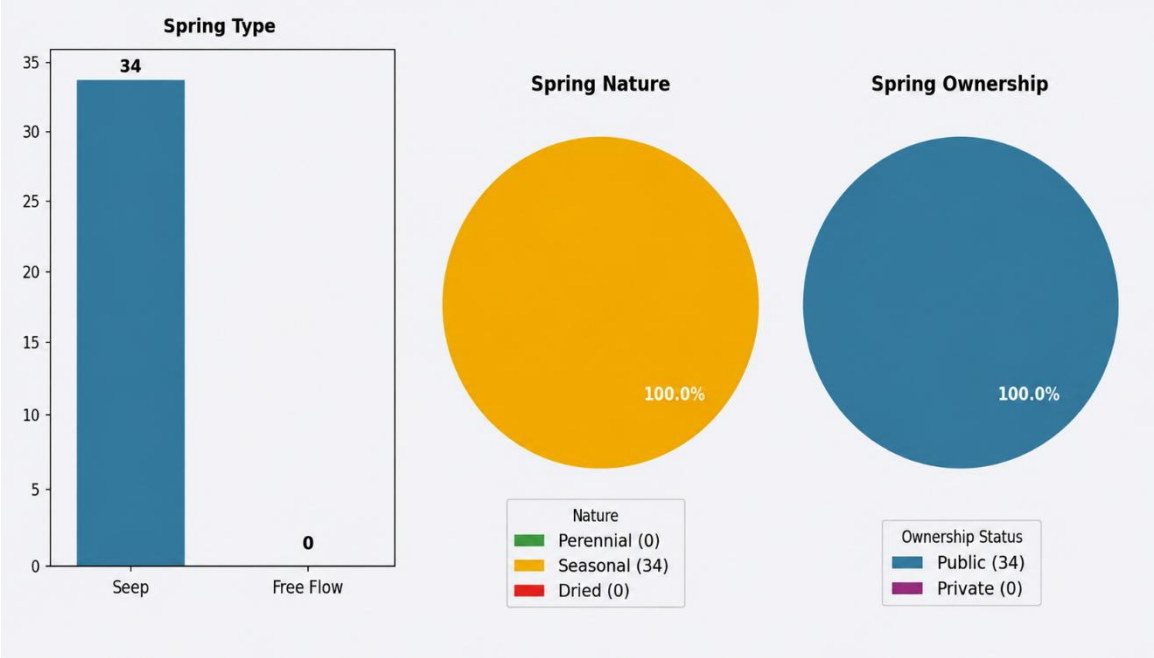


Fig. 3.7.3 Spring characteristics: Type, Nature & Ownership

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), residents use 91.2% (31), Non-residents use 8.8% (3), while none of the springs was found to be accessed by wild animals. Within the resident group, 38.7% (12) of the springs show a moderate level of dependency, 29.0% (9) show low dependency, and 32.3% (10) are reported to have high dependency (Fig. 3.7.4).

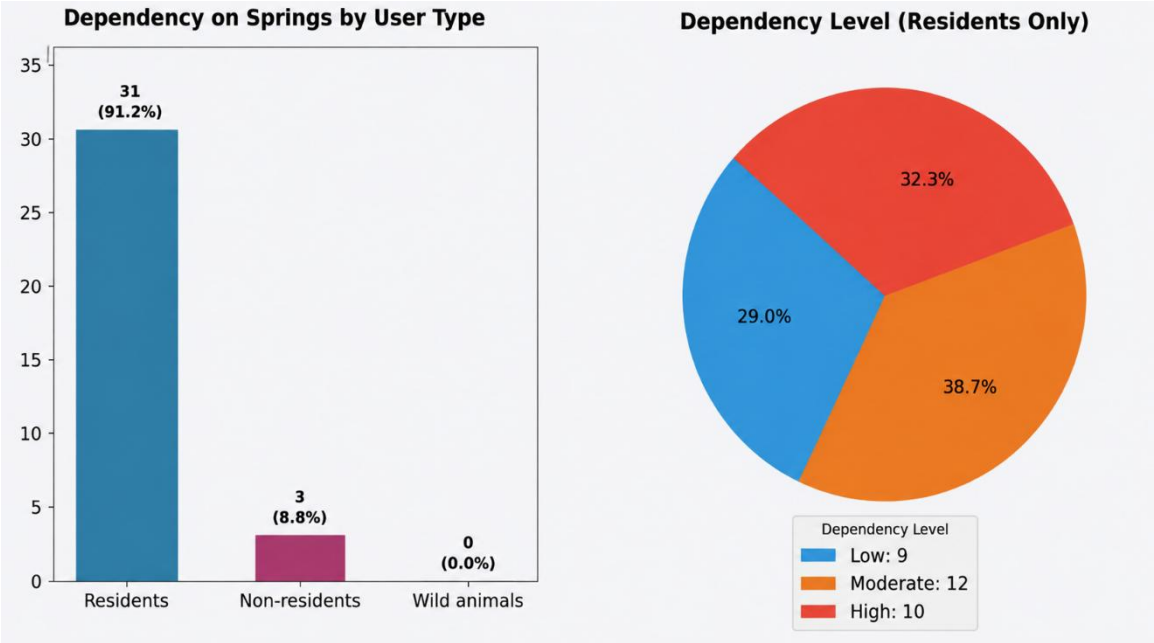


Fig. 3.7.4 Spring dependency

In the survey of spring discharge, no spring could be measured for their flow rate.

In the survey of resource threats to the springs, a total of 34 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 100% (34) of the springs are reported to have no resource threat.

Table 3.7.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Andhra Pradesh.

Table 3.7.1 Overview of spring attributes for Andhra Pradesh.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	Count	34	100.0%
	Springs in Rural Areas	Count	34	100.0%
	Springs in Urban Areas	Count	0	0.0%
2.	**Springs by type**			
	Free Flow	Count	0	0.0%
	Seep	Count	34	100.0%
3.	**Springs by Nature**			
	Perennial	Count	0	0.0%
	Seasonal	Count	34	100.0%
	Dried	Count	0	0.0%
4.	**Springs by ownership**			
	Public	Count	34	100.0%
	Private	Count	0	0.0%

Sl. No.	Parameters	Unit	Value	Percentage
5.	**Springs with chamber/tank to collect the water**	Count	11	32.4%
6.	**Springs with piped water supply**	Count	5	14.7%
7.	**Springs where discharge could be measured**	Count	0	0.0%
8.	**Spring by Colour of its water**			
	Colourless	Count	26	76.5%
	Coloured	Count	8	23.5%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	22	64.7%
	Non-Agreeable	Count	12	35.3%
10.	**Springs by taste of its water**			
	Objectionable	Count	7	20.6%
	Unobjectionable	Count	27	79.4%
11.	**Springs by its water temperature**			
	Hot	Count	0	0.0%
	Cold	Count	34	100.0%
12.	**Springs by resource threat**			
	Yes	Count	0	0.0%
	No	Count	34	100.0%
13.	**Springs by degree of threat**			
	Low	Count	0	0.0%
	Moderate	Count	0	0.0%
	High	Count	0	0.0%
14.	**Spring by type of dependents**			
	Residents	Count	31	91.2%
	Non-residents	Count	3	8.8%
	Wild animals	Count	0	0.0%
15.	**Spring by dependency level (Residents)**			
	Low	Count	9	29.0%
	Moderate	Count	12	38.7%
	High	Count	10	32.3%

3.8 Assam

Assam is a gateway to the north-eastern states of India, situated in the Brahmaputra valley. It is bounded by Bhutan and Arunachal Pradesh to the north, Nagaland and Manipur to the east, Meghalaya to the southwest, and West Bengal and Bangladesh to the west.

It is dominated by the vast Brahmaputra River plains, the Barak valley, and the hilly regions of Karbi Anglong and Dima Hasao. The climate is humid subtropical climate receiving abundant rainfall during the southwest monsoon, which support rich forest and diverse ecosystem. Major rivers include the Brahmaputra, Barak, Dhansiri, Manas, Kopili, and Subansiri.

The geographical area of Assam is about 78,438 sq. km, and the total population is 31,205,576 as per the 2011 Census of India. Administratively, the state is divided into 35 districts. Tea cultivation is a major industry, along with rice, jute, sugarcane, and various citrus fruits.



Fig. 3.8.1 A spring located near the village of Rongnihang in Socheng Block of West Karbi Anglong District, Assam State.

3.8.1 Major findings of the census

In the First Spring Census, a total of 792 springs were enumerated, of which 74.1% (587) are located in rural areas and 25.9% (205) in urban areas. Springs are widely distributed in the hilly and forested tracts of Assam, especially in the Karbi Anglong Plateau, Dima Hasao Hills, and the foothill regions of the Eastern Himalaya. Prominent spring occurrence is reported in districts such as Kamrup Metro (219), Karbi Anglong (196), West Karbi Anglong (157), and Dima Hasao (112), where high rainfall, steep slopes, and fractured rock aquifers favour the emergence of springs (Fig. 3.8.2). In many rural and tribal communities of these districts, springs constitute an important source of drinking water.

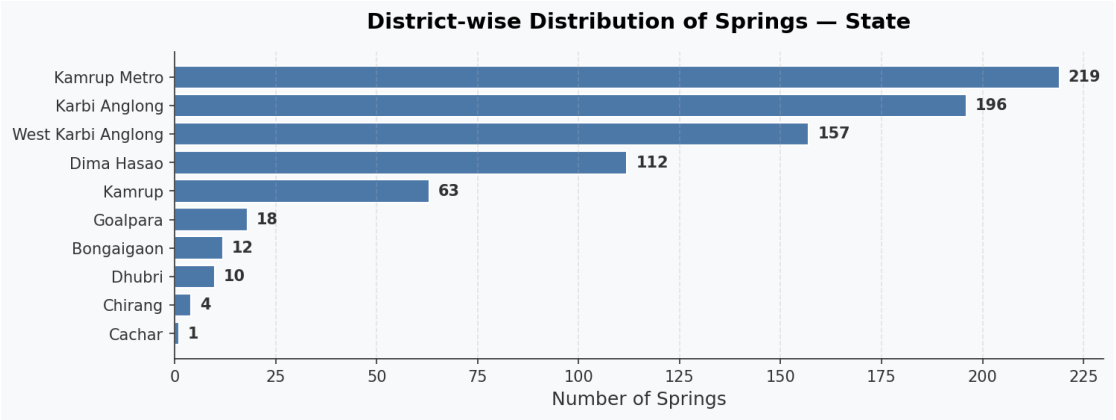


Fig. 3.8.2 District-wise distribution of spring.

In terms of flow type, 36.0% (285) of the springs are of seep type, while 64.0% (507) are free-flowing. Out of the total enumerated springs, 83.6% (662) of the springs are perennial, 16.0% (127) are seasonal, and 0.4% (3) are reported as dried. With respect to ownership, 86.8% (685) of the springs are public, whereas 13.2% (104) are under private ownership (Fig. 3.8.3).

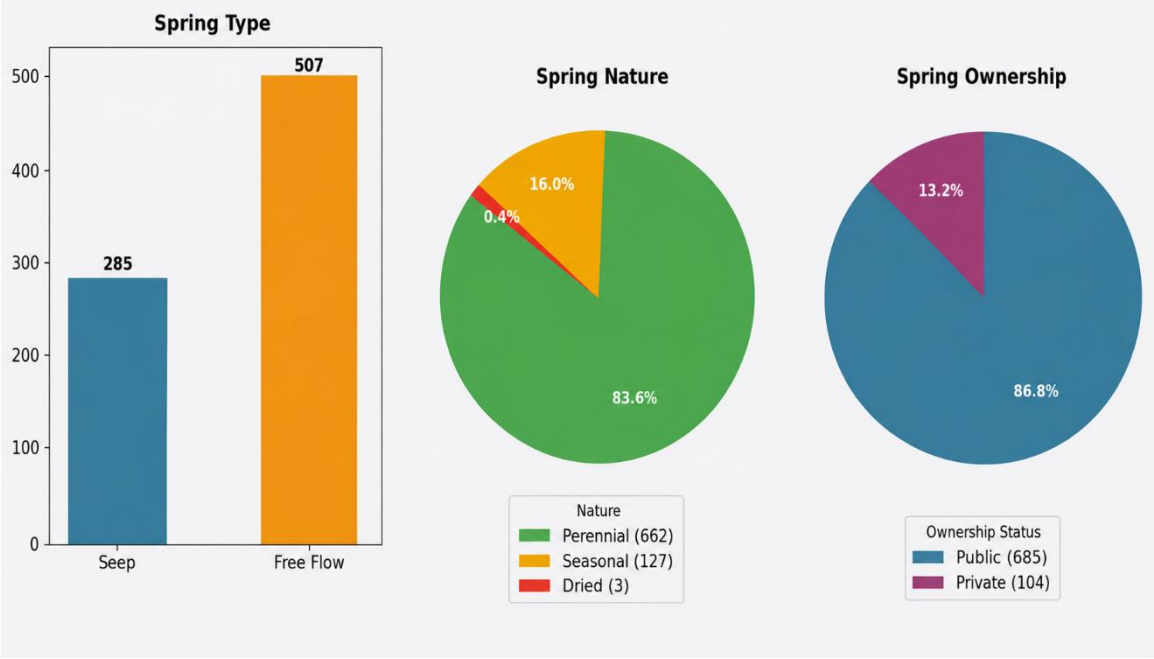


Fig. 3.8.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 11.6% (91), while Wild animals access 3.3% (26). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 37.0% (247) of the springs show a moderate level of dependency, 10.0% (67) show low dependency, and 52.9% (353) are reported to have high dependency (Fig. 3.8.4).

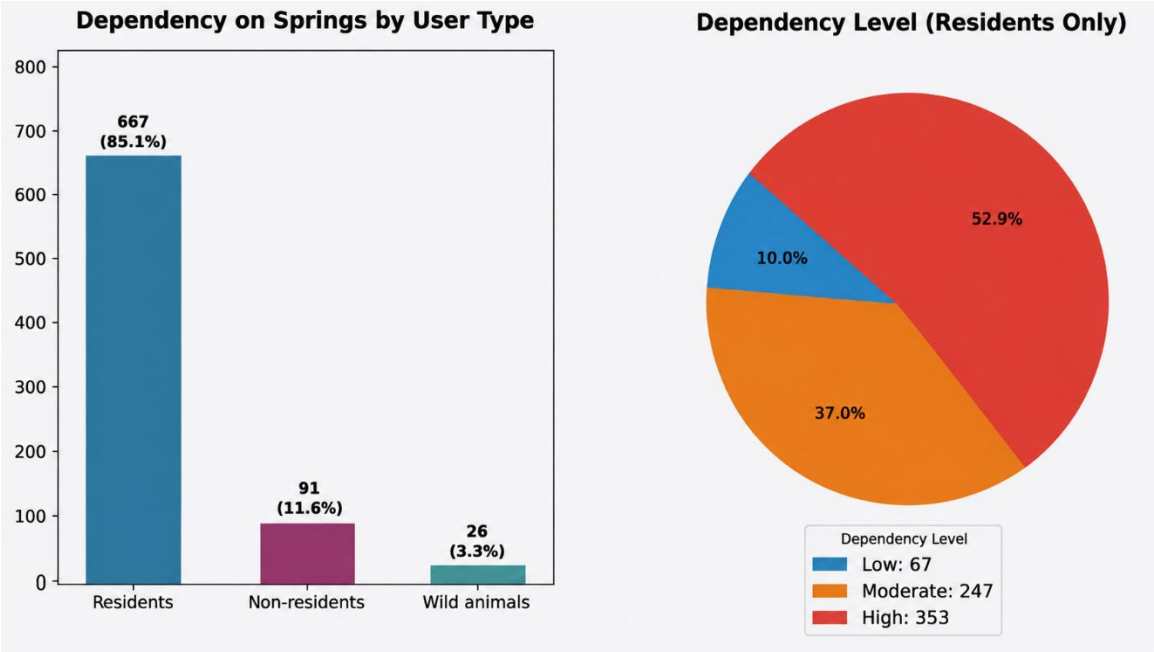


Fig. 3.8.4 Spring dependency.

In the survey of spring discharge, a total of 323 springs were measured for their flow rate. Out of these, the largest proportion, 54.8% (177), falls into the discharge category of 5–20 LPM. This is followed by 24.1% (78) of springs in the <=5 LPM range. Smaller percentages are seen in the higher flow categories, with 12.1% (39) measuring 20–50 LPM range, 6.2% (20) measuring 50–100 LPM, and 2.8% (9) measuring >100 LPM (Fig. 3.8.5).

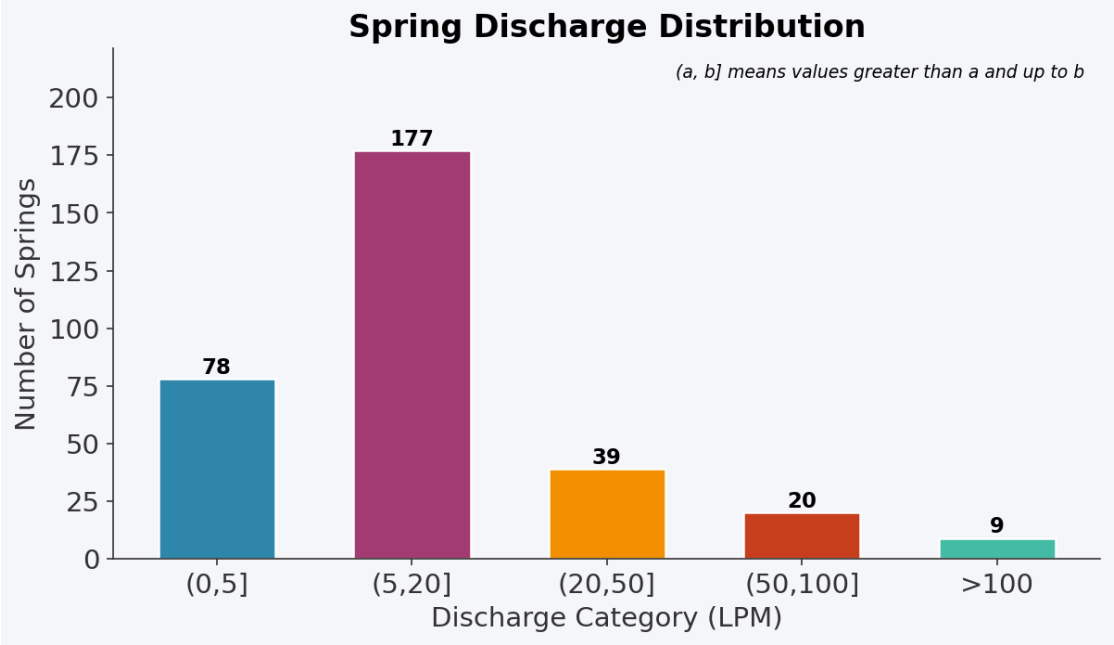


Fig. 3.8.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 784 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 94.8% (743) of the springs are reported to have no resource threat, while 5.2% (41) are identified as having a threat. Among the springs where a threat was identified, 22.0% (9) exhibit a low degree of threat, 61.0% (25) exhibit moderate threat, and 17.1% (7) exhibit high threat levels (Fig. 3.8.6).

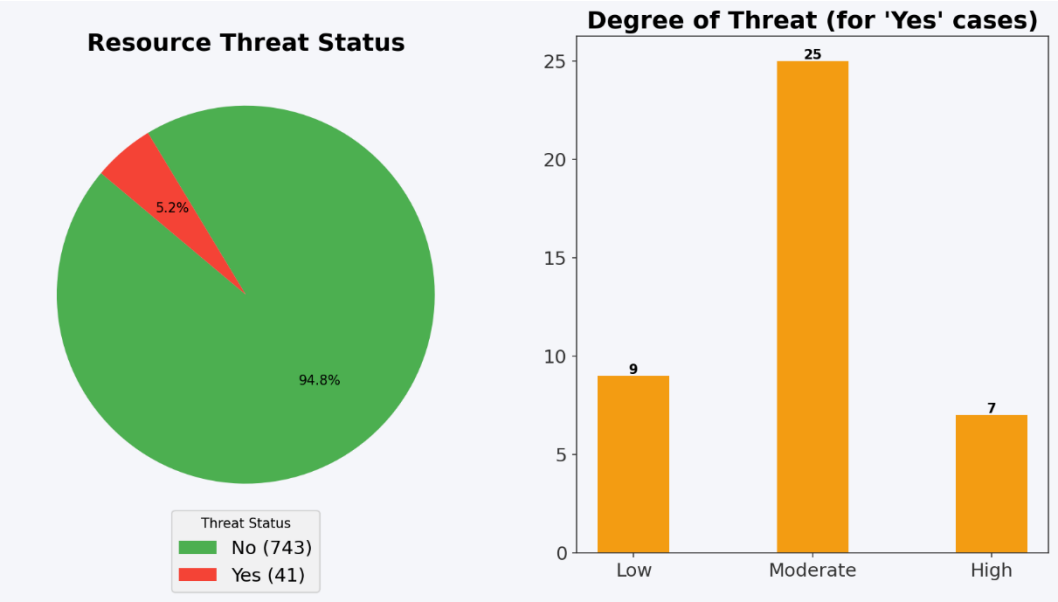


Fig. 3.8.6 Resource threat analysis.

Table 3.8.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Assam.

Table 3.8.1 Overview of spring attributes for Assam.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	**Count**	**792**	**100.0%**
	Springs in Rural Areas	Count	587	74.1%
	Springs in Urban Areas	Count	205	25.9%
2.	**Springs by type**			
	Free Flow	Count	507	64.0%
	Seep	Count	285	36.0%
3.	**Springs by Nature**			
	Perennial	Count	662	83.6%
	Seasonal	Count	127	16.0%
	Dried	Count	3	0.4%
4.	**Springs by ownership**			
	Public	Count	685	86.8%
	Private	Count	104	13.2%
5.	**Springs with chamber/tank to collect the water**	Count	176	22.3%
6.	**Springs with piped water supply**	Count	274	34.7%
7.	**Springs where discharge could be measured**	Count	323	40.9%
8.	**Spring by Colour of its water**			

Sl. No.	Parameters	Unit	Value	Percentage
	Colourless	Count	742	94.0%
	Coloured	Count	47	6.0%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	517	65.5%
	Non-Agreeable	Count	272	34.5%
10.	**Springs by taste of its water**			
	Objectionable	Count	81	10.3%
	Unobjectionable	Count	708	89.7%
11.	**Springs by its water temperature**			
	Hot	Count	5	0.6%
	Cold	Count	784	99.4%
12.	**Springs by resource threat**			
	Yes	Count	41	5.2%
	No	Count	743	94.8%
13.	**Springs by degree of threat**			
	Low	Count	9	22.0%
	Moderate	Count	25	61.0%
	High	Count	7	17.1%
14.	**Spring by type of dependents**			
	Residents	Count	667	85.1%
	Non-residents	Count	91	11.6%
	Wild animals	Count	26	3.3%
15.	**Spring by dependency level (Residents)**			
	Low	Count	67	10.0%
	Moderate	Count	247	37.0%
	High	Count	353	52.9%

3.9 Goa

Goa is India's smallest state by area and is situated along the southwestern coast of India within the Konkan region. It is bounded on the north by Maharashtra and on the east and south by Karnataka, with the Arabian Sea forming its western coast.

The state's physiography comprises coastal plains, undulating uplands, and the Sahyadri (Western Ghats) mountain range along its eastern boundary. Goa experiences a tropical maritime climate characterized by high temperatures, elevated humidity, and intense southwest monsoon rainfall. Major rivers include the Mandovi, Zuari, Terekhol, Sal, Talpona, and Galgibaga.

The geographical area of Goa is about 3,702 sq km, and the total population is 1,458,545 as per the 2011 Census of India. Goa currently comprises three administrative districts. However, the present census adopted the Local Government Directory (LGD) administrative framework effective on 12 February 2025. Since Kushavati district was officially constituted on 31 December 2025, subsequent to the reference date of the LGD dataset, all areas now included within Kushavati district were treated as part of South Goa district for the purposes of data compilation, analysis, and reporting. Agriculture and fisheries constitute important components of the rural economy, with fishing serving as a major livelihood and economic activity along the coast.



Fig. 3.9.1 A spring located near the village of Queula in Ponda Block of South Goa, Goa State.

3.9.1 Major findings of the census

In the First Spring Census, a total of 1,196 springs were enumerated, of which 93.4% (1,117) are located in rural areas and 6.6% (79) in urban areas. Springs are widely distributed in the hilly and forested regions of Goa, particularly along the Western Ghats and their associated foothill and upland catchments. Prominent spring occurrence is reported in districts such as South Goa (861), and North Goa (335), where high rainfall, lateritic formations, weathered and

fractured aquifers, and rugged terrain favour the emergence of springs (Fig. 3.9.2). In many rural communities, these springs constitute an important source of drinking water.

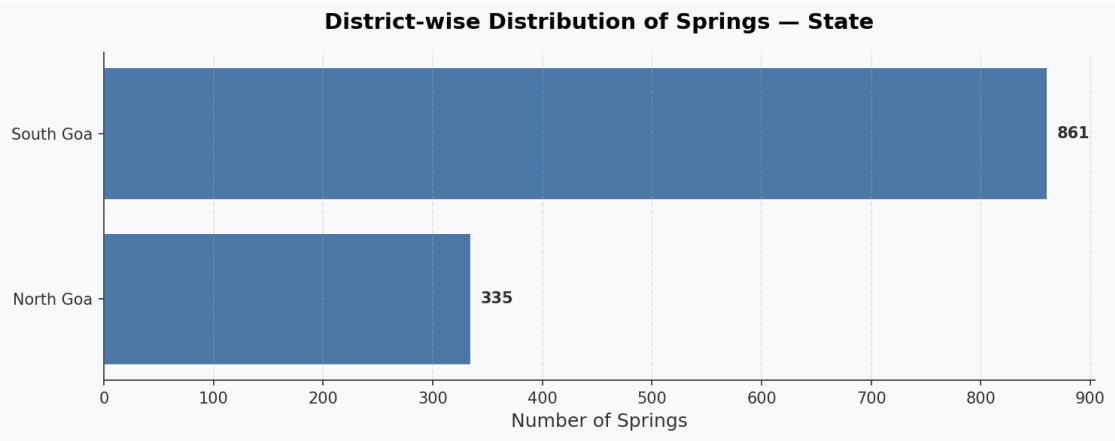


Fig. 3.9.2 District-wise distribution of spring.

In terms of flow type, 88.1% (1,054) of the springs are of seep type, while 11.9% (142) are free-flowing. Out of the total enumerated springs, 92.4% (1,105) of the springs are perennial, 5.5% (66) are seasonal, and 2.1% (25) are reported as dried. With respect to ownership, 56.5% (662) of the springs are public, whereas 43.5% (509) are under private ownership (Fig. 3.9.3).

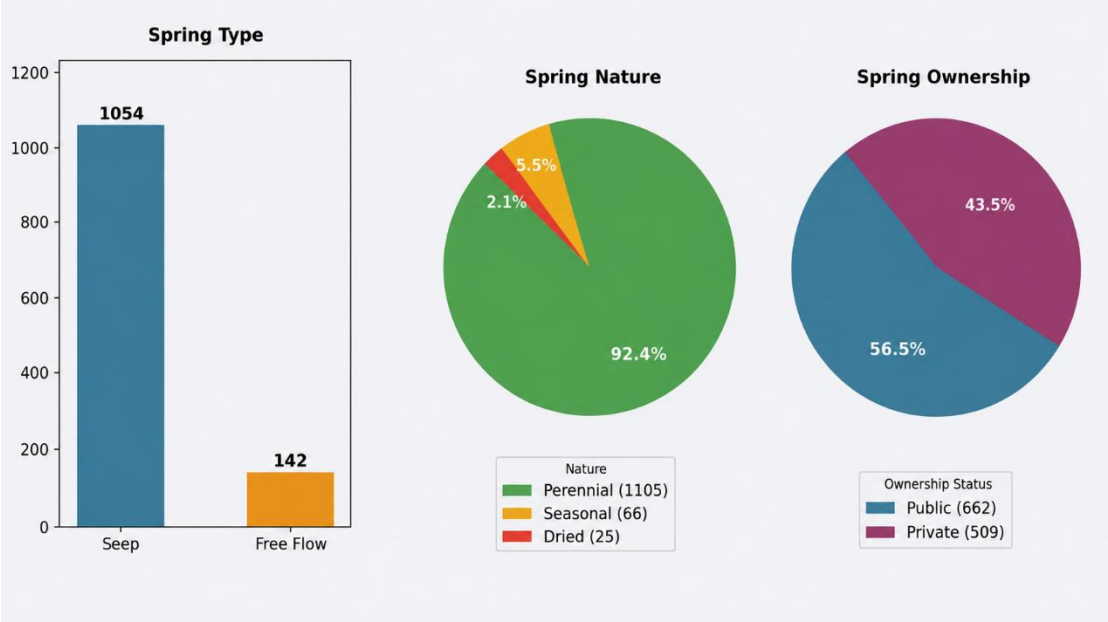


Fig. 3.9.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 23.7% (277), while Wild animals access 11.9% (139). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 38% (287) of the springs show a moderate level of dependency, 58% (438) show low dependency, and 4.0% (30) are reported to have high dependency (Fig. 3.9.4).

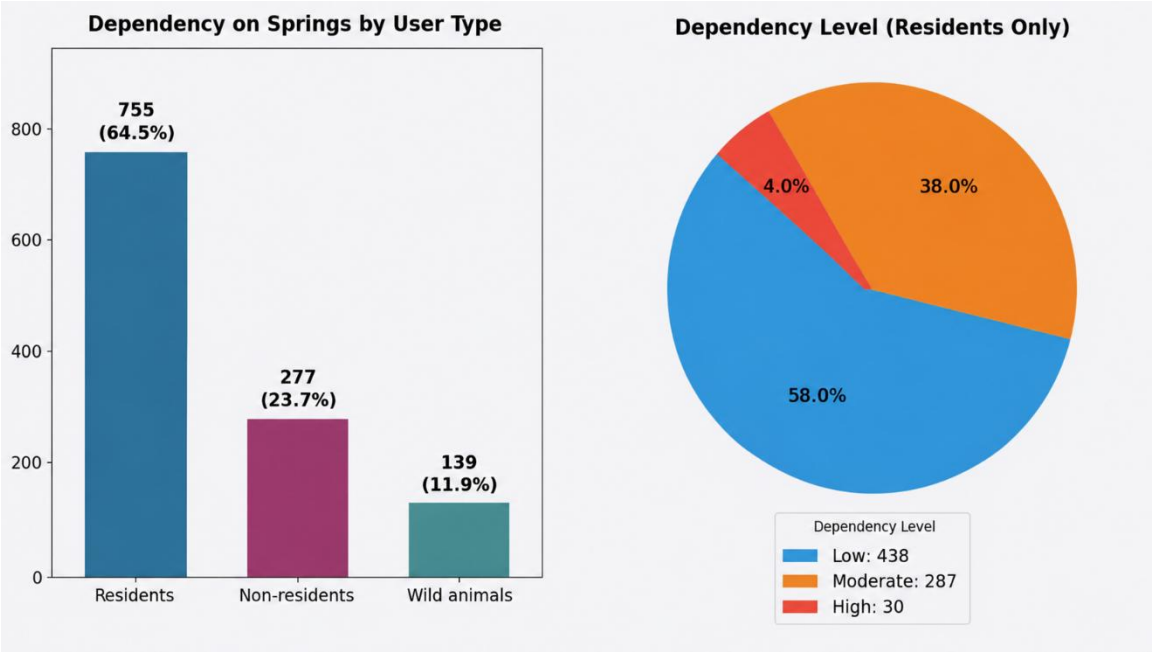


Fig. 3.9.4 Spring dependency.

In the survey of spring discharge, a total of 149 springs were measured for their flow rate. Out of these, the largest proportion, 79.9% (119), falls into the lowest discharge category of <=5 LPM. This is followed by 19.5% (29) of springs in the 5–20 LPM range. Smaller percentages are seen in the higher flow categories, with 0.7% (1) of springs recorded measuring 20–50 LPM. No springs were recorded with a discharge category 50–100 LPM or >100 LPM discharge categories (Fig. 3.9.5).

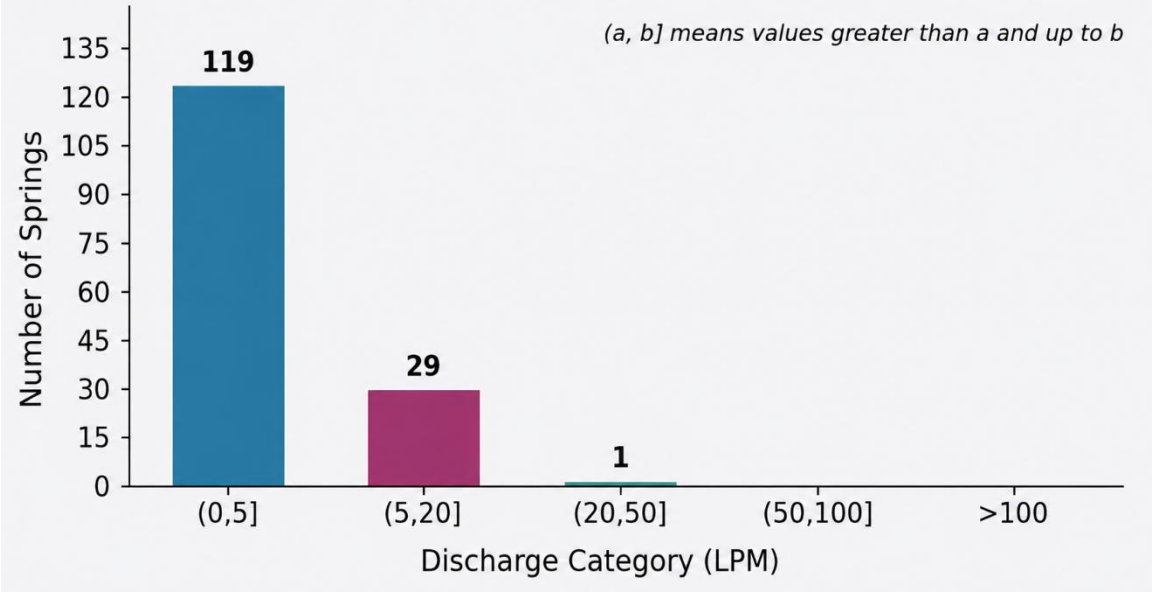


Fig. 3.9.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 1,171 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 94.8% (1,110) of the springs are reported to have no resource threat, while 5.2% (61) are identified as having a threat. Among the springs where a threat was identified, 41.0% (25) exhibit a low degree of threat, 36.1% (22) exhibit moderate threat, and 23.0% (14) exhibit high threat levels (Fig. 3.9.6).

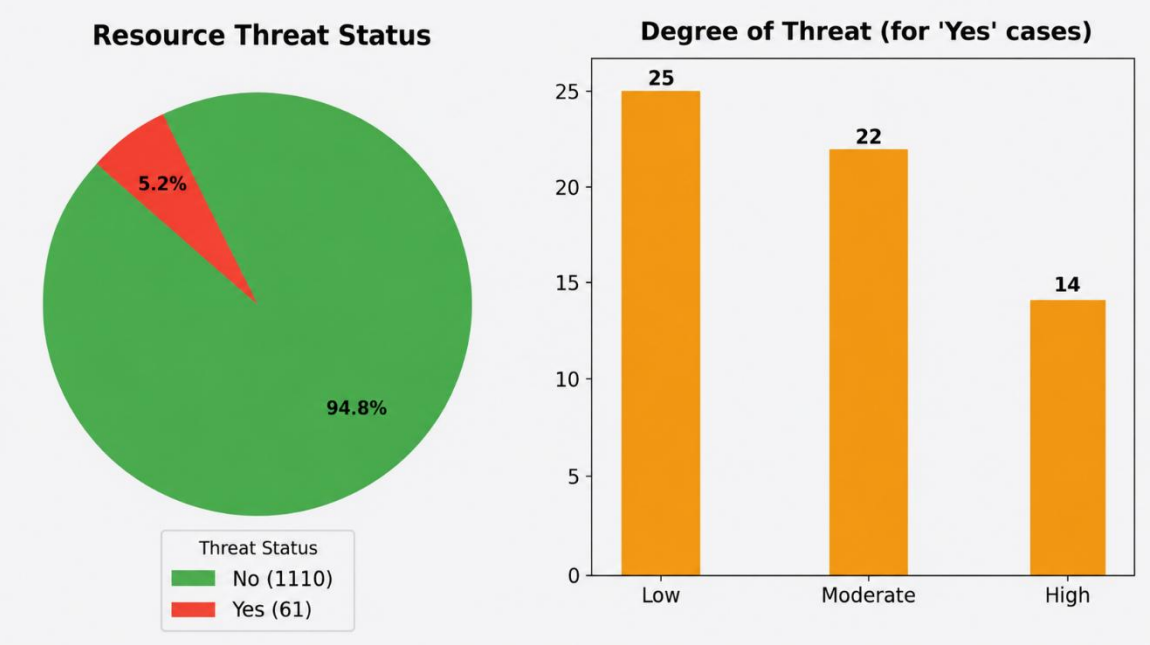


Fig. 3.9.6 Resource threat analysis.

Table 3.9.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Goa.

Table 3.9.1 Overview of spring attributes for Goa.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	Count	1196	100.0%
	Springs in Rural Areas	Count	1117	93.4%
	Springs in Urban Areas	Count	79	6.6%
2.	**Springs by type**			
	Free Flow	Count	142	11.9%
	Seep	Count	1054	88.1%
3.	**Springs by Nature**			
	Perennial	Count	1105	92.4%
	Seasonal	Count	66	5.5%
	Dried	Count	25	2.1%
4.	**Springs by ownership**			
	Public	Count	662	56.5%
	Private	Count	509	43.5%
5.	**Springs with chamber/tank to collect**	Count	341	29.1%
6.	**Springs with piped water supply**	Count	189	16.1%
7.	**Springs where discharge could be**	Count	149	12.7%

Sl. No.	Parameters	Unit	Value	Percentage
8.	**Spring by Colour of its water**			
	Colourless	Count	1115	95.2%
	Coloured	Count	56	4.8%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	1125	96.1%
	Non-Agreeable	Count	46	3.9%
10.	**Springs by taste of its water**			
	Objectionable	Count	44	3.8%
	Unobjectionable	Count	1127	96.2%
11.	**Springs by its water temperature**			
	Hot	Count	0	0.0%
	Cold	Count	1171	100.0%
12.	**Springs by resource threat**			
	Yes	Count	61	5.2%
	No	Count	1110	94.8%
13.	**Springs by degree of threat**			
	Low	Count	25	41.0%
	Moderate	Count	22	36.1%
	High	Count	14	23.0%
14.	**Spring by type of dependents**			
	Residents	Count	755	64.5%
	Non-residents	Count	277	23.7%
	Wild animals	Count	139	11.9%
15.	**Spring by dependency level (Residents)**			
	Low	Count	438	58.0%
	Moderate	Count	287	38.0%
	High	Count	30	4.0%

3.10 Maharashtra

The State of Maharashtra is situated in the western peninsular region of India. It is bounded on the northwest by Gujarat, on the north by Madhya Pradesh, on the east by Chhattisgarh, and on the south by Karnataka and Telangana.

Maharashtra features a varied topography including the Sahyadri Range (Western Ghats) along its western margin, the narrow Konkan coastal plain bordering the Arabian Sea, and the vast Deccan Plateau that covers most of the state's interior. The climate is tropical monsoon, characterized by heavy rainfall along the Konkan coast and Western Ghats, while parts of Marathwada and central Vidarbha are relatively dry and prone to semi-arid conditions. The state's major river systems include the Godavari, Krishna, Tapi (Tapti), and Bhima rivers.

The geographical area of Maharashtra is about 3,07,713 sq km, and the total population is 112,374,333 as per the 2011 Census of India. Administratively, the state is divided into 36 districts. Agriculture is the backbone of the economy, with major crops being jowar, bajra, wheat, sugarcane, cotton, and various oilseeds.



Fig. 3.10.1 A spring located near the village of Lonar in Lonar Block of Buldhana District, Maharashtra State.

3.10.1 Major findings of the census

In the First Spring Census, a total of 3652 springs were enumerated, of which 98.9% (3612) are located in rural areas and 1.1% (40) in urban areas. Springs are widely distributed in the hilly

and forested tracts of Maharashtra, especially along the Sahyadri mountain range of Western Ghats. Prominent spring occurrence is reported in districts such as Ratnagiri (1228), Kolhapur (648), Satara (579), Sindhudurg (351), Nashik (168), Sangli (162), where high rainfall, steep slopes, and fractured hard rock aquifers favour the emergence of springs (Fig. 3.10.2). In many rural and tribal settlements of these districts, springs constitute an important source of drinking water.

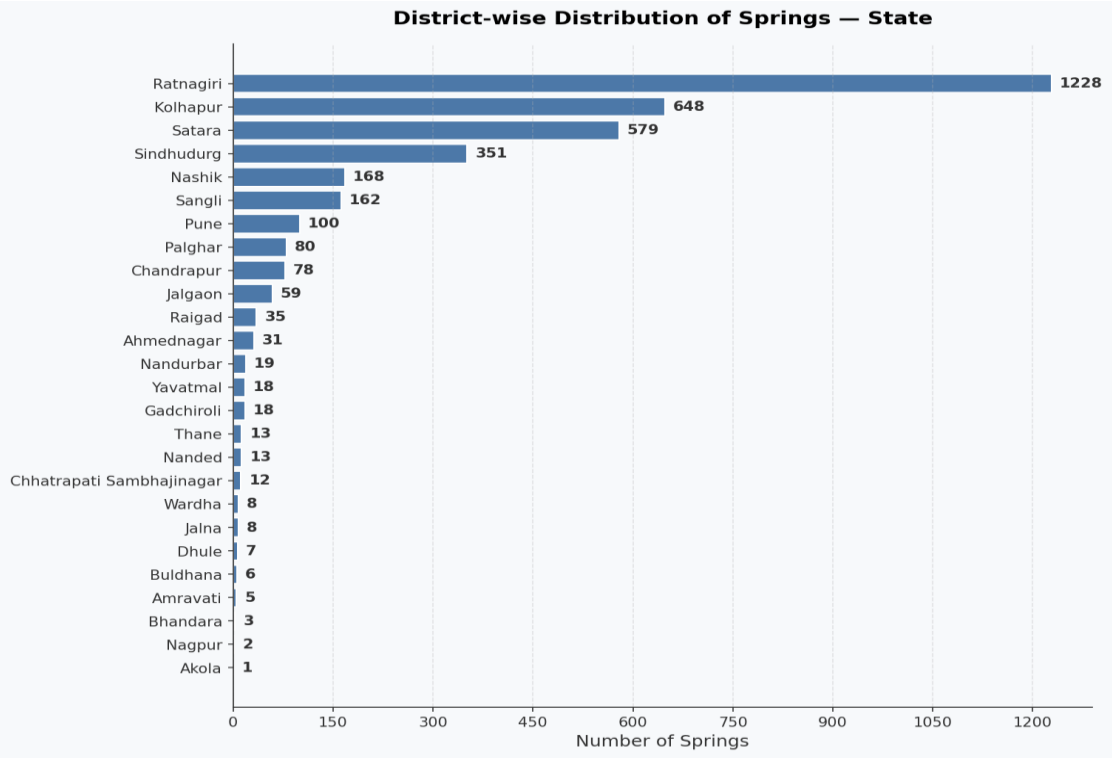


Fig. 3.10.2 District-wise distribution of spring.

In terms of flow type, 71.0% (2592) of the springs are of seep type, while 29.0% (1060) are free-flowing. Out of the total enumerated springs, 72.0% (2629) of the springs are perennial, 24.9% (909) are seasonal, and 3.1% (114) are reported as dried. With respect to ownership, 86.5% (3059) of the springs are public, whereas 13.5% (479) are under private ownership (Fig. 3.10.3).

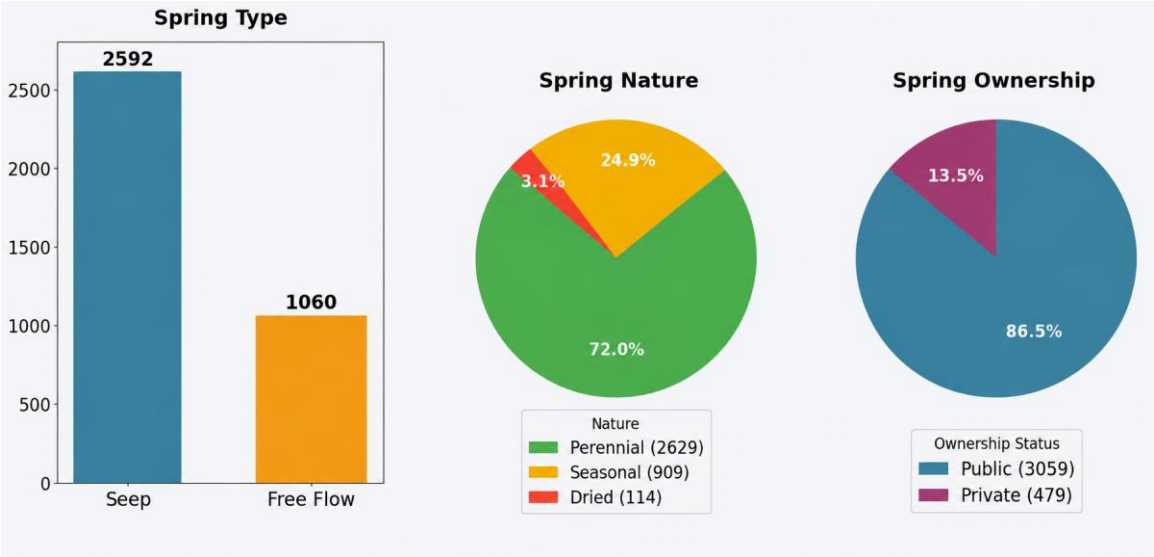


Fig. 3.10.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 26.0% (911), while Wild animals access 22.0% (773). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 42.4% (774) of the springs show a moderate level of dependency, 33.5% (611) show low dependency, and 24.1% (439) are reported to have high dependency (Fig. 3.10.4).

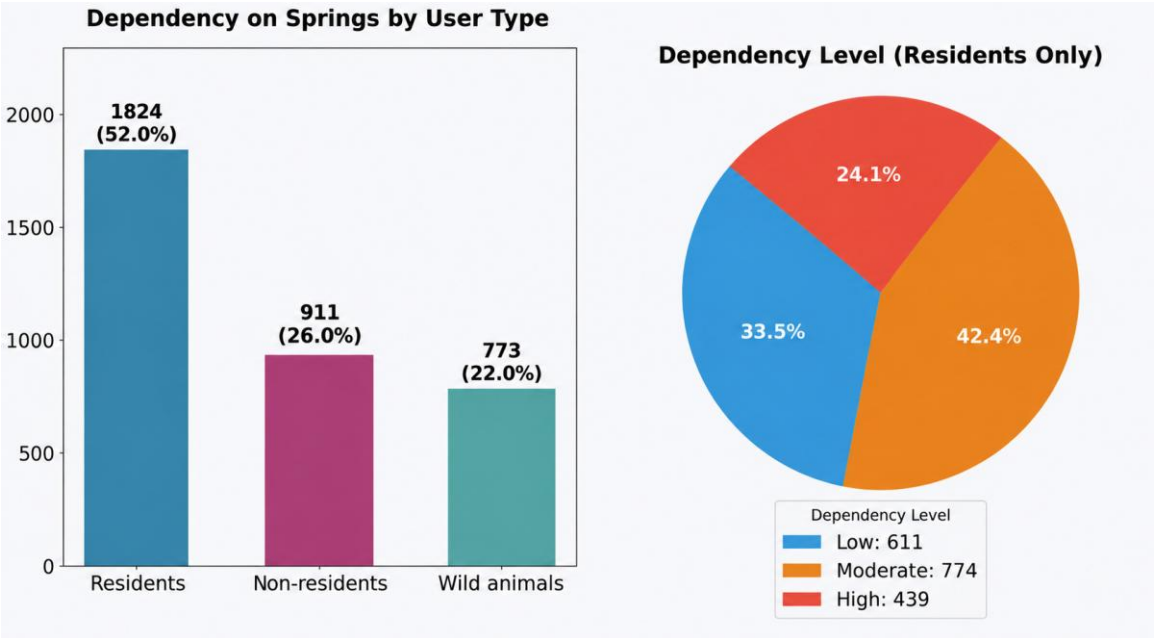


Fig. 3.10.4 Spring dependency.

In the survey of spring discharge, a total of 679 springs were measured for their flow rate. Out of these, the largest proportion, 76.7% (521), fall into the lowest discharge category of <=5 LPM. This is followed by 17.8% (121) of springs in the 5–20 LPM range. Smaller percentages are seen

in the higher flow categories, with 4.4% (30) measuring 20–50 LPM and 1.0% (7) measuring 50–100 LPM. No springs were recorded with a discharge exceeding 100 LPM (Fig. 3.10.5).

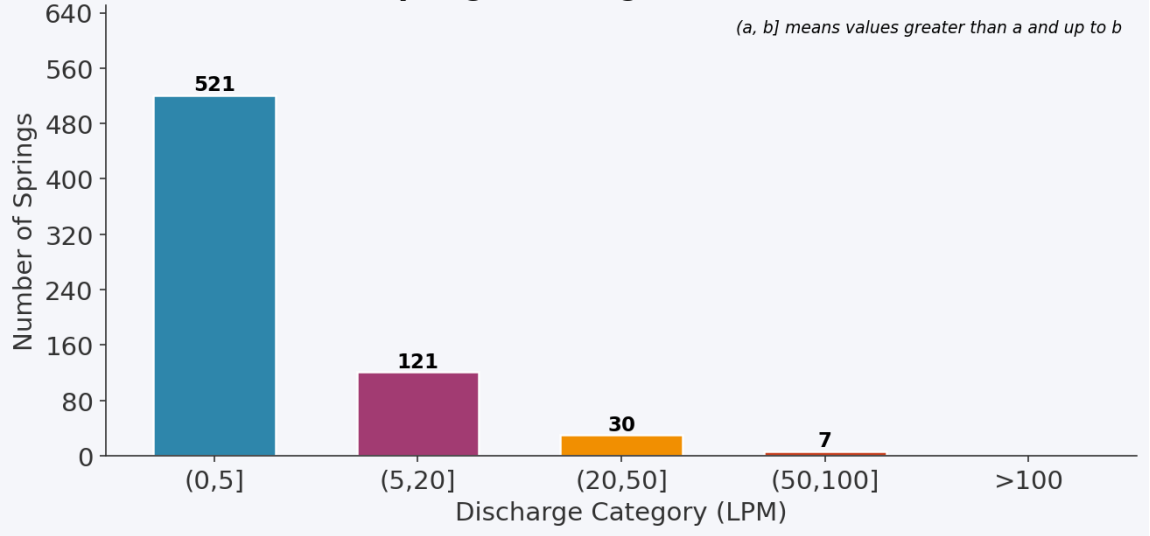


Fig. 3.10.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 3508 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 92.4% (3243) of the springs are reported to have no resource threat, while 7.6% (265) are identified as having a threat. Among the springs where a threat was identified, 44.2% (117) exhibit a low degree of threat, 44.2% (117) exhibit moderate threat, and 11.7% (31) exhibit high threat levels (Fig. 3.10.6).

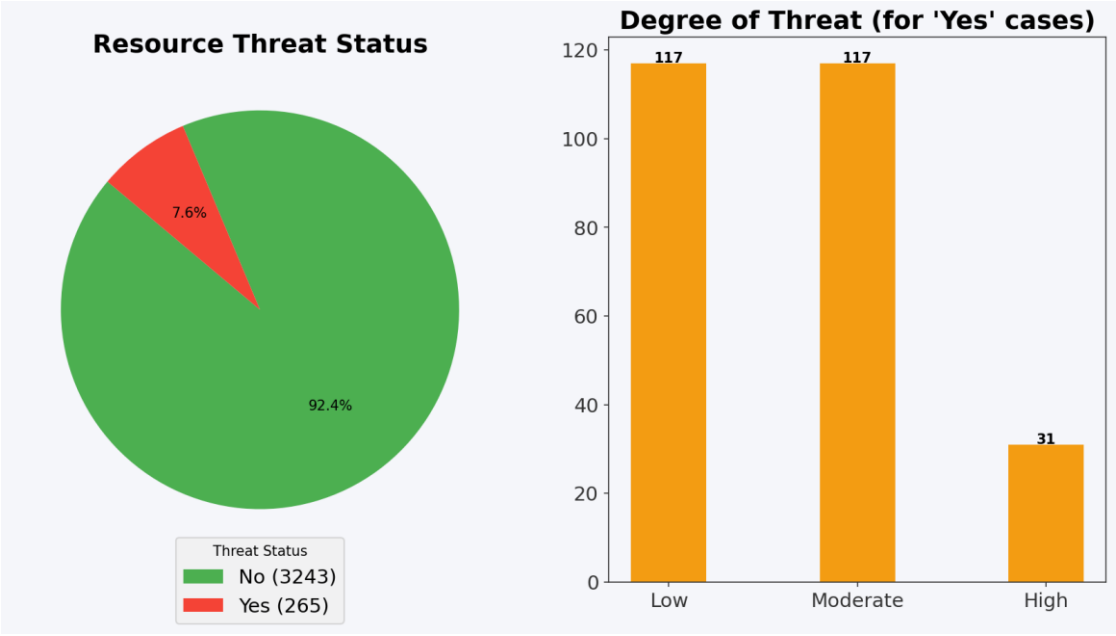


Fig. 3.10.6 Resource threat analysis.

Table 3.10.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Maharashtra.

Table 3.10.1 Overview of spring attributes for Maharashtra.

Sl. No.	Parameters	Unit	Value	Percentage
1.	**Total Number of Springs**	Count	3652	100.0%
	Springs in Rural Areas	Count	3612	98.9%
	Springs in Urban Areas	Count	40	1.1%
2.	**Springs by type**			
	Free Flow	Count	1060	29.0%
	Seep	Count	2592	71.0%
3.	**Springs by Nature**			
	Perennial	Count	2629	72.0%
	Seasonal	Count	909	24.9%
	Dried	Count	114	3.1%
4.	**Springs by ownership**			
	Public	Count	3059	86.5%
	Private	Count	479	13.5%
5.	**Springs with chamber/tank to collect the water**	Count	1693	47.9%
6.	**Springs with piped water supply**	Count	1485	42.0%
7.	**Springs where discharge could be measured**	Count	679	19.2%
8.	**Spring by Colour of its water**			
	Colourless	Count	3381	95.6%
	Coloured	Count	157	4.4%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	3261	92.2%
	Non-Agreeable	Count	277	7.8%
10.	**Springs by taste of its water**			
	Objectionable	Count	243	6.87%
	Unobjectionable	Count	3295	93.13%
11.	**Springs by its water temperature**			
	Hot	Count	30	0.8%
	Cold	Count	3508	99.2%
12.	**Springs by resource threat**			
	Yes	Count	265	7.6%
	No	Count	3243	92.4%
13.	**Springs by degree of threat**			
	Low	Count	117	44.2%
	Moderate	Count	117	44.2%

Sl. No.	Parameters	Unit	Value	Percentage
	High	Count	31	11.7%
14.	**Spring by type of dependents**			
	Residents	Count	1824	52.0%
	Non-residents	Count	911	26.0%
	Wild animals	Count	773	22.0%
15.	**Spring by dependency level (Residents)**			
	Low	Count	611	33.5%
	Moderate	Count	774	42.4%
	High	Count	439	24.1%

3.11 Manipur

Manipur is a northeastern state of India, often referred to as the 'Jewel of India'. It is bounded by Nagaland to the north, Mizoram to the south, Assam to the west, and Myanmar to the southeast.

The state is characterized by central oval-shaped valley surrounded by steep hills and is home to the famous Loktak Lake, the largest freshwater lake in Northeast India. Manipur has a subtropical to temperate climate, with subtropical conditions in the valley and temperate conditions in the higher hill regions. Most of the annual rainfall is received during the southwest monsoon (June–September). The major river systems include the Imphal, Barak, Iril, Thoubal, and Manipur rivers.

The geographical area of Manipur is approximately 22,327 sq km, and the total population is 2,855,794 as per the 2011 Census of India. Administratively, the state is divided into 16 districts. Rice is the principal food crop, while maize, pulses, oilseeds, fruits (including pineapple and orange), and a variety of horticultural crops are also widely cultivated.



Fig. 3.11.1 A spring located near the village of Khoiripok in Kasom Khullen Block of Kamjong District, Manipur State.

3.11.1 Major findings of the census

In the First Spring Census, a total of 3,941 springs were enumerated, of which 99.0% (3,903) are located in rural areas and 1.0% (38) in urban areas. Springs are predominantly distributed across the mountainous and forested landscapes of Manipur, particularly within the Naga Hills, Kuki Hills, and adjoining hill ranges. Prominent spring occurrence is reported in districts such as Senapati (1,009), Tamenglong (643), Ukhrul (580), Kamjong (399), Churachandpur (285), and Kangpokpi (241), combined influence of abundant monsoonal rainfall, rugged topography, and fractured hard-rock aquifers facilitates natural groundwater discharge through springs. In many rural and tribal communities, these springs serve as a vital source of drinking water and domestic water supply.

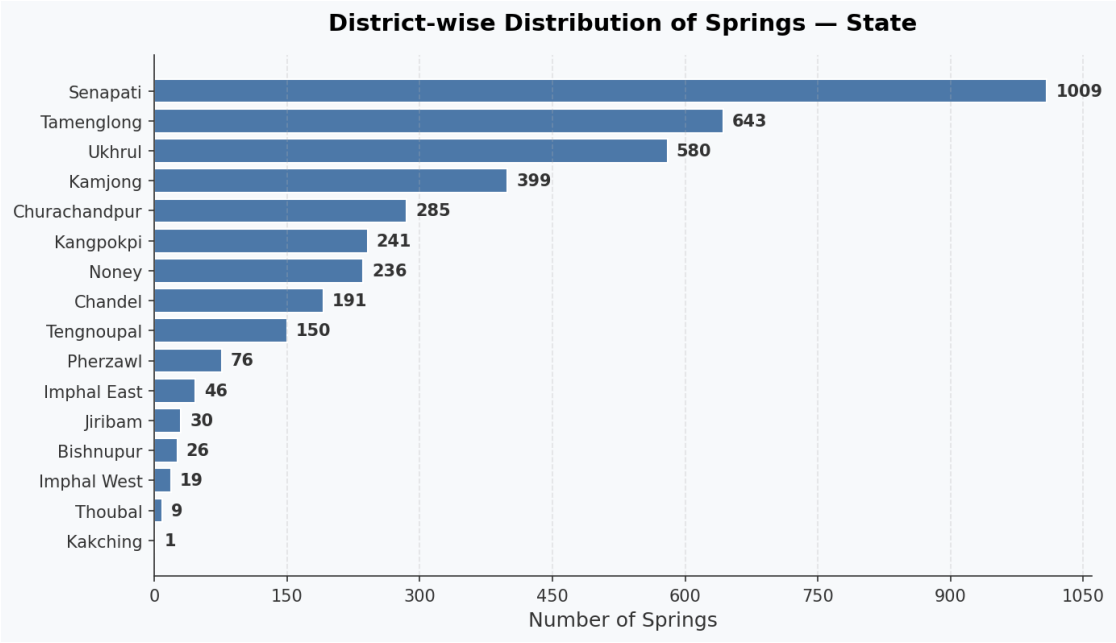


Fig. 3.11.2 District-wise distribution of spring

In terms of flow type, 87.9% (3463) of the springs are of seep type, while 12.1% (478) are free-flowing. Out of the total enumerated springs, 86.8% (3419) of the springs are perennial, 11.6% (457) are seasonal, and 1.6% (65) are reported as dried. With respect to ownership, 91.4% (3543) of the springs are public, whereas 8.6% (333) are under private ownership (Fig. 3.11.3).

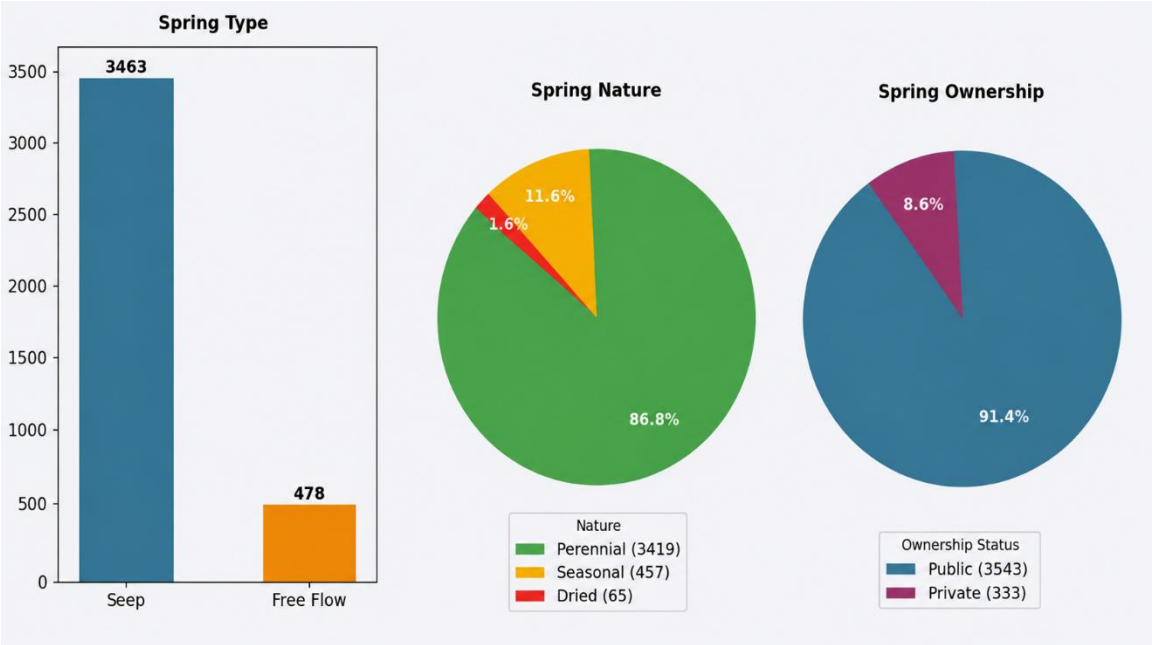


Fig. 3.11.3 Spring characteristics: Type, Nature & Ownership

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 16.4% (634), while Wild animals access 2.9% (113). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 30.6% (956) of the springs show a moderate level

of dependency, 10.4% (326) show low dependency, and 59.0% (1845) are reported to have high dependency (Fig. 3.11.4).

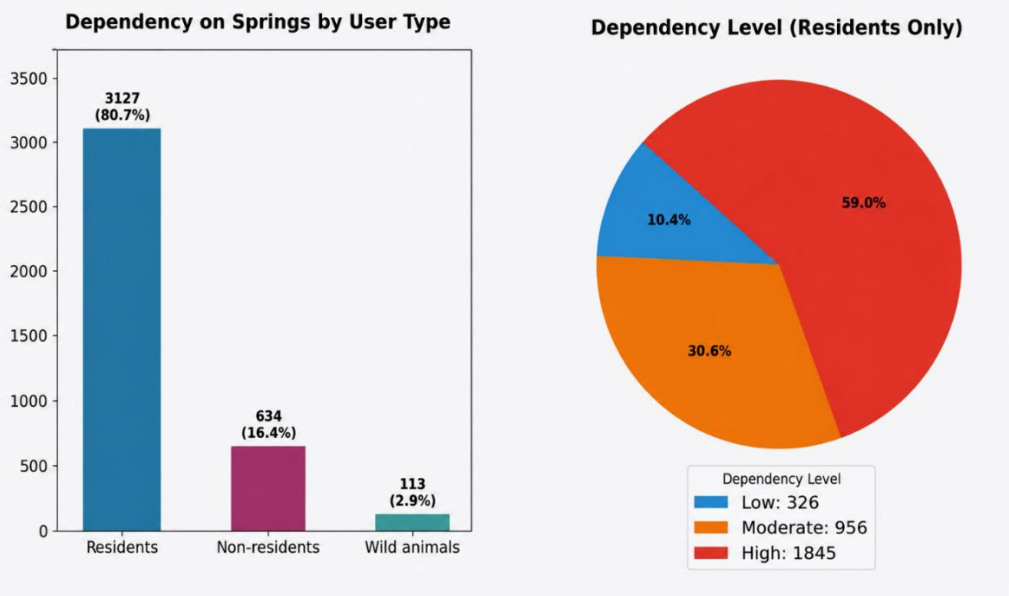


Fig. 3.11.4 Spring dependency

In the survey of spring discharge, a total of 670 springs were measured for their flow rate. Out of these, the largest proportion, 34.3% (230), fall into the lowest discharge category of <=5 LPM. This is followed by 24.5% (164) of springs in the 5–20 LPM range, and 26.3% (176) measuring 20–50 LPM range. Smaller percentages are seen in the higher flow categories, with 14.5% (97) measuring 50–100 LPM range, and 0.4% (3) exceeding 100 LPM (Fig. 3.11.5).

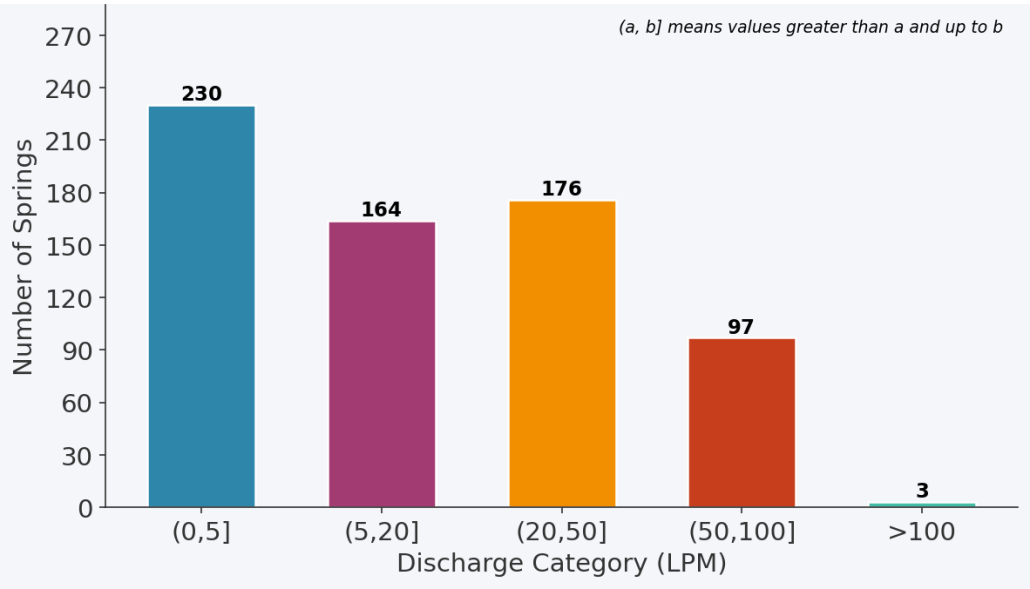


Fig. 3.11.5 Spring discharge distribution

In the survey of resource threats to the springs, a total of 3871 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 65.5% (2535) of the springs are reported to have no resource threat, while 34.5% (1336) are identified as having a threat.

Among the springs where a threat was identified, 22.6% (302) exhibit a low degree of threat, 48.5% (648) exhibit moderate threat, and 28.9% (386) exhibit high threat levels (Fig. 3.11.6).

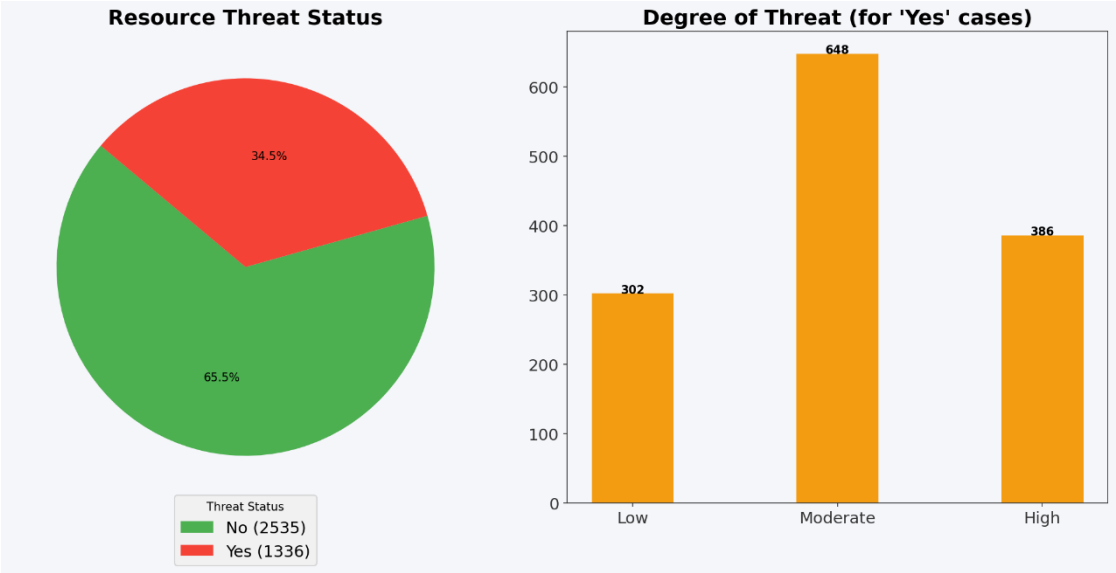


Fig. 3.11.6 Resource threat analysis

Table 3.11.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Manipur.

Table 3.11.1 Overview of spring attributes for Manipur

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	**Count**	**3,941**	**100.0%**
	Springs in Rural Areas	Count	3,903	99.0%
	Springs in Urban Areas	Count	38	1.0%
2.	**Springs by type**			
	Free Flow	Count	478	12.1%
	Seep	Count	3,463	87.9%
3.	**Springs by Nature**			
	Perennial	Count	3,419	86.8%
	Seasonal	Count	457	11.6%
	Dried	Count	65	1.6%
4.	**Springs by ownership**			
	Public	Count	3,543	91.4%
	Private	Count	333	8.6%
5.	**Springs with chamber/tank to collect the water**	Count	1412	36.4%
6.	**Springs with piped water supply**	Count	1379	35.6%
7.	**Springs where discharge could be measured**	Count	670	17.3%

Sl. No.	Parameters	Unit	Value	Percentage
8.	**Spring by Colour of its water**			
	Colourless	Count	3,724	96.08%
	Coloured	Count	152	3.92%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	3630	93.65%
	Non-Agreeable	Count	246	6.35%
10.	**Springs by taste of its water**			
	Objectionable	Count	277	7.15%
	Unobjectionable	Count	3599	92.85%
11.	**Springs by its water temperature**			
	Hot	Count	4	0.1%
	Cold	Count	3872	99.9%
12.	**Springs by resource threat**			
	Yes	Count	1336	34.5%
	No	Count	2535	65.5%
13.	**Springs by degree of threat**			
	Low	Count	302	22.6%
	Moderate	Count	648	48.5%
	High	Count	386	28.9%
14.	**Spring by type of dependents**			
	Residents	Count	3127	80.7%
	Non-residents	Count	634	16.4%
	Wild animals	Count	113	2.9%
15.	**Spring by dependency level (Residents)**			
	Low	Count	326	10.4%
	Moderate	Count	956	30.6%
	High	Count	1845	59.0%

3.12 Odisha

Odisha is located on the eastern coast of India, along the Bay of Bengal. It is bounded by West Bengal to the northeast, Jharkhand to the north, Chhattisgarh to the west and northwest, and Andhra Pradesh to the south.
The state comprises diverse geographical regions, including the coastal plains, central plateaus and hill regions of the Eastern Ghats. It lies predominantly in the tropical zone and experiences a tropical climate, with the coastal areas influenced by the Bay of Bengal. Odisha receives substantial monsoon rainfall and is vulnerable to tropical cyclones and associated coastal hazards. The major rivers include the Mahanadi, Brahmani, Baitarani and Rushikulya, along with several other important rivers.

The geographical area of Odisha is 155,707 sq. km, and its total population was 41,974,218 as per the 2011 Census of India. Administratively, the state is divided into 30 districts. Agriculture and allied activities are major sources of livelihood, particularly in rural areas. Rice (paddy) is the dominant crop, while other important crops include pulses, oilseeds, maize, cotton, sugarcane, vegetables and spices such as turmeric.



Fig. 3.12.1 A spring located near the village of Barabhaya in Narasinghpur Block of Cuttack District, Odisha.

3.12.1 Major findings of the census

In the First Spring Census, a total of 1957 springs were enumerated, of which 99.2% (1942) are located in rural areas and 0.8% (15) in urban areas. Springs are widely distributed in the hilly and forested tracts of Odisha, especially in the Eastern Ghats region. Prominent spring occurrence is reported in districts such as Kandhamal (485), Koraput (402), Rayagada (186), Kendujhar (142), Malkangiri (133), Gajapati (114), where high rainfall, steep slopes, and

fractured hard rock aquifers favour the emergence of springs (Fig. 3.12.2). In many rural and tribal settlements of these districts, springs constitute an important source of drinking water.

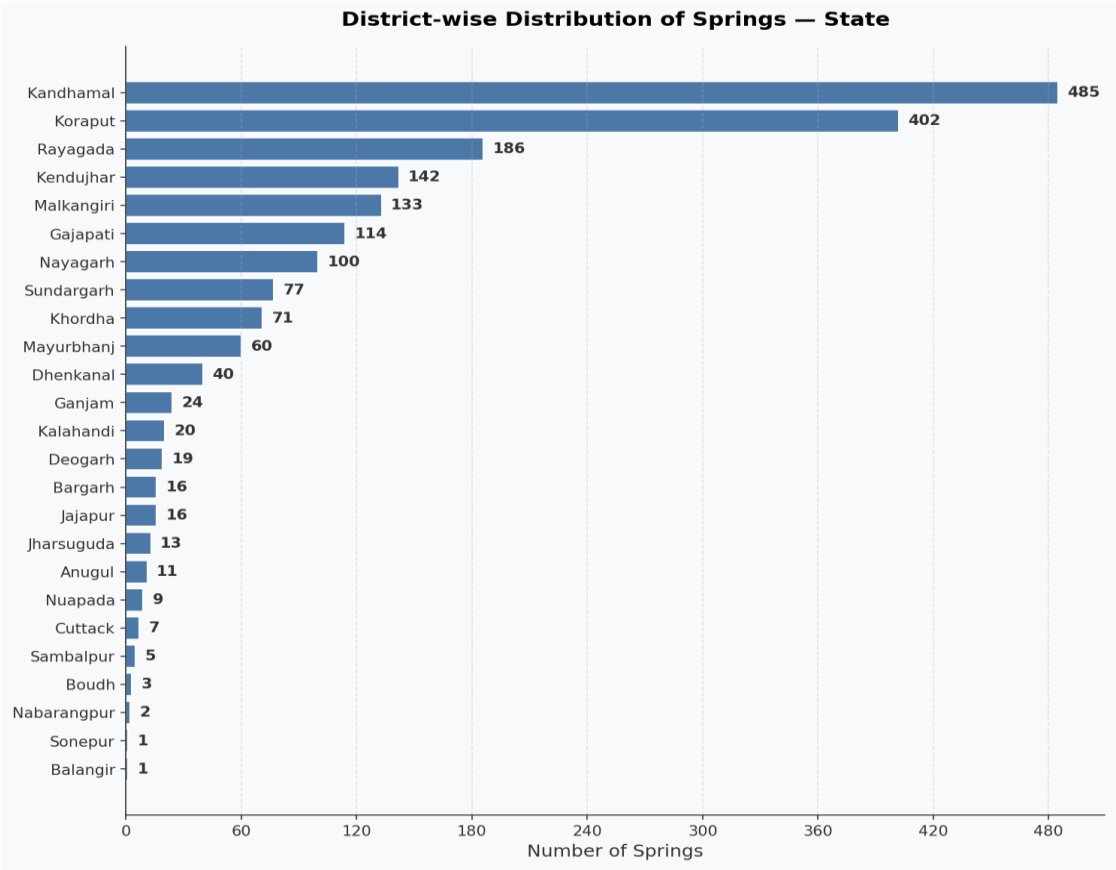


Fig. 3.12.2 District-wise distribution of spring.

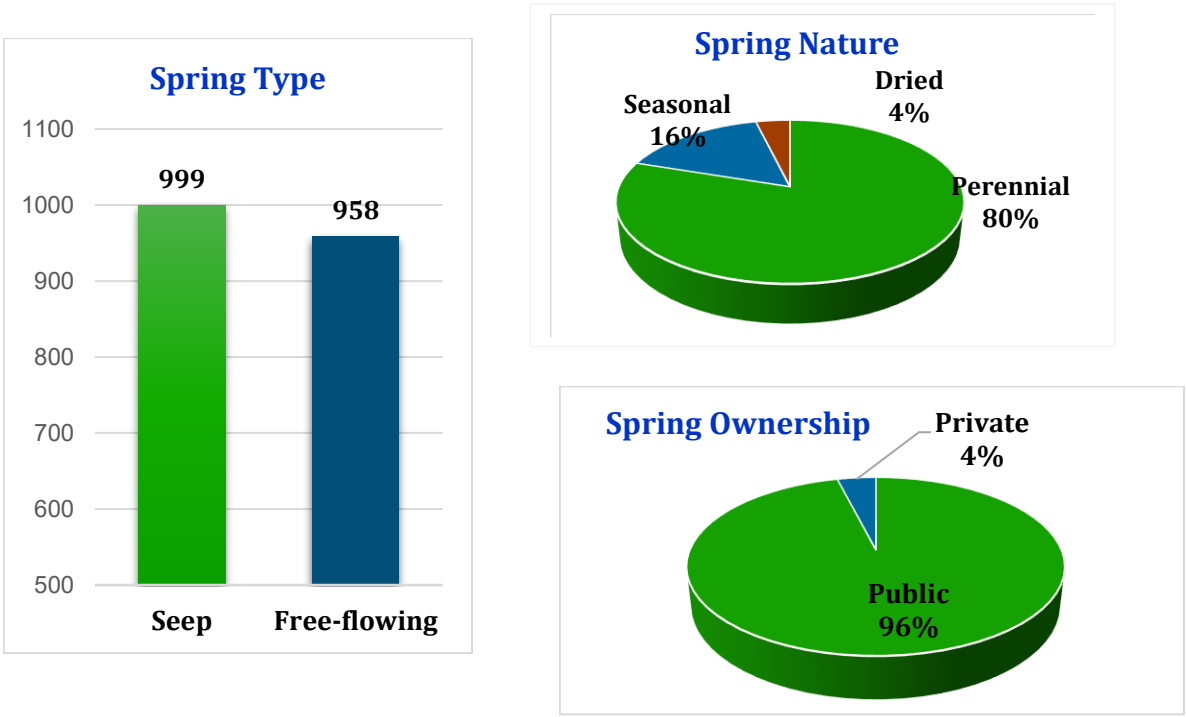


Fig. 3.12.3 Spring characteristics: Type, Nature & Ownership

In terms of flow type, 51.0% (999) of the springs are of seep type, while 49.0% (958) are free-flowing. Out of the total enumerated springs, 80.1% (1568) of the springs are perennial, 16.1% (315) are seasonal, and 3.9% (74) are reported as dried. With respect to ownership, 96.1% (1809) of the springs are public, whereas 3.8% (74) are under private ownership (Fig. 3.12.3).

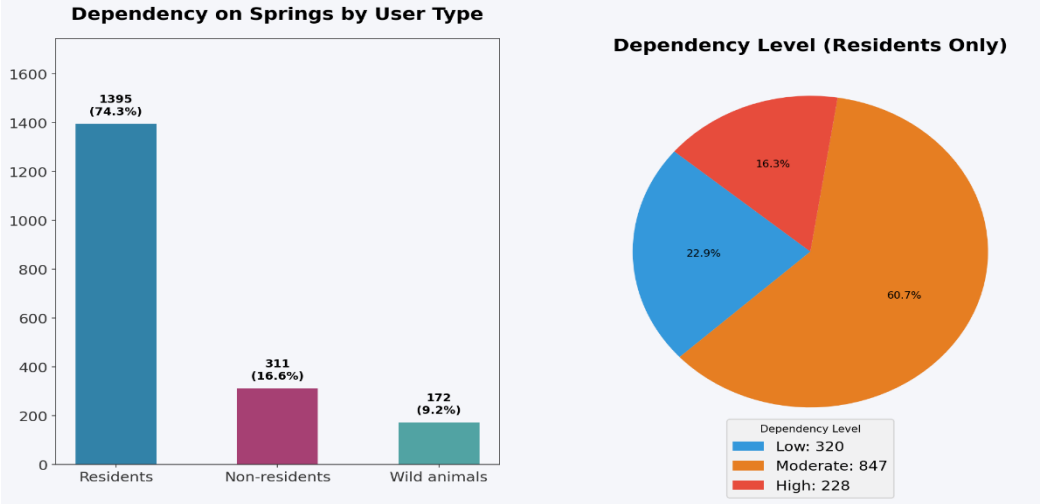


Fig. 3.12.4 Spring dependency

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 16.6% (311), while Wild animals access 9.2% (172). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 60.7% (847) of the springs show a moderate level of dependency, 22.9% (320) show low dependency, and 16.3% (228) are reported to have high dependency (Fig. 3.12.4).

In the survey of spring discharge, a total of 1231 springs were measured for their flow rate. Out of these, the largest proportion, 85.6% (1054), fall into the lowest discharge category of <=5 LPM. This is followed by 10.4% (128) of springs in the 5–20 LPM range. Smaller percentages are seen in the higher flow categories, with 2.4% (30) measuring 20–50 LPM, 1.2% (15) measuring 50–100 LPM and 0.3% (4) measuring a discharge exceeding 100 LPM (Fig. 3.12.5).

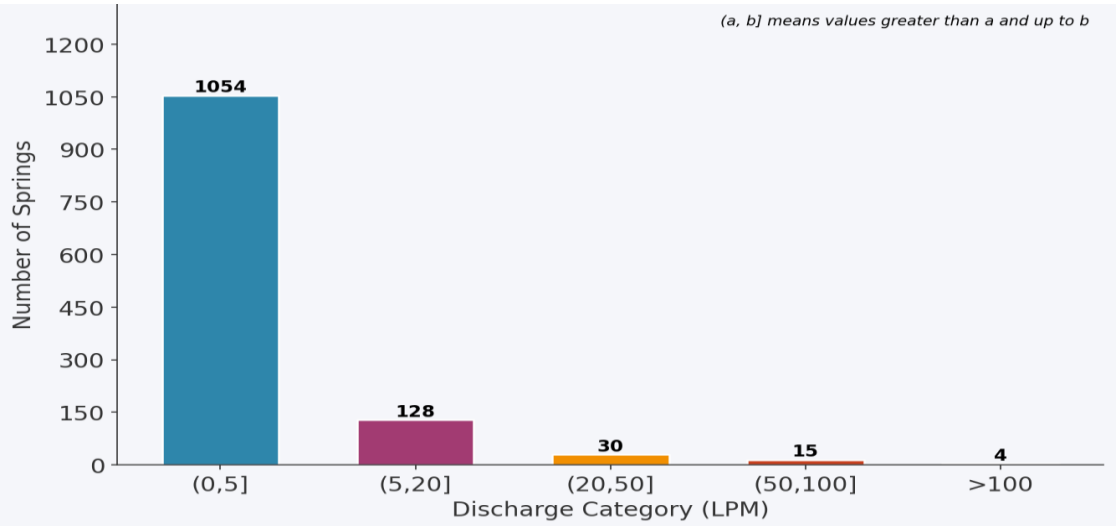


Fig. 3.12.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 1878 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 84.3% (1583) of the springs are reported to have no resource threat, while 15.7% (295) are identified as having a threat. Among the springs where a threat was identified, 30.5% (90) exhibit a low degree of threat, 62.4% (184) exhibit moderate threat, and 7.1% (21) exhibit high threat levels (Fig. 3.12.6).

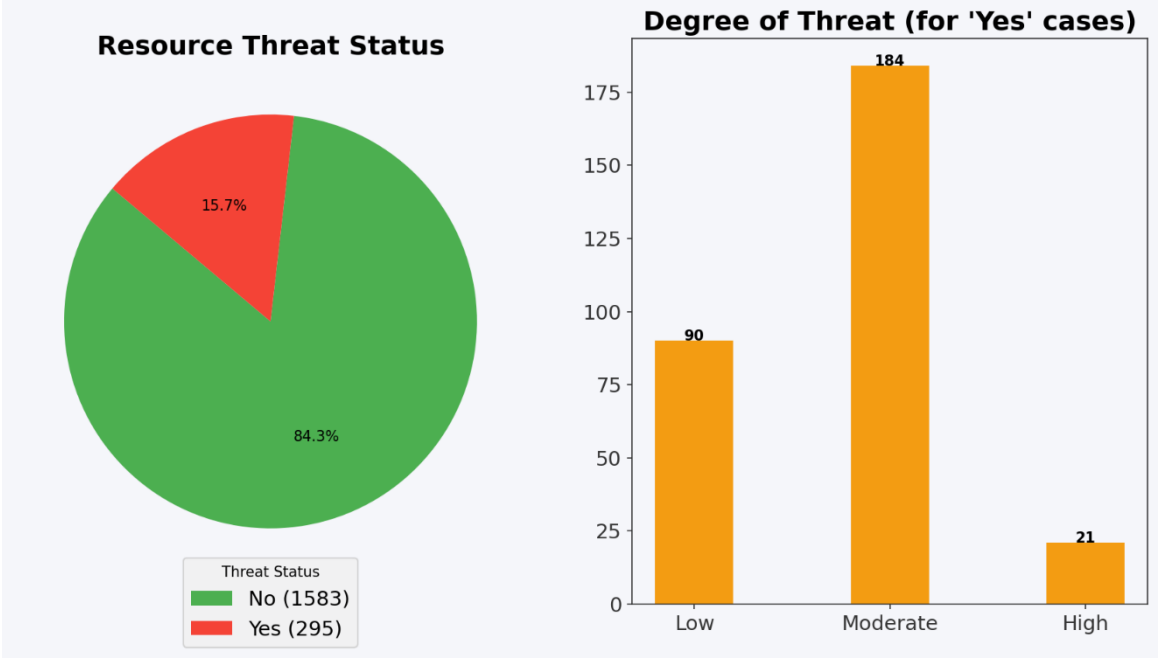


Fig. 3.12.6 Resource threat analysis.

Table 3.12.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Odisha.

Table 3.12.1 Overview of spring attributes for Odisha

Sl. No.	Parameters	Unit	Value	Percentage
1.	**Total Number of Springs**	Count	1957	100.0%
	Springs in Rural Areas	Count	1942	99.2%
	Springs in Urban Areas	Count	15	0.8%
2.	**Springs by type**			
	Free Flow	Count	958	49.0%
	Seep	Count	999	51.0%
3.	**Springs by Nature**			
	Perennial	Count	1568	80.1%
	Seasonal	Count	315	16.1%
	Dried	Count	74	3.8%
4.	**Springs by ownership**			
	Public	Count	1809	96.1%
	Private	Count	74	3.9%

Sl. No.	Parameters	Unit	Value	Percentage
5.	**Springs with chamber/tank to collect the water**	Count	513	27.2%
6.	**Springs with piped water supply**	Count	246	13.1%
7.	**Springs where discharge could be measured**	Count	1231	65.4%
8.	**Spring by Colour of its water**			
	Colourless	Count	1629	86.5%
	Coloured	Count	254	13.5%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	1238	65.7%
	Non-Agreeable	Count	645	34.3%
10.	**Springs by taste of its water**			
	Objectionable	Count	460	24.4%
	Unobjectionable	Count	1423	75.6%
11.	**Springs by its water temperature**			
	Hot	Count	5	0.3%
	Cold	Count	1878	99.7%
12.	**Springs by resource threat**			
	Yes	Count	295	15.7%
	No	Count	1583	84.3%
13.	**Springs by degree of threat**			
	Low	Count	90	30.5%
	Moderate	Count	184	62.4%
	High	Count	21	7.1%
14.	**Spring by type of dependents**			
	Residents	Count	1395	74.3%
	Non-residents	Count	311	16.6%
	Wild animals	Count	172	9.2%
15.	**Spring by dependency level (Residents)**			
	Low	Count	320	22.9%
	Moderate	Count	847	60.7%
	High	Count	228	16.3%

3.13 Rajasthan

Rajasthan is India's largest state by geographical area, located in the northwestern part of the country. It shares an international border with Pakistan to the west and northwest, and is bounded by the Indian states of Punjab to the north, Haryana and Uttar Pradesh to the northeast, Madhya Pradesh to the southeast, and Gujarat to the southwest.

It is dominated by the Thar Desert in the west and the Aravalli Range extending from southwest to northeast. The climate is predominantly arid to semi-arid, with sparse rainfall and extreme temperature variations. Major rivers include the Luni, Banas, Chambal, and Sabarmati.

The geographical area of Rajasthan is about 342,239 sq km, and the total population is 68,548,437 as per the 2011 Census of India. Administratively, the state is divided into 33 districts. Despite water scarcity, major crops include bajra, mustard, pulses, wheat, and spices like coriander and cumin.



Fig. 3.13.1 A spring located near the village of Indok in Malakhera sub-district of Alwar District, Rajasthan State.

3.13.1 Major findings of the census

In the First Spring Census, a total of 13 springs were enumerated, of which 76.9% (10) are located in rural areas and 23.1% (3) in urban areas. Springs in Rajasthan are primarily associated with the Aravalli hill ranges and occur in localized hard-rock terrain. Prominent spring occurrence is reported in Alwar district (6), where favourable geological conditions, the Aravalli hill topography, and fractured hard-rock aquifers facilitate spring emergence (Fig.

3.13.2). In many rural communities, these springs serve as an important source of drinking water.

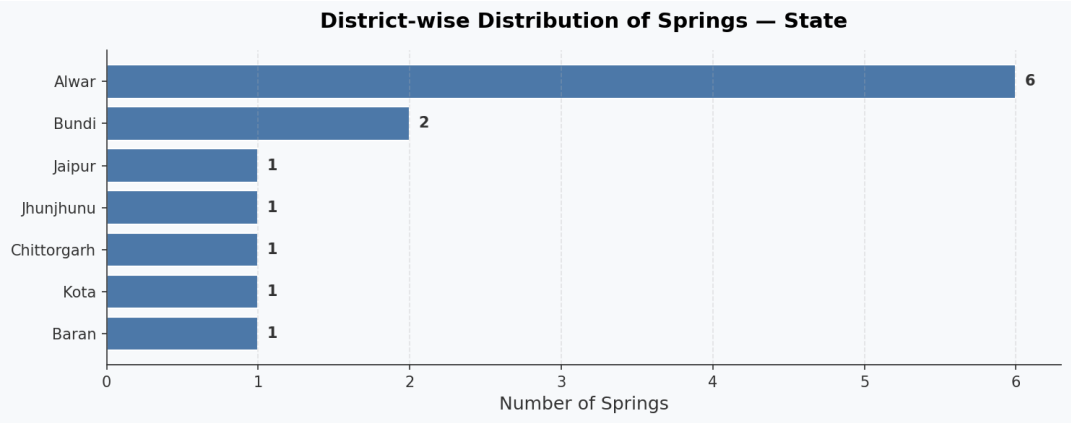


Fig. 3.13.2 District-wise distribution of spring.

In terms of flow type, 46.2% (6) of the springs are of seep type, while 53.8% (7) are free-flowing. Out of the total enumerated springs, 61.5% (8) of the springs are perennial, 38.5% (5) are seasonal, and no spring was reported as dried. With respect to ownership, 100% (13) of the springs are under public ownership (Fig. 3.13.3).

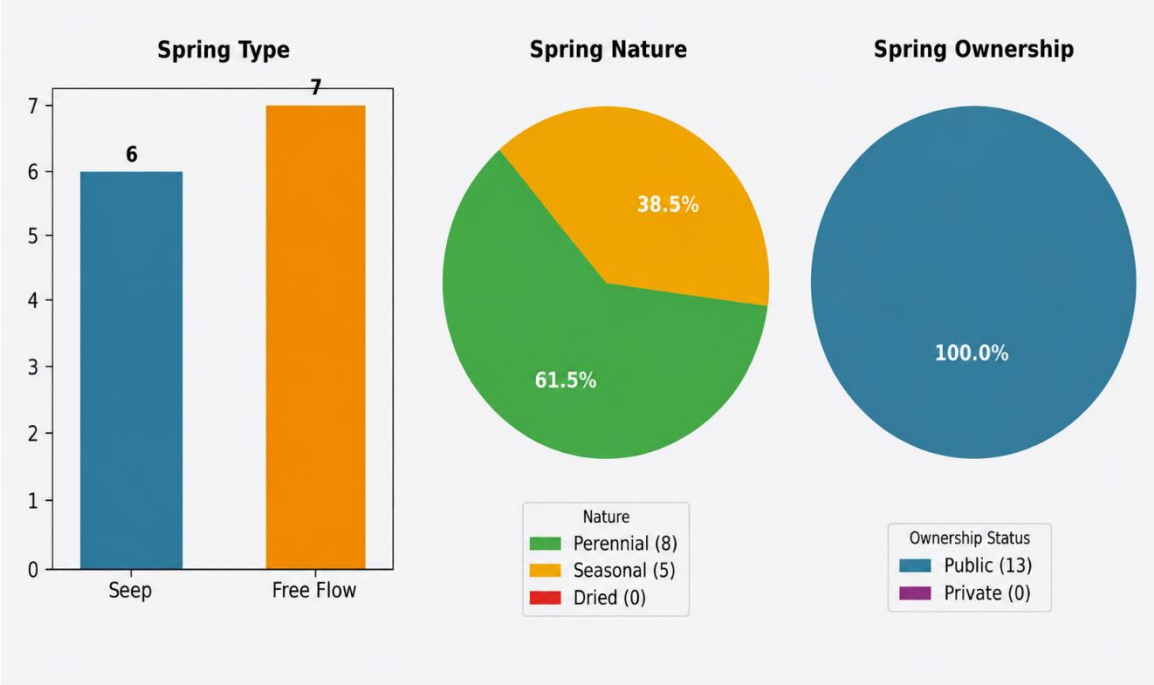


Fig. 3.13.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 41.7% (5), Wild animals access 58.3% (7), and no spring was found to be used by residents (Fig. 3.13.4).

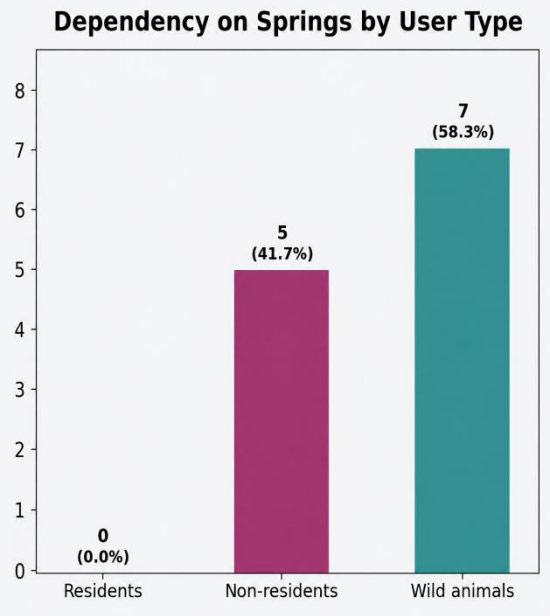


Fig. 3.13.4 Spring dependency.

In the survey of spring discharge, a total of 2 springs were measured for their flow rate. Of these, 50.0% (1 spring) fell into the lowest discharge category (≤5 LPM), while 50.0% (1 spring) fell within the 5–20 LPM range (Fig. 3.13.5).

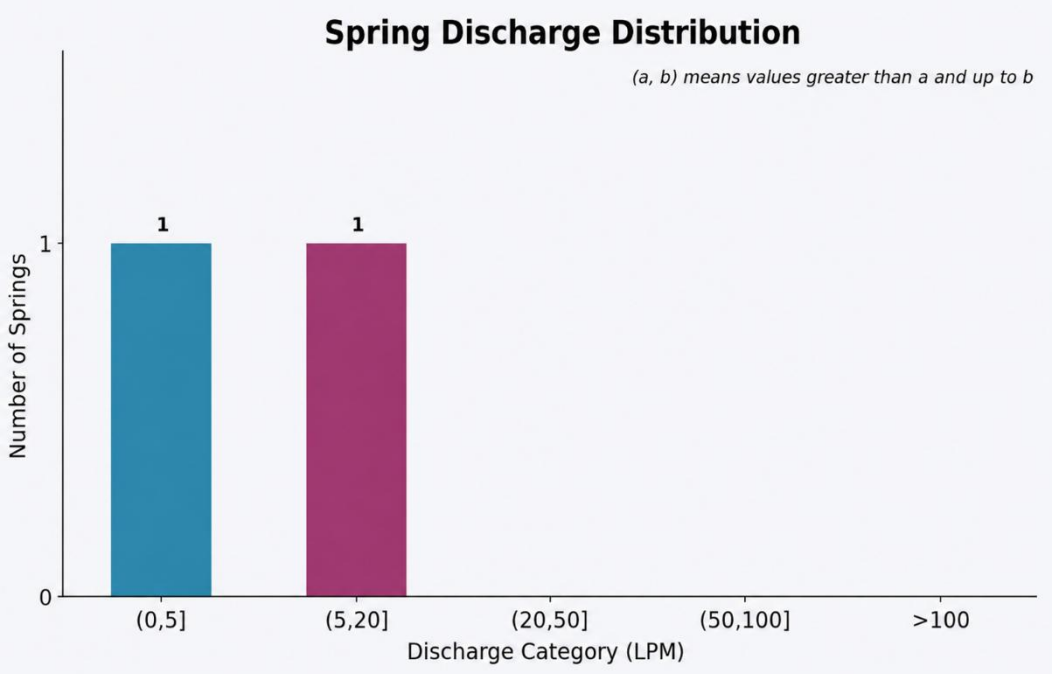


Fig. 3.13.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 12 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 91.7% (11) of the springs are reported to have no resource threat, while 8.3% (1) are identified as having a threat under high threat level (Fig. 3.13.6).

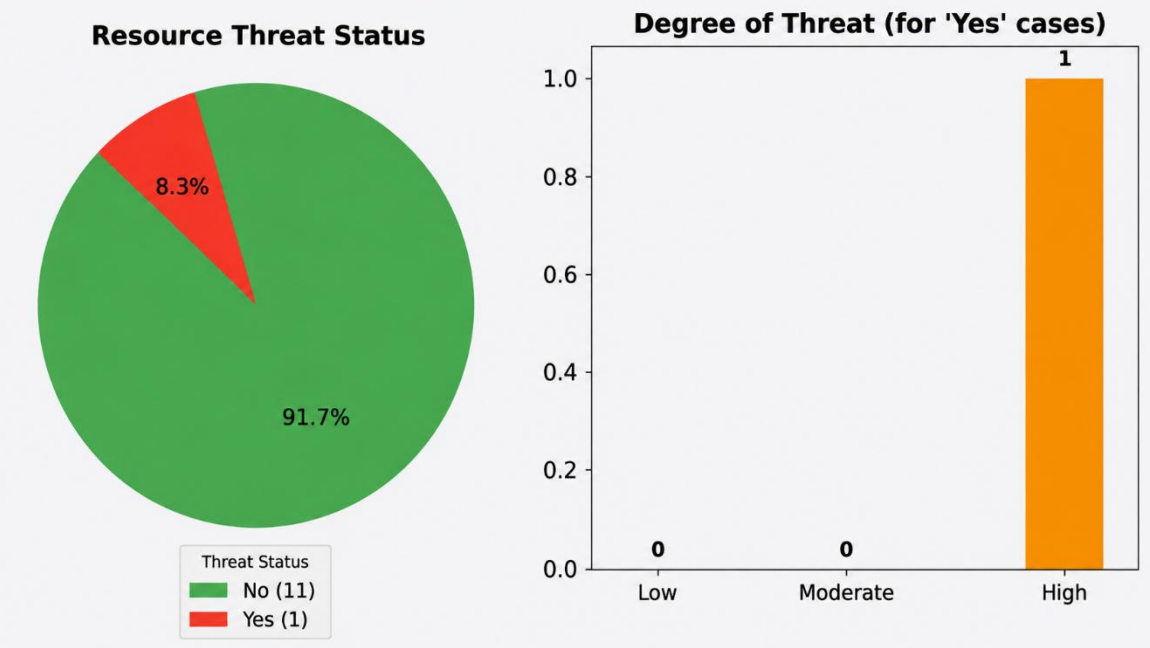


Fig. 3.13.6 Resource threat analysis.

Table 3.13.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Rajasthan.

Table 3.13.1 Overview of spring attributes for Rajasthan.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	**Count**	**13**	**100.0%**
	Springs in Rural Areas	Count	10	76.9%
	Springs in Urban Areas	Count	3	23.1%
2.	**Springs by type**			
	Free Flow	Count	7	53.8%
	Seep	Count	6	46.2%
3.	**Springs by Nature**			
	Perennial	Count	8	61.5%
	Seasonal	Count	5	38.5%
	Dried	Count	0	0.0%
4.	**Springs by ownership**			
	Public	Count	13	100.0%
	Private	Count	0	0.0%
5.	**Springs with chamber/tank to collect the water**	Count	9	69.2%
6.	**Springs with piped water supply**	Count	1	7.7%
7.	**Springs where discharge could be measured**	Count	2	15.4%

Sl. No.	Parameters	Unit	Value	Percentage
8.	**Spring by Colour of its water**			
	Colourless	Count	13	100.0%
	Coloured	Count	0	0.0%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	12	92.3%
	Non-Agreeable	Count	1	7.7%
10.	**Springs by taste of its water**			
	Objectionable	Count	1	7.7%
	Unobjectionable	Count	12	92.3%
11.	**Springs by its water temperature**			
	Hot	Count	1	7.7%
	Cold	Count	12	92.3%
12.	**Springs by resource threat**			
	Yes	Count	1	8.3%
	No	Count	11	91.7%
13.	**Springs by degree of threat**			
	Low	Count	0	0.0%
	Moderate	Count	0	0.0%
	High	Count	1	100.0%
14.	**Spring by type of dependents**			
	Residents	Count	0	0.0%
	Non-residents	Count	5	41.7%
	Wild animals	Count	7	58.3%
15.	**Spring by dependency level (Residents)**			
	Low	Count	0	0.0%
	Moderate	Count	0	0.0%
	High	Count	0	0.0%

3.14 Telangana

Telangana is a landlocked state on the Deccan Plateau in southern India. It is bounded by Maharashtra and Chhattisgarh to the north, Karnataka to the west, and Andhra Pradesh to the south and east.

The state's terrain is characterized by an undulating plateau interspersed with low hills, river valleys, and scattered forested tracts. It has a tropical semi-arid climate, with most of its annual rainfall received during the southwest monsoon (June-September). The Godavari and Krishna rivers, along with their tributaries, constitute the principal river systems of the state.

The geographical area of Telangana is about 112,077 sq km, and the total population is 35,003,674 as per the 2011 Census of India. Administratively, the state is divided into 33 districts. Cotton is a major cash crop, while rice, maize, pulses, oilseeds, and chilli are among the principal crops cultivated across the state.

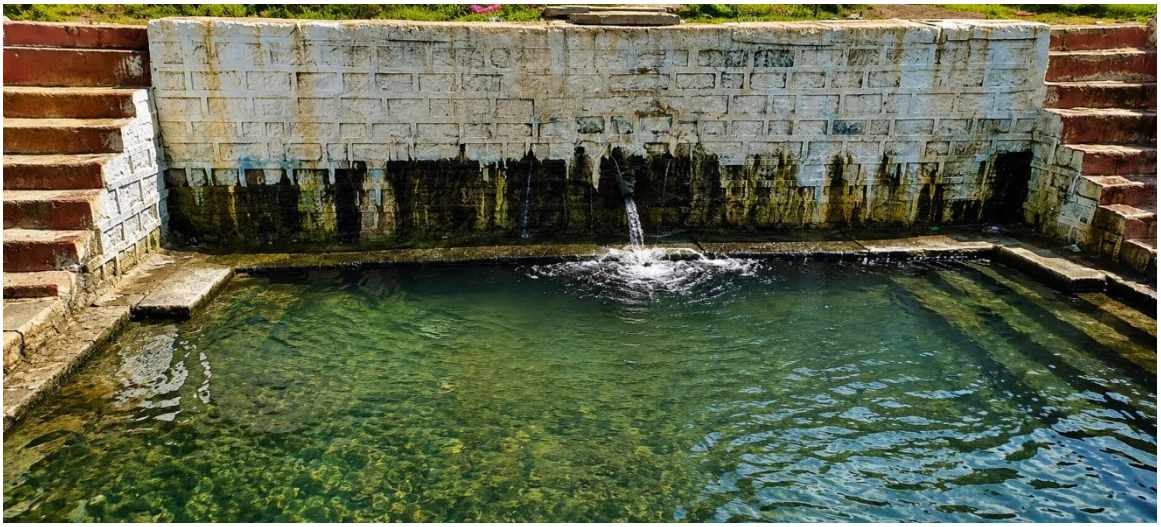


Fig. 3.14.1 A spring located near the ward of Vicarabad (NP) - Ward No.10 in Vikarabad Town of Vikarabad District, Telangana State.

3.14.1 Major findings of the census

In the First Spring Census, a total of 148 springs were enumerated, of which 99.3% (147) are located in rural areas and 0.7% (1) in urban areas. Springs are widely distributed in the hilly, forested, and plateau regions of Telangana, particularly in the northern and eastern parts of the state associated with the Eastern Ghats, the Godavari River basin, and fractured hard-rock terrains. Prominent spring occurrence is reported in districts such as Bhadradri Kothagudem (32), Kumuram Bheem Asifabad (30), Nagarkurnool (26), and Mulugu (19), where relatively high rainfall, rugged topography, and fractured granitic and basaltic aquifers favour the emergence of springs (Fig. 3.14.2). In many rural and tribal settlements of these districts, springs constitute an important source of drinking water.

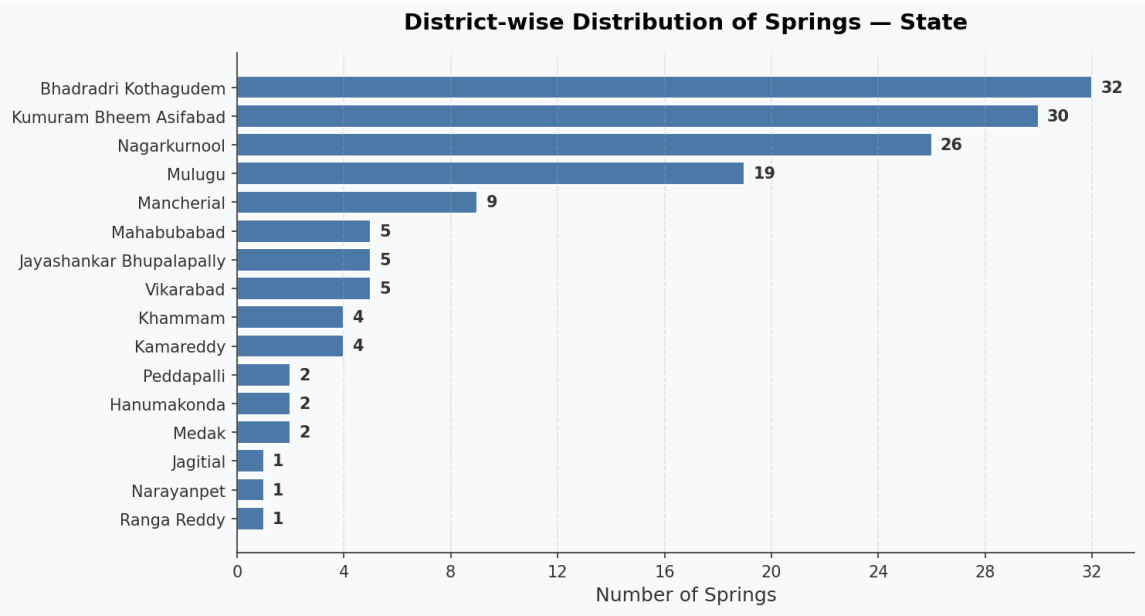


Fig. 3.14.2 District-wise distribution of spring.

In terms of flow type, 31.8% (47) of the springs are of seep type, while 68.2% (101) are free-flowing. Out of the total enumerated springs, 85.1% (126) of the springs are perennial, 12.2% (18) are seasonal, and 2.7% (4) are reported as dried. With respect to ownership, 94.4% (136) of the springs are public, whereas 5.6% (8) are under private ownership (Fig. 3.14.3).

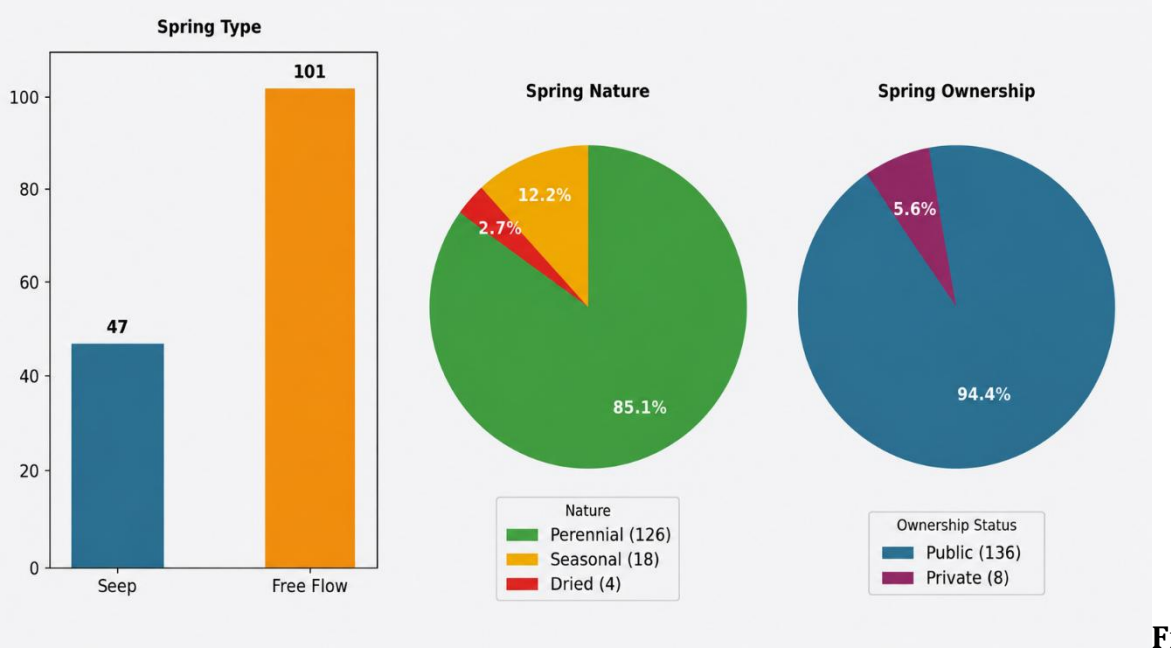


Fig. 3.14.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 19.6% (28), while Wild animals access 35.7% (51). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 20.3% (13) of the springs show a moderate level of dependency, 60.9% (39) show low dependency, and 18.8% (12) are reported to have high dependency (Fig. 3.14.4).

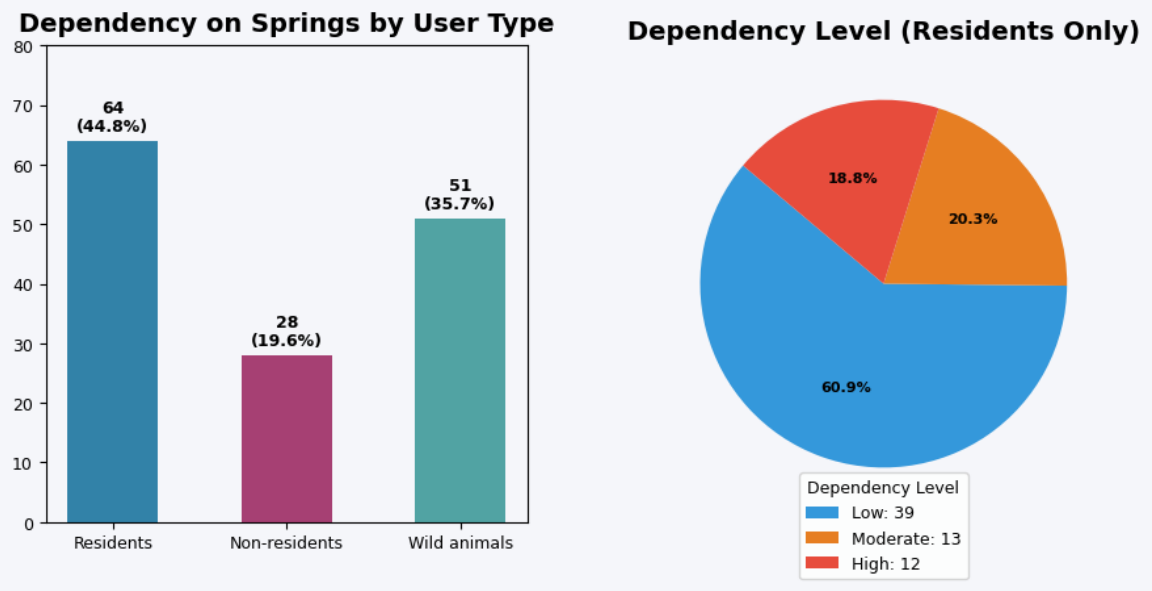


Fig. 3.14.4 Spring dependency.

In the survey of spring discharge, a total of 102 springs were measured for their discharge rate. The largest proportion, 37 springs (36.3%), falls within the highest discharge category (>100 LPM). This is followed by 35 springs (34.3%) in the 0–5 LPM category and 14 springs (13.7%) in the 5–20 LPM range. Smaller proportions were observed in the intermediate discharge categories, with 5 springs (4.9%) recorded in the 20–50 LPM range and 11 springs (10.8%) in the 50–100 LPM range (Fig. 3.14.5).

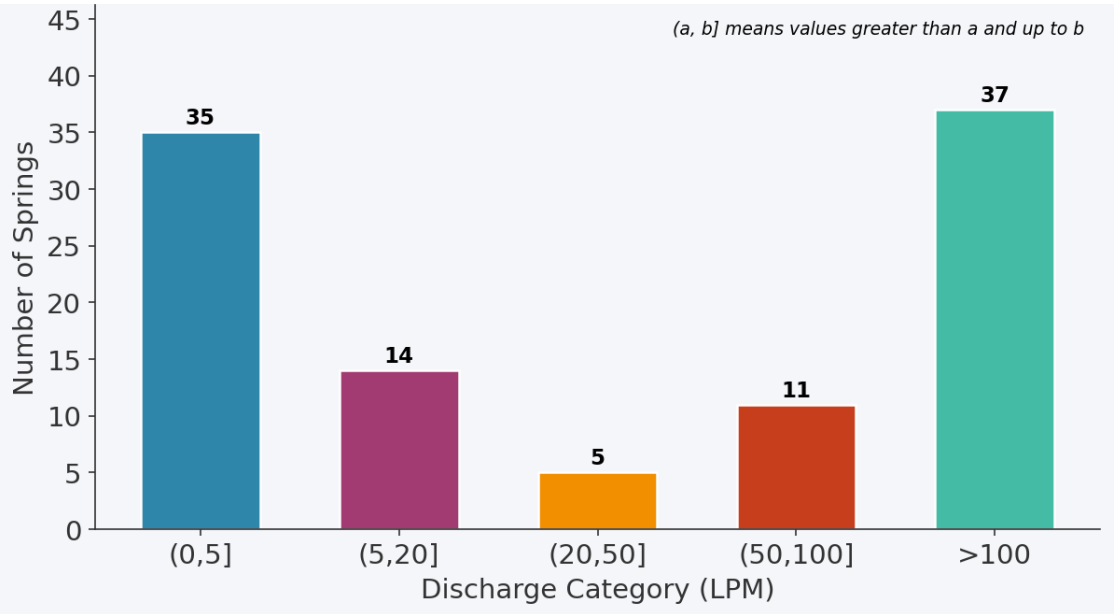


Fig. 3.14.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 143 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 97.2% (139) of the springs are reported to have no resource threat, while 2.8% (4) are identified as having a threat. Among the springs where a threat was identified, 75.0% (3) exhibit moderate threat, and 25.0% (1) exhibit high threat levels (Fig. 3.14.6).

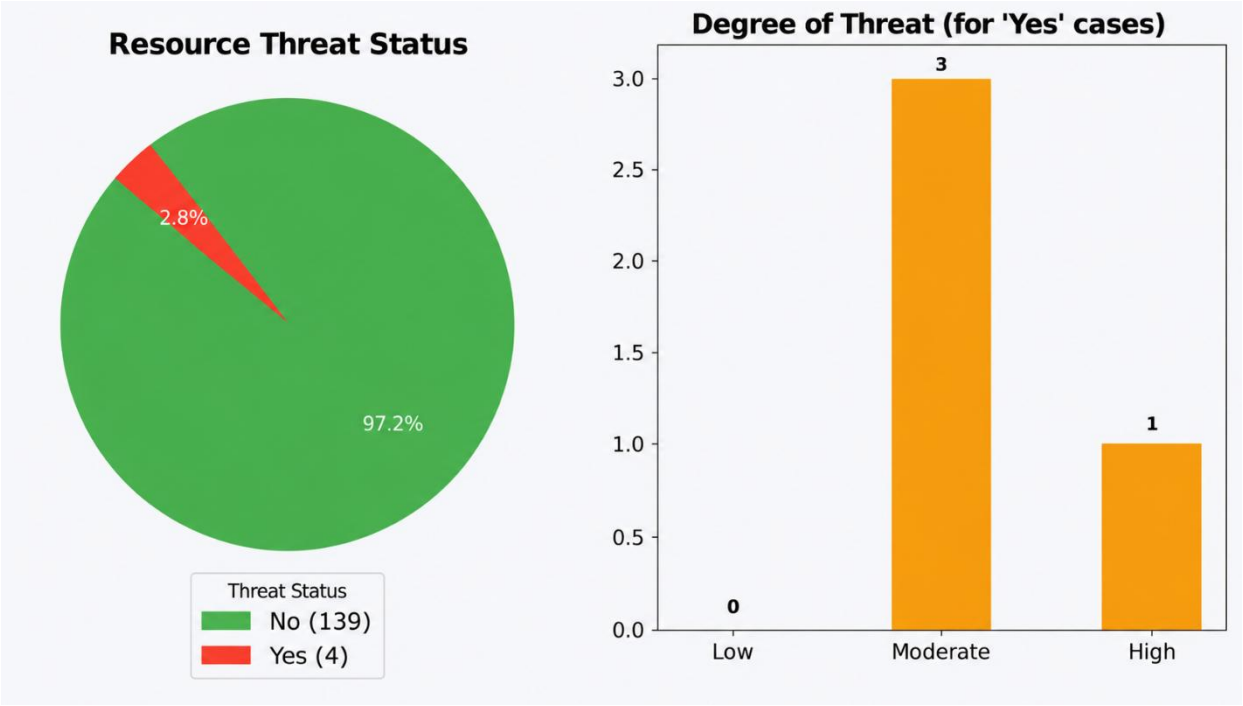


Fig. 3.14.6 Resource threat analysis.

Table 3.14.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Telangana.

Table 3.14.1 Overview of spring attributes for Telangana.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	Count	148	100.0%
	Springs in Rural Areas	Count	147	99.3%
	Springs in Urban Areas	Count	1	0.7%
2.	**Springs by type**			
	Free Flow	Count	101	68.2%
	Seep	Count	47	31.8%
3.	**Springs by Nature**			
	Perennial	Count	126	85.1%
	Seasonal	Count	18	12.2%
	Dried	Count	4	2.7%
4.	**Springs by ownership**			
	Public	Count	136	94.4%
	Private	Count	8	5.6%
5.	**Springs with chamber/tank to collect the water**	Count	46	31.9 %

Sl. No.	Parameters	Unit	Value	Percentage
6.	**Springs with piped water supply**	Count	5	3.5%
7.	**Springs where discharge could be measured**	Count	102	70.8%
8.	**Spring by Colour of its water**			
	Colourless	Count	139	96.5%
	Coloured	Count	5	3.5%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	123	85.4%
	Non-Agreeable	Count	21	14.6%
10.	**Springs by taste of its water**			
	Objectionable	Count	34	23.6%
	Unobjectionable	Count	110	76.4%
11.	**Springs by its water temperature**			
	Hot	Count	1	0.7%
	Cold	Count	143	99.3%
12.	**Springs by resource threat**			
	Yes	Count	4	2.8%
	No	Count	139	97.2%
13.	**Springs by degree of threat**			
	Low	Count	0	0.0%
	Moderate	Count	3	75.0%
	High	Count	1	25.0%
14.	**Spring by type of dependents**			
	Residents	Count	64	44.8%
	Non-residents	Count	28	19.6%
	Wild animals	Count	51	35.7%
15.	**Spring by dependency level (Residents)**			
	Low	Count	39	60.9%
	Moderate	Count	13	20.3%
	High	Count	12	18.8%

3.15 Tripura

Tripura is a hilly state in Northeast India, bordered by Bangladesh on the north, west, south, and southeast, and by Assam and Mizoram on the east.

The state is characterized by five major hill ranges running roughly north–south, interspersed with low-lying valleys. It has a tropical monsoon climate, characterized by warm and humid conditions and high rainfall. Major rivers include the Gomati, Haora, Khowai, and Manu.

Tripura covers a geographical area of approximately 10,486 km^2 and had a population of 3,673,917 according to the 2011 Census of India. Administratively, the state was divided into eight districts at the time of the 2011 Census. Rice is the principal food crop, while other important crops include jute, rubber, tea, and various fruit crops.



Fig. 3.15.1 A spring located near the village of Thelakum in Jampuijala Block of Sepahijala District, Tripura.

3.15.1 Major findings of the census

In the First Spring Census, a total of 1,049 springs were enumerated, all of which (100.0%) were located in rural areas, with no springs recorded in urban areas. Springs are widely distributed across the hilly and forested areas of Tripura, where high rainfall, varied topography, and favourable geological conditions support their emergence. The highest numbers of springs were recorded in Dhalai (398), North Tripura (238), Khowai (205), Unakoti (75), Gomati (59), and South Tripura (40) (Fig. 3.15.2). In many rural and tribal settlements of these districts, springs constitute an important source of drinking water.

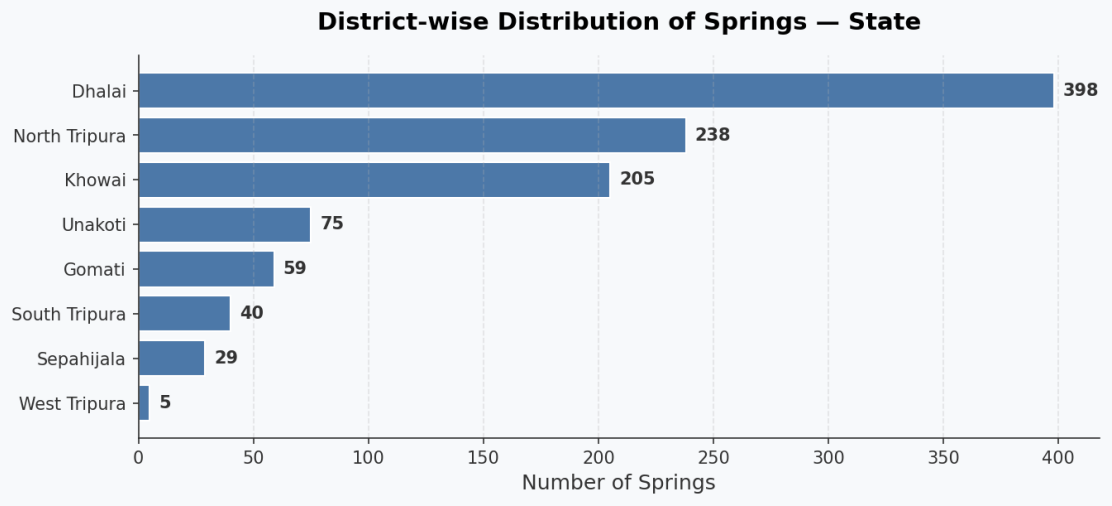


Fig. 3.15.2 District-wise distribution of spring.

In terms of flow type, 37.8% (397) of the springs are of the seep type, while 62.2% (652) are free-flowing. Out of the total enumerated springs, 63.0% (661) are perennial, 36.0% (378) are seasonal, and 1.0% (10) are reported to be dried. With respect to ownership, 98.4% (1022) of the springs are publicly owned, whereas 1.6% (17) are under private ownership (Fig. 3.15.3).

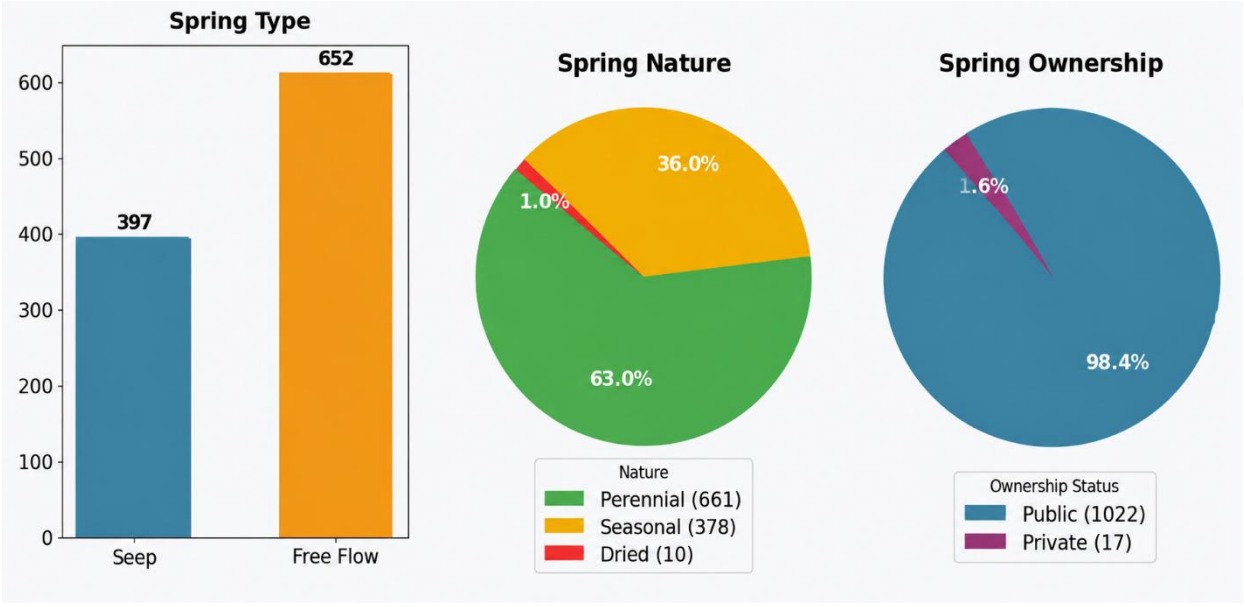


Fig. 3.15.3 Spring characteristics: Type, Nature & Ownership

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 23.6% (245), while Wild animals access 1.8% (19). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 21.7% (168) of the springs show a moderate level of dependency, 16.1% (125) show low dependency, and 62.2% (482) are reported to have high dependency (Fig. 3.15.4).

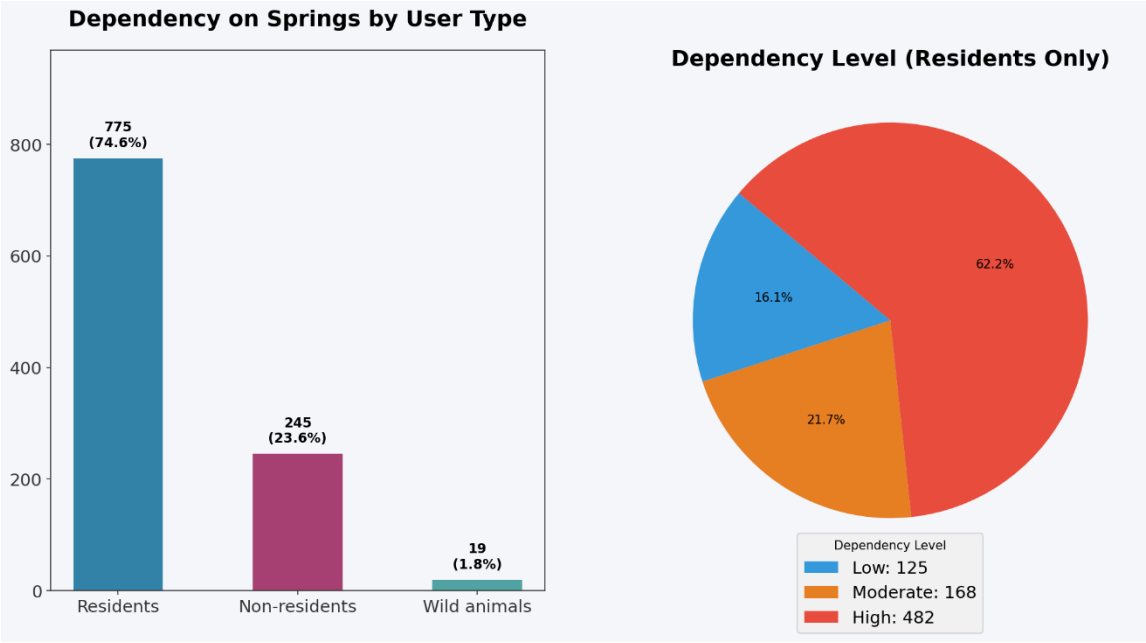


Fig. 3.15.4 Spring dependency.

In the survey of spring discharge, a total of 718 springs were measured for their flow rate. Out of these, the largest proportion, 76.3% (548), fall into the lowest discharge category of <=5 LPM. This is followed by 22.0% (158) of springs in the 5–20 LPM range. Smaller percentages are seen in the higher flow categories, with 0.8% (6) measuring 20–50 LPM and 0.8% (6) measuring 50–100 LPM. No springs were recorded with a discharge exceeding 100 LPM (Fig. 3.15.5).

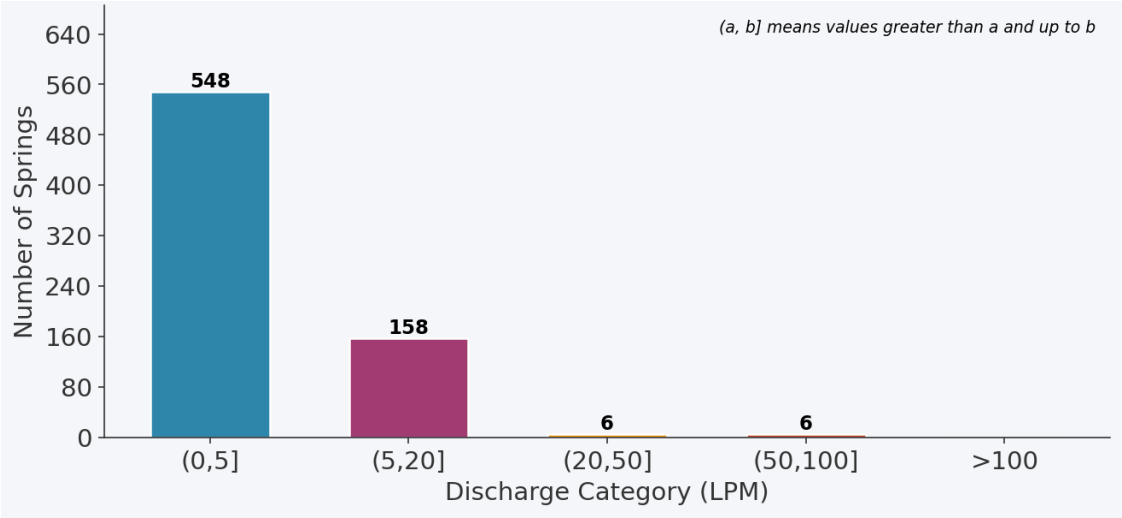


Fig. 3.15.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 1039 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 75.7% (787) of the springs are reported to have no resource threat, while 24.3% (252) are identified as having a threat. Among the springs where a threat was identified, 37.3% (94) exhibit a low degree of threat, 56.0% (141) exhibit moderate threat, and 6.7% (17) exhibit high threat levels (Fig. 3.15.6).

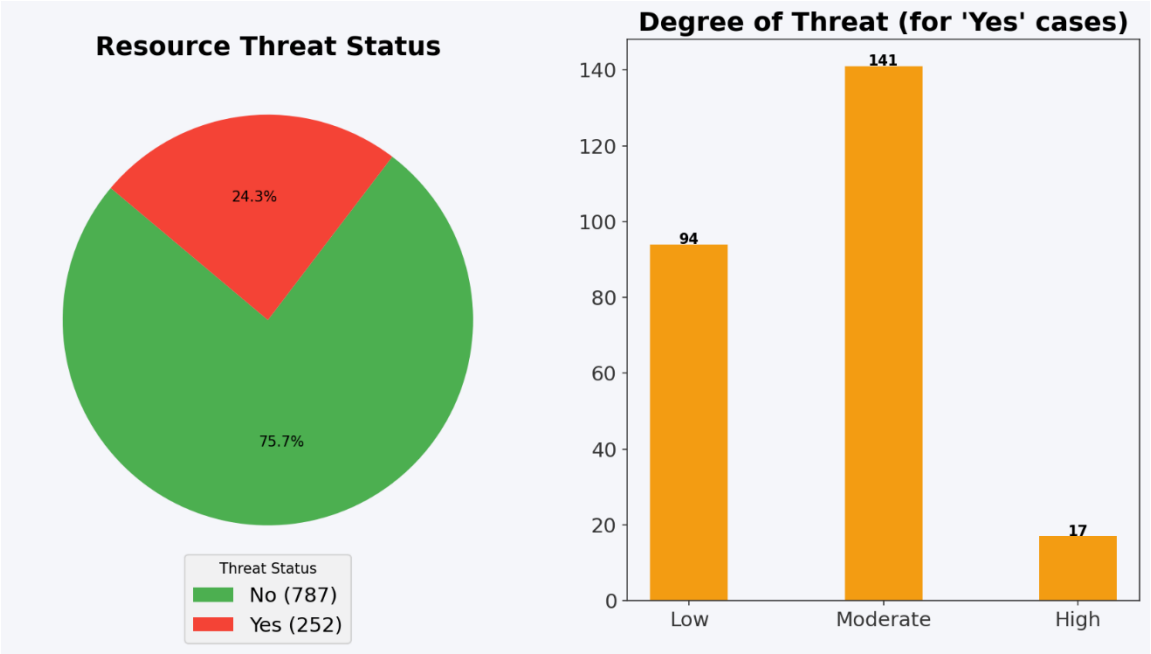


Fig. 3.15.6 Resource threat analysis.

Table 3.15.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of Tripura.

Table 3.15.1 Overview of spring attributes for Tripura.

Sl. No.	Parameters	Unit	Value	Percentage
1	**Total Number of Springs**	Count	1049	100.0%
	Springs in Rural Areas	Count	1049	100.0%
	Springs in Urban Areas	Count	0	0.0%
2.	**Springs by type**			
	Free Flow	Count	652	62.2%
	Seep	Count	397	37.8%
3.	**Springs by Nature**			
	Perennial	Count	661	63.0%
	Seasonal	Count	378	36.0%
	Dried	Count	10	1.0%
4.	**Springs by ownership**			
	Public	Count	1022	98.4%
	Private	Count	17	1.6%
5.	**Springs with chamber/tank to collect the water**	Count	95	9.1%

Sl. No.	Parameters	Unit	Value	Percentage
6.	**Springs with piped water supply**	Count	35	3.4%
7.	**Springs where discharge could be measured**	Count	718	69.1%
8.	**Spring by Colour of its water**			
	Colourless	Count	1016	97.8%
	Coloured	Count	23	2.2%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	954	91.8%
	Non-Agreeable	Count	85	8.2%
10.	**Springs by taste of its water**			
	Objectionable	Count	64	6.2%
	Unobjectionable	Count	975	93.8%
11.	**Springs by its water temperature**			
	Hot	Count	0	0.0%
	Cold	Count	1039	100.0%
12.	**Springs by resource threat**			
	Yes	Count	252	24.3%
	No	Count	787	75.7%
13.	**Springs by degree of threat**			
	Low	Count	94	37.3%
	Moderate	Count	141	56.0%
	High	Count	17	6.7%
14.	**Spring by type of dependents**			
	Residents	Count	775	74.6%
	Non-residents	Count	245	23.6%
	Wild animals	Count	19	1.8%
15.	**Spring by dependency level (Residents)**			
	Low	Count	125	16.1%
	Moderate	Count	168	21.7%
	High	Count	482	62.2%

3.16 West Bengal

West Bengal is located in eastern India, extending from the Eastern Himalaya in the north to the Bay of Bengal in the south. It is bounded on the north by Bhutan and Sikkim, on the east by Bangladesh, on the west by Odisha, Jharkhand and Bihar, and on the south by the Bay of Bengal.

It is characterized by diverse physiographic regions, including the Eastern Himalayan mountains and Darjeeling Himalaya in the north, the Terai–Dooars plains, the Rarh Plateau, the Gangetic alluvial plains, and the Ganga–Brahmaputra delta, including the Sundarbans in the south. The climate is tropical monsoon, with heavy rainfall and high humidity, especially in the coastal regions. Major rivers include the Ganga (Hooghly), Teesta, Damodar, and Mahananda.

The geographical area of West Bengal is about 88,752 sq km, and the total population is 91,276,115 as per the 2011 Census of India. Administratively, the state is divided into 23 districts. State is a top producer of rice and jute; tea from the Darjeeling region is internationally renowned for its quality and geographical indication (GI) status.



Fig. 3.16.1 A spring located near the village of Shushunia Pahar in Chhatna Block of Bankura District, West Bengal.

3.16.1 Major findings of the census

In the First Spring Census, a total of 1,686 springs were enumerated, of which 93.0% (1,568) are located in rural areas and 7.0% (118) in urban areas. Springs are predominantly distributed across the Darjeeling Himalayan region and the western plateau districts of West Bengal. Prominent spring occurrence is reported in districts Darjeeling (1,200), and Kalimpong (427), where favourable geological conditions, rugged terrain, and fractured hard-rock aquifers facilitate spring emergence (Fig. 3.16.2). In many rural and tribal communities of these districts, springs constitute an important source of drinking water.

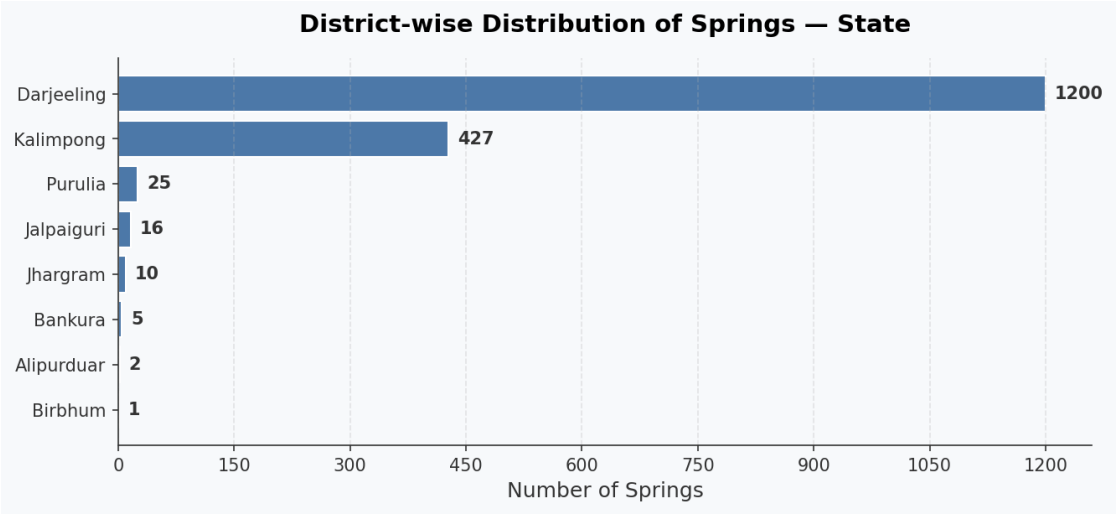


Fig. 3.16.2 District-wise distribution of spring.

In terms of flow type, 7.7% (129) of the springs are of seep type, while 92.3% (1,557) are free-flowing. Out of the total enumerated springs, 87.1% (1,469) of the springs are perennial, 12.6% (212) are seasonal, and 0.3% (5) are reported as dried. With respect to ownership, 65.7% (1,105) of the springs are public, whereas 34.3% (576) are under private ownership (Fig. 3.16.3).

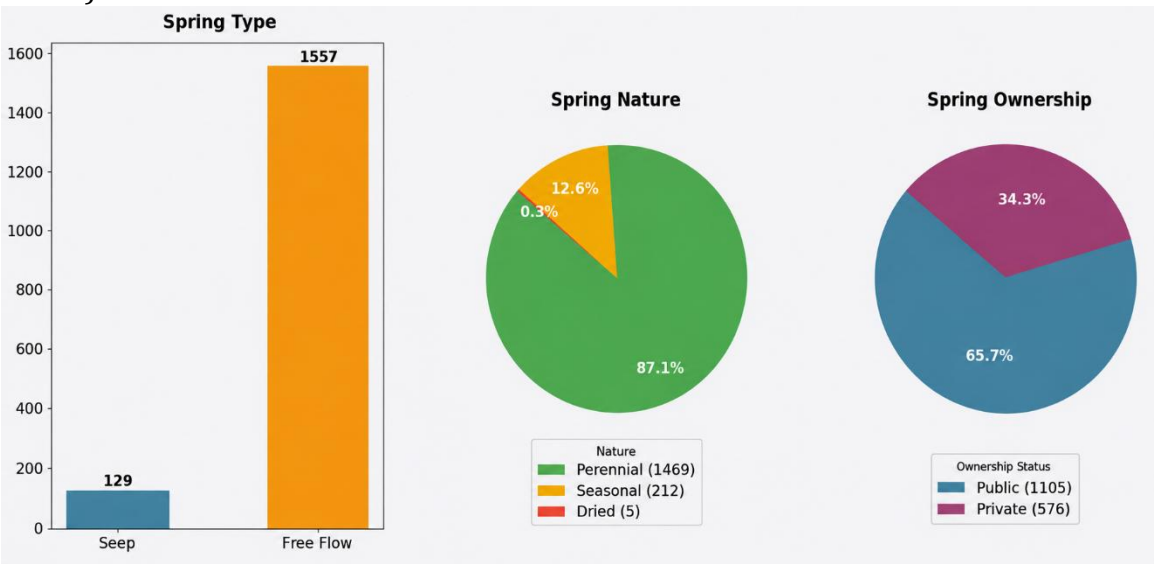


Fig. 3.16.3 Spring characteristics: Type, Nature & Ownership.

In the survey of spring dependency, the usage and reliance patterns were analysed across three primary groups i.e., residents, non-residents, and wild animals. Out of the total springs enumerated (excluding Dried and Hot Springs), Non-residents use 9.3% (156), while Wild animals access 2.3% (38). Residents, who exhibit varying levels of dependency, utilize the remaining springs. Within the resident group, 57.0% (847) of the springs show a moderate level of dependency, 17.8% (264) show low dependency, and 25.3% (376) are reported to have high dependency (Fig. 3.16.4).

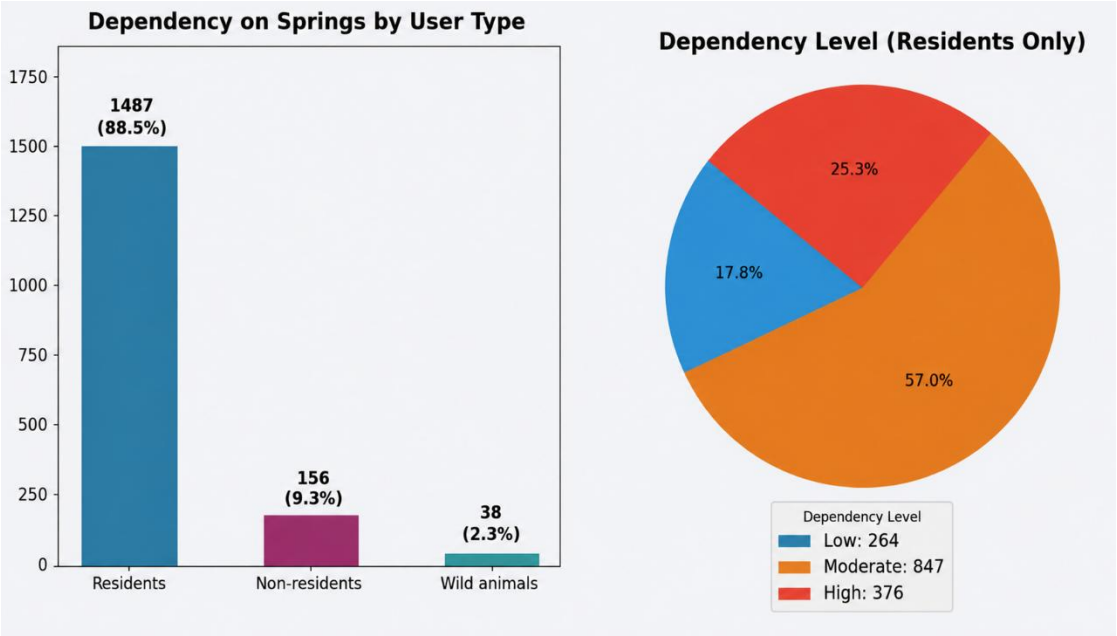


Fig. 3.16.4 Spring dependency.

In the survey of spring discharge, a total of 1538 springs were measured for their flow rate. Out of these, the largest proportion, 67.1% (1032), falls into the lowest discharge category of <=5 LPM. This is followed by 26.6% (409) of springs in the 5–20 LPM range. Smaller proportions are seen in the higher discharge categories, with 4.3% (66) in the 20–50 LPM range, 1.6% (25) in the 50–100 LPM range, and 0.4% (6) springs exhibiting discharge exceeding 100 LPM (Fig. 3.16.5).

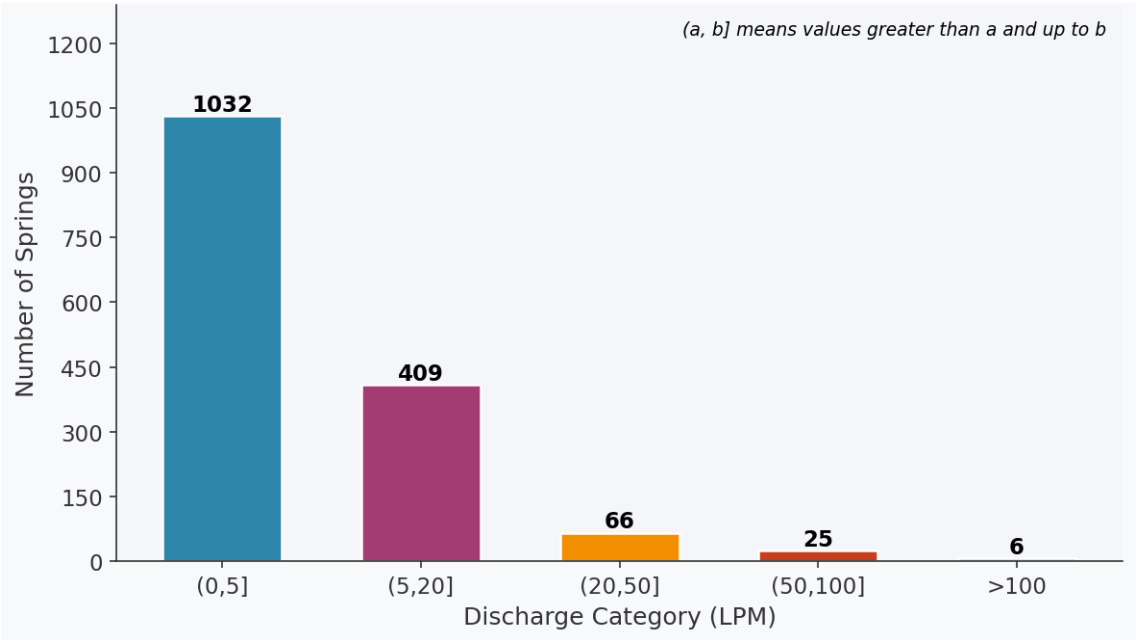


Fig. 3.16.5 Spring discharge distribution.

In the survey of resource threats to the springs, a total of 1,681 springs (excluding Dried and Hot Springs) were analysed for their threat status. Out of these, 74.7% (1,256) of the springs are reported to have no resource threat, while 25.3% (425) are identified as having a threat. Among the springs where a threat was identified, 41.2% (175) exhibit a low degree of threat, 50.1% (213) exhibit moderate threat, and 8.7% (37) exhibit high threat levels (Fig. 3.16.6).

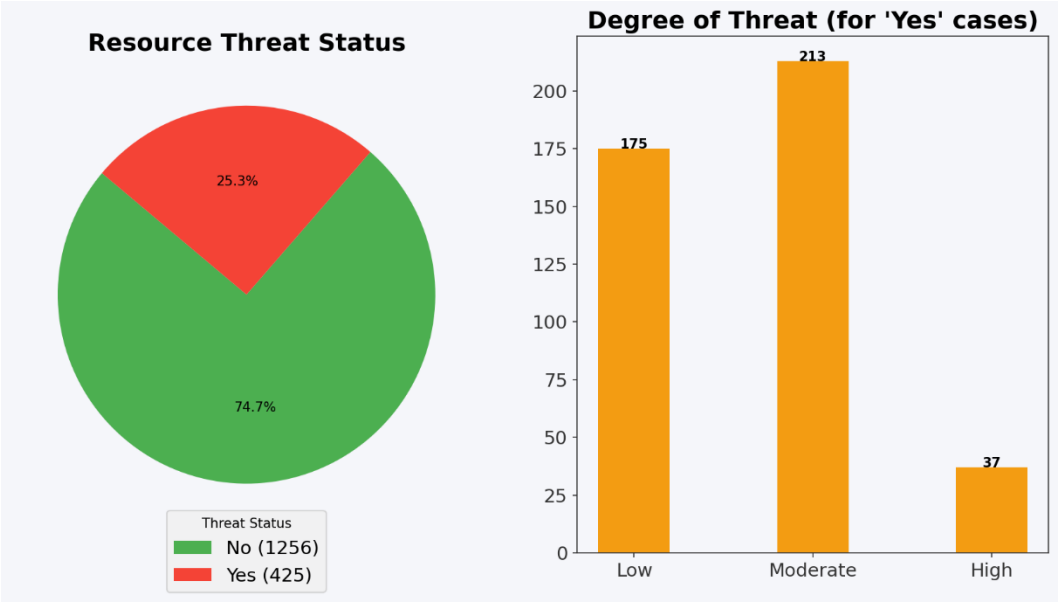


Fig. 3.16.6 Resource threat analysis.

Table 3.16.1 provides a consolidated overview of the key characteristics of the inventoried springs and may be referred to for understanding the overall status, spatial distribution, and usage patterns of spring resources in the State of West Bengal.

Table 3.16.1 Overview of spring attributes for West Bengal

Sl. No.	Parameters	Unit	Value	Percentage
1.	**Total Number of Springs**	Count	1,686	100.0%
	Springs in Rural Areas	Count	1,568	93.0%
	Springs in Urban Areas	Count	118	7.0%
2.	**Springs by type**			
	Free Flow	Count	1,557	92.3%
	Seep	Count	129	7.7%
3.	**Springs by Nature**			
	Perennial	Count	1,469	87.1%
	Seasonal	Count	212	12.6%
	Dried	Count	5	0.3%
4.	**Springs by ownership**			
	Public	Count	1,105	65.7%
	Private	Count	576	34.3%
5.	**Springs with chamber/tank to collect the water**	Count	568	33.8%
6.	**Springs with piped water supply**	Count	929	55.3%

Sl. No.	Parameters	Unit	Value	Percentage
7.	**Springs where discharge could be measured**	Count	1,538	91.5%
8.	**Spring by Colour of its water**			
	Colourless	Count	1,663	98.93%
	Coloured	Count	18	1.07%
9.	**Springs by Smell/odour of its water**			
	Agreeable	Count	1,548	92.09%
	Non-Agreeable	Count	133	7.91%
10.	**Springs by taste of its water**			
	Objectionable	Count	26	1.55%
	Unobjectionable	Count	1,655	98.45%
11.	**Springs by its water temperature**			
	Hot	Count	1	0.1%
	Cold	Count	1,680	99.9%
12.	**Springs by resource threat**			
	Yes	Count	425	25.3%
	No	Count	1,256	74.7%
13.	**Springs by degree of threat**			
	Low	Count	175	41.2%
	Moderate	Count	213	50.1%
	High	Count	37	8.7%
14.	**Spring by type of dependents**			
	Residents	Count	1,487	88.5%
	Non-residents	Count	156	9.3%
	Wild animals	Count	38	2.3%
15.	**Spring by dependency level (Residents)**			
	Low	Count	264	17.8%
	Moderate	Count	847	57.0%
	High	Count	376	25.3%

Annexure-I

SCHEDULE FOR 1ST CENSUS OF SPRINGS

First Census of Springs
Reference Year 2023-24

Rural-1/Urban-2

I IDENTIFICATION PARTICULARS (Standard Codes to be used)

(a) State..... Code

(b) District..... Code

For Rural

(c) Block/Tehsil..... Code

(d) Villages name..... Code

For Urban

(e) Town/Municipality..... Code

(f) Ward No.

Serial no. of spring within village/town

Unique Identification Key for Spring, with prefix 'S' *(If urban give code for town and ward)*

R/U	State	District	Tehsil/Town/Block	Village/Ward	Sl. No. within village/town

Timestamp of Survey *[dd-mmm-yyyy hh:min]*

II SPRING DESCRIPTION

1. Locational Information

Latitude *(Degree Decimal)* Longitude *(Degree Decimal)* Altitude *(m, a.m.s.l.)*

2. Local Nomenclature of Spring...(Fetch data from the Table).....

3. Spring type: Free Flow-1, Seep-2 Code

4. Spring Nature: Perennial-1, Seasonal-2, Dried-3 Code

5. Whether this is a newly emerged spring *[within the last 10 years]:* Yes-1, No-2 Code

6. Does spring discharge muddy water in rainy season? Yes-1, No-2 Code

7. Cleanliness in and around the spring: Satisfactory-1, Unsatisfactory-2 Code

8. Spring ownership: Public-1, Private-2 Code

9. Whether there is any chamber/tank to collect the water? Yes-1, No-2 Code

10. Whether there is any pipe water supply from spring? Yes-1, No-2 Code

11. Capture three photographs for additional details

(a) Close up shot of spring *(about 2 m from the spring outlet)*
(b) Wide angle shot of spring *(about 10-20 m from the spring outlet)*

III GENERAL PHYSICAL CHARACTERISTICS OF THE SPRING

1. Whether spring discharge could be measured? Yes-1, No-2 Code

2. No. of spring outlets *[If the answer of III (1) is 'Yes' i.e., Code-1]*

Volume *(litres)* Duration *(min:sec)* Discharge *(litre per minute)*

3. Seasonal variability of the discharge across the year: High-1, Low-2 Code

4. Spring discharge trend in last 10 years:

Highly decreased-1, Slightly decreased-2, No change-3, Increased-4 Code

5. Colour of spring water: Colourless-1, Coloured-2 Code

6. Smell/odour of water: Agreeable-1, Non-agreeable-2 Code

7. Taste of water: Objectionable-1, Unobjectionable-2 Code

8. Temperature of spring water: Hot-1, Cold-2 Code

IV OTHER INFORMATION

1. Dominant land use land cover in spring upstream:

Agriculture-1, Forest-2, Pasture-3, Shrubs-4, Settlement-5 Code

2. Land use land cover in and around spring location:

Agriculture-1, Forest-2, Pasture-3, Shrubs-4, Settlement-5 Code

3. Resource threat: Yes-1, No-2 Code

If the answer of IV (3) is 'Yes' i.e., Code-1, fill the following details,

(a) Degree of threat: Low-1, Moderate-2, High-3 Code

(b) Major stressor responsible for threat *(up to three codes, in the order of preference):*

Drought-1, Forest Fire-2, Scouring/Gully Erosion-3, Landslide/Subsidence-4, Code

Earthquake-5, Avalanche-6, Urbanization-7, Deforestation-8, Pollutant load-9, Code

Introduction of non-native plants-10, Animal grazing-11, Mining-12, Other-13 Code

4. Usage of spring water *(up to three codes, in the order of preference):* Code

Drinking/Cooking-1, Washing/Sanitation-2, Cattle/Livestock-3, Code

Irrigation-4, Industrial-5, Other-6 Code

5. Dependent type: Residents-1, Non-residents-2, Wild animals-3, Not applicable-4 Code

If the answer of IV (5) is 'Residents' i.e., Code-1, fill the following details,

(a) Total dependent population:

6. Dependency level: Low-1, Moderate-2, High-3 Code

7. Other available source of water *(select multiple options, if applicable):*

Other spring-1, Piped supply-2, Hand pump-3, Dugwell-4, Pond-5, None-6, Other-7 Code

8. Whether the spring has undergone any springshed/watershed management program? Code

Yes-1, No-2, Not known-3

Remarks, if any:

Checked by:

Name:

Designation of Supervisory Officer:

Mobile No.:

Signature of Enumerator:

Name:

Designation of Enumerator:

Mobile No.:

Annexure – II

Scrutiny Check Points

1. If 2.4=1 then 3.1 can't be 2 [*If a spring is perennial, then it can't have zero discharge*]
2. If 2.4=3, then all fields after 2.4 should be blank [*For dried springs, the schedule stops at item 2.4, so there should be no entries recorded after it*]
3. If item 3.1 is yes, then item 3.2 should be >0. [*If Spring discharge could be measured, then no. of spring outlets should be greater than zero*]
4. If item 3.2=0 then entry in item discharge in item 3.2 should be zero [*if number of outlets is zero then there should not be any discharge*]
5. In item 3.2, Outlet 1 Discharge, Outlet 2 Discharge, Outlet 3 Discharge etc should not be exactly equal [*In a spring with multiple outlets, all the outlets should not have the same discharge*]
6. If 3.8=1, then all fields after 3.8 should be blank [*For hot springs, the schedule stops at item 3.8, so there should be no entries recorded after it.*]
7. If item 4.5=3, then item 4.1 and item 4.2=2 or 4 [*If dependent type is Wild animals, then Land use land cover in and around spring location should be forest, shrubs or pasture only*[1]]
8. If item 4.5 = 2 or 3, then 4.5 (a) should be blank [*If dependent type is non-residents or wild animals, then there will be no dependent population*]
9. If item 4.6=1 or 2 then, item 4.7 not equal to 6 [*If dependency level is low or moderate, then other available source of water cannot be None*]
10. If item 3.5 = 2, and item 3.6=2, then item 3.7 should be 1 (objectionable) and item 4.4. should not be 1 (Drinking use) [*If Spring water is coloured and smell of water is non-agreeable, then taste of water should be objectionable and water should not be used for drinking purpose*]

[1] This condition has been relaxed in some states since agricultural lands found close to the forest boundaries where the wild animals use the spring water.

Annexure - III

Validation Check Points

Item No.	Item/Field	Checks
3.1	Whether spring discharge could be measured?	Show warning when spring is free flow but discharge can't be measured in item 3.1
3.2	No. of spring outlets	Show warning when number of spring outlets is more than 3 in item 3.2 (outlet)
3.2	No. of spring outlets (discharge)	Show warning when spring discharge is more than 100 lpm in item 3.2 (discharge)
3.7	Taste of water	Show warning when spring water is coloured with non-agreeable smell/odour but taste is Unobjectionable in 3.7
4.4	Usage of spring water	Show warning when either spring water is coloured or non - agreeable smell/odour or objectionable taste but still is used for Drinking/cooking in item 4.4
4.5 (a)	Total dependent population	Show warning when Spring is privately owned and number of dependent populations is more than 100 in item 4.5(a)
4.7	Other available source of water	Show warning when there is high dependency on Seasonal Spring but other available source of water is 'none' in item 4.7

स्प्रिंग अध्ययन प्रकोष्ठ, राष्ट्रीय जलविज्ञान संस्थान,
रुड़की, उत्तराखंड

CELL FOR SPRING STUDIES,
NATIONAL INSTITUTE OF HYDROLOGY,
ROORKEE, UTTARAKHAND
EMAIL: CESS-NIHR@GOV.IN

लघु सिंचाई (सांख्यिकी) स्कंध
जल संसाधन,नदी विकास एवं गंगा संरक्षण विभाग

MINOR IRRIGATION (STATISTICS) WING
DEPARTMENT OF WATER RESOURCES, RIVER
DEVELOPMENT & GANGA REJUVENATION
EMAIL: MISTAT-MOWR@GOV.IN



जल संसाधन, नदी विकास एवं गंगा संरक्षण विभाग
जल शक्ति मंत्रालय, भारत सरकार
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION
MINISTRY OF JAL SHAKTI, GOVERNMENT OF INDIA