



January 2023

Water *Watch*



Quality Matters



**Visakhapatnam's
Spring shed Ecosystem**
Simhachalem Hill range!

In India, Divinity and sacredness are added to the Springwater in order to safeguard it with the highest priority. Due to poor knowledge transformation, Generations miss several Traditional Wisdom. In Simhachalem hill, One spring outlet is designed according to the belief of the Snake God, But they moved the sculpture for 10meters and start worshipping the idol. The water flow is permanently stopped.

Traditional Wisdom is always matters.



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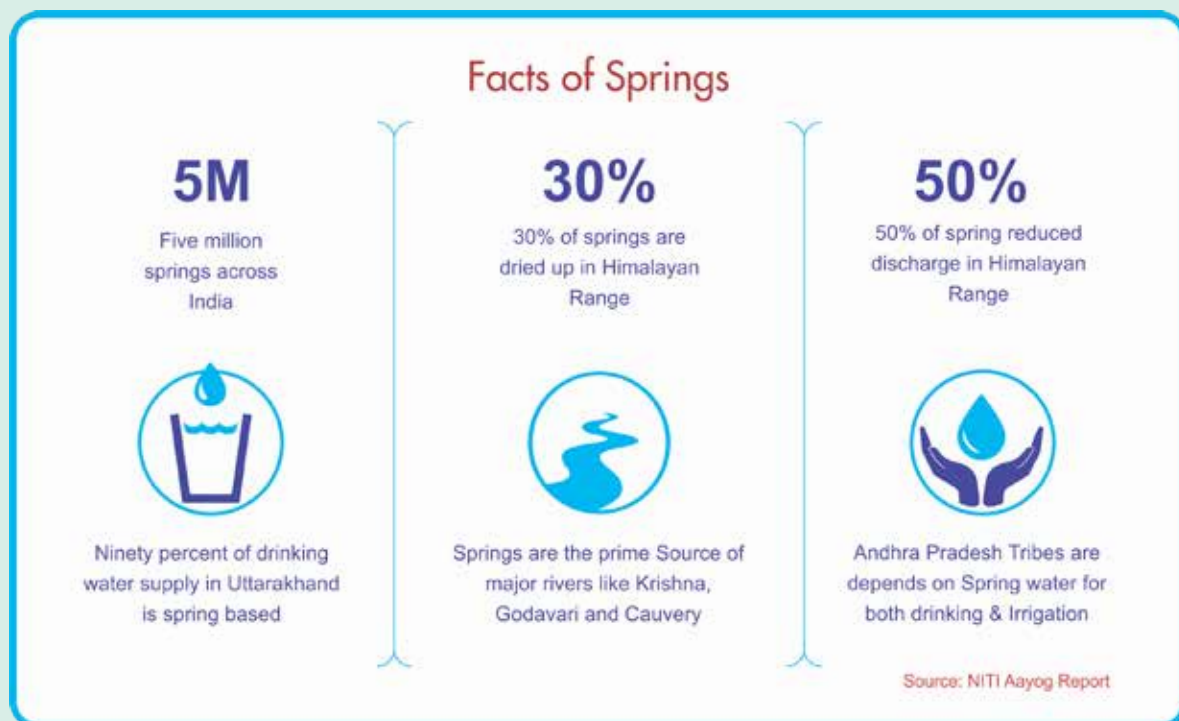
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1.0 Springs - The Missed Prime Sources

“Our ancestors restricted the misuse of precious water by assigning divinity to it, proving their social commitment to water.” as repeatedly stated in the book Indian Water Culture. The nexus of India-Water-Culture safeguarded several water resources in the name of Sacredness. The prime sacred water resource is the springs. Natural springs have been a vital part of the hydrological cycle for millennia. The very existence of springs has given rise to unique indigenous biodiverse ecosystems, which act as catalysts for human settlements in highland regions from the Himalayan ranges to Western & Eastern Ghats of Deccan Plateau.

The unusual trend of urbanization in India is done by compromising our several Social commitments

towards the environment. India, The oldest civilisation of the world is entering into the most brutal urbanization either in the name of western Impact or in the name of Survival. This urban transformation is mostly homogeneous by compromising the uniqueness of the local land’s topology, Hydrology and even geology. Visakhapatnam, an ecosystem rich terrain is also a victim of this urbanization. The city is in a trend of losing its unique features like Springs in the hills of Simhachalam, Kambalakonda, Yarada. This WaterWatch Magazine throws a limelight on the importance of Springs and the dissemination of local springs in Visakhapatnam City.



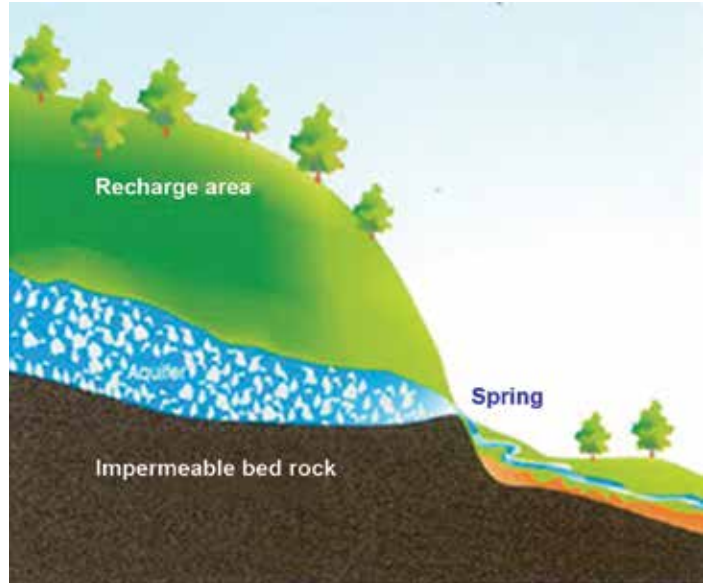
2.0 Defining Springs

A spring is a natural point of exit at which groundwater from an aquifer flows out on top of the Earth's crust and becomes surface water. Springs are driven out onto the surface by various natural forces, such as gravity and hydrostatic pressure. These are formed at the side of a hill, a valley bottom or other points. When the rainfall is erratic, when the top soil is eroded, when rock structures are disturbed due to stone quarrying, when land use land cover of recharge area (springshed or spring basin) is altered, the spring discharge gets reduced or either dry out or falls seasonal. Groundwater that shoots out as spring contributes to the streams and rivers by extending their flow period. Therefore, reduction in spring discharge directly affects the flow of spring fed rivers.

Springs Form From Aquifers: Groundwater is stored in aquifers, which are underground water reservoirs. Aquifers hold billions of liters of water and feed water bodies on the surface, like lakes and rivers. There are two types of aquifers: confined and unconfined. Confined aquifers are sandwiched between two layers of low permeability soil or rock. So the recharge area is far away. Where unconfined aquifers are underneath permeable soil layers, so water easily trickles through the ground into the aquifer. A spring is formed when the pressure in an aquifer causes some of the water to flow out at the surface. This usually happens at low elevations, along hillsides or at the bottom of slopes. Visakhapatnam is naturally blessed with many hillsides.

Basic type of Springs:

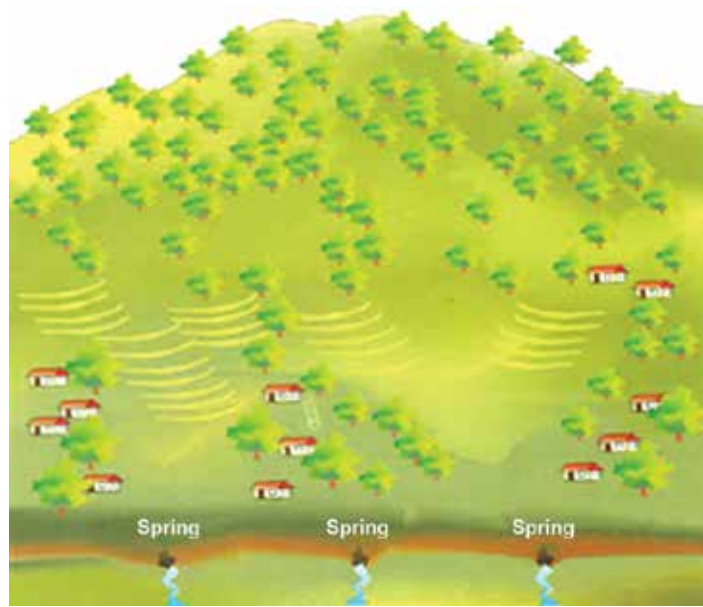
Depression or Gravity springs occur where there is a sharp change in the Slope or Sudden change in topography. These are usually found along the hillside and cliffs. **Catchment:** The catchment of the depression springs are loose boulders, Sediments and weathered material.



Recharge: Recharge Area will be just above the spring

Contact springs: are a series of Springs emerging at the contact of two different rock types. The rock above and below the springs are different.

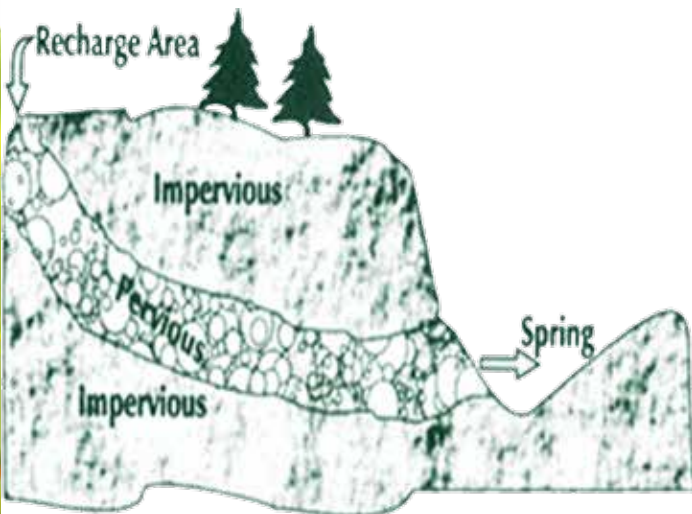
Catchment: The above rock of an aquifer which is permeable rock. **Recharge:** Dip Slope of the rock and along the fractures.



Fracture springs originate along a fracture which cuts across an aquifer forming rock. The fracture acts as the Spring point, where groundwater moves out of the aquifer. **Catchment:** The down slope along the fracture. **Recharge:** Recharge area of the fracture springs will be along the fractures above the Springs, Dip Slope area, Escarpment Slope Area



Artesian springs, which come from pressure in confined aquifers forcing the water to the surface. The pressure inside the confined aquifer is less than the pressure outside the aquifer, so the water moves in that direction. Any cracks or holes in the land will easily let the water escape.



Karst springs - Limestones host many springs. Springs in limestone terrains can be interconnected to topographic depressions caused where Large quantities of water move through the cavities.

Fault springs are formed when faulting gives rise to conditions favourable for spring formation as groundwater (at depth) under hydrostatic pressure (such as in confined aquifers) can move up along such faults.

Types based on the Flow:

1. **Perennial springs** that flow constantly during the year;
2. **Intermittent or temporary springs** that are active after rainfall, or during certain seasonal changes;
3. **Periodic Springs** are vent and erupt at regular or irregular intervals.

Springs are also classified by the volume of the water they discharge. The largest springs are called "first-magnitude", defined as springs that discharge water at a rate of at least 2800 liters of water per second and the range goes up to "Eight Magnitude" where the discharge rate is 8 mL/s.

Greater Visakhapatnam Municipal Corporation (GVMC), one of the largest Urban Local Body of Andhra Pradesh hydrologically falls under East Flowing River Basins includes Sarada River Basin, Anakapalli River Basin, Narvegedda River Basin, Madhurawada River Basin, Gosthani River Basin. The GVMC has major hill ranges like Simhachalam, Kombalakonda, Yarada which has several Perennial Springs, Gravity Springs, Fault Springs and many Intermediate Springs. These all together form a Springshed or Spring Basins. Activities such as stone quarrying and sand mining for infrastructure creation, deforestation, erosion of topsoil, Changes in the land use attributed by erratic rainfall consequently limited the amount of rainwater that infiltrates to recharge the groundwater aquifers. Which dried the springs and ultimately reduced the flow of water in Streams. This water watch throws a limelight on the springs that are still functioning in the Simhachalam hills.





3.0 Simhachalam Spring Shed

Simhachalam hills are in altitude of 800 feet from the MSL, in a Kailasa range of the Eastern Ghats. The noteworthy feature of the hill is abounding in perennial rivulets, Springs and Seepages. Interestingly, the names of the nearby settlements are Simhachalam Dhara, Sitamma Dhara and Madhava Dhara. Where Dhara refers the Springs. There were more than 14 springs in the Simhachalam Hills. But now locals were able to list only a few springs, namely Gangadhara, Naagadhara, Saagidhara, Aakasadhara, Pichhukadhara, Madhavadhara, Seekudhara, Pulletidhara. Among which Gangadhara, Naagadhara, Saagidhara are almost perennial. Aakasadhara, Pichhukadhara, are seasonal. Many Springs are dysfunctional. The simhachalam ranges are extended to 15kms but the southern facing valley has many springs due to

joints and fractures have resulted in micro valleys. Geologically, Simhachalam rock has a property of charnockite which is metamorphic rocks with variable chemical composition. The Simhachalam temple meets all water requirements without digging a borewell or getting water from GVMC. Muddasarlova Cheruvu which is completely fed by Springs originating in Kailasa and Kombalakonda ranges acts as the main sources of drinking water. In fact, several efforts have been made to know the origin of the water springs of Simhachalam, but in vain. Thousands of devotees visit the Simhachalam temple popularly known as Simhadri Appanna and over 2,000 devotees per day stay in the hotels and guest houses. At this juncture, Centre for Urban Water Resources(CURE) made a field visit with the locals to identify the existing springs.



Gangadhara

The most sacred Spring of the Simhachalam hill. The ancient structure and the mandap of Ganagadhara proved its antiquity. It's also considered as the Lords bathing ghat.

Location: The Geo- Coordinates are at Latitude of 17.768284°N and Longitude of 83.251688°E. Gangadhara is located at the right side corner of Simhachalm Temple. This Spring altitude is higher than the temple structure.

Specification: Gangadhara is the perennial spring and having the character of Depression or Gravity Springs. The discharge rate is around 7,000 liters per day and it is double in the rainy season. The Total Dissolved Solids (TDS) are less than 50mg/L. Two inscription stones are found near the spring which is written in the Sanskrit language through Telugu script. One is about the importances of bathing in the springs and the other is about the victory of the local king.

Water Usage: The Temple administration is diverting the water in two ways. One is one lakh capacity storage tank and another directly supplied via pipes to the devotees for drinking, bathing and for annaprasadam making. The devasthanam also constructed a major tank with Gangadhara inputs at Kesakhandanasala for the holy dip

Present Status: By Considering the high flow of devotees, Temple administration invested a lot on creating infrastructure like Wide Road, storage tank, High retaining walls, Rest House, etc., This will directly impact on the ecology around the Spring.

The devotees are using Chemical Soaps and Shampoos for their holy dip. This also directly affects the physical and chemical properties of the Sacred water. Most of the water is diverted towards the storage tank which is used for domestic purposes. This diversion affects the ecological flow for the downstream biodiversity.



Special Note on Gangadhara:

In general, Temples are supposed to face in East direction, But Simhachalam Temple are made to face on west direction which may have moved the builders in the direction of the flow of the principal spring, Gangadhara. It flows from east to west, and, given the scriptural sanction.

Gangadhara, whose waters are held to be sacred. It is usual to find the devotees that visit the temple taking a dip in its waters and undergoing the tonsuring ceremony before entering the temple. Previously, The temple used to maintain an elephant to bring water from the Gangadhara every day for the bathing service of the Lord. The Plumbing systems replaced the Elephant services.



Naagadhara

Naagadhara is the other main source of water for the Simhachalam temple. Temple Administration took several measures to divert the water for domestic purposes.

Location: The Geo- Coordinates are at Latitude of 17.767603°N and Longitude of 83.247728°E. Nagadhara is located at the left side of the pathway towards the temple. This Altitude of the spring is lower than the temple structure.

Specification: Nagadhara is the perennial spring and has the character of Fracture Springs. The discharge rate is around 2,400 liters per day in the peak summer. Earlier, the farmers utilized the water

for their cultivation. The Total Dissolved Solids (TDS) is less than 50mg/L.

Water Usage: Naagadhara is close to the temple main kitchen. The Temple administration is diverting the water for the minor treatment plant followed by the domestic usage.

Present Status: In order to safeguard the spring, the Administration constructed a concrete box which is completely arresting the visibility of the springs. Fortunately, the Spring wall is constructed through stone pitching and the rest of them are completely concrete. The water is collected through the HDPE pipeline for treatment and Storage. There is no ecological flow maintained for the dependent ecosystem.





Saagidhara

Saagidhara is mostly used by the locals and the priests for bathing. The efficiency in discharges, access of this spring is always high due to its prime location.

Location: The Geo- Coordinates are at Latitude of 17.767435°N and Longitude of 83.247884°E. Saagidhara is the top most spring which is just located on the side of the staircase.

Specification: Saagidhara is the perennial spring and has the character of Fracture Springs. The springs have well designed Sculptures which shows its millennia of existence. The discharge rate is around 4000+ liters per day in the peak summer. Earlier, the farmers utilized the water for their cultivation. The Total Dissolved Solids (TDS)

are less than 50mg/L. In order to divert the water for domestic usage they poured a high amount of concrete around the Springs which affects the pleasantness and also the sensitivity of the Spring ecosystem.

Water Usage: Saagidhara is also used for domestic purposes and also diverted for the treatment plant. Too much of concrete structures will directly affect the unique property like discharge from waterbodies.

Present Status: The banyan tree adjacent to the spring may also have the ecological link to the spring. The stair cases, water diversion structure all are affecting the sensitive spring ecosystem. In spite of this disturbance, there are no changes in the efficiency like discharge and domestic usage of the Spring. The ecological flow also needs to be maintained particularly in the summer.





Aakasadhara

Aakasadhara is naturally formed like a waterfall from the sky. This Spring has more deities and pictures of the god.

Location: The Geo- Coordinates are at Latitude of 17.767963°N and Longitude of 83.247906°E. Aakasadhara is the waterfall spring located on the left side of the pathway.

Specification: Aakasadhara is the Seasonal and periodic spring and has the character of Fracture Springs. No ancient structures are found in the spring due its waterfall nature. But several GI, Plastic,

HDPE pipes are connected to this seasonal spring. The ecosystem around the springs untouched may be due to its seasonal properties.

Water Usage: Aakasadhara is the seasonal springs, Most of its water is for ecological flow. But some pipe arrangement shows that this water also diverted for the domestic usages in the hilltop.

Present Status: During rainy days, Springs acts as the waterfall but no major flow in the non-rainy days but still devotional acceptances are very high





Pichhukadhara

Pichhukadhara is also called as Sparrow springs due to many outlets in the fracture of rock. The accessibility is very tough to reach.

Location: The Geo- Coordinates are at Latitude of 17.767813°N and Longitude of 83.247002°E. Pichhukadhara is located near to the drain and filled with dense ecosystems.

Specification: Pichhukadhara is the Seasonal and periodic spring and has the character of Fracture

Springs. The yield is comparatively less, but the consistency of the flow is maintained.

Water Usage: Most of Pichhukadhara water is diverted for the ecological flow. Due to poor accessibility the springs are kind of untouched.

Present Status: There are direct effects on construction of buildings above these springs. The used water from the devotee's stay places are mixing in the drain. This mix of wastewater directly affects the sacredness (divinity) of the water.



In the next series we capture the status of Madhavadhara, Seekudhara, Pulletidhara and many other springs. There is a challenge of access to information, dense terrain and poor accessibility. We are enabling locals to overcome these challenges.



4.0 Inferences of Simhachalam Spring Shed



- Temple administration completely depends on Spring water even for the hotels in the hill premises. This reduces the importance and the sacredness of the holy water and directly affects the ecosystem of the Spring Shed.
- Number of functional springs in Visakhapatnam have reduced to a greater extent. The names of the springs and their locations were told predominantly by the elder members of the communities. It is visible that there is a huge loss in memory of springs over generations. This shows that the dependency on the spring has reduced.
- The community strongly believes that the holy water from the Springs has more herbal values to cure many diseases. But there is no scientific evidence. Research shall be carried out on the same.
- An age-old giant tree could be noticed adjacent to the springs. This shows the relation of green cover and the Springs
- Temple administration efforts on increasing green cover impacted lot in the overall ecosystem of the hill range such green initiative programmes like Simhagiri Vanasamrakshana Yagnam (SVY) to restore the greenery by one lakh plantation, Go Green-Grow Green initiative with Naval Scientific Technological Laboratory (NSTL) were seed balls with Mango, Almond, Black Berry and other 28 varieties of fruits, flowers and avenue seeds packed with the cow dung have been thrown around the hills, Through Green Visakha Programme, Exotic trees are replaced by the native species found here include Srigandam ,Banyan, Alli, Ankudu, Fig and Ashoka trees.



5.0 Local Community - A Prime Stakeholder



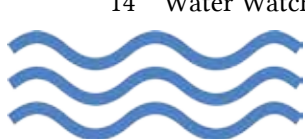
Hill Village: A population of about five hundred inhabits the village which has grown round the temple proper. Out of the hundred houses of the village, Half of the population consists of the Hill Chiefs (Konda Doras). In fact, Konda Doras are a hill tribe look to the temple for their living. Some of them live by looking after the needs of pilgrims and others by securing leases of plantations, gardens and lands on the hills. Malaria used to be a great scourge to the people; but its severity is greatly mitigated by the anti-malarial operations undertaken by the administration of the temple.

Adivivaram, the village down the hill, which is closely attached to the temple, has a population of about 6,000+. Previously, It is a Panchayat village now it's under GVMC with a Rural Health Centre and Hospital maintained by the temple. Most of the

people are either employed as the staff of the temple or cultivate lands of the temple. The two gardens of the Lord, the Phool Bagh and the Udyanavanam, the two temple tanks, the Lord's Tank (Swami Pushkarini) and the Boar's Tank (Varaha Pushkarici) are also in this village. Both these tanks are fed by the water from the spring on the hill, the water of which is led down by means of pipes. The Deity descends to the village for the celebration of special festivals like the Floating Festival (Teppotsavamu). The Tree Festival (Sami Puja), the Swinging Festival (Dolotsavamu) and the Hunting Festival (Makaraveta).

Urbanized Population: Recently due to rapid expansion several settlements are found in this area. These populations are naturally less aware of the uniqueness of this hill range.

The major Stakeholder of the Springs are Local Communities of the villages, New habitants at the foothills, Temple administration- Sri Varaha lakshminarasimha Swamy vari Devasthanam, Greater Vishakhapatnam Municipal Corporation (GVMC), Forest Department. Now it's a high time for people institution, for a community driven conservation.



6.0 Way- forward



- Setting up Spring shed Management Steering Committee with the major stakeholders like Temple administration, GVMC, Forest department where Centre for urban Water Resources act as Secretariat for this Spring shed Management Committee.
- Call for Philanthropist to support Spring shed management
- A 'Community Spring Resources Centre' needs to be established to maintain the inventory and to the local traditional wisdom of the community and to demystify the science of hydrogeology. This puts the ability to map geology, aquifers and recharge areas directly into the hands of community members.
 - Building local institutions and institutional mechanisms for springshed management to undertake such activities in the long-term activity.
- A community centric pilot needs to be executed on holistic springshed restoration with evidence-based information and with traditional wisdom.
- Restriction on changes in the Land use, maintaining ecological flow and reducing the infrastructure creation are needs to be a priority of the administration.
- Linking the livelihoods of communities with interventions related to the revival of springs in ensuring the sustainability
- Mainstreaming and convergence of springshed management with other developmental programmes will be required to facilitate greater synergies with government schemes and involving local colleges and universities to continuous research and dissemination of information.



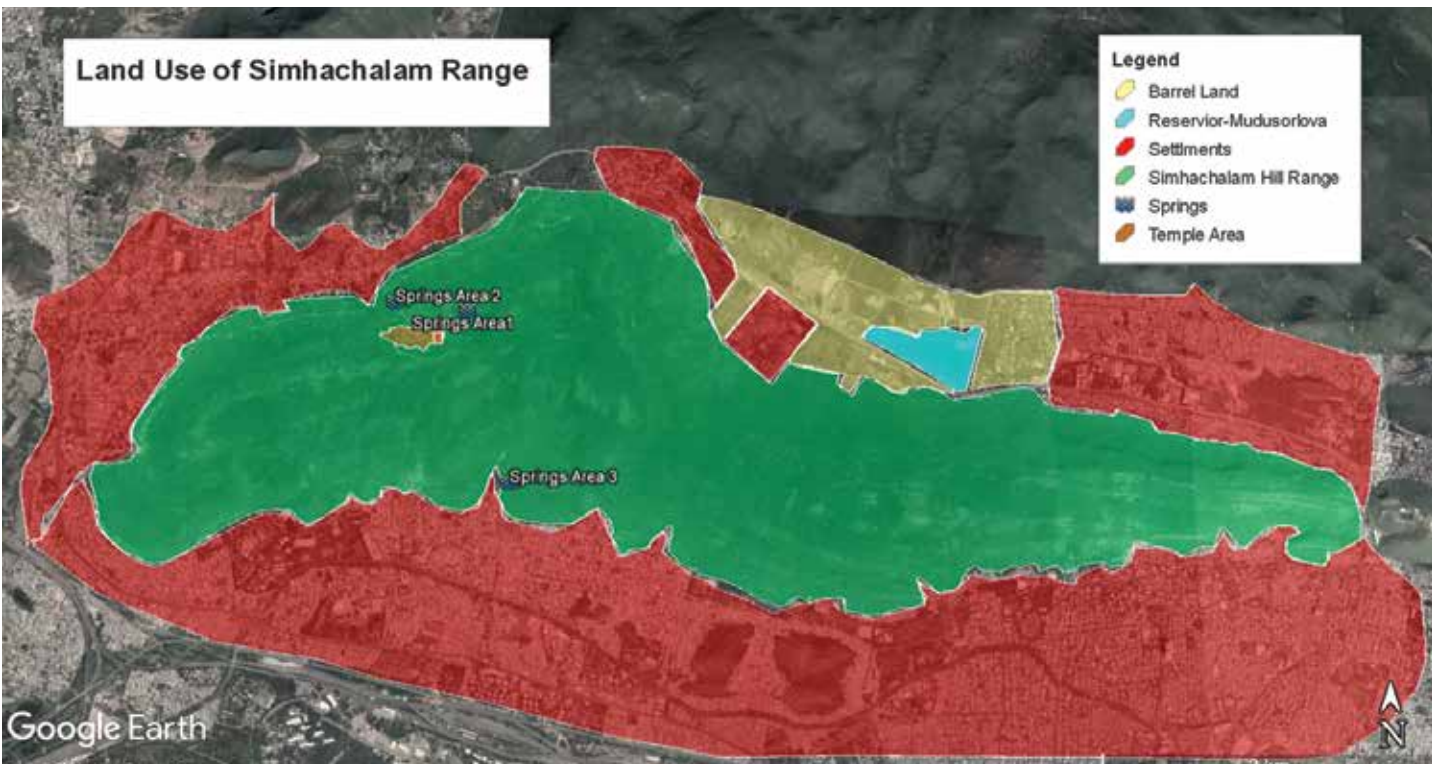
7.0 Simhachalam Range: Why not Biodiversity Heritage Site?

Simhachalam hills are unique among the Eastern Ghats with lavish flora and fauna. Andhra University has found that there were 74 varieties of flora and 200 species of fauna. The notable flowers like Jasmine, Artabotrys, Chrysanthemum and hills are dotted with several fruit bearing trees like Custard apple, Jackfruit, Pomegranate. Domesticated animals are found where Panther occasionally stray from the neighboring forest. Simhachalam hills are playing a vital role in protecting Vizag city from the environmental hazards which have been spread in 15-km radius, have strong potential to sequester carbon emissions.

The rapid urbanization and the effect of the Hudhud cyclone impacted a lot on its biodiversity. Four years back, Srivarahalakshmi Nrusimha Swamy Devasthanam launched Simhagiri Vanasamrakshana

Yagnam (SVY), an integrated project, to restore the greenery, minimizing the pollution levels in the city and stabilize groundwater table in the city. The impact of the project was also well noticed. Particularly, this hill range with their ever-oozing springs are clothed in thick verdure as point of ecological attraction. The uniqueness of the Simhachalam is well matched with the criteria of a Biodiversity Heritage Site.

“Biodiversity Heritage Sites” (BHS) are well defined areas that are unique, ecologically fragile ecosystems having rich biodiversity. Under Section 37 of the Biological Diversity Act, 2002 (BDA) the State Government in consultation with local bodies may notify in the official gazette, areas of biodiversity importance as Biodiversity Heritage Sites (BHS).



The location having any of the following characteristics may qualify for inclusion as BHS.

Specifications	Simhachalam Status	Remarks
Areas contain a significant diversity of life forms.	Yes	Springshed Ecosystem
Areas that contain significant domesticated biodiversity component	Yes	74 varieties of flora and 200 species of fauna
Areas that are significant from a biodiversity point of view as also are important cultural spaces	Yes	The temple is the Cultural Spot
Areas corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands.	Yes	Located around the Dense Urban area
Medicinal Plant Conservation Areas.	Yes	Medicinal plants are still collected by the locals
Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding.	-	No information available
As far as possible, those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended	Yes	Maintained by the temple administration
Areas that are maintained as preservation plots	Yes	Maintained by the temple administration
All kinds of legal land uses, whether government, community or private land could be considered under the above categories.	-	No information available

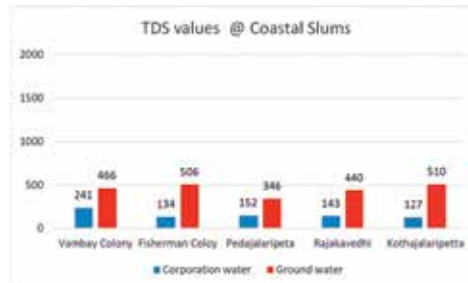
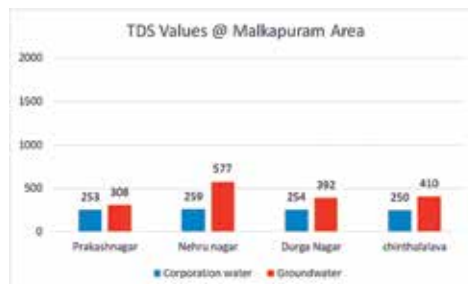
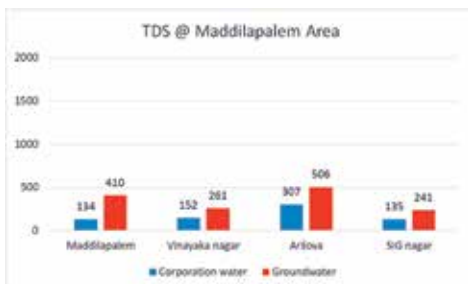
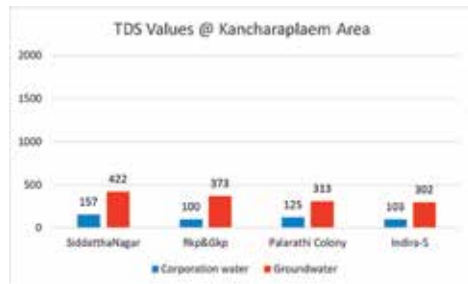
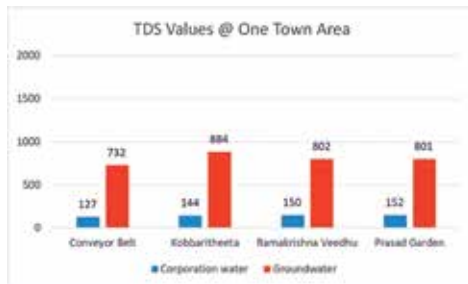
Andhra Pradesh not even have a single BHS, Let's start work on the sacred springs and the ecosystem of Simhachalam hill range to bring national attention to conserving the unique biodiversity of Visakhapatnam.



8.0 Baseline Assessment Water and Scenario Analysis

Quality of drinking water is a serious concern in urban areas of India, with cities facing problems of water contamination time to time. Better information is required on where the issues lie and what is needed to effectively and efficiently take action to protect and improve water quality. This water quality assessment would provide policymakers and other stakeholders with information they need in order to make informed decisions to address water issues. A spatial temporal assessment of the

GVMC water quality to provide an understanding of the relative condition of water quality in different sources of water supplies such as Corporation water and Groundwater which are all utilised for drinking purpose. In order understand the Scenario, we collected the 42 samples in 21 locations of GVMC area. Tota Dissolved Soilds (TDS) parameter is taken for consideration. This is parameter is an indicative values of waterquality and the biological paramnters are not tested.



According to BIS 10500 (2012)
Drinking water quality Standards
TDS values

Acceptable limit = 500 mg/L
Permissible Limit=2000 mg/L

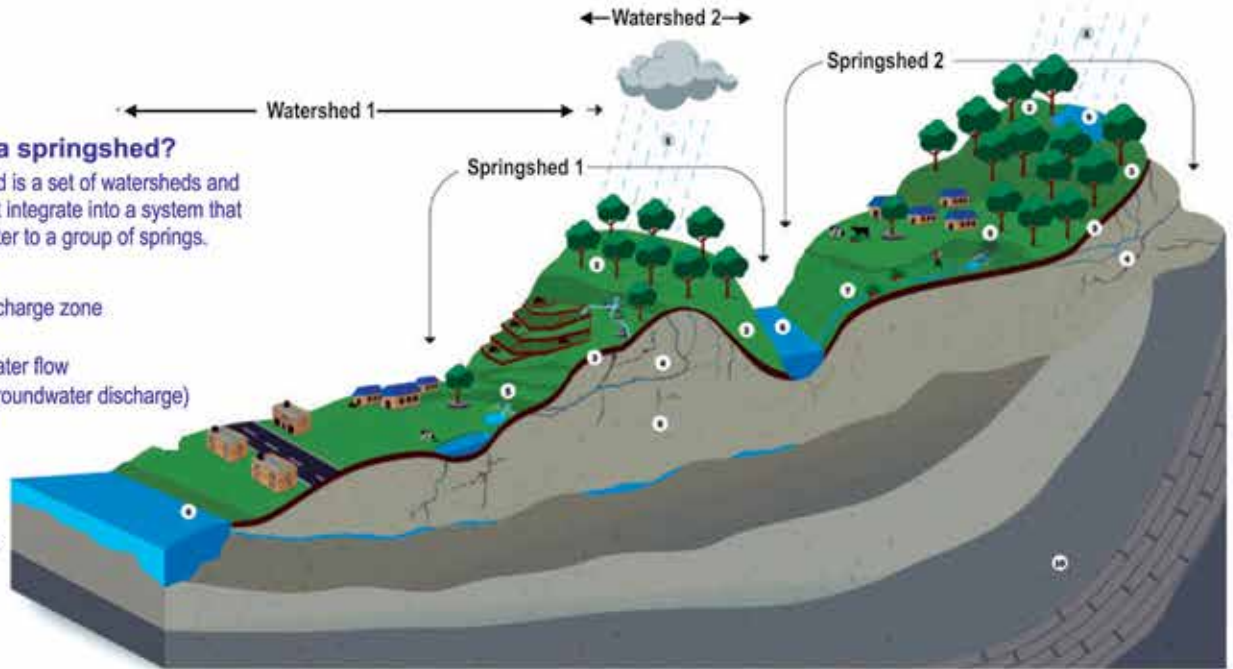
Inferences: The Corporation supplied water is safe and healthy for drinking where values are ranges from 100mg/L to 250mg/L. Most of the Groundwater is crossing the acceptable limits; Filtration is needed before consuming the Groundwater.



What is a springshed?

A springshed is a set of watersheds and aquifers that integrate into a system that supplies water to a group of springs.

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



Borewell is worshipped



Inscription about Springs are used as Manhole-lid

References

- ◆ Focus group Discussions with Kalanjiam members, Local communities and Priests
- ◆ The Book "The Simhachalem Temple" by Dr.K. Sundaram
- ◆ ICIMOD Report 2021 on Springshed management in the Himalaya
- ◆ Resource Book on Spring shed Management by NITI Aayog and IWMI



DHAN Foundation is a professional development organization, spread in 19,016 villages in 16 states of India, working for the upliftment of the poor and the disadvantaged segment of the community. The institution has reached 2.40 Million poor households. DHAN follows 'Enabling approach' and 'Institution Building Approach' which lays emphasis on self-help, mutuality, community ownership, and control over resources by the community.



DHAN Vizag region is working with 33,000+ families, 1,500+ adolescents, 400 physically challenged persons from the vulnerable for 22 years with the strong social capital of Slum and the coastal communities. Over a period, it became a sustainable community managed, owned and controlled people institutions. Geographically, DHAN Vizag region is working in 67 wards, and 157 slums of Greater Visakhapatnam Municipal Corporation (GVMC).



DHAN Foundation's Centre for Urban water resources (CURE) launched its second centre at Visakhapatnam. CURE is working on Urban water security and to enhance the quality of life of vulnerable at Urban and Peri-Urban areas. CURE's major works on Surface bodies renovation, Spring Shed management, Environmental Education, Roof Water Harvesting, Action researches, GIS studies for local action. DHAN has promoted more than 6500+ associations (exclusive for water) by organizing 0.41 million farmers.

Meteorological Updates

Average Rainfall Data for Visakhapatnam

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Precipitation	12	12	17	39	48	103	133	169	160	179	79	4	955
Number of Wet Days (Probability of rain on a day)	1 (3%)	1 (4%)	1 (3%)	2 (7%)	3 (10%)	7 (23%)	12 (39%)	10 (32%)	12 (40%)	11 (35%)	4 (13%)	1 (3%)	65 (18%)



For Suggestion/Comments please write us on

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