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WATER GOVERNANCE IN SEMI-ARID AND ARID REGIONS

Lessons from Haryana

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Illustrating the Synergy Between Humankind and Nature

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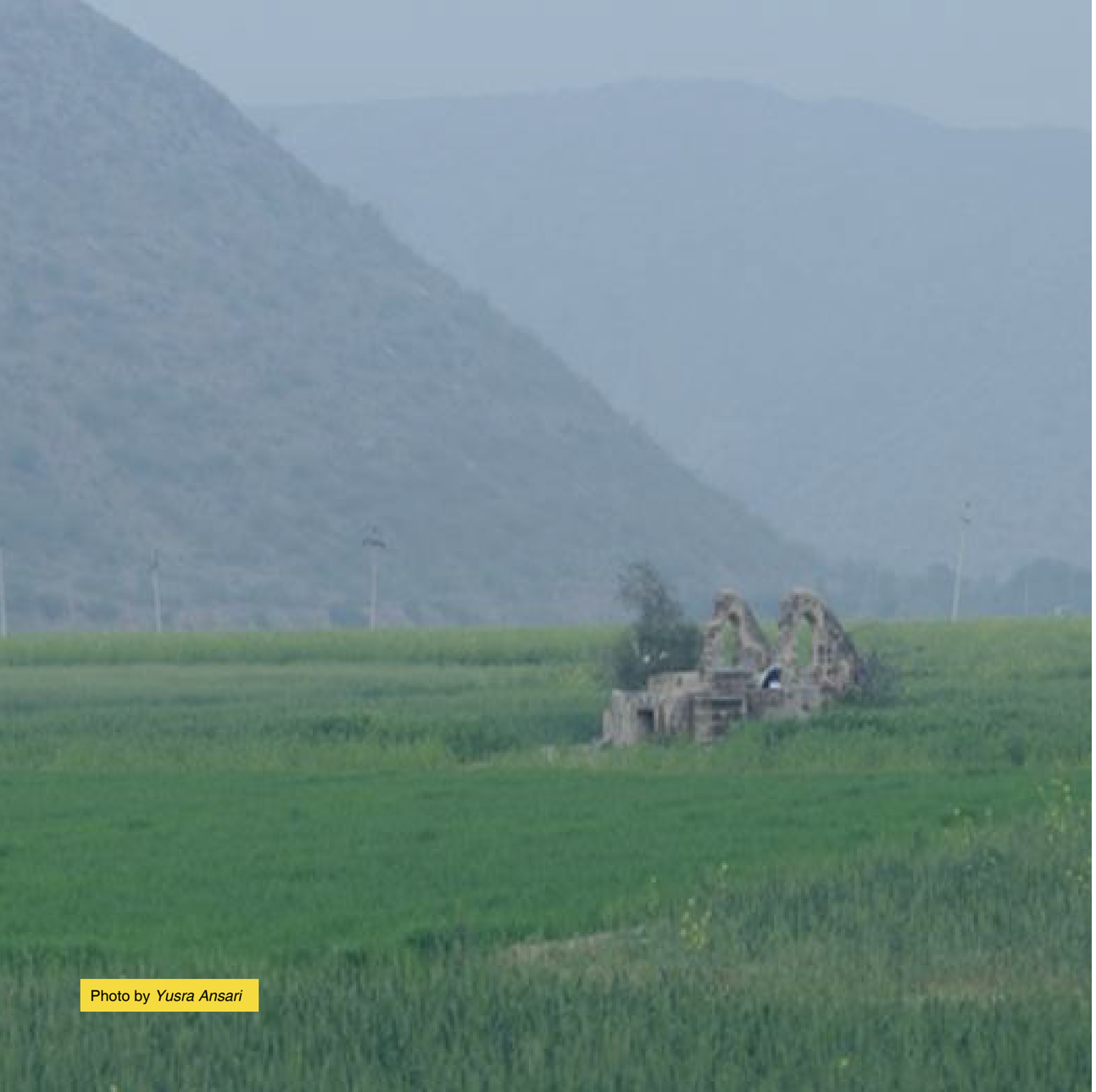

Photo by *Yusra Ansari*

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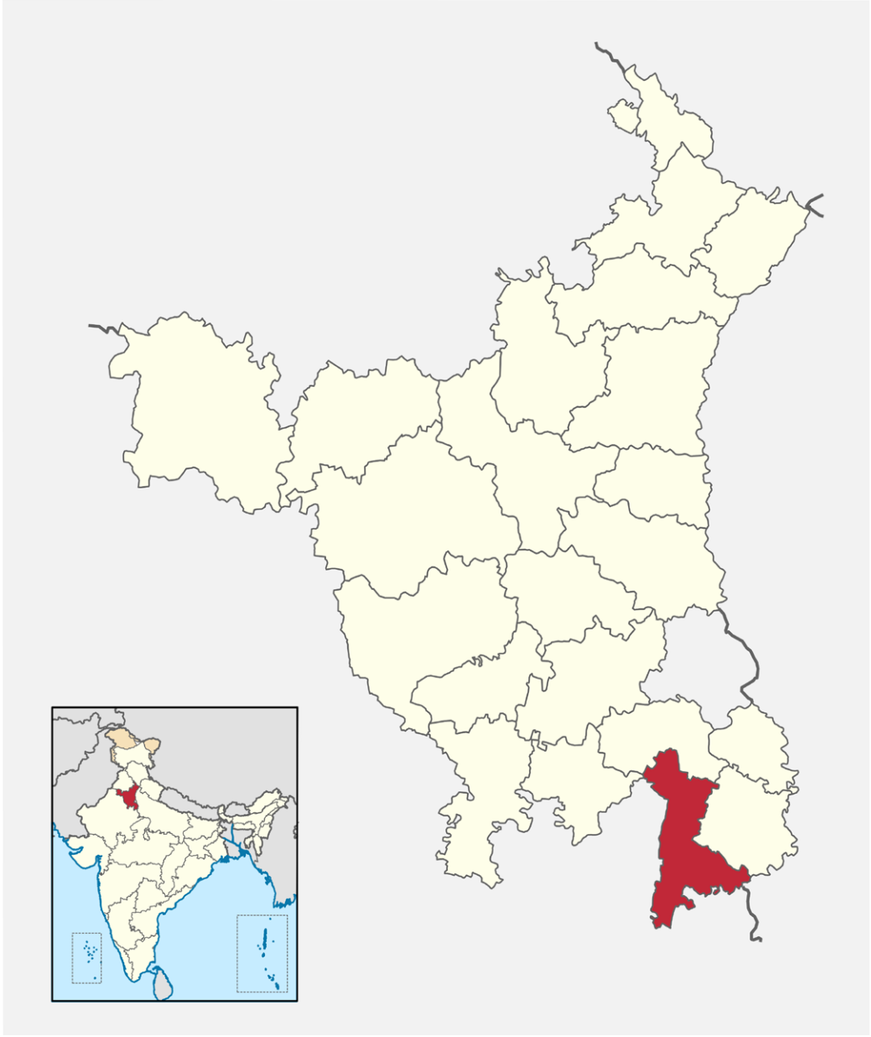
INTRODUCTION: ARID AND SEMI-ARID REGIONS IN INDIA

Arid and semi-arid zones cover approximately 33% of India's geographical area (Das 2019: 16). While the states of Rajasthan, Haryana, Punjab, and Gujarat fall under the semi-arid and arid zones in northern India, the southern arid zones are located in Maharashtra, Karnataka, Tamil Nadu, and Andhra Pradesh. These regions are characterised by recurrent droughts with critical need for groundwater development in most blocks. About 74 districts in these regions fall in the drought-prone category (ibid).

Scanty rainfall limits groundwater replenishment, and with the increase in climate variability, water scarcity has aggravated in these regions. Over-appropriation of surface water, groundwater depletion, and water shortage for competitive uses are some of the major water challenges in these regions (Kumar n.d. A). The dry states in the northern region, such as Haryana and Punjab, which are primary producers of food grains, face additional water management challenges owing to intensive irrigation for crop cultivation.

This issue brief will discuss water governance challenges facing Mewat as a case to study Haryana's state water governance policies. The brief also outlines best practices and policy recommendations to advocate for traditional water systems restoration and effective water governance in other semi-arid/ arid states like Rajasthan, Maharashtra, Gujarat, Telangana, and Karnataka.



Mewat district in Haryana

Source: Milenioscuro (2016)

WATER RESOURCES IN SOUTHERN HARYANA

Central Ground Water Board reports that groundwater resources in Haryana have been over-exploited, resulting in 78 out of 121 blocks sinking to the critical category (Ministry of Jal Shakti 2019: 56). The report also puts the potable water availability in Bhiwani, Fatehabad, Jhajjar, Mewat, and Sirsa districts at less than 30%. Additionally, these districts also recorded waterlogging, reflected by the shallow water levels in 9% of the wells and 4% area of the state. The shallowest water table has been recorded at 0.53 bgl in Nuh block of Mewat (Ministry of Water Resources 2012). Majority of the districts in south-western Haryana have highly saline water unfit for human consumption. Another pertinent issue plaguing Haryana's water is pollution. The state's main seasonal river Ghagger is replete with agrochemicals and pesticides, much beyond permissible limits for drinking purposes. A 2013 CGWB-North West Region report highlights that more than 50 parts per billion (PPB) of arsenic concentration was mapped in groundwater across various districts in the state that fall along the river courses of Yamuna and its tributaries (Bhattacharya, Kumar, and Lodh 2018: 579).

The Mewat district is the leading example when discussing water salinity and contamination. Located in the Aravalli foothills, the area's characteristic aeolian sands[1] and discontinuous saline aquifers[2] result in poor quality water in the district. Out of the 503 villages in Mewat, only 61 have freshwater (Sharma et al., n.d.: 204).

[1] Aeolian sands are fine to medium, non-plastic and uniformly graded materials present in many sandy sites, mainly in desert areas.

[2] Saline aquifers are sedimentary rocks saturated with saline, non-potable water from which water can be drawn and fluids can be injected to be stored for a longer period of time. The geological formations consist of water permeable rocks that are saturated with salt water called brine.

There is no perennial river flowing in the region except for some "nalas" and streams that rise from the Aravallis during the rainy season and dry up within a few months. Until the 1930s and 1940s, the Aravalli range had verdant forest cover. A multitude of traditional water-harvesting systems ensured that the low rainfall was optimally utilised to provide an adequate water supply to the village community throughout the year.

Photographed and reimagined by
Yusra Ansari/ 2018

Saline water's mixing with the fresh groundwater is leading to diminished reserves of safe water by 300-500 millimeters every year due to overexploitation in the district (Acharya n.d.). The groundwater is so briny that at multiple locations it is evaporated for salt extraction. The increased salinity and contamination at both shallow as well as deeper levels can be attributed to lack of drainage and heavy concentration of salts, fluorides, nitrates and metals like arsenic, lead, and mercury in the region. Consequently, more than 75% of the groundwater in Nuh and Nagina blocks are unfit for domestic consumption.

With fluoride levels in groundwater exceeding the permissible limits of 1.5mg/l[3] Mewat has been subject to a heavy caseload of fluorosis. There has also been an increasing incidence of chronic health issues among the residents, especially women, due to lack of potable water. According to the 2015-16 data released by the Union Ministry of Drinking Water and Sanitation, more than 600 habitations in the state were affected due to water contamination, with 36,000 people affected by fluoride contamination, 15,489 due to salinity, and 80,827 due to the presence of heavy metals in water (Mahajan 2015). Water scarcity coupled with contamination has led to a rise in water conflicts in the district and an increasing prevalence in purchasing it from informal markets.

Despite the scarcity and harsh climatic conditions in the region, agriculture remains the main occupation of the people. Irrigation has proved to be a significant hurdle for the farmers in Haryana, especially ones in backward districts like Mewat, where 90% of the groundwater is saline. Only a few areas receive canal water but owing to its bad quality and non-usage, stagnation problems have arisen. The region has no rivers and mostly runs on artificial drains like the Nuh, Ujna, and Kotla drains.

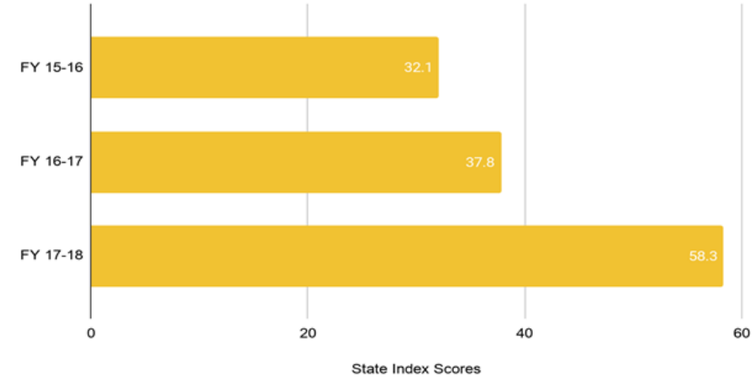
[3] milligrams per litre

WATER GOVERNANCE IN MEWAT, HARYANA

In light of challenges like water scarcity, exploitation, and pollution that arid and semi-arid regions face in India, water resource management and more than that, water governance becomes a crucial policy question. In the absence of any other surface sources, groundwater and hence, groundwater management emerge as significant factors. Hence, Haryana in general and Mewat, in particular, suffer from these same issues and outlining water governance problems on the supply side can provide us with clues as to what works and what continues to lack.

According to Composite Water Management Index (2019)[4] by Niti Aayog, Haryana is a medium performing state in water resource management. However, it showed significant improvement by moving up nine positions between 2016 to 2018 (Figure 1).

Fig. 1: Haryana's performance in water management



Source: Composite Water Management Index (2019: 58)

[4] The Index comprises nine themes (each having an attached weight), covering groundwater and surface water restoration, major and medium irrigation, watershed development, participatory irrigation management, on-farm water use, rural/urban water supply, policy, and governance.

The Economic Survey of Haryana states that focus has been placed on water supply infrastructure and augmenting water supply in villages with below 55 litres per capita per day (lpcd). By mid-January 2020, out of the 226 identified habitations, 70 targeted habitations have been provided with drinking water supply. However, groundwater restoration must be improved given that less than 20% of identified wells in the state have experienced a rise in the water table. Moreover, since less than 2% of the area is covered with micro-irrigation systems, agriculture is only aggravating the water stress (Niti Aayog 2019: 197). Reports from Mewat show that it has been facing drought-like conditions (Marvel 2016). A 2019 media report covered people of Mewat expressing concerns about the water shortages, poor quality of water, paying for water and the government's unfulfilled promises (The Quint 2019: 0:02). A study conducted by Huang (2011) in four Mewat villages showed that government neglect was the primary reason for the irregularity of water supply. The village panchayats did not have enough incentives to put in the effort to maintain water supply systems.

The government water pumps in the villages do not have a consistent electricity supply, and water is often only available at night when electricity is relegated from urban to rural areas. The water is also unclean at times because of the poor maintenance of water supply systems. The motor break-downs and damaged pipes become a big hurdle given the unavailability of mechanical expertise or appropriate tools to fix the damage in the local area. Thus, even when water is available, it might not be accessible for ten to fifteen days because of a host of other reasons.

While building new sources of water, the historical contributions of traditional water systems are often ignored. One such system is that of a kund[5], a traditional water-harvesting structure in the town of Nuh in Mewat. Nuh, being a semi-arid region with low rainfall, benefited from the kund historically. It collected rainwater, which was then utilised in meeting the daily requirements of water for drinking, washing, and bathing.

[5] *Kund* is a local name given to underground tanks which were primarily developed to overcome drinking-water problems. They were prevalent in western regions of Rajasthan and where groundwater was scarce or saline.

Kunds developed as something closely linked to the community they fed and even today hold some water. The Kund of Nuh has always been privately owned, but due to the lack of monetary resources for maintenance, it fell into disuse. With the availability of tap water in households, these decentralised systems were gradually forgotten or ignored, not only by the community but also their local governments. Some kunds or similar structures located in agricultural fields are filled up with soil to increase land use.

Photographs by
Yusra Ansari/ 2018

Photographed and reimagined by
Yusra Ansari/ 2018

It is surprising that while people suffer from water scarcity, health anomalies from groundwater pollution, and travelling long distances to fetch or purchase water, water systems such as the kund, which carry the potential of providing clean drinking water, remain expendable. This points to the dire need of efficient groundwater governance and the restoration of beneficial traditional systems in relieving water scarcity in semi-arid regions like Mewat, Haryana, and other arid regions. Therefore, it is worth examining Haryana's State Rural and Urban Water Policies, Groundwater Management and Regulation Bill, and Sub-Regional Plan for Haryana Sub-Region of NCR-2021 to analyse their effectiveness in groundwater management and traditional water systems restoration.

ASSESSING STATE WATER GOVERNANCE IN HARYANA

Groundwater governance is challenging, especially in a country like India, with its "disconnect between the largely 'atomistic' development and pumping of groundwater through some 30 million access points across the country on one hand and a vaguely defined water governance system on the other" (Kulkarni, Shah, and Shankar 2018). Water governance issues might seem like a local problem but they extend to vast geographical regions becoming an "ecosystem" of its own. India is characterised by a diverse typology of groundwater, and hence, water policies in semi-arid and arid regions must be cognisant of on-ground challenges in groundwater management and the potential of restoring traditional water practices (ibid).

Haryana Rural and Urban Water Policies 2012

The Haryana Rural and Urban Water Policies of 2012 aim at conserving water and preventing wastage in rural and urban areas. This is attempted through providing metered connections to the domestic, commercial, industrial, and institutional sectors. The policies also penalise overuse of water and construction of tube wells without state permission in areas labelled 'overexploited'. The State Level Empowered Committee is

constituted to streamline the implementation of the policy. In addition, the rural policy also requires the constitution of Village Water and Sanitation Committees (VWSCs) to encourage people to take metered water connections. To incentivise the village panchayats to support water conservation, they are given monetary motivation ranging from INR 20,000 to 50,000, depending upon the population of the village.

Haryana State Rural Water Policy of 2012 aimed at providing household metered connections to 50% of the rural population by 2017. It was only recently that Haryana further planned 100% tap connection coverage for rural households by 2022, under the Jal Jeevan Mission. In 2018-19, the state received 94% of the funds released by the Central Government and spent 90% of those funds on the mission. In 2019-20, by 31 December 2019, it received 50% of funds and spent 13% of it on the same (Kapur and Irava 2020: 4). Till that date only 53% of the rural households had Functional Household Tap Connections [FHTCs] (PIB Delhi 2020). This clearly indicates that in Mewat, FHTCs are not present in each rural household, even though 100% of rural habitations might have clean drinking water.

Haryana Groundwater Management and Regulation Bill 2013

The Haryana State Groundwater Management and Regulation Act (2013) addresses the need for regulating the development of groundwater in the state by enhancing groundwater recharge through various sources even those such as rainwater, floodwaters, and treated wastewater. While the bill takes cognisance of overexploitation of the same aquifers leading to depletion of the groundwater table and the need for their protection, there is no mention of aquifer-wide groundwater regulation in the state. Only in deep aquifer zones does the bill recognise the need of an approval mechanism, granting partial utilisation of these zones only after conducting a feasibility (Government of Haryana 2013: 22). There are no provisions for remediation of the exploited aquifers.

Given the saline nature of groundwater, nearly 45% of the area in the state is not suitable for irrigation. Despite this knowledge, the emphasis on water

quality in the groundwater bill remains quite bleak. While the pricing system for commercial use of tube wells is briefly mentioned in the bill, no pricing schedule is provided. The bill contains detailed guidelines about rainwater harvesting, including guidelines for the corporate sector to take up artificial recharge structure. It also recommends re-using domestic treated water for full utilisation. However, provisions for using existing traditional water structures like kunds to facilitate rainwater harvesting are missing. There are also no provisions for resolving water-related conflicts in the bill.

The bill has laid strict rules for seeking permission to conduct groundwater abstraction from water-logged regions for business purposes. The bill also penalises users for contravening or failing to comply with any of the rules made under the act, with a penalty extending to INR 10,000 or 6 months of prison. Despite contamination of groundwater being a punishable offence as stated in the bill, lack of implementation has resulted in Haryana ranking on the top for overall contamination of underground water (Singh 2018).

Haryana Water Resources Authority Act (HWRA) 2020

The act aims at conservation, management, and regulation of water resources such as ground and surface water within the State of Haryana. It ensures the judicious, equitable, and sustainable utilisation, management, and regulation by way of fixing the rates for the use of water and for matters connected therewith (Haryana Water Resources [Conservation, Regulation and Management] Authority Act 2020).

The act came into force on 07 December 2020 and aims to prepare an Integrated State Water Plan within a year and revise it every three years based on plans prepared for every block in the state. The act includes provisions for a water security plan, state groundwater, surface water plan, and tariffs for the use and disposal of water. Additionally, the authority encourages self-regulation, especially in water-stressed districts, adopting rainwater harvesting, catchment conservation, and water-logging mitigation measures.

Sub-regional Plan for Haryana Sub-regional 2021

This document recognises the need for vast improvements in water supply coverage per capita supply in the Mewat district, especially in the rural areas. It reports that no water connections in the district are metered and therefore required a complete revamping. There is also no data available on the extent of unaccounted-for-water (UFW[6]) and water is available only for 2 to 3 hours a day (Town and Country Planning Department Haryana n.d.: 178). The Plan mentions that an integrated water resource management system has been developed and proposes functional designs to utilise surface run-offs, village ponds and lakes, and build new dams in the Yamuna basin.

It also recommends utilising existing infrastructure to its optimum by reducing UFW losses in the water supply systems, canal waters and rainwater harvesting. In Mewat, a total of 700 recharge structures are required to use surface runoff for rain water harvesting (ibid.: 198). The Plan also includes specific policies and proposals for Mewat district but is still missing is the revival of traditional water structures like the Kund of Nuh that can serve as a source of clean water.

[6] difference between "net production" (the volume of water delivered into a network) and "consumption" (the volume of water that can be accounted for by legitimate consumption, whether metered or not).

The Kund of Nuh:

Illustrating The Synergy Between Humankind and Nature

By Yusra Ansari | Water Seekers' Fellow 2020

Photographs by **Yusra Ansari/ 2018,** reimagined and illustrated from a historical perspective.

Historic traditional water structures are a rich repository of technology and architecture among many other facets of cultural heritage. However, they have disintegrated and fallen into disuse due to continuous neglect. Magnificent water structures with a variety of architectural forms and decorative features are prominent across the country.

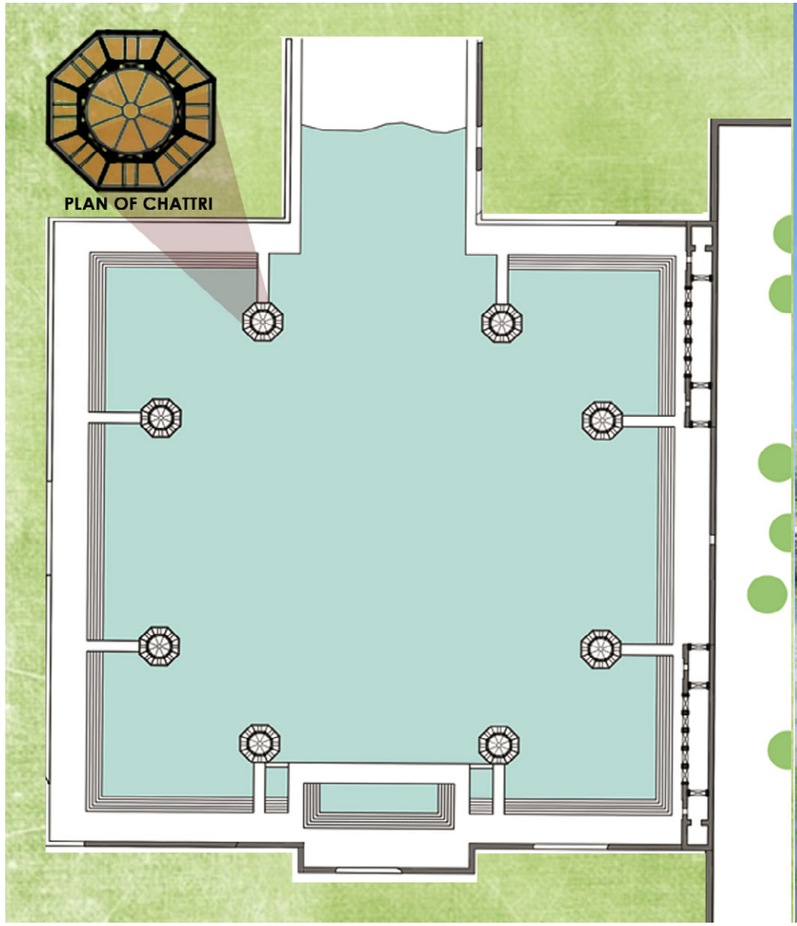
Such indigenous technologies evolved in harmony with the environment but soon became victims of neglect and oblivion. The natural process applicable to building these water structures in rural society was quite different from building and energising a modern water supply scheme.

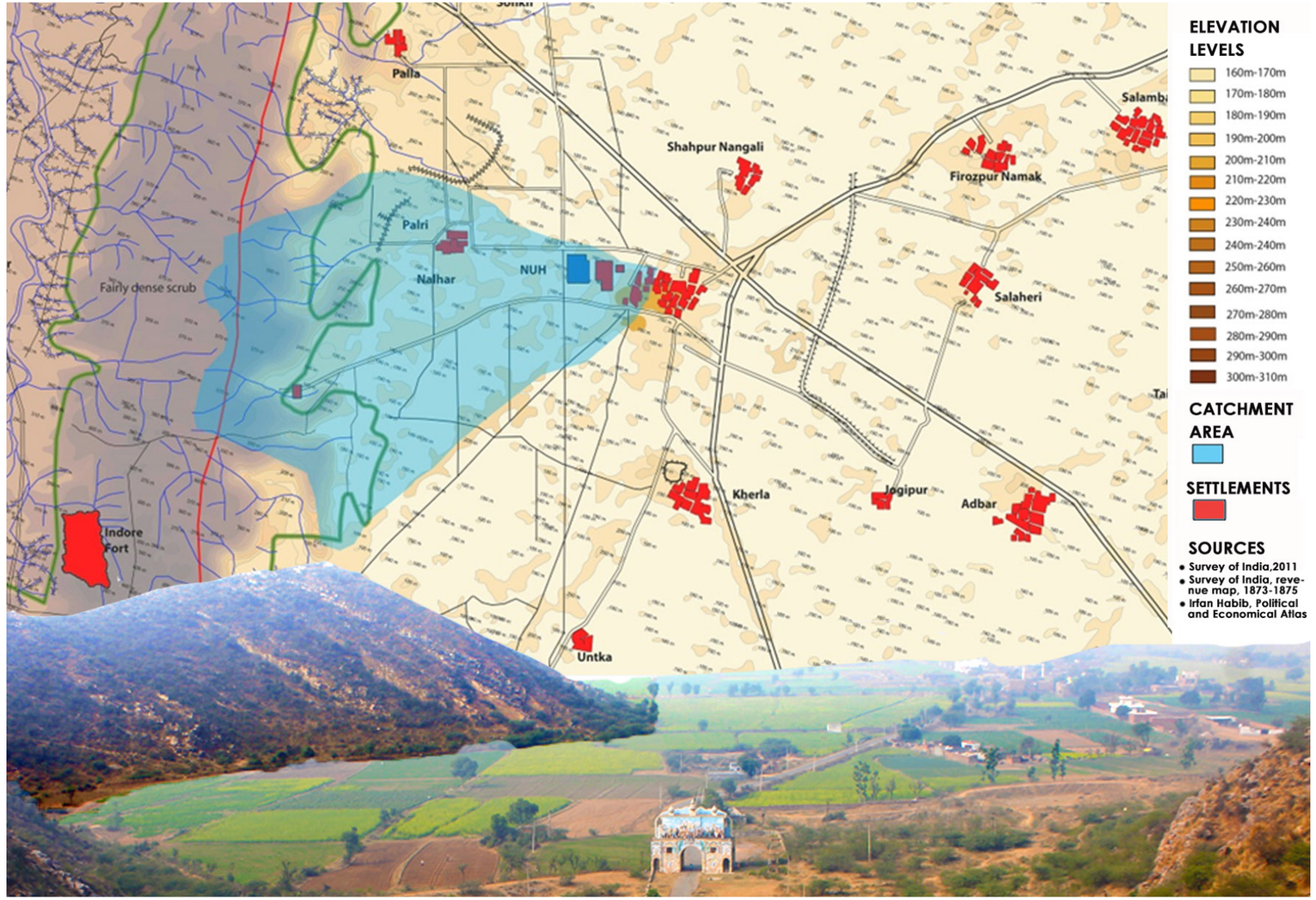
One such indigenous and decentralised water technology system is that of a kund. Kund is a local name given to underground tanks primarily developed to tackle drinking water problems. A well known kund today is situated at a distance of 45 km from Gurgaon and 70 km from Delhi on the Delhi-Alwar state highway in the town of Nuh. The town sprawls on foothills of the Aravalli Range and is an important settlement in the Mewat region.

The Aravalli mountain range in western India runs approximately 482 km from northeast to southwest across Rajasthan and Haryana. Until the 1930s and 1940s, the Aravalli range had verdant forest cover. A multitude of traditional water-harvesting systems ensured that the low rainfall was optimally utilised to provide an adequate water supply to the village community throughout the year.

Kunds were more prevalent in the western arid regions of Rajasthan and in regions where limited groundwater was available or the groundwater was moderate to highly saline, like in the case of Nuh. The Kund is built in the traditional sandstone Rajputana style of architecture. It is square in shape and has steps leading in from all directions. The corners are crowned with eight octagonal chattris (gazebos).

The present-day catchment area of the kund comprises the foothills of the Aravallis covered with agricultural land. The kund were often planned in the exterior of the settlement, in proximity to the Aravalli to ensure that the catchment area was not exploited.





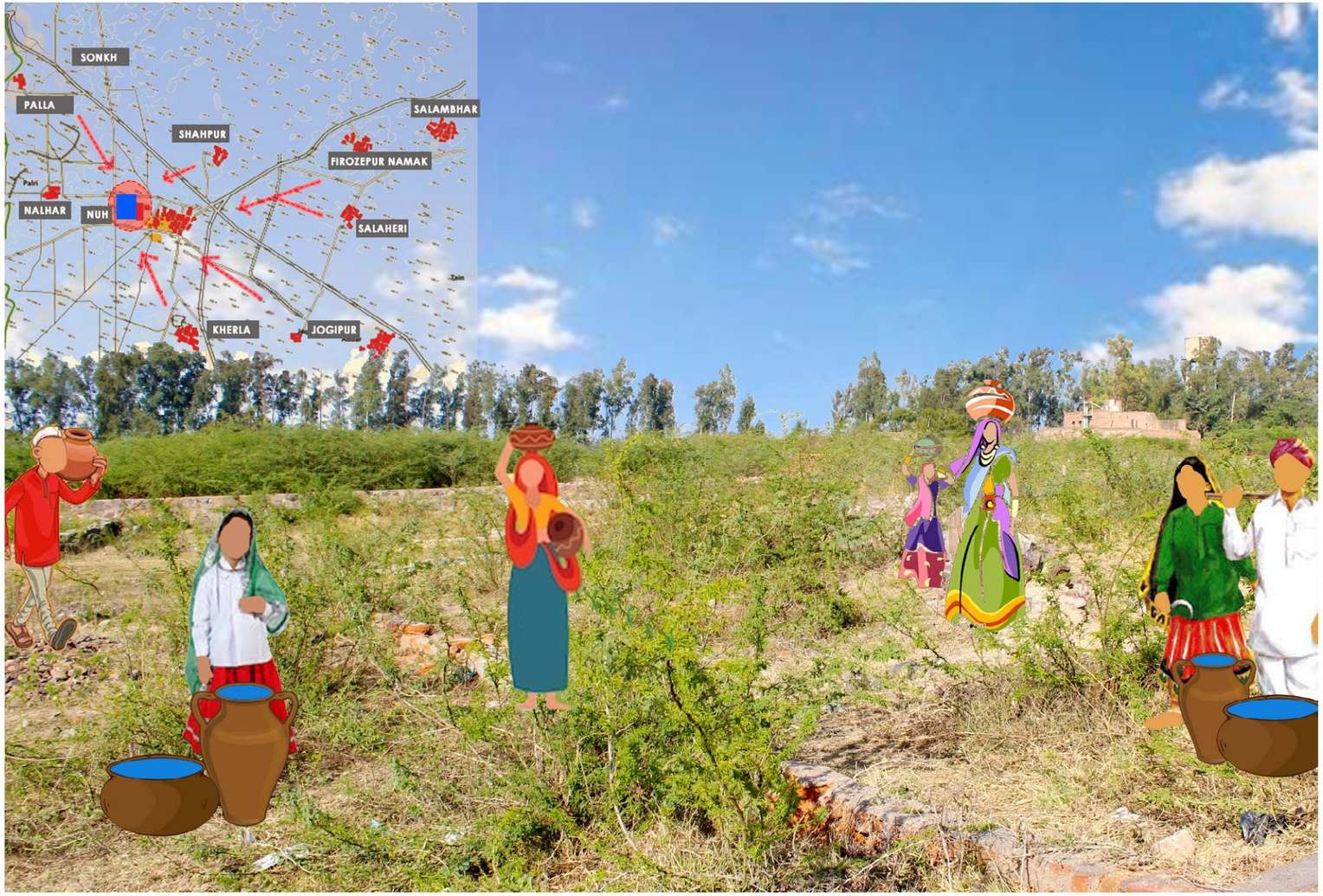
There is a sloped/ramped access to the kund in the northern direction. This sloped access was for cattle and other domestic animals for bathing or drinking water purposes.

The kund has two serais towards its eastern direction, which link it directly to the temple complex providing a designated space and separate access to women. The women utilised the kund extensively for washing and bathing purposes. It was also a space for social interaction for them.

A kunds was not only an example of an efficient decentralised traditional water system but also a space for community interaction. It celebrated the water, people, and culture of the region. It is intertwined with the community with many important festivals such as Dusshehra celebrated near it.

According to a local legend, during a prolonged drought in the region of Mewat known as “Chappaniya Akaal”, the kund was one of the only remaining sources of water in the region. This attracted people from neighbouring villages like Shahpur, Palla, Kherla, Firozepur Namak, and Nalhar to the kund to collect water.

The kund is a model example of water architecture and water aesthetics illustrating the importance of decentralised traditional water systems. As a historic traditional water structure it is a rich repository of technology, architecture, and many other facets of cultural heritage of Mewat.



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BEST PRACTICES AND RECOMMENDATIONS

In light of the previous assessment of Haryana's state water policies, it is useful to look at programmes that have been successful in traditional water systems restoration and effective water governance in other semi-arid/arid states like Rajasthan, Maharashtra, Gujarat, Telangana, and Karnataka.

In Rajasthan, the work of Tarun Bharat Sangh [TBS] of Young India Association has helped reconstruct johads, through strong community participation in identifying the needs of the villages, designing, and implementing projects. Recognising TBS's work, the government also started the People's Action Watershed Development Initiative (PAWDI), a replication of TBS's strategy (Thanju and Shrestha 2011: 2). Under the Mukhyamantri Jal Swavlamban Abhiyan, the Rajasthan government ensured a 56% increase in the transportation of water through water tankers in villages resulting in additional monthly water availability.

The Jal Yukt Shivar scheme in Maharashtra was introduced with the aim of improving water security at the village level. This was done by deepening and widening streams, working on nullahs, and digging of farm ponds (Verma, Shah, and Santhosh 2018). Another important scheme introduced in the state was the Galmukt Dharan and Galyukt Shivar (GDGS) which, through tank desilting, significantly benefited the region leading to an increase in irrigated area, improvement in drinking water availability, and increase in groundwater levels.

In 2004, the Gujarat state government launched the Sujalam Sufalam Yojna with the aim of recharging aquifers and reservoirs using excess water available in the Narmada and Mahi rivers flowing through the state. A survey conducted across 26 villages in the state found that there was an average 12% rise in the water tables. The Managed Aquifer Recharge (MAR) strategy adopted by the state for managing groundwater aimed at doing so by recharging with surface water, rainwater and through community efforts. In 2018, the state also launched a campaign to create water

structures in about 8,000 sites to capture rainwater and ensure groundwater recharge (ibid).

In Telangana, 'Mission Kakatiya' was launched in 2014 to "revive and harvest the benefits of tank irrigation by increasing command area, water available for irrigation and opportunities for agriculture". The programme is undertaking desalination and reparation of tanks to increase water-storing capacity. Evidence shows that this has also increased groundwater recharge, irrigated area, and cropping intensity (Verma, Shah, and Santhosh 2018).

The Karnataka State Council for Science and Technology (KSCST) surveyed more than 13,000 traditional water systems to investigate reasons for disuse. They found that lack of maintenance was the primary reason leading to dried up water systems filled with weed and silt. The state looks forward to unlocking over 6000 litres of water by reviving these systems, which would cost INR 300 crores (Rao 2019). The Rural Development and Panchayat Raj Department has announced the 'Jalamrutha' scheme to rejuvenate these water bodies on the basis of the KSCST reports. The scheme intends to set up local monitoring committees and imbibe tank maintenance into the village governance (ibid).

Haryana itself homes some inspiring examples. After studying the Mewat regions, the SM Sehgal Foundation has undertaken various initiatives to help its water shortage problems, including community tank for water storage, rooftop rainwater harvesting and water structures like dams, ponds and soak pits to augment groundwater. It also partnered with the Mewat Development Agency (MDA) to provide clean drinking water under the Groundwater Recharging and Integrated Watershed Development Program (IWDP) project. Their interventions in Kotla, Bangali Khola, and Bhond villages have helped positively impact the water supply (Sehgal Foundation 2014). However, there is still potential to undertake far-reaching government-led interventions as is being observed in Karnataka and Gujarat.

It is apparent that in Haryana, efforts to revive traditional water systems have been non-existent, and there are no larger schemes like that in Karnataka

to revive water systems. Even if the traditional water structures cannot be restored due to low water tables, ideas can be derived from modernising traditional knowledge and fostering community-based water harvesting. What is needed is a programme that goes beyond the aim of the Jal Jeevan Mission to provide tapped water to households and creates an ecosystem involving the communities in water management so that these governance problems that are being witnessed in Mewat can take care of itself.

It is important to note how local participation made a difference in the Sehgal Foundation's work in Mewat and TBS's work in Rajasthan. This would also bring sustainable change and make information systems stronger. The newer water resources authority and sub-regional plan for Haryana are yet to pan out, and it will be interesting to see how water shortages are mitigated through them.

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