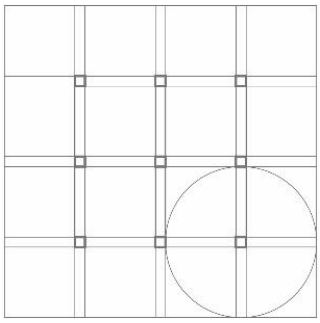

STEPWELLS OF AHMEDABAD

Online Exhibition | Irwin S. Chanin School of Architecture | 2020

Regional Patterns of Water and Settlements

The Indian subcontinent has unique traditions of harvesting water that emerged in tune with their climatic, geographical, and cultural specificities.[1] Water harvesting practices have an especially enduring legacy in the region of north central Gujarat in western India. Bordered by the rugged Aravalli hills to the northeast, arid stretches of the Thar Desert to the northwest, and the Arabian Sea to south, this region experiences a dry, semi-arid climate with summer temperatures frequently soaring up to 113 F. The region receives almost all its freshwater from the southwest monsoon which falls between June and September. The topography consists of relatively flat but gently undulating alluvial plains, and the wrinkled terrain lets water flow along its veins to create seasonal streams and rivers. Natural depressions in the terrain fill with rainfall and runoff during the monsoons. Underneath the alluvial tracts there are shallow, unconfined aquifers that hold groundwater at depths of 30–100 feet.[2]

Throughout the region, from the smallest settlement like the village of Meta to the largest urban agglomeration like Ahmedabad, a consistent pattern emerged in the relationship between settlements, terrain, surface water, and groundwater. Small agricultural settlements arose near riverbanks and seasonal streams whose floodwaters were harnessed for growing crops during the monsoon. Dwellings were strategically built on dry higher ground (*tekro*), often with a sacred shrine marking the highest point. The man-made lines of the streets aligned with the natural lines of drainage and marked the movement of people and water across the landscape. Beyond the monsoon, water was stored in natural or man-made reservoirs (*talav*) for use during dry months. The reservoirs located at the edge of the settlement filled with rainwater and runoff from the surrounding catchments, and with diverted floodwater from seasonal watercourses. An elaborate system of sliding sluices was built on reservoirs and seasonal streams to control the inflow and release of water. Irrigation channels were dug in the earth to guide water from the

[1] Anil Agrawal and Sunita Narain, *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems,* 1997.
[2] H.N Tiwari, "Central Ground Water Board, Ministry of Water Resources, River Development and Ganga Rejuvenation," 2015, 209.

reservoirs into fields.[3] Their banks were lined with masonry and strengthened by banyan, mango, and tamarind trees.[4]

The domain of stagnant surface water is often associated with deities, gods, and goddesses that were symbolically kept outside the settlement. People gathered at the banks of the reservoir for rearing and bathing livestock, washing and dyeing clothes, and for performing funerary cremation rituals. Most crucially, the reservoirs recharge groundwater. The stored water slowly percolates into the ground to replenish the shallow aquifer below. The ecological domains of surface water and groundwater are thus symbiotically tied to one another. The surface water, which mixed with sediments, was deemed unfit for consumption, whereas the groundwater, which had been filtered by layers of earth, was privileged as a source for drinking water. It was extracted from simple open wells (*kuo*) located within settlements, and from stepwells (*vaav*) typically positioned between the settlement and reservoir. Together, the reservoir and the stepwell bound the settlement to the surface and depth of the earth.

A stepwell is a type of subterranean well architecture which is unique to the Indian subcontinent, and it attained unsurpassed importance and elaboration in the semi-arid regions of western India.[5] It consists of a large, open well shaft which is accessed by a long flight of steps sandwiched between strong retaining walls. The well shaft grants access to groundwater, whereas the subterranean stepped corridor doubles as a cistern that stores rainwater directly from the sky.[6] At such great depths, very little water is lost to evaporation. As the water level recedes with time, more steps are gradually revealed. Water for domestic use was collected in pots, usually by women, who walked down the stepped corridor. Large volumes of water required for irrigation were extracted from the well shaft using draught animals that pulled large leather sacks (*kos*) over a pulley.[7] The stepwell also served as a meeting and resting space for the local community and travelers. Thus, the stepwell hosted a complex ecosystem of seasonal fluxes and social functions within its depths.

The ecology of north central Gujarat required water harvesting at various scales, from settlements to a single house. A holistic working knowledge of the terrain, surface water, and groundwater were put into practice,[8] enabling historic settlements to thrive in the challenging semi-arid climate. During the early 19th century, these traditional systems gradually decayed (see Gallery 5), establishing a pattern of environmental degradation that continues in India's post-colonial era of valorized centralization and technological progress. Today, unfortunately, the settlements of this region, especially the larger cities, have been transformed from 'flood-dependent' to 'flood-vulnerable.'[9]

[3] David Hardiman, "Well Irrigation in Gujarat: Systems of Use, Hierarchies of Control," *Economic and Political Weekly*, June 20, 1998, 13.
[4] James Forbes, *Oriental Memoirs, A Narrative of Seventeen Years Residence in India*, 1834.
[5] Jutta Jain-Neubauer, *The Stepwells of Gujarat: In Art- Historical Perspective*, 1st ed. (Abhinav Publications, 1981).
[6] Johannes du Preez, "Heritage and the Environment: Groundwater Mapping, Analysis and Management of the World Heritage Site, Ran Ki Vav, India" (Ku Leuven, 2015).
[7] David Hardiman, "Well Irrigation in Gujarat: Systems of Use, Hierarchies of Control," *Economic and Political Weekly*, June 20, 1998, 13.
[8] Amita Sinha, "Conservation of Historic Water Systems in Champaner-Pavagadh, Gujarat, India," *Landscape Research* 44, no. 5 (July 4, 2019): 588–99, https://doi.org/10.1080/01426397.2018.1495702.
[9] Tushaar Shah, *Taming the Anarchy: Groundwater Governance in South Asia* (Washington, DC: Colombo, Sri Lanka: Resources for the Future; International Water Management Institute, 2009).