



## QUICK WIN PROJECT – RAJKOT GROUND WATER RECHARGE SYSTEM

### About Rajkot

Rajkot, an industrial town famous for its foundry and machine tools industry, is the fourth largest city in the state of Gujarat. It is located on the banks of the Aji and Nyari rivers at the center of peninsular Saurashtra region, in the central plains of Gujarat state. It is the biggest city in terms of population in the Saurashtra-Kutch region, and is bustling with commercial activity.

### CapaCITIES Project

Cities account for approximately two-thirds of global energy use and over 70 percent of energy-related greenhouse gas (GHG) emissions that drive global climate change. In India, increased demand for energy, infrastructure and services is putting city systems under pressure. This will be accentuated further by growing risks caused by climate variability. Poor and vulnerable segments of the city populations will be affected most. Through the Capacity Building for Low Carbon and Climate Resilient City Development project (CapaCITIES), SDC's Global Programme Climate Change will support and accelerate the Government of India's efforts for sustainable urbanization.

### Ground Water Recharge System

Rajkot lies in an arid zone, with irregular and erratic monsoons and predominantly experiences a hot and dry climate. The city depends on ground and surface water sources to meet water requirements.

Locally available water bodies such as Aji-II and Nyari-II dams are abandoned as drinking water sources due to their unacceptable levels of pollution, from city waste water flows. Post monsoon, water is sourced from the Aji-I and Nyari-I dams and the surrounding lakes to meet part of the city water needs, Under such conditions, the rapidly expanding city is highly dependent on the distant Narmada canal water supplies. This dependence increases to over 90 percent in the dry months; the city faces severe water scarcity in the non-monsoon months. The off-take point from the Narmada is 700 km away from the city. Water supply accounts for 60% of electricity consumption by

municipal facilities, accounting for 57% of resultant GHG emissions.

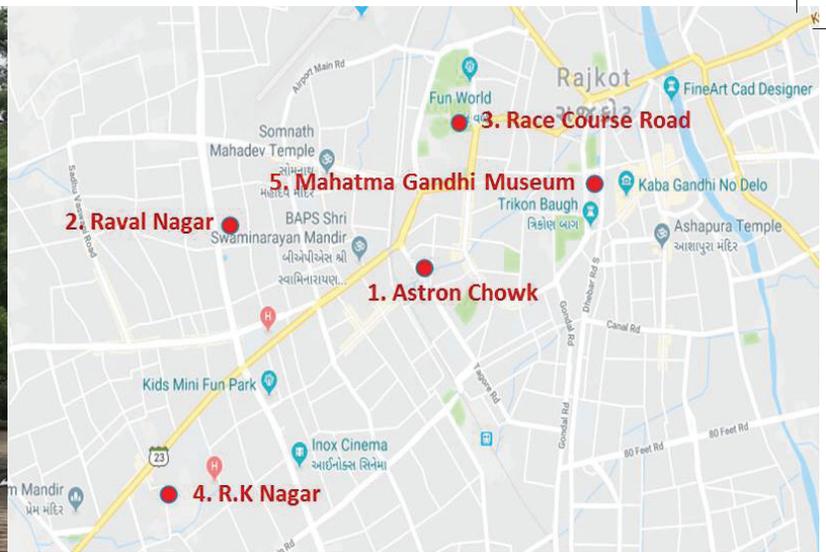
Potential for water augmentation and ground water recharge was assessed in Rajkot under CapaCITIES project. The study shows that ground water availability in general is dwindling in Rajkot due to increased pumping for various purposes, particularly in the western part of the city. As a result citizens are resorting to deeper borewells, tapping the deeper aquifer, which is not desirable. Ground water quality issues have also been observed in the eastern part of the city. At the same time, many areas of the city get flooded during the rainy season, impacting life in the city.

Ground water recharge systems, in combination with improvements to the storm water drainage systems have the potential to improve ground water availability and drain-off excess rain water, thereby avoiding localized flooding. Improving availability of local water resources would also reduce the need for pumping water over large distances, thereby also resulting in a reduction of GHG emissions from electricity use.

### Ground Water Recharge Structures at 5 Locations in the City

In complex urban hydrology with negligible un-paved surfaces and several closely spaced physical features (like buildings, roads, traffic junctions etc.) obstructing rain water flows an integrated approach, with respect to surface, subsurface and ground water interactions, is required while addressing the flooding issues. A study of the basins and sub-basins in the city led to the identification of flood-prone areas in the city. Different locations, where recurring instances of flooding occur in Rajkot city, were studied and the reasons for flooding, including the design and execution issues in storm water drainage systems were analyzed.

Five best suitable locations were identified in consultation with RMC for rain water recharge to ground water and to reduce the flooding impact at same time. Various aspects were taken into consideration while selecting the sites



i.e existence of a natural slope from the catchment area towards a suitable location for the recharge pit, availability of adequate space for the recharge pit, ensuring a 10 feet buffer from adjacent buildings and foundations and ensuring that there are no underground utilities in the vicinity of the recharge pit. Care was taken to ensure that no sewer lines are present around the selected sites, in order to mitigate the risk of raw sewage contamination. All the ground water recharge structures are within the premises of RMC like public parks and museum, which not only ensure the safety of the system but also results in creating community awareness.

1. **Astron Chowk** – Rain water from Virani chowk and from Mahila College Chowk accumulates at Astron Chowk and drains into the open drain (Astron nala) nearby. A ground water recharge system with two bore wells is constructed at the park in this area. Obstructions to the flow of surface run-off into the storm water drain are also removed.
2. **Raval Nagar (near Raiya circle behind Modi School)** – Run-off from different parts of the colony floods the road in front of the colony park. Flow through existing storm water pipeline is impeded by an unfavorable slope over a long distance. A bore well recharge structure with one bore well is constructed in front of the park
3. **Race Course Road (Opposite Bal Bhavan)** – Rain water runoff from upstream areas such as Mahila College Chowk flows through the Race Course Road to further drain into Aji river downstream. Part of this water stagnates in the southern side of Race Course, near the energy park opposite Bal Bhavan, due to a local depression and undesirable road curvature. A ground water recharge system with two bore wells, 5

feet apart and 200 feet deep is constructed to address the issue.

4. **R.K. Nagar (near Vrishabh Apartment, Opposite Crystal Mall)** – Ground water levels are depleted here and most of the bore wells go dry during summer months. One bore well recharge structure tapping water from the roof tops of two nearby apartments and from adjacent roads is constructed.
5. **Mahatma Gandhi Museum** – The paved area within the Mahatma Gandhi Museum is large and RMC has planned to provide a storm water drainage system at the lower point of this catchment area. A ground water recharge system with one bore well is constructed at a location adjacent to the storm water outflow, in order to ensure groundwater recharge. A provision is made for excess runoff to drain into the storm water drainage system.

## Beneficiaries

Project beneficiaries include citizens of Rajkot, Rajkot Municipal Corporation, Traffic and Transport Department, Gujarat and Gujarat State Ground Water Board.

## Potential for Replication

During the study on augmentation of local water resources through ground water / aquifer recharge, over 15 locations which would benefit from ground water recharge were identified. Based on the success of the interventions at the stated five locations, RMC intends to scale-up the construction of such recharge structures, covering the entire city.

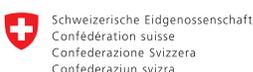
## Project Investment

The total project investment was CHF 32'000

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