BUILDING FLOOD RESILIENCE THROUGH INTERLINKING OF LAKES

- THE CASE OF AHMEDABAD

CASE STUDY:
COMPLEMENTARY REFERENCE MATERIAL | FOLDER - A

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FOLDER-A

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1. ACTIVE BEAUTIFUL CLEAN WATERS (ABC) PROGRAM, SINGAPORE

Introduction:

The ABC program of Singapore is one of the most elaborate practices of Sustainable Urban Water Management in the world. The program has been led by PUB (Singapore's National Water Agency) in collaboration with the private entities and the people of Singapore. The program is a pioneering example of the shift in paradigm from grey infrastructure to blue-green infrastructure for stormwater management.

Strategies:

ABC Program works on the catchment level by connecting water and nature with the public. The stormwater management system for the city has been designed in a way to catch rainwater at different scales and then act like an integrated system through a series of water bodies. Recreational spaces have been constructed around these water bodies and they have been de-concretized to transform the urban landscape. This approach has improved adaptation against flooding by increasing infiltration, decreasing the run-off volume and rate of flow at the catchment level.

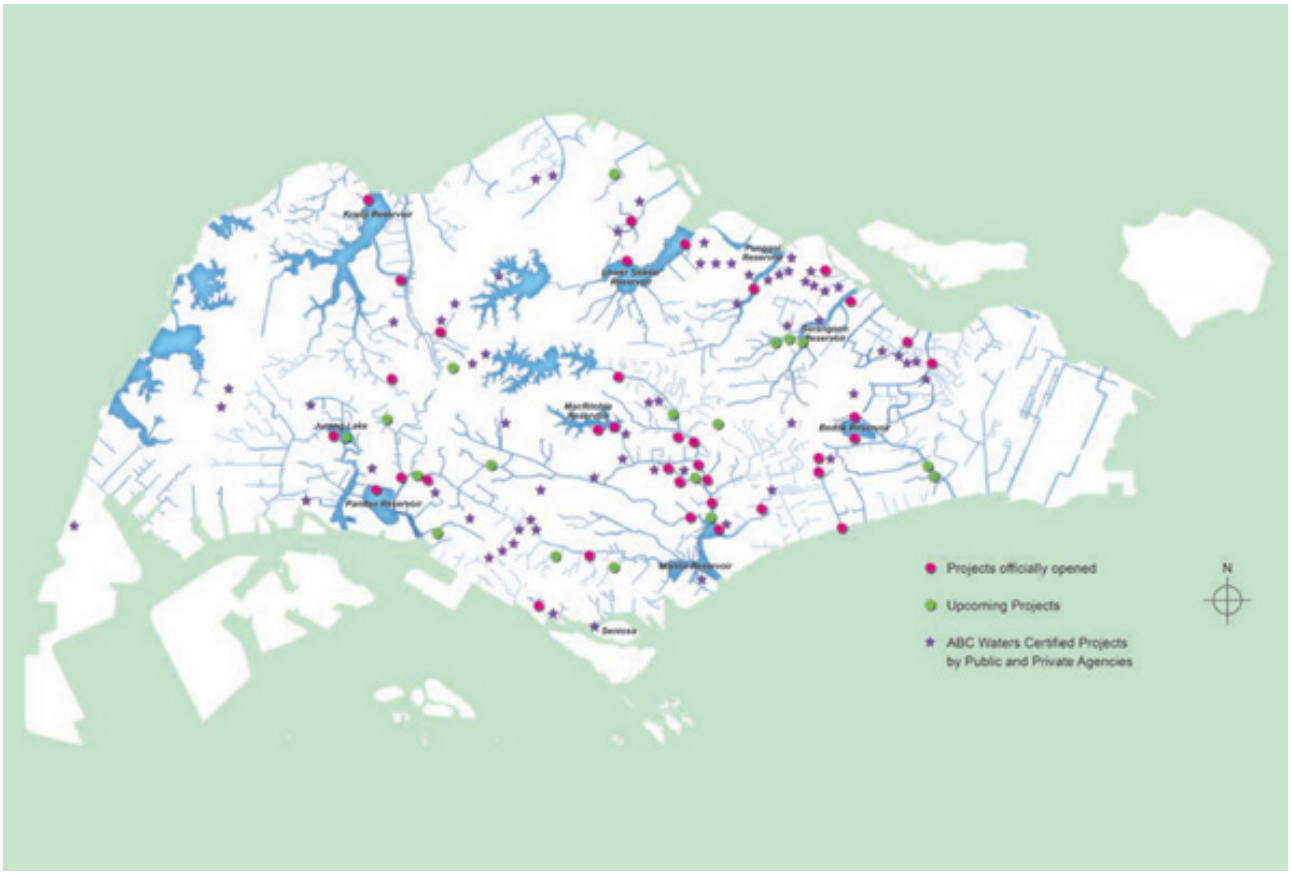

Figure 9: Singapore's Blue Map
Source: PUB

Figure 10: Bishan-Ang Mo Kio Park adjacent to the Kallang river

Source: PUB

Figure 11: PUB's mascot - Water Wally for engaging the public on water sustainability and consciousness

Source: PUB

Outcome:

The initiative began in 2006 by PUB in the flagship projects like Kolam Ayer, Bedok Reservoir, MacRitchie reservoir, Bishan-Ang Mo Kio adjacent to the Kallang River etc. The pilot projects were a shift from the usual approach of dealing with stormwater and lacked acceptance from the local community. However, with the completion of this project the community acceptance grew manifold. The support of the public strengthened the political will behind the project and helped in the further implementations; 36 projects under the ABC program had been implemented by 2017 (Centre for Liveable Cities, 2017).

Key Learnings:

Various public and private agencies worked in collaboration for the implementation of ABC projects. The partnership scope ranged from funding to implementation. Singapore has evolved an institutional framework over the years to support the ABC Program with PUB at the top of this hierarchy. This program also exhibits the importance of cross-sectoral expertise as there is a complexity involved in the planning of such programs. ABC has been an amalgam of considerations from demographics, land-use, hydrology, cultural and historic significance.

The very factors that make the ABC Program unique were a challenge in the implementation. The inter-agency cooperation, maintenance of the ABC sites, funds for the project and the community engagement were all hurdles on the way. The leadership at agency level and political level helped steer the way through these hurdles, making political will and leadership the key success factors.

2. SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS), MALMO, SWEDEN

Introduction:

Malmo is one of the three largest and fastest growing cities of Sweden with a population of 3,47,949 (Malmo stad, 2021). The city lies in south of the country with an average annual rainfall of approximately 550 mm. The Sustainable Urban Drainage system in Malmo was a ULB led initiative aimed at the regeneration of its suburban neighborhood and solution of urban flooding. The city was one of the earliest examples in Europe to have shifted its approach from that of a conventional grey infrastructure of a combined system to the more unconventional and sustainable blue-green infrastructure. The initiative was launched at a suburban district named Augustenborg with interventions at the scale of buildings, streets and neighborhood.

Figure 2: An integrated park and drainage corridor in Lonngatan in Malmo
Source: (Stahre, 2005)

Figure 3: The inlet area of Toftanas wetland park in Malmo
Source: (Stahre, 2005)

Strategies:

The core idea of the system was to curtail the stormwater from roofs and impermeable surfaces by 70% with the help of open systems. The intention was to eliminate the need of combined sewer overflow through reduction in run-off volume and peak flow rate (Climate Adapt, 2017). The main strategies of the SUDS system were source control, onsite control, slow transport and downstream control. These principles were implemented through strategies such as green roofs, infiltration in lawns, stone fillings, swales, etc. on private land and dry ponds, wetlands, canals, creeks, ponds and lakes, etc. on public land. The SUDS targeted the socio-economic co-benefits by including these above strategies with public spaces and landscape areas (Stahre, 2005). The initiative is also an example of collaboration of national administration, local administration, and private entities on financial and management aspects. Residents were involved in the project through consultations and public meetings on project specifics. The uniqueness of Malmo also lies in the complex procedure of planning and execution of SUDS involving an array of agencies that work in cooperation capitalizing on multiple benefits with a single initiative.

Outcome:

Augustenborg has been unhindered in two extreme rainfall events in 2007 and 2014 when rest of the areas where SUDS has not been implemented were severely affected. Leisure and recreational areas were created from reconfiguration of spaces between the housing blocks. Participatory nature of the project has increased the awareness of the public into the approaches of sustainability.

Key Learnings:

The example of Malmo exhibits that stormwater management should not be viewed upon as a technical service provided by the ULB. Stormwater can play a major role in transforming urban spaces and urban environment. Successful implementation of such projects requires a great deal of inter-departmental co-operation within the administration. The approach also requires higher expertise because if its time consuming and complicated nature as compared to conventional stormwater management. The outcome of pilots for SUDS at Malmo was the Dagvatten-strategi or the water policy for the implementation of such projects that clearly defined the power, roles, and responsibilities of each of the agencies in the sector.

3. KAIKONDRAHALLI LAKE RESTORATION, BENGALURU

Introduction:

The restoration of Kaikondrahalli Lake was a collaborative project between the local community and the ULB. The 48-acre lake was in a degraded condition due to solid waste dumping, sewage disposal, eutrophication and encroachments. 17 lakes were transferred to Bruhat Bengaluru Mahanagara Palike (BBMP) in 2009 following which the project commenced at the Kaikondrahalli Lake. There were two primary goals attached to this project - Restoration of the Lake and its Sustainable Maintenance. A participatory approach was adopted by BBMP by their giving the onus of maintenance and monitoring of the waterbody to the community post restoration.

Figure 4: Lake restoration work at Kaikondrahalli Lake
Source: (UNDP; NITI AAYOG, 2015)

Figure 5: Kaikondrahalli Lake post restoration
Source: (UNDP; NITI AAYOG, 2015)

Strategies:

The ULB partnered with a society - Mahadevapura Parisara Samrakshane Mattu Abhivrudhi Samiti (MAPSAS) and a US based NGO - United Way for the project. The corpus was provided by United Way as part of its agenda to fund community action. The restoration was to be implemented by BBMP and MAPSAS. The work was implemented in phases to match with the release of funds. The initial phase involved demarcation of Lake Boundary, removal of encroachments, diversion of raw sewage, followed by the removal of weeds, desiltation and deepening of lake. The inlets and outlets of the lake were developed to restore the inflow of rainwater and outfall of the excess run-off. Later, recreational spaces were created along the lake for the public and separate ponds were created for religious activities.

The security, cleanliness, gardening, maintenances of barriers, and lighting were to be maintained by the community. The control of the lake was passed over to the community as a common property to promote community engagement. The process of development of the management system involved technical and ecological experts working with the local groups. This collaborative effort has helped in changing the outlook of the community towards lakes as a system of systems for biodiversity, cultural heritage, flood control, wastewater treatment and water conservation.

Figure 6: Cycling and Jogging tracks at Kaikondrahalli Lake
Source: (UNDP; NITI AAYOG, 2015)

Outcome:

The capacity of the lake has increased by 54% due to restoration project. The lake has transformed into a vibrant urban leisure space with over 1200 visitors per day (UNDP; NITI AAYOG, 2015). Moreover, the ecology of the lake has thrived attracting numerous bird species.

Figure 7: Recreational space at Kaikondrahalli Lake
Source: (UNDP; NITI AAYOG, 2015)

Key Learnings:

The limited ability of ULBs to coordinate with the various departments and agencies was exhibited in the case of this initiative. They have not been successful in stopping the sewage inflow into the lake and further broadening of the initiative. The dependency over an international NGO for funds makes the project vulnerable in terms of financial sustainability. There is a constraint in the form of availability of resources within the community for monitoring and maintenance. Therefore, the project lacks a sustainable method of generating funds like from stable commercial sources.

4. INTEGRATED URBAN WATER MANAGEMENT, BHUJ

Introduction:

The Integrated Urban Water Management program at Bhuj is an example of active community participation in water resource management. The program is a unique blend of technical expertise amalgamated with traditional community knowledge and stakeholder engagement. Historically, a well-planned system collected the rainwater and its run-off into the Hamirsar Lake. The lake was an important source of water supply for the city. This system got abandoned with the advent of borewells and ultimately became damaged in the earthquake of 2001.

An NGO named Arid Communities and Technology (ACT) took an initiative to study the traditional systems of rainwater harvesting and revive them and further rejuvenate them by applying modern technical expertise. The aim of this initiative was to make Bhuj water secure.

Strategies

The work started with a technical study of the catchment area of water bodies in the city. Meanwhile, ACT began to mobilize the community regarding the importance of streams and drains that connected to the lakes. Awareness building activities were conducted along the Hamirsar Lake to motivate the community, ULB and the technical experts to involve themselves in the revival of water bodies. The efforts led to community exercises of cleaning the Hamirsar Lake and the Pragsar Lake. The community also crowd funded and restored the wall around the lake. ACT formed the Jal Strot Samvardhan Samiti or JSSS, an umbrella group to oversee such projects along various water bodies. Government agencies

Figure 8: Hamirsar Lake, Bhuj
Source: (Gujarat Tourism, 2021)

were also engaged in the program. The JSSS ensured the inclusion of several water bodies in the Development Plan of BHADA to avoid the lakes getting encroached upon or becoming extinct (Sheth & Iyer, 2021)

Plantation drive was undertaken around the Hamirsar Lake in collaboration with the Forest Department of Gujarat and funds were provided by the Bhuj Nagar Panchayat. To counter flooding in certain areas, recharge wells were constructed in common plots. Grants from ACT and contributions from local residents associations helped funding the construction of these wells. The water table rose substantially following which the scale of the interventions was expanded to other areas of the city.

Key Learnings

The active involvement of the community and the institutions is the major factor that led to the successful implementation of the Bhuj model. The adopted approach was social as well as technical and gave the control of the management of the resources to the community. However, here too the sustainability of the funds for such projects in the rest of Bhuj also, remains a challenge.

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