RESILIENT SURAT

A Model For Resilience Project Implementation Strategies

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

GLOBAL RESILIENCE ACADEMY
THE ROCKEFELLER FOUNDATION

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CONTENTS

Following the release of the City of Surat's Resilience Strategy in April 2017, the City, together with 100RC, hosted the Strategy Implementation Resilience Academy to leverage the political and public relationship momentum around the launch as a catalyst to advance project implementation strategies with key stakeholders. The City and 100RC, through an in-depth prioritization process, determined four resilience initiatives and projects to use as cases during the workshop centered around two key Strategy pillars: water and mobility. The Academy convened representatives from across the City's government, including key decision-makers such as the Commissioner and project managers, as well as Subject-Matter-Experts from Surat and elsewhere to refine the design of initiatives and begin to develop implementation strategies. Teams met for two days on 22-23 May 2017 and produced final 5-page project concept notes—summarizing the approach, costs and benefits, engagement strategies, and action steps—to inform this report.

SURAT RESILIENCE STRATEGY

Surat's resilience work builds on years of close collaboration with the Rockefeller Foundation, which began with the Asian Cities Climate Change Resilience Network. The Resilience Strategy reflects this through the amazing progress the City has made in understanding its resilience challenges and embracing the holistic thinking and planning that true resilience requires. Through initiatives and actions that strengthen the city, the Strategy enables Surat to address its past challenges while also recognizing the increasing unpredictability of the future.

While the Strategy addresses the fissures formed by the city's rapid growth, it goes much further. Alongside the enforcement of traffic rules, driving license norms, quality of life assessment, and guidelines on public open space, the Strategy also includes innovative and progressive initiatives such as a health and action plan that emphasizes the connection between urbanization, climate change, and public health; support for women entrepreneurs; and the promotion of civic engagement. Through this multifaceted blueprint for the city's present and future, Surat has the opportunity to lead not only in India, but throughout the 100RC network, and the world.

Central to these efforts are the people of Surat. The Strategy provides for creative public outreach to spread awareness of the city's challenges and the role of all residents in working to strengthen the city. It also dedicates one of several Pillars, around which the document is structured, to social cohesion, celebrating the city's heritage while also embracing its immigrants and their contributions to their adopted home.

The Surat Resilience Strategy is a new and exciting chapter of the city's resilience work and its relationship with 100RC.

100 RESILIENT CITIES

100 Resilient Cities—Pioneered by the Rockefeller Foundation (100RC) is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century.

100RC supports the adoption and incorporation of a view of resilience that includes not just the shocks—earthquakes, fires, floods, etc.—but also the stresses that weaken the fabric of a city on a day to day or cyclical basis.

RESILIENCE

The capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it.

We can learn from disruptions and take adaptive actions to address the chronic stresses that undermine the whole system's ability to respond to shocks. We have an opportunity to innovate to create a more adaptive and flexible system.

We can't know where or when the next crisis will come. But we know it will. Places that invest in building their adaptive capacity today will reap a what we understand as the resilience dividend, or the net positive change that's created by making investments in resilience.


EXIT

GLOBAL RESILIENCE ACADEMY

The Global Resilience Academy (GRA) is an initiative of The Rockefeller Foundation managed by HR&A Advisors. The Resilience Academy model is designed to connect interdisciplinary teams with place-based and technical expertise to design solutions that address the current and future risks of a place. Academies help partners deepen their understanding of resilience concepts, build strategies, design initiatives, and develop initiative implementation plans.

Every Academy is designed to produce the following outcomes:

1. Enhanced quality of project ideas
2. Articulation of common goals among stakeholders
3. Feedback from experts on feasibility and implementation approach
4. Sharing of personalized subject-matter expertise
5. Generation of innovative financing and partnership strategies
6. Strengthened relationships between project teams and experts
7. Development of concrete implementation actions based on established goals and strategies

"Resilience is the capacity of any entity, an individual, a community, an organization, or a natural system to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience."

—Judith Rodin, President,
The Rockefeller Foundation, 2005-2017

APPLICATIONS

Capacity-building around risk + theory

Common goal development

Strategy + approach development

Project design + implementation strategies

Project metric(s) development

OUTCOMES

Increased quality of project ideas

Common goals

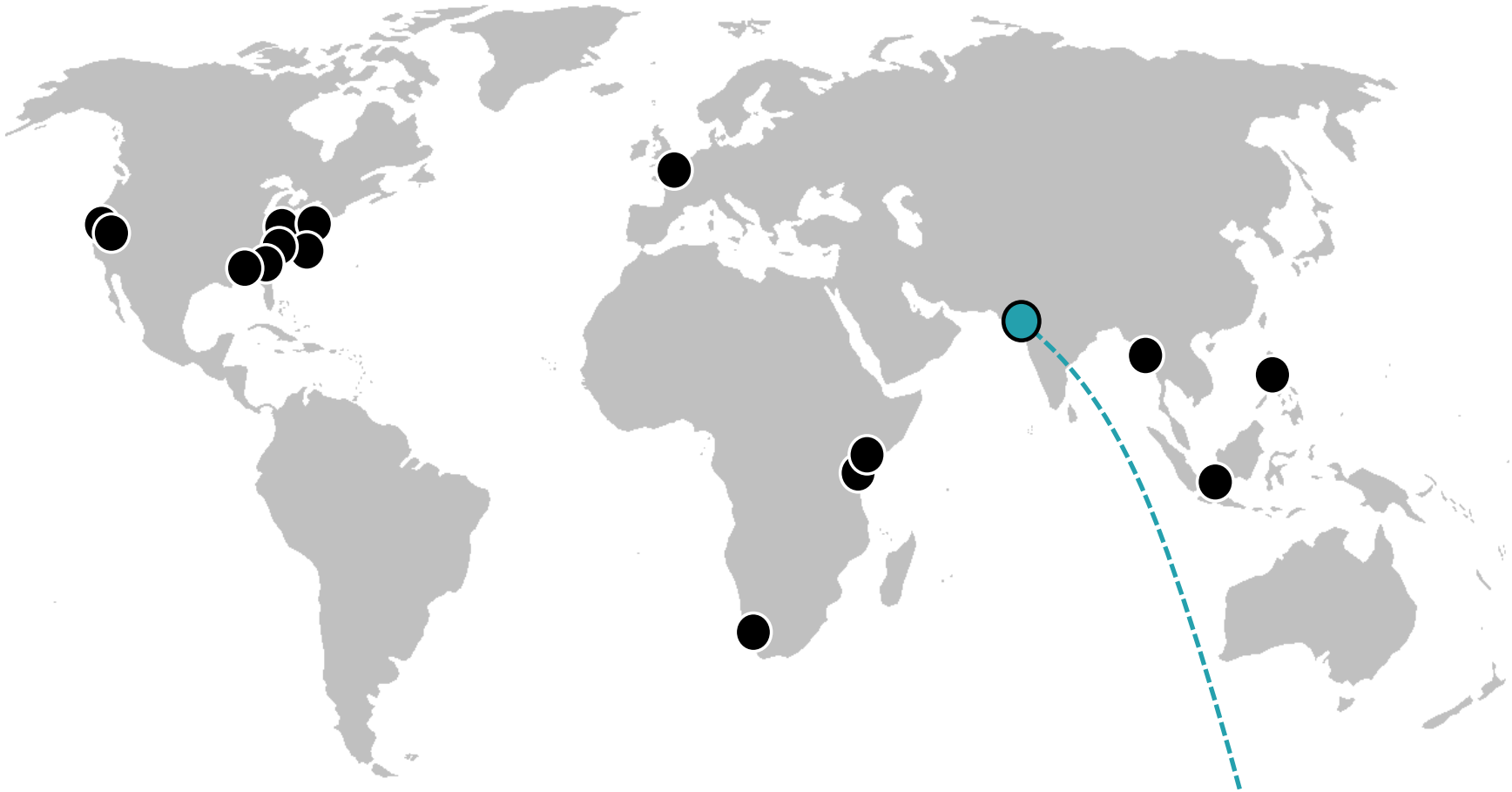
Feedback from experts on feasibility + implementation approach

Personalized subject-matter expertise

Innovative financing + partnership strategies

Relationships between project teams + experts

Actionable steps to take goals + strategies to concrete implementation actions



The Rockefeller Foundation Internal
New York, NY

100 Resilient Cities, Los Angeles River
Los Angeles, CA

World Bank Resilient Health Systems
Washington, DC

100 Resilient Cities, Los Angeles Hubs
Los Angeles, CA

Resilience AmeriCorps
Washington, DC

Community Development Financial Institutions
Atlanta, GA

Alliance for a Green Revolution in Africa
Nairobi, Kenya

NATO
New York, NY

Western Cape Department of Health
Cape Town, South Africa

The Rockefeller Foundation
Africa Regional Office
Nairobi, Kenya

Lafayette Consolidated Government
Lafayette, LA

Asian Development Bank
Bangkok, Thailand

American Red Cross
Semarang, Indonesia

100 Resilient Cities, Paris
Paris, France

100 RESILIENT CITIES
SURAT, INDIA

LIFECYCLE 3 PRIORITIZATION

As part of the 100 Resilient Cities (100RC) Implementation process, the City of Surat gathered several key stakeholders including Surat's Chief Resilience Officer Kamlesh Yagnik, Deputy Commissioner M. Nagarajan, SMC Advisor Jatin Shah, 100RC Regional Director Vikram Singh, and Senior SMC officials to attend the Surat Lifecycle 3 (L3) Workshop, a project prioritization workshop aimed at highlighting specific initiatives which could be put forth during the May 2017 Global Resilience Academy. The GRA was designed to advance the design of these priority initiatives with the help of subject-matter-experts. At the Academy, participants collaborated together to outline specific steps and action items that the City and partners must take to ensure successful project implementation.

At the L3 Workshop, City participants were asked to recommend projects that they believe should be prioritized by the City and the CRO, as illustrated by the Priority Initiatives graphic on the facing page. 100RC participants were, in turn, asked to suggest initiatives for which they felt 100RC could provide the greatest level of implementation support, through Platform Partners and other cities in the global 100RC network. Projects identified as priorities by both City and 100RC participants were recommended for advancement to the Academy.

Following the Academy, Surat and 100RC will develop a "Year One Project Plan", which will lay out the CRO's strategic focus over the course of the coming year. This Plan is likely to include most of the projects selected during the L3 Workshop prioritization exercise.

Potential Priority Initiatives Identified through Lifecycle 3, and Potential Platform Partners:

Spatial Assessment Of Accessibility to Public Transport

Non-Motorized Transport Strategy

Affordable Locality Audit

Affordable Housing Finance Schemes

Real-Time River Health Monitoring of Tapi River (Potentially — Veolia)

Preservation of River and Tidal Creeks (Potentially — Arcadis & Deltares)

Advanced Smart Water Supply System (Potentially — Deltares)

Promote Women Entrepreneurs (Potentially — EY)

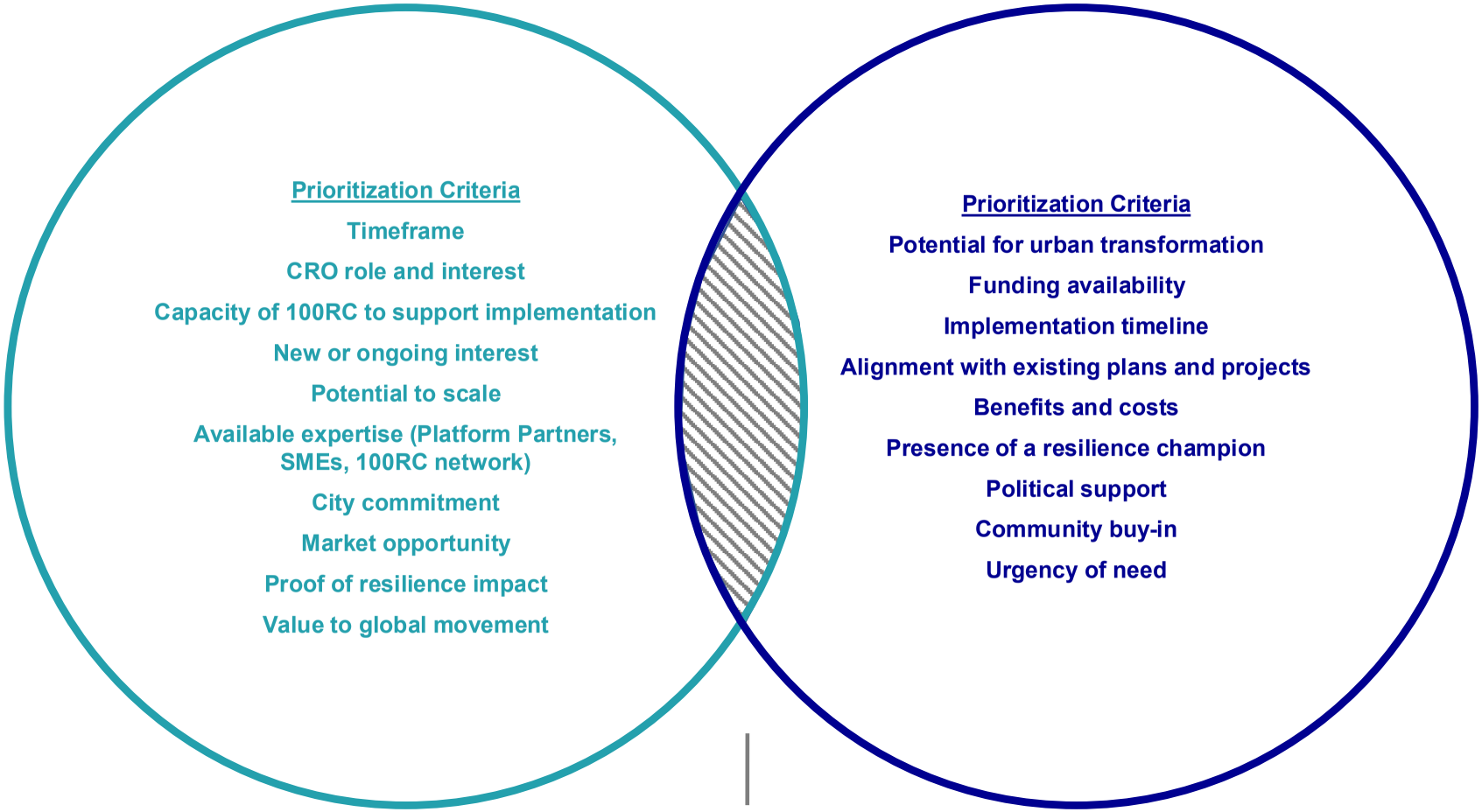
Community Level Rain Water Harvesting System (Potentially — TNC; Tactical Resilience Workshop)

Centre for Community Resilience (Potentially — RBD; Citymart Challenge)

Center of Excellence for Urban Health and Climate Resilience (Save The Children)

Year One Priority Initiatives | 100RC

100RC provides support to city



Year One Priority Initiatives | City

100RC and City evaluate priorities and adjust resourcing for Year 2+

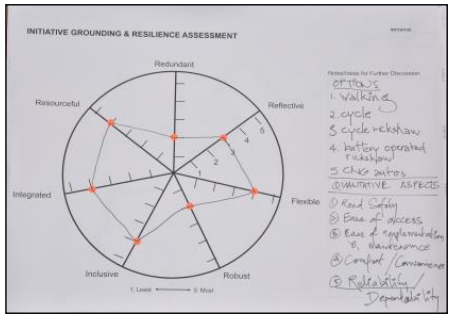
Mutual Priorities

100RC works with City to help deliver project charters, detailed design plans, partnership resources etc.

100RC SURAT ACADEMY

INTRODUCTION
Surat Resilience Strategy
L3 Planning Process
Global Resilience Academy

EX 1. INITIATIVE GROUNDING AND RESILIENCE ASSESSMENT
Review initiatives
Assess initiatives in terms of seven qualities of resilience



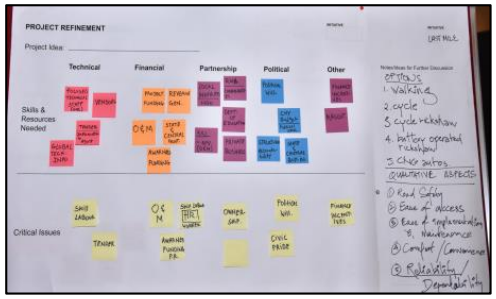
The Academy, held in Surat on 22-23 May, 2017, focused on the themes of **Mobility** and **Water**. Participants were divided into four groups, each of which addressed one of the subthemes identified through the L3 prioritization process:

- **High Mobility Corridor**: Develop an initial urban design framework for a corridor through a multi-modal hub approach that connects Railway, Interstate Bus, and BRT lines to a major commercial business hub in Surat, and produces multiple benefits.

- **Last Mile Connectivity**: Develop a project design or framework that develops stronger, more seamless, linkages between BRT stations and adjacent neighborhoods, to be prototyped in key locations and then expanded citywide.

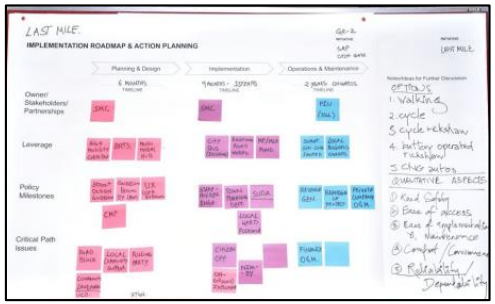
- **Cleaning the Tapi River:** Conduct a critical analysis of the Tapi River Master plan and corresponding DPR for implementation to develop a four-page concept note designed to provide the City with a project rationale that can be brought to funding agencies, including the State Government and the ADB.

- **Tapi River Vision 2030:** Study the Tapi River's course through Surat and develop a 2-4 page project brief for 2-3 pilot projects that can be implemented by SMC following the river's clean-up.

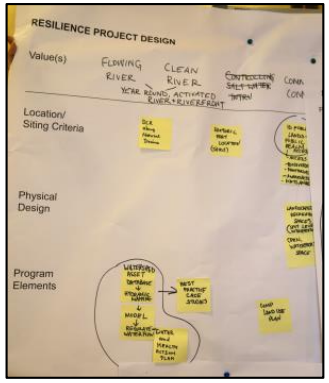


EX 3. PROJECT REFINEMENT
Select priority project(s)
Identify inputs and remaining issues

EX 5. IMLPEMENTATION ROADMAP & ACTION PLANNING
Identify owners/stakeholders/partnerships, finance, policy, and administrative elements that need to be engaged

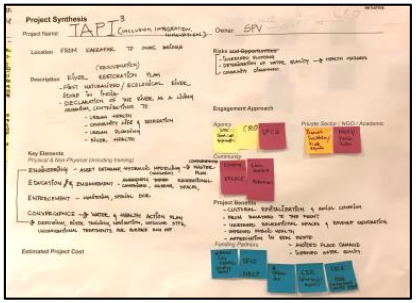


EX 2. RESILIENCE PROJECT DESIGN
Identify Resilience Values
Generate project design ideas that maximize Resilience Values



EX 4. CONNECTING PROJECT BENEFITS & FUNDING STRATEGIES
Identify project benefits and outcomes
Frame funding strategies in terms of project benefits

EX 6. PROJECT SYNTHESIS
Summarize key project elements
Pitch projects to a wider audience



TEAMING + PARTICIPANTS

Resilience Academies bring together diverse stakeholders and experts whose inter-disciplinary and cross-sectoral expertise aids the creation of innovative strategies and project ideas by participants through a series of facilitated breakout groups. For any Resilience Academy, engagement is calibrated based on participant needs and drives towards to the following goals:

- Involve a wide range of disciplines and sectors are represented to maximize innovation and collaboration;
- Support teams at their relative stage of project development;
- Ensure that teams receive technically and geographically relevant support, based on project typologies (e.g., local knowledge, infrastructure, housing, economic development, water management).

For the 100RC Surat Resilience Academy, local stakeholders from the City of Surat were joined by subject matter experts (SMEs) with intricate project implementation knowledge.

Facilitator

City of Surat - Leadership

City of Surat - Staff

SME

Project Design Support

Cleaning the Tapi River

Lalit Dashora, TARU

Kamlesh Yagnik, CRO, SCCT

C.Y. Bhatt, SMC

Sameeha Sheth, CEPT
Dr. Sanjay Yadav, SVNIT

Sujith Sourab, TARU
Justine Lerche, Veolia

Vision for the Tapi River 2030

Asima Jansveld, HR&A Advisors

K.H. Khatwani, SMC

Neha Modi, SCCT
Bhairav Desai, SMC
Dr. Vikas Desai, SCCT

Tushar Bose, CEPT
Ajit Savadi, ARUP India
Karishma Desai, South Gujarat University

Shivani Talati, TARU

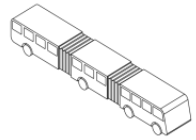
Last Mile Connectivity

Saurabh Gaidhani, 100RC

M. Nagarajan, SSCDL

Dr. Rajesh Pandya, SMC
Jatin Desai, SMC
Jigar Patel, SMC

Lubaina Rangwala, WRI
Nikhil Chaudhary, WRI
Arjun Joshi, CEPT



High Mobility Corridor

Dr. Mahesh Rajasekar, TARU

Jatin Shah, SMC, SCCT

Jagdish Thadani, SMC
Mehul Patel, SMC

Dr. Bargava Advaryu, CEPT
Shivarao Channapattan, VNSGU

Abhay Chopde

IMPLEMENTATION STRATEGY

CLEANING THE TAPI RIVER

Problem Statement: Over the years, various factors have led to the deterioration of the Tapi River. A combination of untreated sewage from upstream settlements and pollution generated by river-adjacent festivals have led to increased biological oxygen demand (BOD) levels in the river. Industrial waste has negatively impacted the river's health and severely affected the nearby Mindhola River. If no action is taken to remedy these conditions, worsening water siltation and the growing prevalence of untreated effluents will continue to impact water quality. A comprehensive environmental management of the Tapi River, coupled with a major public engagement process, will be needed to build a clean, sustainable river.

Strategy Linkage: Goals 3.1 and 3.3; Initiatives 3.1.2 and 3.3.1.

Resilience Value

The Tapi River is the sole source of fresh drinking water available to Surat's 5.5 million residents. By cleaning the river and focusing on treating sewage at its source, the City will transform Surtis' relationship with their primary body of water. Resulting benefits will include the long-term provision of clean drinking water to millions of Surtis, enhanced potential for recreational areas along the river, the restoration of ecosystems in the river's buffer areas, and improvements to the river's accessibility.

Physical Project Elements

Physical design elements will include place-based interventions at the river's edge across several Surat wards, in outlying upstream villages, and at outlets along the course of the Tapi River. A green belt will be developed along both banks of the river to provide recreational opportunities for the city's residents. Enhancements to sewage treatment facilities and the incorporation of new cogeneration plants will accompany river cleaning strategies, to secure a clean river for future generations.

Programmatic Project Elements

SMC will conduct a comprehensive analysis of water quality data, conducting additional tests to update existing data on an as-needed basis. Water quality will be monitored on a regular basis using instruments that test for specific pollutants and are equipped with GPS/GPRS capabilities to enable officials to map changes over time at key locations. Capacity-building trainings will be incorporated into the project's implementation to educate City staff about best practices in measuring water quality in the long-term.

Engagement Approach
Stakeholders from across City, State, and Central governments will be convened to jointly implement the project, including:

Various elements of the Surat's City Government, including the Urban Development Authority, who will be called upon to support communities that surround the river in potential relocation efforts

The Government of Gujarat, whose Urban Development and Urban Housing agencies, and Irrigation Department will all be required to approve various aspects of design and implementation

Representatives from the Government of India, namely from the Central Water Commission and District Collectors for Surat and the Tapi District.

Potential Barriers to Implementation
Successful implementation of this project will require:

- **A clear funding strategy that** incorporates funding from the State and Central government;
- **Significant interagency coordination**, given the multi-jurisdictional nature of the Tapi River;
- **A strong governance structure led by an umbrella authority** to support the project through implementation and long-term operations and maintenance; and,
- **The use of innovative technologies** to maximize efficiency and accuracy in the monitoring of Tapi River cleanliness.

Potential Project Cost

The River clean-up was given a preliminary costing, as listed in the table below by river segment:

Project Element	Cost
Kakrapar to NH (SUDA Boundary), Left Bank	INR 30,00,00,000
Kakrapar to NH (SUDA Boundary), Right Bank	INR 86,00,00,000
Within SUDA Area, Left Bank	INR 2,21,00,00,000
Within SUDA Area, Right Bank	INR 42,00,00,000
Within SMC Area, Left Bank	INR 3,95,00,00,000
Within SMC Area, Right Bank	INR 98,00,00,000
Administrative and Contingency	**INR 69,76,00,000**
Total Project Cost	**INR 9,41,76,00,000**

Recommended Next Steps

Immediate Next Steps

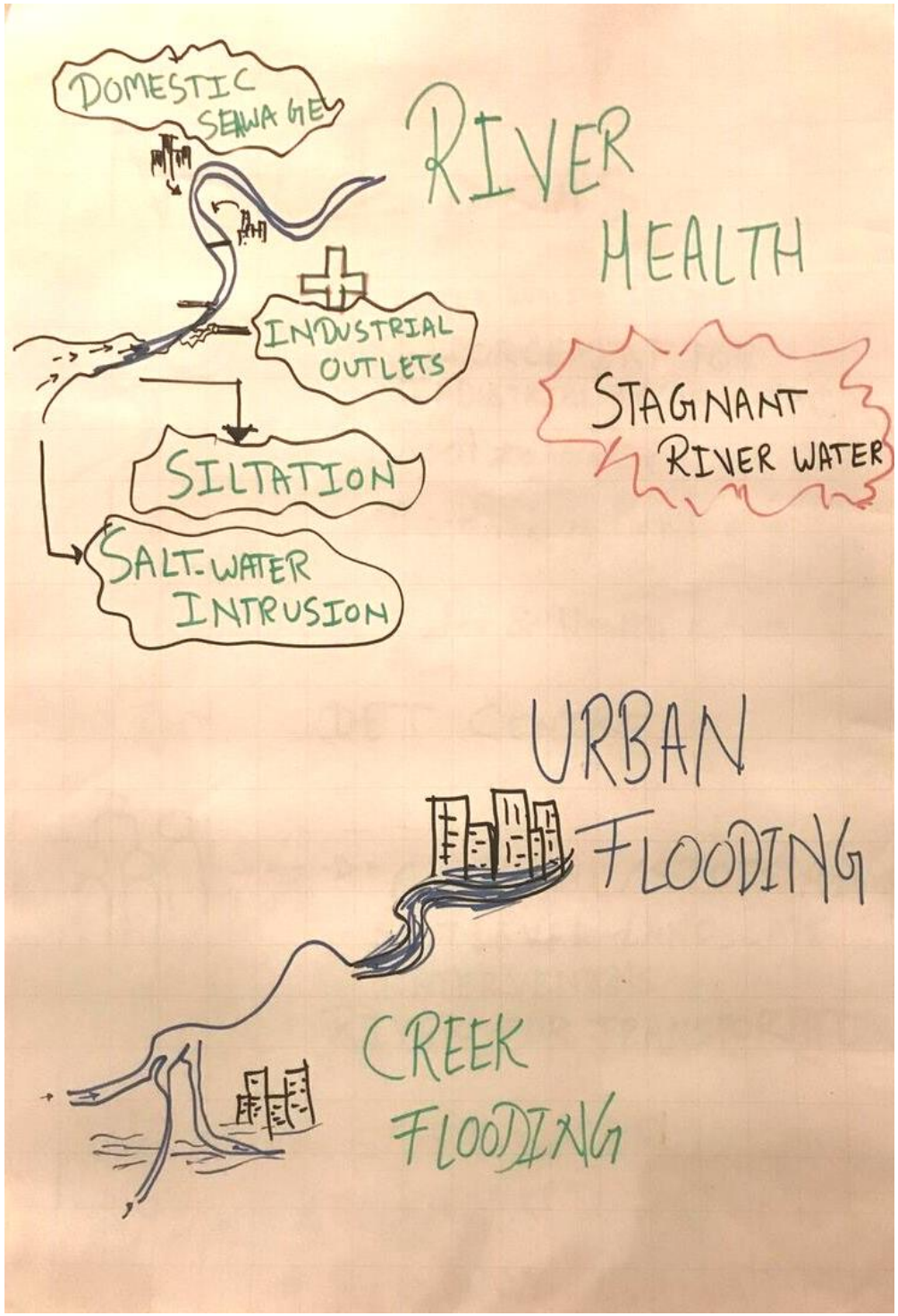
- Form an early-stage committee of stakeholders to generate excitement about the project and begin the outreach process – this organization will serve as a precursor to the eventual SPV
- Publicly declare the Tapi River a "living organism"
- Validate all existing data on the Tapi River, including hydraulic models, to identify areas where further analysis might be needed
- Conduct a benchmarking exercise to identify precedent projects
- Conduct a preliminary water health monitoring test of Tapi River and publish the results to raise awareness
- Engage Surtis through a targeted multi-pronged outreach campaign

Medium-term Next Steps

- Draft the Comprehensive Master Plan for the River Restoration
- Seek statutory approvals for the project's implementation, including an environmental clearance
- Develop discrete implementation strategies for each intervention that include funding streams and specific technical aspects

Long-term Next Steps

- Implement the Master Plan for River Restoration



CASE STUDIES

Cleaning up the Citarum Basin (Indonesia, $500M USD)
The Citarum River and its tributaries in Indonesia's West Java are a vitally important water supply for both the city of Bandung and the greater Jakarta region, which are together home to 25 million people. Its waters irrigate farms that produce around 5% of the nation's rice, and also supply more than 2,000 factories on its banks. Over the past 20 years, water quality in the Citarum region has been decreasing rapidly as pollution squeezes the life from the waterways. Every day thousands of tons of household garbage and untreated industrial waste contribute to an enormous drifting mass of rubbish, which completely blankets the river in many places. This toxic waste stifles the river's ecology, fosters disease, and clogs hydroelectric turbines. The environmental damage, which has depleted river-adjacent forests and frequently blocks drains, also leads to regular flooding in cities such as Bandung.

In 2008, the Asian Development Bank (ADB) committed $500 million in funding to Indonesia via a multiyear loan aimed at financing a wide-ranging cleanup and rehabilitation plan for the Citarum River basin. These funds are currently being used to clean the Citarum River and the West Tarum Canal, which connects it to Jakarta and provides the capital with 80% of its water supply. In Bekasi, a municipality in Greater Jakarta, ADB funds have been used to support a major engineering project to filter canal water as it makes its journey to the capital. The project channels the canal water beneath the Bekasi River, one of the most polluted in the Citarum region.

Cleaning of Melaka River (Malaysia)
The Melaka River recently underwent a transformation from a backyard drainage channel into a popular and highly successful cultural amenity. The project was part of a highly integrated effort that lasted close to a decade and involved the construction of wastewater infrastructure, adoption of historic preservation and placemaking measures, and pursuit of economic development strategies to create an urban waterfront with a riverwalk and river cruise experience. Today, the Melaka River is a popular tourist attraction.

Other case studies considered by Academy participants include:
- Cleaning of Manila's Pasig River, Philippines (Asian Development Bank)
- Nura River Clean-Up Project, Kazakhstan (World Bank)
- Vaigai River Restoration Project, India

LINKAGES TO OTHER PROJECTS
The cleaning of the Tapi River will build upon existing research on the river's water quality and will also support the Tapi River Vision 2030 - Action Plan for Inclusion, Integration, and Innovation.

IMPLEMENTATION STRATEGY
TAPI RIVER VISION 2030

Problem Statement: Rapid urbanization in Surat in recent decades has significantly increased the prevalence of land covered by impervious surfaces. This has heightened the city's susceptibility to urban water-logging and led to the degradation of the groundwater table. The Tapi Riverfront should be redeveloped through a set of resilient urban design interventions, which might include the planting of pollinator-friendly plants, and plants that generate less litter, in parks and medians.

Strategy Linkage: Goals 3.1 and 3.4; Initiatives 3.3.1 and 3.4.7.

Resilience Value

The restoration of the Tapi River through the development of the first naturalized ecological river edge in India has the potential to open up the river for public enjoyment, while ensuring that the health of the river itself dramatically improves over time. Since its founding, Surat has relied on the Tapi River as a key source of water and lifeblood of trade. Neglect and overuse of the river has significantly reduced its water quality over time and made it a health hazard for residents. Intensive growth around the river has also had a marked impact on biodiversity, and put many at risk of floods.

The revitalization of the River, through an inclusive, innovative, and integrated strategy has the potential to transform the lives of millions of Surtis: the redesigned river edge will become a park, a major addition to Surat's few accessible open spaces; partnerships that will be created between various City departments and authorities to implement the project will serve as a model for future interagency cooperation; and sustainable approaches, which make use of innovative green technologies, will be adopted to ensure the long-term health of the river and a clean water supply for future generations.

Physical Project Elements

Future physical interventions will include: the addition of sewer drain filters, recreational elements along the river, and signature landscape elements.

Programmatic Project Elements

SMC will work with partners to create a database to compile information about conditions along the Tapi River. The database will serve as a repository for information collected through exploratory dredging studies, hydraulics assessments, research on stormwater runoff management schemes, and studies on the navigability of the river. SMC and partners will produce interactive hotspot maps to display this data as part of the project's public engagement strategy. Ultimately, the bulk of the action plan will be rooted in these assessments but will also incorporate strategies for improving water quality and health outcomes for Surtis living around the river.

A long-term engagement campaign will be launched to help guide implementation and raise awareness of the many opportunities that a revitalized Tapi River will provide to communities across the city. Awareness-building strategies could include developing recreational pop-up spaces and themed installations along the river to give residents a sense of how a transformed river might look and feel.

Finally, a new partnership between various City, State, and Central government agencies will be created to provide strong oversight of the implementation process and ensure long-term water quality monitoring. Special Development Control Regulations may be applied along the riverfront, natural drains, tributaries, and canals that connect to the river.

Engagement Approach

SMC will lead early stages of the planning effort in the near term but will rely on a broad range of stakeholders throughout the implementation process to ensure successful project implementation. These stakeholders will include:

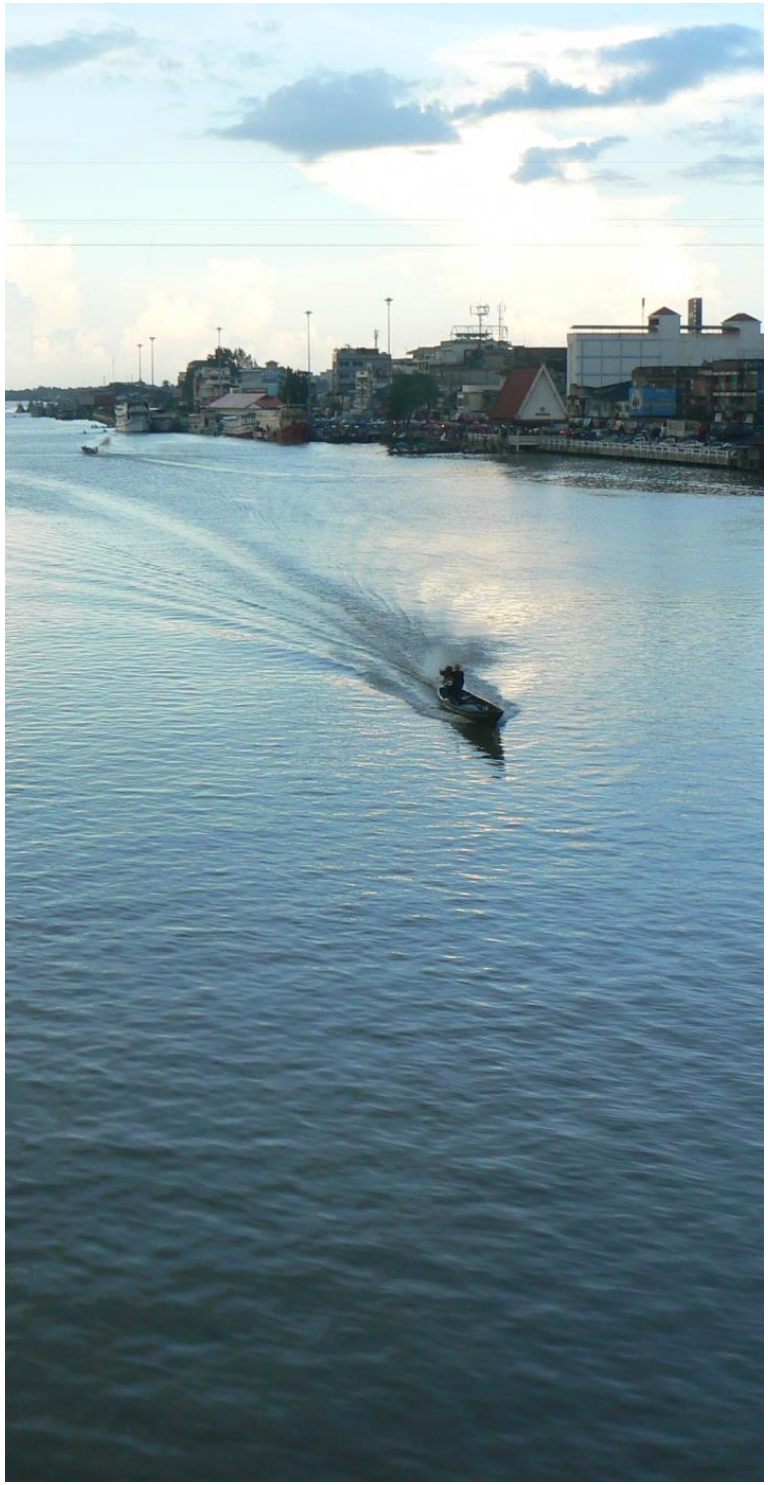
Residents of Surat, who, along with other stakeholders, will guide the design of the waterfront based on their desires and needs for new accessible open space. This group will include slum dwellers, who stand to benefit the most from such space, and communities who earn their livelihood through the river, such as fishermen

The Government of Gujarat, who have jurisdiction over portions of the Tapi River and its tributaries

Private sector actors, who will be leveraged for their expertise and the funding of discrete project elements, both in the planning stage and in future waterfront post-design implementation stages

Non-governmental and community-based organizations, who will ensure that the project meets the needs of Surtis and provide research and engagement support throughout implementation, including as it relates to enhancing the river's water quality to improve health outcomes

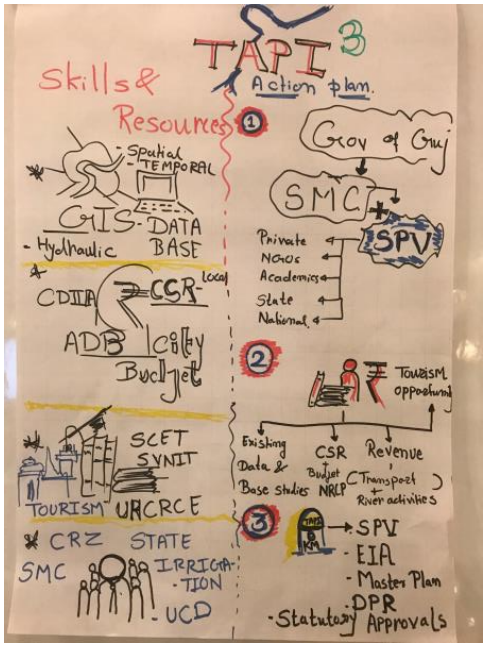
Academic institutions and global thought leaders, who will provide research, innovation, capacity-building, and technical knowledge-sharing to the SMC throughout implementation. This group will include the Urban Health and Climate Resilience Center (UHCRC), Surat Climate Change Trust (SCCT) and Surat CRO office

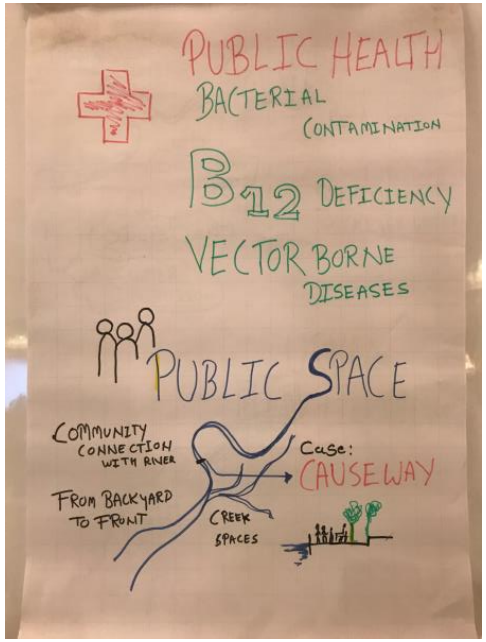


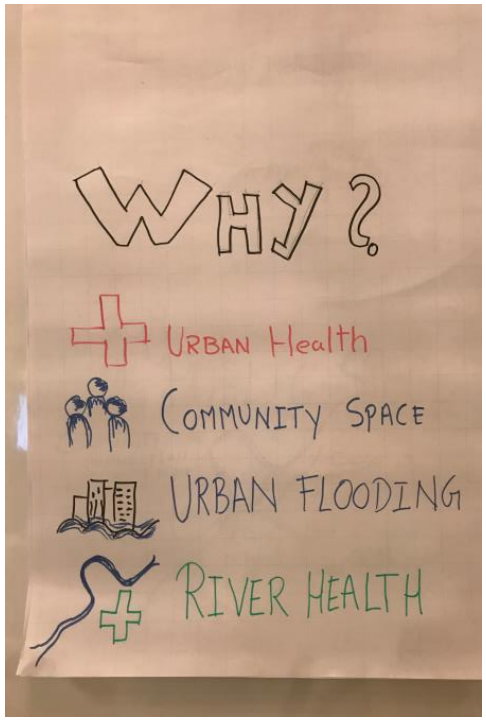
Potential Barriers to Implementation

Successful implementation of this project will require:

- **The formation of a Special Purpose Vehicle (SPV)**, to ensure that coordination between multiple agencies and authorities is seamless;
- **Robust data analysis,** needed to justify specific interventions and measure progress;
- **Land adjacent to the river,** which will have to be made available for open space through significant coordination with communities that currently reside there;
- **Careful prioritization of interventions** to maximize benefits at every stage of the process;
- **Sustained political will and public support**, which will require a strong marketing strategy; and,
- **A strong governance structure and healthy funding sources,** which will ensure the project's long-term sustainability.







Recommended Next Steps

Immediate Next Steps

- Form an early-stage committee of stakeholders to generate excitement about the project and begin the outreach process – this organization will serve as a precursor to the eventual SPV
- Publicly declare the Tapi River a "living organism"
- Validate all existing data on the Tapi River, including hydraulic models, to identify areas where further analysis might be needed
- Conduct a benchmarking exercise to identify precedent projects
- Organize a student design studio in partnership with CEPT university to analyze & validate this project further.
- Engage Surtis through a targeted multi-pronged outreach campaign

Medium-term Next Steps

- Draft the Comprehensive Master Plan for the River Restoration
- Seek statutory approvals for the project's implementation, including an environmental clearance
- Develop discrete implementation strategies for each intervention that include funding streams and specific technical aspects

Long-term Next Steps

- Implement the Master Plan for the River Restoration

CASE STUDIES

Academy participants raised several precedent cases as sources of inspiration for Surat. In addition to the revitalization of the Singapore River, attendees discussed the following case studies:

San Antonio RiverWalk (San Antonio, Texas)
The San Antonio River flooded disastrously in 1921, killing 50 people and causing widespread damage. A dam was constructed upriver of San Antonio and a plan to drain and cover the portion of the river that ran through the city's downtown was proposed. The community worked with the US Army Corps of Engineers to maintain the river in the downtown as a bypass channel controlled by floodgates. A paved walkway was installed along the river in 1938 and over the years, development around this amenity grew. From the 1960s through 1980s, the river was extended to reach the Convention Center, the Alamo, and other key community features. Extensions to the river and private investments along it continue today. Most recently, in 2013, the River Walk was connected to 2,020 acres of public space through the "Museum Reach" extension.

Sabarmati Riverfront (Ahmedabad, India)
The Sabarmati River has long been a center of activity in Ahmedabad. Over time surrounded by industrial development, markets, and informal settlements, the riverbanks have become mostly inaccessible to the general public. The impacts of seasonal flooding, worst during India's monsoon period, have become increasingly severe over the past several decades as development has encroached upon the river and contributed to its pollution. In 2003, a Special Purpose Vehicle was created to guide the redevelopment of the river into a publicly accessible, culturally significant and environmentally sustainable amenity for Amdavadis. Since then, both sides of the river have been transformed into a 23-kilometer public edge, made possible through the reclamation of over 200 hectares of land from the riverbed. New waterfront land along the river is now home to a combination of commercial and residential private development, open space, sports facilities, and entertainment uses.

LINKAGES TO OTHER PROJECTS
The master plan will support localized efforts to improve the quality of the river's natural environment and will also support the Cleaning of the Tapi River project.

IMPLEMENTATION STRATEGY
LAST MILE CONNECTIVITY

Problem Statement: Throughout the Strategy development process, a majority of stakeholders raised concerns about the state of the city's public transport network. Surat's mass transit systems currently struggle to provide adequate service, suffering from low frequencies and limited geographic coverage. The City needs to broaden accessibility within its transport systems, highlighting areas in need of improvement and working to make transport facilities easy to reach.

Strategy Linkage: Goals 1.1 and 1.4; Initiatives 1.1.1, 1.4.1, and 1.4.3.

Resilience Value

A strategic approach to improving access to Surat's historic center will incorporate physical interventions such as street infrastructure improvements designed to enhance the public realm, traffic management strategies to reduce congestion, and enhanced public transport amenities along key access routes into central Surat. Potential quality of life benefits to this approach include improved health outcomes due to reduced emissions, augmented productivity owing to reductions in travel times, and an improved pedestrian experience for all within the historic core. Furthermore, during extreme weather events, improved pedestrian access will aid in evacuation and emergency response processes within the dense historic city core. Further development of this project will involve a community engagement process that and robust participation by local stakeholders.

Physical Project Elements

Physical design elements will include new roadway design features, such as permeable pavements to support stormwater management in the historic core and design elements that provide shade for pedestrians who currently suffer during periods of extreme heat. Enhancements to the transportation system will require the procurement of new, efficient vehicles such as feeder buses and electric auto rickshaws. A bicycle sharing scheme, also central to enhancing connectivity through improved multimodality, also necessitates investment in new physical infrastructure.

Programmatic Project Elements

Programmatically, future roadway design will be supported by new street design guidelines that prioritize enhanced pedestrian safety and access. Capacity-building trainings will be held to train Surat Municipal Corporation officials and their affiliates in implementing resilient access solutions, while transport operators and traffic management workers will receive revamped driver and fuel efficiency trainings to improve their performance. Residents, who will be encouraged to first participate in local community engagement campaigns focused on this initiative, will eventually enjoy new smart phone applications that will enable them to make efficient and sensible choices to guide their journeys.

Engagement Approach

SMC will champion the planning and design process and may enter into PPP or CSR partnerships to ensure successful project implementation. Independent of the structure through which the SMC proceeds with implementation, it will need to engage a diverse array of stakeholders, including but not limited to:

Historic Core residents, whose support will be needed throughout the implementation process

Residents of Surat, whose participation will help build awareness about the initiative, enhance political will and capital, and ensure a context-specific design that meets community needs and desires

Private sector actors, who will be leveraged for support in vehicle procurement as well as transport operations and maintenance

Non-governmental and community-based organizations, who will ensure that the project meets the needs of the local community at every stage of its implementation

Academic institutions and global thought leaders, who will provide research, innovation, capacity-building, and technical knowledge-sharing to the SMC throughout implementation

Potential Barriers to Implementation

Given the scale and complexity of this project, SMC and implementing partners will need to remain mindful of the essential elements necessary for its success:

- **Continuous community support and strong political will** must exist to drive the project through implementation;
- **A phased implementation plan** will be necessary to ensure that gaps are addressed in early pilot stages before interventions impact the entire historic core, and that any physical work can occur in months not impacted by monsoon season;
- **Strong partnerships between the SMC and transit operators** will mitigate potential barriers to interagency cooperation, which can have a significant effect on the rider experience; and,
- **Direct and indirect financing mechanisms** will need to be leveraged for to ensure stable long-term operations.

Recommended Next Steps

Immediate Next Steps

- Pilot interventions through tactical urbanism initiative at strategic pilot stations and intersections
- Implement "easy win" street infrastructure improvements at selected pilot locations
- Engage local community stakeholders through workshops and other engagement strategies
- Conduct accessibility and road safety audits in select locations to drive prioritization of further interventions
- Launch a comprehensive Travel Demand Management (TDM) analysis of Surat's BRT system

Medium-term Next Steps

- Develop innovative street design guidelines for Surat, which may become part of regular statutory planning processes
- Implement recommendations for one community/neighborhood

Long-term Next Steps

- Scale up piloted interventions throughout Surat, prioritizing locations with physical characteristics similar to those in pilot locations.

CASE STUDIES

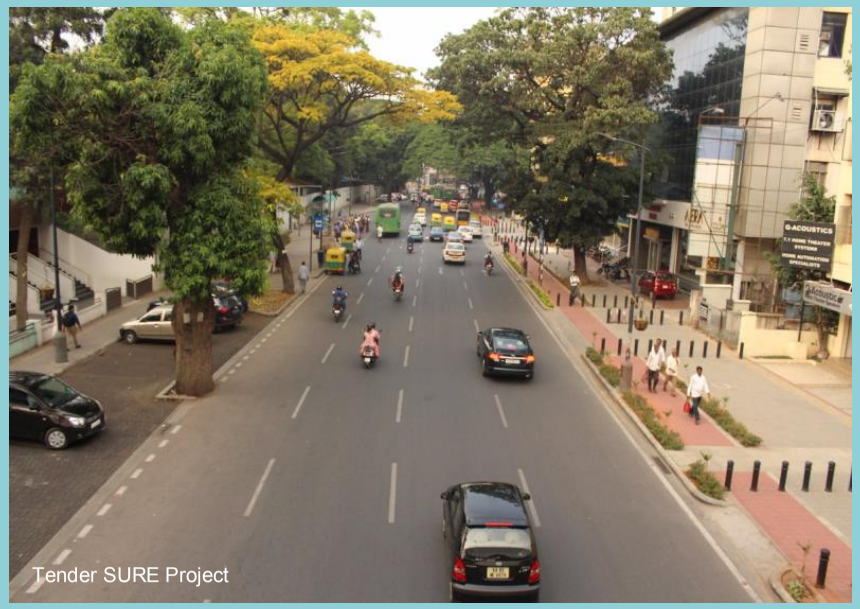
Participants drew inspiration from various precedent projects throughout India and elsewhere in the world. A sample of these case studies follows:

Permanent infrastructure improvements:
- Tender SURE Project (Bangalore, India);
- MRT Feeder Bus System (Singapore)
- Permeable streets to address climate risk (Copenhagen, Denmark)

Project implementation
- Redesign of HP Junction through tactical urbanism (Surat, India)
- Revamped U-Turn program, influenced by the WRI's Raahgiri Movement (Surat, India)

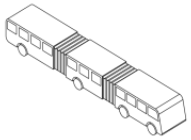
LINKAGES TO OTHER PROJECTS
The Last Mile Connectivity pilot study site (within the historic core) will support a number of ongoing and planned interventions throughout Surat, including:

- The existing High Mobility Corridor project;
- A planned BRT corridor; and,
- A proposed multi-modal hub.


Tender SURE Project


U-Turn Surat

IMPLEMENTATION STRATEGY
HIGH MOBILITY CORRIDOR



Problem Statement: Surat's long-term resilience will depend on its ability to efficiently manage traffic and provide adequate public transport. The City must study existing conditions to determine the scale of necessary interventions, which will likely include increasing public parking and pedestrian facilities, improving road junctions and rail crossings, and incorporating traffic signals and lane separators into the road network to better segregate traffic.

Strategy Linkage: Goals 1.1 and 1.4; Initiatives 1.1.1, 1.3.1, 1.4.1, and 1.4.3.

Resilience Value
SMC is seeking to increase public transport ridership throughout Surat by developing a 12 km bus corridor designed to link different Ring Road communities to one another, and to existing corridors into the central business district. It will work to provide city residents with affordable, safe, and speedy transport, reducing traffic congestion and emissions. Surat's most vulnerable residents, many of who suffer from limited transport connectivity between employment centers and their communities, stand to benefit significantly from the successful implementation of this initiative.

Physical Project Elements
Physical design elements will involve supporting the new bus service through improvements to street design, which might include a reconfiguration of key junctions, reprogramming of traffic signals to facilitate efficient bus movements, and the implementation of standardized road markings and signage.

Programmatic Project Elements
Non-physical elements necessary for the project's success include an accompanying branding campaign for the corridor, an equitable fare structure and highly integrated ticketing mechanisms, and energy-saving transit operations. Stakeholders, including Surat residents, the Surat City-District Auto Rickshaw Association, and the Federation of Surat Textile Traders Association (FOSTTA), will be engaged at an early stage and throughout the project implementation process.

Engagement Approach

SMC will lead an engagement approach that incorporates stakeholders from across Surat, including but not limited to:

Residents of Surat, who reside along the high mobility corridor and its influence zone

The Surat City-District Auto Rickshaw Association, who represent rickshaw drivers throughout Surat, a group that understands residents' travel patterns and may be concerned about the project's potential impacts on their livelihood

FOSTTA, who represent some of Surat's largest employers and who can offer details about how their employees might benefit

Potential Barriers to Implementation

The success of this project will depend on the extent to which SMC and its partners are able to secure the following elements:

- **Strong local community and political** support, which must exist to maintain momentum throughout the project's lifecycle;
- **A well-structured implementation timeline**, which will ensure that interventions are spaced out both physically and over time to maximize impact, and that implementing teams are able to avoid monsoon risks;
- **A highly synchronized SMC**, necessary to ensure strong and efficient collaboration with government and funding partners; and,
- **A clear funding strategy for long-term operations and maintenance**, to secure the role of the Tapi River as a permanent natural and recreational asset.

Potential Project Cost
Project elements were given a preliminary costing, as follows:

Project Element	Cost
Validation of Data & DPR by Third-Party Consultant	INR 15,00,000
Battery-Operated Vehicle Pilot	INR 6,00,000
3-Month Awareness & Marketing Campaign	INR 10,00,000
Total Project Cost	**INR 31,00,000**

Immediate Next Steps

- Hire a third-party consultant to validate existing mobility data and assess the existing DPR
- Launch a multimedia and multilingual civic engagement campaign to raise awareness of the project
- Pilot a battery-operated bus/autorickshaw and assess the extent to which it meets user needs
- Identify non-City funding sources to secure the long-term success of the corridor

CASE STUDIES

In devising this project, Academy participants consulted Delhi's successful roll-out of efficient battery-operated buses, which might serve as a model for Surat. Other precedent projects that could serve as inspiration include:

Bus Rapid Transit

- TransJakarta, the world's largest BRT network (Jakarta, Indonesia)
- Bhopal BRTS, India's largest system in terms of route length and stations (Bhopal, India)

Bus Electrification

- TOSA Bus, equipped with rapid-charging technology (Geneva, Switzerland)
- City of Copenhagen, which has committed to replacing all diesel buses with electric buses beginning in 2019 (Copenhagen, Denmark)

LINKAGES TO OTHER PROJECTS

The High Mobility Corridor will support ongoing and planned transport and connectivity-enhancing interventions throughout Surat, as well as the Last Mile Connectivity pilot site (Historic Core Accessibility Plan).

TransJakarta

TOSA Bus

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