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Mu City Savior

Preventing urban flooding and improving public services with a co-created digital solution

@Bhubaneshwar & Kochi, India

Implemented by:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

INTERNATIONAL
CLIMATE INITIATIVE (IKI)

In cooperation with:

Federal Ministry
of the Interior, Building
and Community

In partnership with:

Smart City
MISSION TRANSFORM-NATION

BMC

BHUBANESWAR
Smart

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CITY SAVIOR

CLIMATE DIGITAL
CITIES HUB

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Mu City Savior
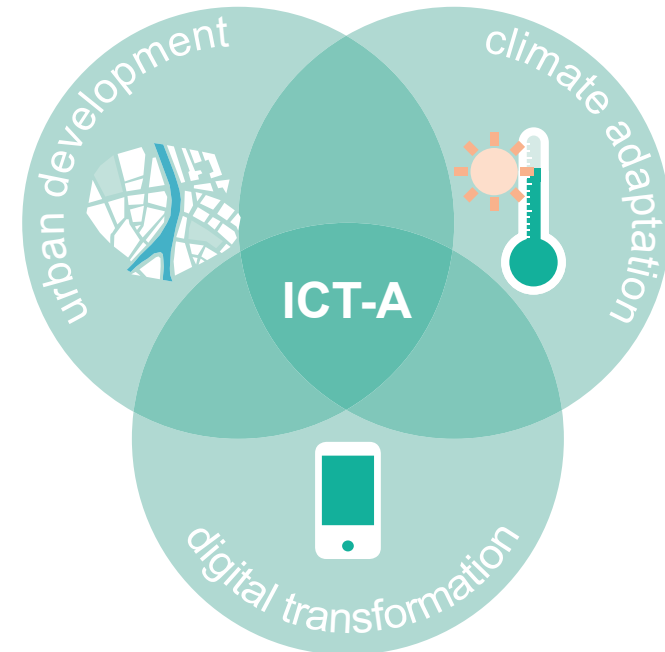
Mu City Savior in a Nutshell

Mu City Savior is an interactive digital solution, designed to facilitate data exchange between citizens and the municipal administration in the maintenance and clearing of the city's (storm water) drainage systems. Co-created, tested and implemented in the city of Bhubaneswar in the Indian state of Odisha, it aims to support municipal urban storm water management while raising awareness about climate change impacts on cities. Bhubaneshwar and its citizens are prone to flooding during the seasonal monsoons. Heavier rainfall and changing, less predictable rainfall patterns resulting from climate change coupled with inadequate disposal of solid waste (often directly into the drains) exacerbate this challenge. Mu City Savior allows its citizens to report

on identified critical points in the urban drainage system in real time. This data in turn promotes an evidence-based cleaning schedule on behalf of municipal staff, which also considers data about affected population, business, health and traffic, as well as hydrological data like normal predictions and regular rainfall data, type of drainage, etc. Over time, the accrued data provides decision-makers with evidence to adapt future urban planning in a climate resilient and sustainable manner. The tool's name means "I am city savior" in Odia, the regional language of Odisha. The developed algorithm analyses the crowdsourced and statistical data, which is then send to the Command and Control Center of the Bhubaneswar Smart City Limited (BSCL), where the digital solution has been integrated. In Bhubaneshwar, the severity and

repercussions of the flooding can be reported in an intuitive manner. Consecutively, the developed dashboard is utilised by municipal employees to enhance their drainage cleaning activities. With its approach and areas of intervention,

Mu City Savior lies at the intersection of three established global trends:

- Climate Change Adaptation
- Urbanisation
- Digital Transformation

Mu City Savior

CITY SAVIOR

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MEXICO
- Guadalajara
- Guadalajara Metropolitan Area

PERU
- Trujillo
- Chiclayo

GERMANY

INDIA
- Bhubaneswar
- Kochi

» Through Mu City Savior, the Bhubaneshwar Municipal Corporation (BMC) can receive data to iterate their response to future flooding events. «

Mu City Savior as part of the Global Program "ICT-based Adaptation to Climate Change in Cities"

Mu City Savior was conceived in the framework of activities of the Global Program "ICT-based Adaptation to Climate Change in Cities (ICT-A)". The program's goal is to co-create, test, implement and upscale digital solutions to support selected cities in India, Peru and Mexico in becoming more resilient to climate change. Following the program´s strategic
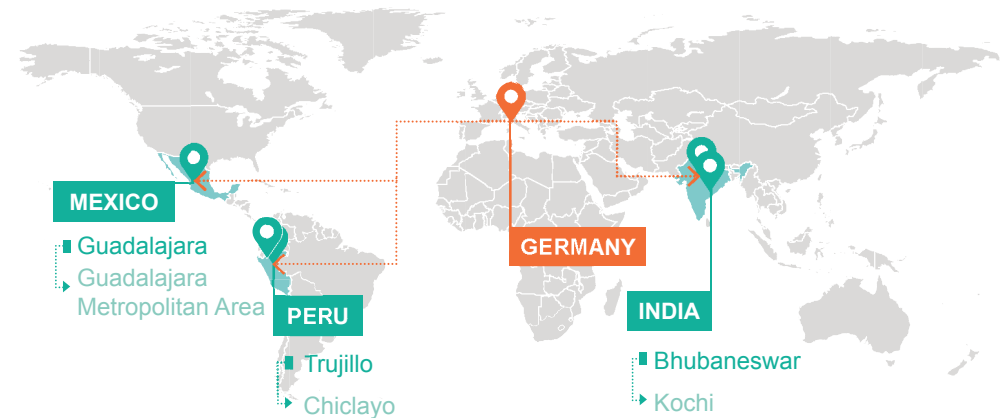
principles (see page 10-11) the digital solutions contribute to achieving Climate Digital Cities. ICT-A is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) as part of their International Climate Initiative (IKI), in cooperation with the German Federal Ministry for the Interior, Building and Community (BMI).

The Climate Digital Cities Hub

The Climate Digital Cities Hub is an online platform designed to showcase digital solutions that tackle climate change in cities. Here, further information and downloads about Mu City Savior and other digital solutions can be found:

www.climate-digital-cities.com

02

Mu City Savior & SDGs

Mu City Savior contributes to the following Sustainable Development Goals (SDG):

Mu City Savior is contributing to the following goals of India's Intended Nationally Determined Contributions (INDCs)

- **INDC 6** – To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.

- **INDC 8** – To build capacities, create domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India […].

To achieve these goals, Mu City Savior supports the priority areas of

- Developing climate resilient infrastructure
- Planning and implementation of actions to enhance climate resilience and reduce vulnerability to climate change.

Additionally, it supports the implementation in the area of adaptation to climate change (adaptation to climate change for the social sector):

- The National Climate Change Adaptation Plan, in particular the **Mission on Sustainable Habitat**
- Developing Climate Resilient Urban Centers under the Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
- Citizens and private sector contribution to combating climate change.
- Disaster management
- Actions under State Action Plans on climate change
- Requirement for technology transfer & support

In addition, Mu City Savior contributes to the INDCs' call for multi-level governance by offering an adaptive solution at the city level, with the option of upscaling it to further municipalities.

Moreover, it helps to fulfil the identified needs of capacity building, knowledge exchange and innovation in the context of adaptation measures in the section "Capacity Building, Transfer of Technology and Finance for Adaptation". More specifically, the digital solution directly supports the identified need of "methods and tools to assess climate impacts, vulnerability and adaptation in specific sectors and regions".

03

Strategic Principles for » Climate Digital Cities «

FOSTER CITIZEN ENGAGEMENT
- Carrying out the program for and with citizens;
- Supporting participation of vulnerable groups;
- Allowing a wider range of experiences and knowledge to jointly find solutions to harness collective wisdom.

Created by
Adnen Kadri
from the
Noun Project

TACKLE LOCAL CLIMATE CHALLENGES
- Focusing on challenges identified by the citizens and that have been shown in climate scenarios, vulnerability assessments, etc.;
- Collecting and collating data and information to develop measures for climate adaptation;
- Providing inputs to guide resilience in urban infrastructure.

Created by
Creative Mania
from the
Noun Project

CONTRIBUTE TO THE CITY'S PLANNING PROCESS
- Aligning activities to current urban planning processes;
- Identifying missing data needed to increase urban resilience;
- Anchoring collected data to current open data efforts and existing information systems.

Created by
Martin Vanco
from the
Noun Project

PROMOTE LOCAL CO-CREATION
- Drawing upon local innovation ecosystems;
- Supporting involvement and further development of local talent;
- Enabling social appropriation of the jointly developed measures.

Created by
Yu Luck from the
Noun Project

PLAN & IMPLEMENT FOR SUSTAINABILITY
- Contribute to the long-term vision of the city, setting short-term actions;
- Involving a wide range of stakeholders and communicating in an easy to understand manner;
- Aligning local, regional and national strategies.

Created by
BomSymbols
from the
Noun Project

FACILITATE TRANSFERABILITY & UPSCALING
- Managing knowledge, documenting innovative approaches and good practices in a precise manner;
- Feeding back lessons learned and success factors to improve the process;
- Spreading the knowledge, i.e. tools, results, etc.

Created by
Deivid Sáenz
from the
Noun Project

MAKE A RESPONSIBLE USE OF DATA
- Complying with international standards as well as national and local norms and regulations;
- Addressing and mitigating risks to data protection and cyber security;
- Strengthening the citizens digital competencies to recognize risks and threads, and protect themselves better.

Created by
Rajakumara
from the
Noun Project

PRIORITIZE OPEN SOURCE
- Trying to reduce software and license dependencies for local governments and other stakeholders;
- Fostering collaboration with the local ecosystem and across sectors;
- Customizing existing open source solutions.

Created by
Rockicon
from the
Noun Project

04

Ideating, Implementing & Upscaling Mu City Savior

In India, the Global Program ICT-A is carried out in two phases:
- Phase 1: Co-creation and Implementation
- Phase 2: Upscale

In India, the program's political partner on the national level is the Ministry of Housing and Urban Affairs (MoHUA), as part of India's Smart City Mission. On a local level, the cooperation is undertaken with the Bhubaneshwar Municipal Corporation (BMC), the Bhubaneshwar Smart City Limited (BSCL) and the Kochi Municipal Corporation (KMC):
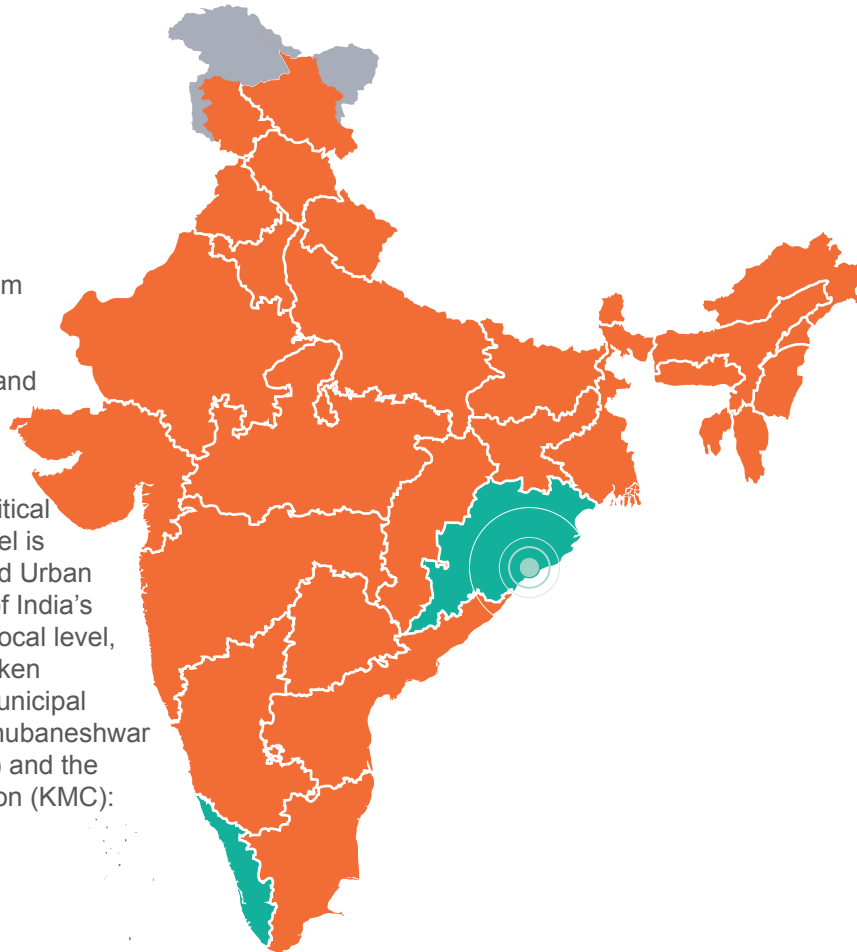
PHASE 1
Co-creation & Implementation
- **Time frame:** 2018 - 2019
- **Partner:** BMC & BSCL

PHASE 2
Upscale of Supervisor App
- **Time frame:** 2019 - 2020
- **Partner:** KMC

KEY RESULTS
> Winner of the Award "Best Climate Smart Cities Project" by the Indian Government
> 3-day event with pres conference, mappathon and other community outreach activities
> 500+ app downloads after 5 days

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**EXTREME
WEATHER EVENTS**

Data exchange between citizens and the municipal administration in the maintenance and clearing of the city's (storm water) drainage systems.

Support municipal urban storm water management.

Raise awareness about climate change impacts on cities.

**URBAN
FLOODING**

05
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Fighting Urban Flooding with Mu City Savior

The adverse effects of climate change pose a serious challenge to the citizens and administration of Bhubaneswar.

Located on the heavily affected west coast of India, the city is experiencing heavier and more frequent rainfalls during the

monsoon season, which make the city more vulnerable to hazards like urban flooding. The challenges for the Bhubaneshwar Municipal Corporation (BMC) is to keep the stormwater drains free of debris (often in the form of solid waste) in order to guarantee an unobstructed storm water runoff.

Clogged drains further exacerbate urban flooding like situation during the monsoon. Simultaneously, the resources of the BMC are limited. In order to enable stormwater runoff, Mu City Savior enhances the efficiency of the current cleaning process while raising awareness among citizens for the climate

change impacts on the city. In the medium to long-term perspective, the collected data could be used for prioritizing urban infrastructure investment for climate change and disaster proof urban development.

06

Citizen-Centered innovation process

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»Putting citizens' knowledge and perspective at the heart of the digital solution fosters social inclusion and political participation. This is one of Mu City Savior's greatest strengths.«

Digitally enhanced public services and citizen science have great potential to increase climate resilience in cities, providing platforms for data exchange and improving the dialog between city administrations and citizens. Yet tendencies to prioritize technology ahead of citizen's perspectives jeopardize their sustainability and scalability.

Mu City Savior was conceived putting citizens – not technology – at the core of its development. The digital solution is the result of an innovative co-creation process carried out under a citizen-centered innovation approach. It was the first time the city of Bhubaneswar developed a public service solution using such an approach.

The co-creation process carried out included Design Thinking Sprints – a multi-stakeholder method to develop digital solutions, meeting the city's and citizen's needs and desires, in a technologically feasible and iterative problem-solving manner. The co-creation process fostered cross-sector collaboration among several city departments. It brought together representatives from different areas including those of environment, urban planning, health, disaster management, etc., as well as universities, training institutes and citizen associations.

This process promoted an inclusive process building on local strengths.

07

Mu City Savior's components

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1. CROWD REPORTING APP

The volunteer app engages city officials and citizens and city officials as volunteers. Users are guided to critical points in the drainage system. Here, the volunteer identifies the current status of water flow in the drain and the debris levels in the drain.

2. GEOGRAPHIC INFORMATION SYSTEM (GIS)

The GIS data provides basic information about the topography, hydrology, land use and population. Specific layers provide data on the status of the hydrological network and the vulnerability of the specific urban areas.
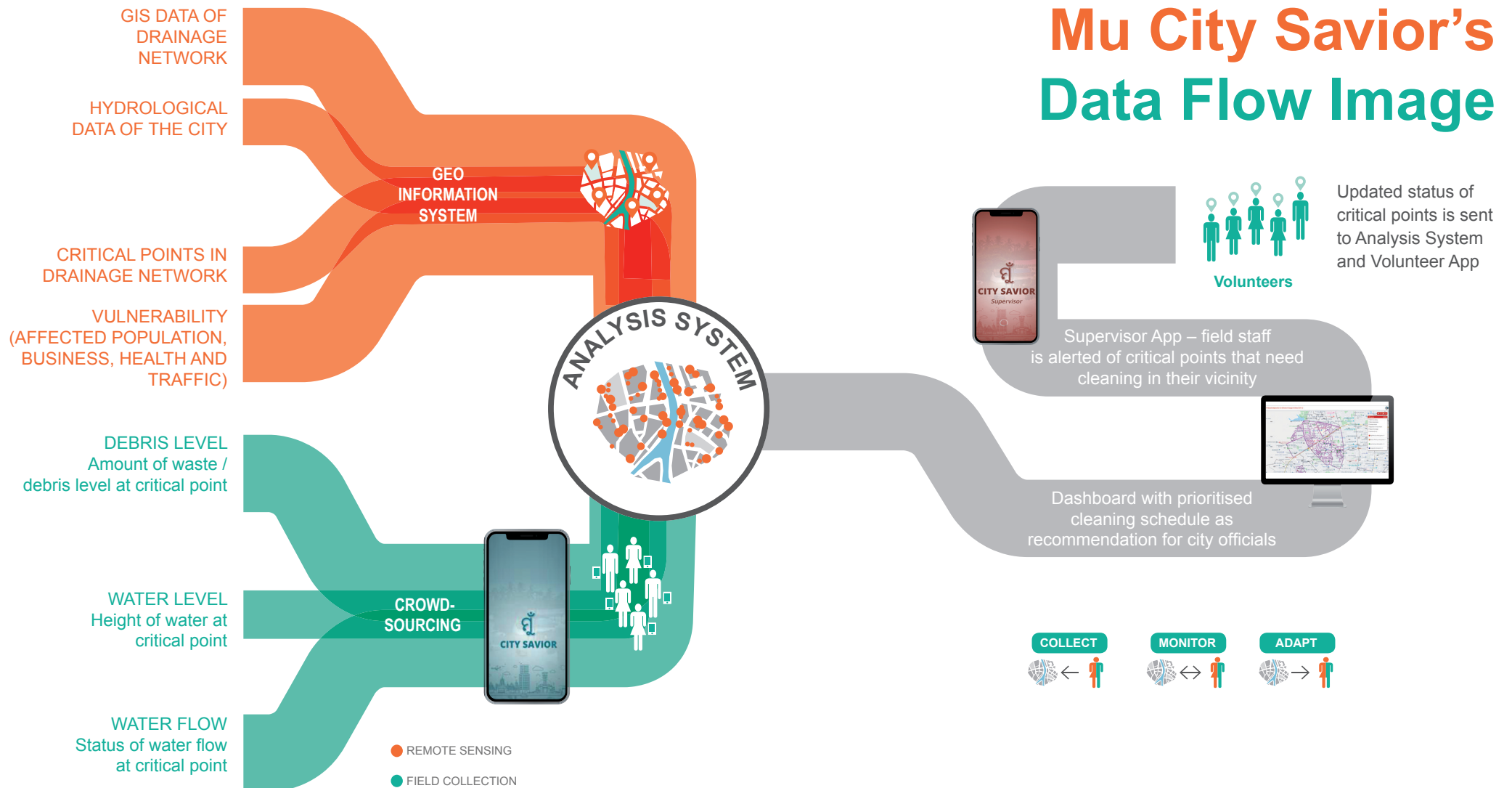
3. ANALYSIS SYSTEM (RANKING MODEL)

The analysis system embodies the core of the overall solution. Its algorithm analyses the input data from the Crowd Reporting App, the GIS data and also statistical data about affected population, business, health and traffic, as well as hydrological data like normal predictions and regular rainfall data, type of drainage, etc. With this data the algorithm creates a ranking of the critical spots to be cleaned as recommendations to the city officials. This output is displayed on the BMC & BSCL dashboard (see component 4). In the future, the collected data could be used for prioritizing urban infrastructure investment for climate change and disaster proof urban development.

4. DISPLAY DASHBOARD AND SUPERVISOR APP

The dashboard displays the recommendations of the analysis system to the BMC & BSCL officials. Each critical spot is visualized with a cleaning priority ranking, and a colour code for a specific action. The information depicted on the dashboard is sent to a mobile app that supports supervisors to control the critical spots and mark the cleaning status of the drain. Upon clearing the critical spot, the information is reported back and updates the overall system.

Mu City Savior's
Data Flow Image

GIS DATA OF DRAINAGE NETWORK

HYDROLOGICAL DATA OF THE CITY

GEO INFORMATION SYSTEM

CRITICAL POINTS IN DRAINAGE NETWORK

VULNERABILITY (AFFECTED POPULATION, BUSINESS, HEALTH AND TRAFFIC)

DEBRIS LEVEL
Amount of waste / debris level at critical point

ANALYSIS SYSTEM

WATER LEVEL
Height of water at critical point

CROWD-SOURCING

CITY SAVIOR

WATER FLOW
Status of water flow at critical point

● REMOTE SENSING
● FIELD COLLECTION

CITY SAVIOR
Supervisor

Volunteers

Updated status of critical points is sent to Analysis System and Volunteer App

Supervisor App – field staff is alerted of critical points that need cleaning in their vicinity

Dashboard with prioritised cleaning schedule as recommendation for city officials

COLLECT ← | MONITOR ↔ | ADAPT →

08

Digital Citizen Engagement & Inclusion

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GAMIFICATION
Compete with your fellow citizens and collect points to exchange for urban services.
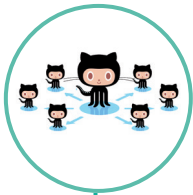
UPSCALING
Documentation of the solution programming and coding. The source code is made publicly available to be utilised by others.

PRIVACY
ICT-A Privacy and Data Protection Training aimed at public officers and citizens.

CITY SAVIOR

Mu City Savior

09

Award and International Transfer

We are happy to announce that the Mu City Savior digital solution was awarded the **Best Climate Smart Cities Award** by the Government of India, within the framework of the Smart City Mission, Ministry of Housing and Urban Affairs (MoHUA).

**I want Mu City Savior in my city!
How can I transfer it?**

As an open source technology, Mu City Savior is fully replicable! We are currently working on an interactive transfer package to upscale the digital solution to other Indian and international cities facing flooding as a result of blockages in storm water drains. In India, the solution has been endorsed on the national level, as the Ministry of Housing & Urban Affairs will feature it in the upcoming National Manual for Storm Water Drainage. The digital solution will be made available to other cities using web-based hosting services so that they can easily transfer and customize it to their specific needs, capacities and IT requirements. So, if you are thinking about developing something similar in your city, this could be an option that can be easily transferred and tailored!

For further information and downloads of Mu City Savior please visit the Climate Digital Cities Hub or write us at **ClimateDigitalCities@giz.de**

CLIMATE DIGITAL CITIES HUB

List of Abbreviations

BMC Bhubaneshwar Municipal Corporation

BMI Bundesministerium des Innern, für Bau und Heimat (German Federal Ministry of the Interior, Building and Community)

BMU Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)

BSCL Bhubaneswar Smart City Limited

GIS Geographic Information System

GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

ICT Information and Communication Technology

ICT-A Global Program ICT-based Adaptation to Climate Change in Cities

INDC Intended Nationally Determined Contributions

IKI Internationale Klimaschutzinitiative (International Climate Initiative)

NGO Non-Governmental Organization

SDG Sustainable Development Goals (17 goals of the 2030 Agenda for Sustainable Development developed by the UN in 2016 for a more sustainable future)

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