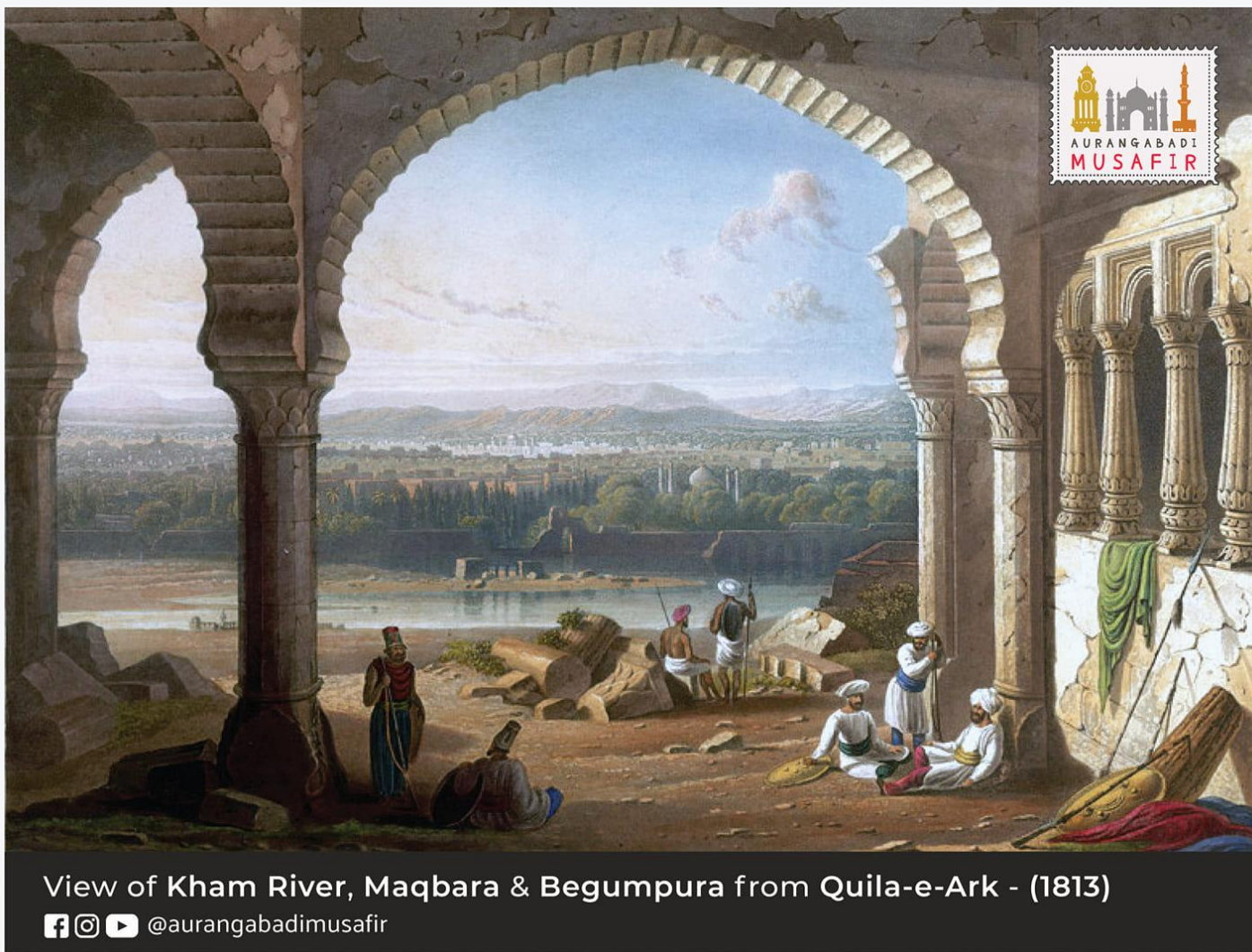


THE CITY ADMINISTRATION OF CHHATRAPATI SAMBHAJINAGAR (Aurangabad) RCA Global Seminar | 4th May 2023



View of Kham River, Maqbara & Begumpura from Quila-e-Ark - (1813)

[f](#) [@](#) [@aurangabadimusafir](#)

niua National Institute of Urban Affairs

75 Azadi Ka Amrit Mahotsav

G20 2023 INDIA

NAMAMI GANGE

TRANSITIONING TO A SUSTAINABLE TOMORROW

Discuss. Debate. Deliberate.
Forge New Partnerships.

NIUA
RCA GLOBAL SEMINAR
Partnership for building international river-sensitive cities
04TH MAY 2023, SILVER OAK, IHC, NEW DELHI

An initiative under
RIVER CITIES ALLIANCE
A city led movement

“The Story of Chhatrapati Sambhajinagar is The story of Water”

CASE STUDIES FROM RCA CITIES

EXCELLENCE IN WATER MANAGEMENT



Jameel Baig Mosque & Mahmood Gate (1860)
Unknown Artist

• Overview:

The Need For A Water Centric Agenda.

• Precious Water Resources and Innovative Restoration Plans:

- Natural Water Heritage - Kham River.
- Man Made Water Heritage - *Neher*.

• Municipal Drinking Water Supply

- Summer water crisis- 40 Point Agenda & Jal Bell App, NRW- Tech based Interventions.
- Carbon Neutral Water Utilities.

• Wastewater Reuse– Industries, Agri and Urban

- Piloting the Purple Revolution

• URMP (URBAN RIVER MANAGEMENT PLAN)

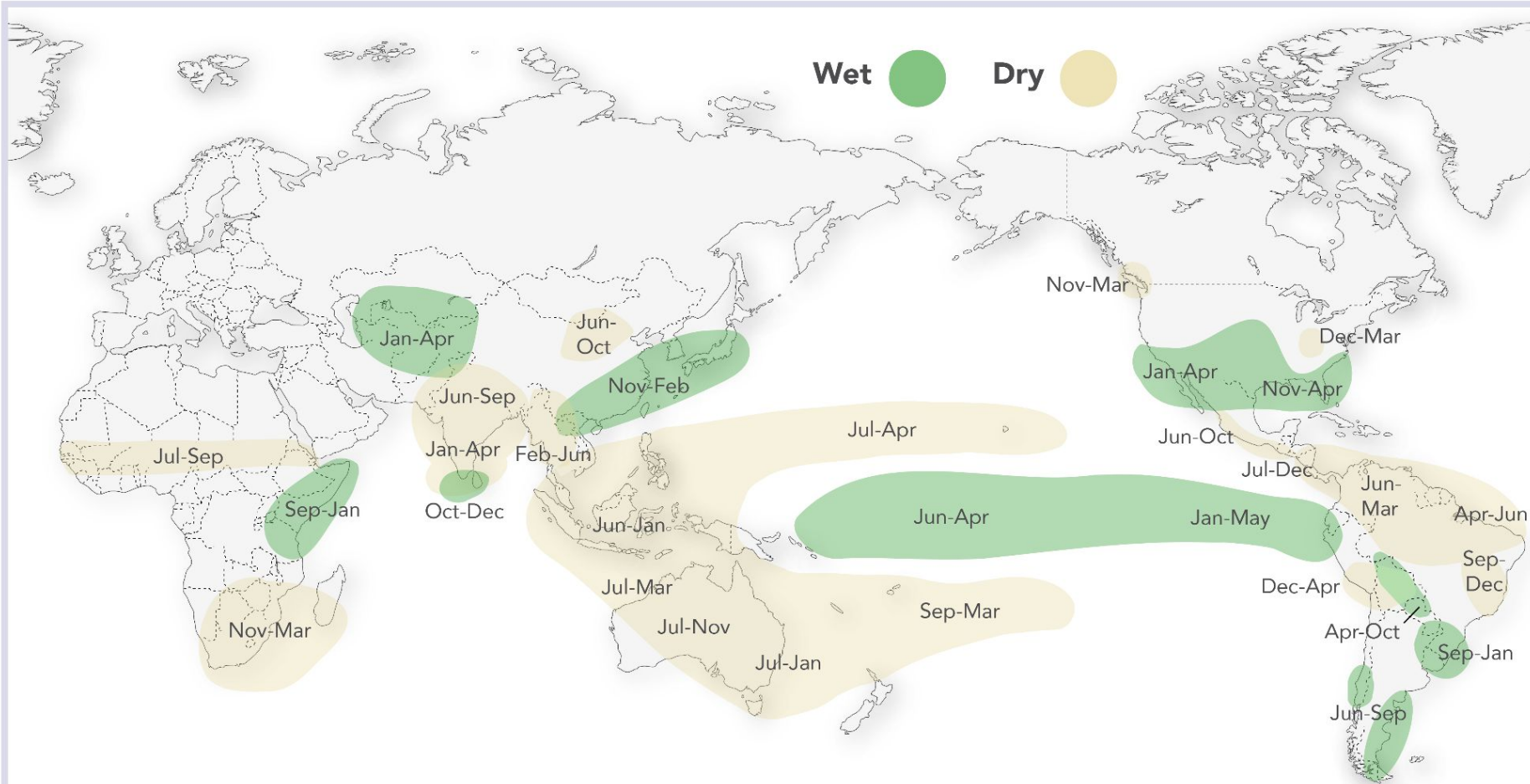


Panchakki (1860-1885)

Unknown Artist

El Niño and Rainfall

El Niño conditions in the tropical Pacific are known to shift rainfall patterns in many different parts of the world. The regions and seasons shown on the map below indicate typical but not guaranteed impacts of La Niña. For further information, consult the probabilistic information* that the map is based on.



*<http://iridl.ldeo.columbia.edu/expert/home/.lenssen/.ensoTeleconnections/>
For more information on El Niño and La Niña: <http://iri.columbia.edu/enso>

- Sources:
1. Lenssen, Goddard and Mason, 2020. Seasonal Forecast Skill of ENSO Teleconnection Maps. Weather Forecasting, 2387–2406
 2. Mason and Goddard, 2001. Probabilistic precipitation anomalies associated with ENSO. Bull. Am. Meteorol. Soc. 82, 619-638

IRI International Research Institute for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY

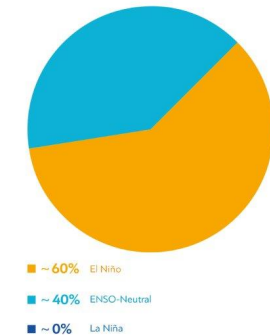
[f /climatesociety](https://www.facebook.com/climatesociety) [@climatesociety](https://www.instagram.com/climatesociety) [@climatesociety](https://www.tiktok.com/@climatesociety)

WMO Update: Prepare for #ElNiño 🌪️
We just had the 8 warmest years on record despite cooling La Niña for 3 straight years. An El Niño event will most likely lead to a new spike in global heating and increase the chance of breaking temperature records.
bit.ly/3LP7yUr



7:12 PM · May 3, 2023 · 35.2K Views

Estimated ENSO Probabilities For May - July 2023



- The multi-year La Niña event, also referred to as a "triple-dip" La Niña, is over and the tropical Pacific is currently in an ENSO-neutral state.
- Model predictions and expert assessment indicate about 60% chance for the onset of El Niño during May-July 2023.
- Probability for continuing ENSO-neutral conditions is 40%.
- The chance of La Niña re-development is near zero.

Information on ENSO should be combined with other regionally and locally relevant factors in order to anticipate its effects on regional climates.



2023 is strongly predicted to be a El Niño Year (W.M.O.)

Central and peninsular India

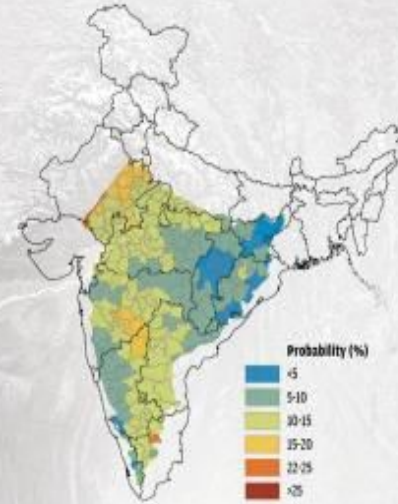
The region covers most of India's rainfed areas that contribute more than 40 per cent of the country's foodgrain production. Already ravaged by frequent floods and droughts, this region will be severely impacted by climate change, affecting the country's food security



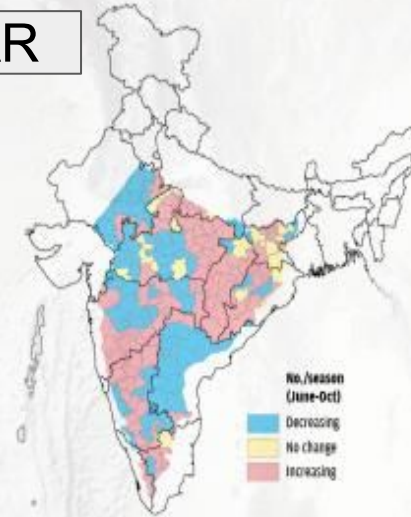
CLIMATE CHANGE TRENDS

Drought

Parts of Tamil Nadu, Karnataka and Andhra Pradesh have the highest probability of drought in the region



Dry spells of >=14 days (2021-50 over 1961-90)
Dry spells are increasing in most of Tamil Nadu, Karnataka, Maharashtra, Chhattisgarh and Madhya Pradesh



Source: Rama Rao C.A., et al., Atlas on Vulnerability of Indian Agriculture to Climate Change, Central Research Institute for Dryland Agriculture, Hyderabad, 2013

www.downtoearth.org.in

Climate change projections and impacts



Temperature:

- Six of the 11 states will witness a temperature rise of 1°C to 4°C. Maharashtra will record a 3.4°C increase by 2100
- Most states will have hotter summer and winter. The winter temperature in Jharkhand will rise to such an extent that the lowest minimum temperature in the 2000 will be higher than the highest minimum temperature in the 2020s

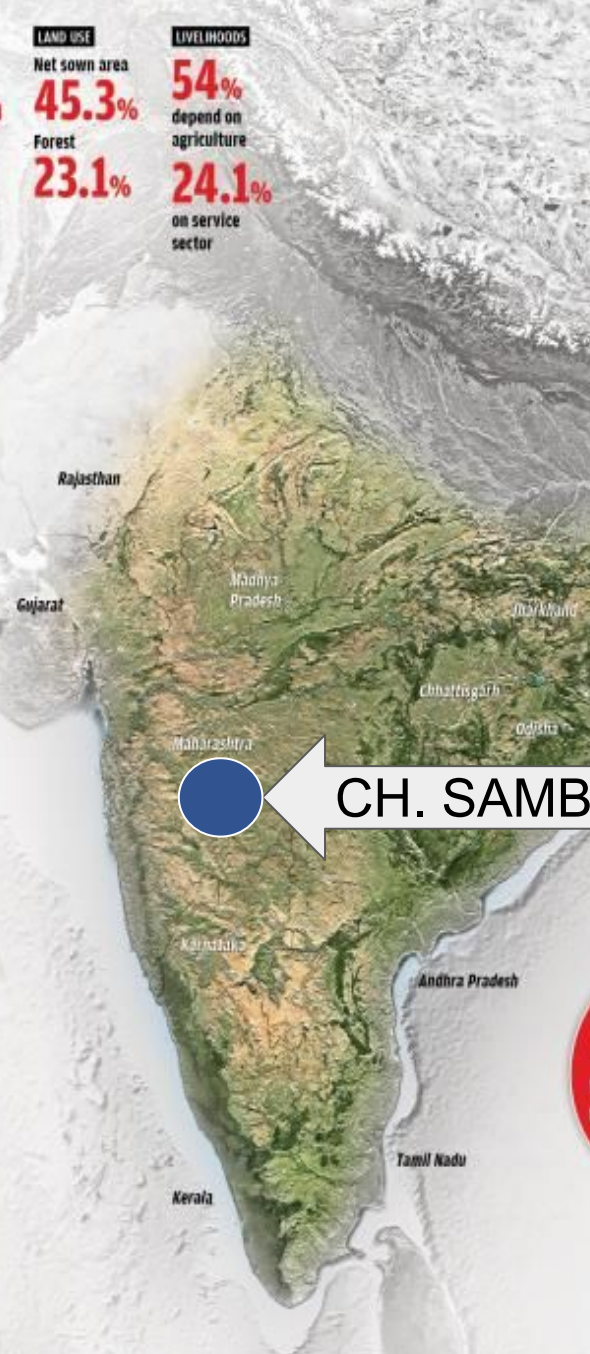


Rainfall:

- Tamil Nadu, Telangana, Maharashtra and Jharkhand will witness increase in rainfall. Summer rainfall will increase by the end of this century and the number of rainy days during summer will increase by up to 10 days by 2100 in Jharkhand
- The post-monsoon and pre-monsoon increase in rainfall is projected to be more than the increase in rainfall projected for the monsoon period for 2100
- Rayalaseema region of Andhra Pradesh, parts of Madhya Pradesh and Karnataka will witness less rainfall. In Andhra Pradesh, there will be drastic decrease in southwest rainfall over Anantapur and Kadapa districts
- Northern Karnataka, already witnessing less rainfall and higher temperature, will see the temperature trends accentuated

Impact and vulnerabilities:

- The number of days with 'high' or 'very high' rainfall (>25 mm/day) is projected to increase over Maharashtra, while the number of days with 'low' to 'moderate' rainfall is expected to reduce
- Fluctuating weather to affect agricultural yield in all the states
- For Karnataka, an increase in droughts is projected for 2021-50 for the two growing seasons. Most of the northern districts of Karnataka would have 10-80% increase in drought incidences



Western parts of Karnataka may face fewer droughts due to the projected increase in rainfall

CH. SAMBHAJINAGAR NEED FOR A WATER CENTRIC AGENDA

CHALLENGE Water Scarce & Drought Prone Region

Disturbed Monsoon Highly vulnerable to Climate Change

OPPORTUNITY Growing city with scope for Climate Conscious Infrastructure Development

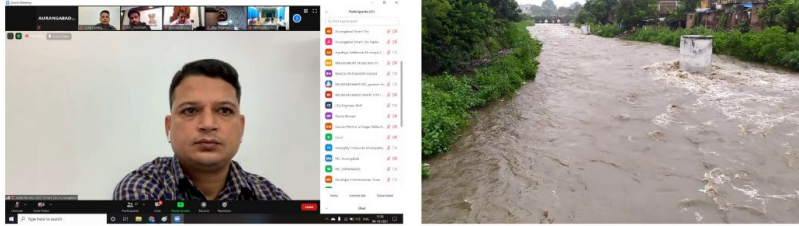
INNOVATIVE RESTORATION



नमामि
गंगे


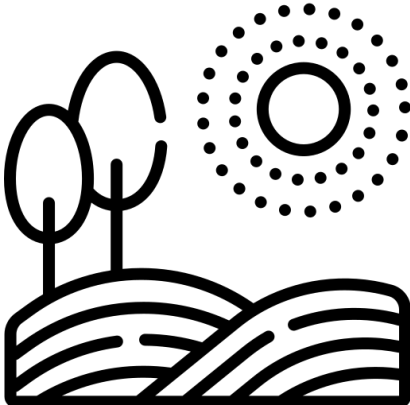
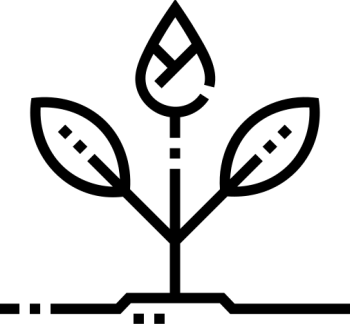
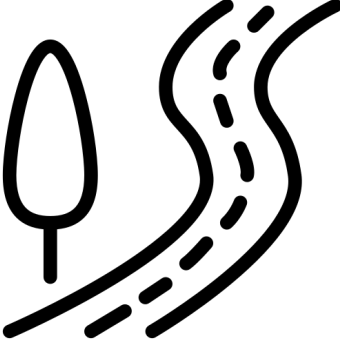


Aurangabad gets included in the **Namami Gange** project and becomes one of only 2 cities from Maharashtra to be included. Cheers to Team Kham and the people of Aurangabad!



Rejuvenation of Water Bodies

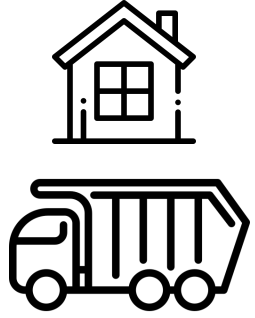
INNOVATIVE RESTORATION | NATURE BASED SOLUTIONS

Area Cleaned	 <p>1,00,000 Sq. Metres</p>	Area Greened	 <p>31,076 Sq. Metres</p>
Saplings Planted	 <p>1,30,000 saplings</p>	Length of banks pitched	 <p>8 Km.</p>

IMPACT

INNOVATIVE RESTORATION | UPSTREAM INTERVENTIONS | IMPACT

Waste-Collection
Integration



5,000+
Households

25,000+
Population

Municipal Staff
trained



250+
SWM

30
STF

Municipal Resources
Harnesses



Rs 14 Cr
of municipal
funds saved

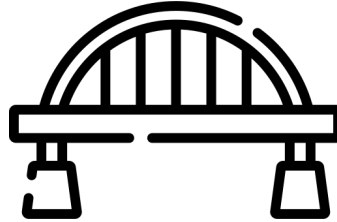
GVP Removal



200+

GVPs closed
and reduced

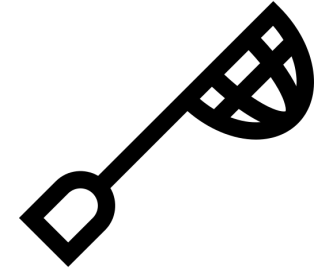
Bridge Barricading



80

Bridges
Barricaded to
prevent Solid
Waste Dumping

Plastic Trappings



6

Plastic Traps
installed in
Nallas

SOP's Developed



3

SWM

1

Nalla Cleaning

Awareness
Generation



100+

Events held

15,00,000+

Citizens engaged

Hours of
Municipal Work
Supervised



9984

SWM

2496

Nalla

HOW BUILDING RESILIENCE CAN HELP | CASE STUDY “KHAM”

6-fold increase in frequency of extreme flood events in Maharashtra in last 50 years

Over 10. 23 million people in state still exposed to floods

Mumbai alone witnessed 3-fold increase in frequency of extreme flood events

The City experienced 90 mm of rainfall in just 4 hours an EXTREME WEATHER EVENT

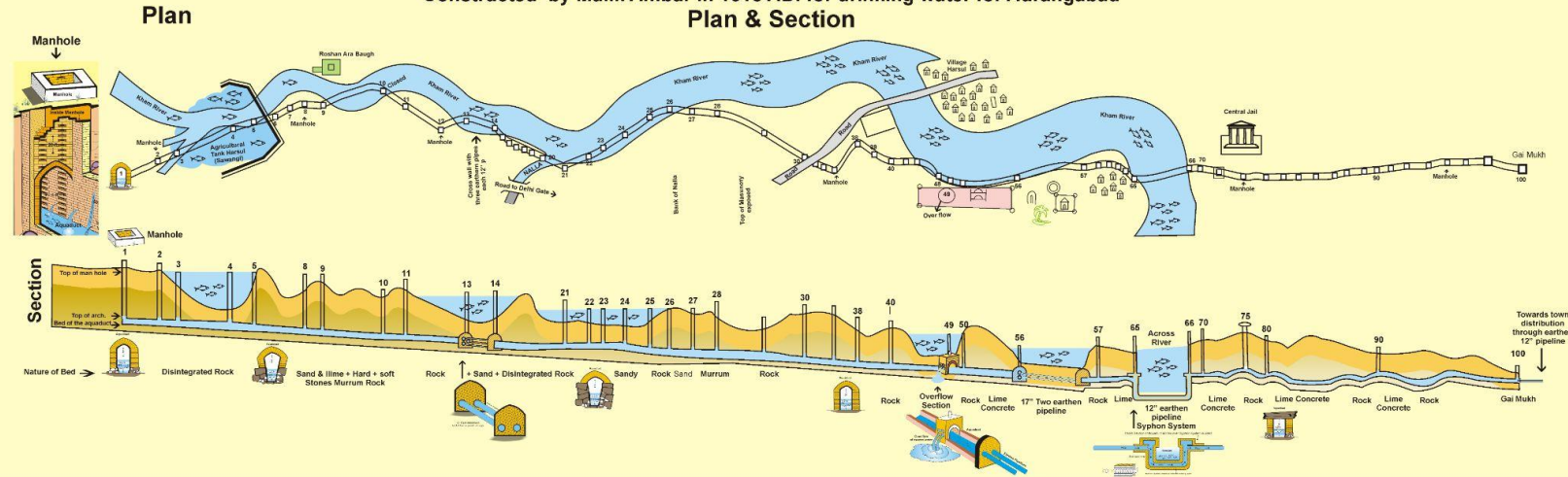


NO FLOODING OR DAMAGE TO LIFE AND PROPERTY RECORDED ALONG THE RIVERSIDE IN THE CITY DUE TO RIVER RESTORATION EFFORTS

SAVING PRECIOUS WATER HERITAGE | 'NEHERS'

Nahar-e-Ambari an underground aquaduct Aurangabad

Constructed by Malik Ambar in 1618 AD. for drinking water for Aurangabad
Plan & Section



Statistical measurement in feet.

Man Hole No.	1	2	3	4	5	8	9	10	14	20	25	40	48	56	57	60	65	66	70	75	80	90	100	
Ground Level Datum from Sea level	2031.4	2035.9	2046.5	2048.6	2046.5	2009.3	1999.1	1990.4	1981.3	1980.4	Bottom of Conveying 1977.91	1984	1992.7	1985.2	1990.2	1991.1	1988.4	1982.5	1982.5	1971.7	1993.6	1973.1	1966.9	1954.4
Top of Manhole Sea Level	2035.2	2028.6	2022.3	2021.6	2011.4	2012.3	2003.1	Bottom of Conveying 1988.2	1993.9	1984.7	1983.6	1987	1974 (20.07)	1970.3	1984.5	1985.6	1984.3	1982.5	1982.5	1971.6	1993.6	1988.4	1966.9	1954.4
Bed to Arch height	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7
Arch from Sea Level	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7
Water Level from Sea Level	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7
Bed from Sea Level	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7	1987.7

Survey made & sketch drawn by Dr. Shaikh Ramzan in 1980 for his doctoral research work

The above map is prepared on the basis of the First Survey Map and the complete repair done in 1931 - 1932 by Mir Osman Ali Khan, the Nizam of Hyderabad

AFRICAN WHO ROSE FROM SLAVERY TO POWER IN INDIA

Malik Ambar was born in 1548 as *Chapu* into the Oromo tribe in Ethiopia. He was brought to India as a slave and rose through the ranks of the army to become the Prime Minister of the Nizamshahi dynasty of Ahmadnagar. He strengthened the Ahmadnagar Sultanate & was the real power behind the throne. Malik Ambar was a trained warrior & a pioneer of guerrilla warfare. He was a thorn in the side of the mighty Mughals & kept them away from the Deccan region.



Interesting Fact : Malik Ambar built the present day city of Aurangabad in Maharashtra in 1610. The city was named 'Khadki' when it was founded by Ambar, but was later conquered by Aurangzeb and renamed as Aurangabad.



@LEARNVIAPOST

Neher's are capable of delivering some 6-10 MI/d and capable of producing a maximum of 20 MI/d with improved maintenance - World Bank Study 2008

“

जल संरक्षण के लिए जन भागीदारी की सोच को जनता के मन में जगाना है। जब किसी अभियान से जनता जुड़ी रहती है, तो उसे कार्य की गंभीरता भी पता चलती है।

जल पर अखिल भारतीय राज्य मंत्री वार्षिक सम्मेलन में प्रधानमंत्री मोदी

5th जनवरी 2023



औरंगाबाद के ऐतिहासिक नेहेर अब भारत का 'जल इतिहास'

शहर / टीएनएन / अपडेटेड: 8 जनवरी, 2023, 06:01 IST



औरंगाबाद के नेहड़ को उन्नत जल वितरण प्रणाली के रूप में जाना जाता है

औरंगाबाद: जल शक्ति मंत्रालय ने भारत में 75 सबसे महत्वपूर्ण जल विरासत संरचनाओं की सूची में औरंगाबाद से नेहर-ए-अंबरी और नेहर-ए-पंचक्की का चयन किया है।

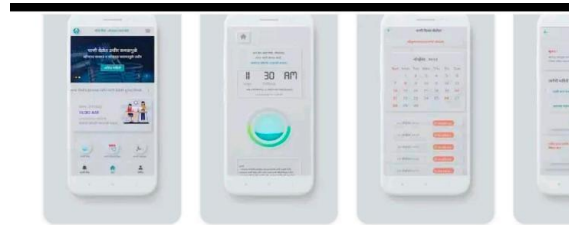


Overcoming Summer Shortages

- **40 Pt. AGENDA**
- Tapping of water from *Nehers* harsul lake used to **augment modern supply.**
- Grievance redressal through **Samadhan**, a toll-free number (**155304 toll free** number allows leakage detection)
- **Service level agreement**
- **NRW-** Preventing Theft Through CCTV monitoring



Jal Bell- A popular App



Data safety



Ratings and reviews



Ratings and reviews are verified and are from people who use the same type of device that you use

4.9



783

5

4

3

2

1

JAL BELL Mobile App has been rated 4.9 star on Google Play Store. Its a great achievement for Smart City and AMC



Carbon Neutral Water Utilities

- Carbon Neutral Water Utilities (CNWU) in collaboration with 2030 WRG.
- **Baseline Assessment of carbon Emissions from Water supply and Treatment systems.**
- EoI to MEDA to take part in the **Energy Efficiency Program of BEE** (Bureau of Energy Efficiency)
- Work order issued by MEDA to carry out energy audit of 5 high energy consuming pumps
- Way forward- **Retrofitting of pumps and prepare DPR for CNWUs.**

INNOVATION | WASTE WATER TREATMENT & REUSE

	Collection	Treatment	Reuse
Context & Status (As in Nov. 2022)	<ul style="list-style-type: none"> • Total Wastewater generation- 96 MLD • Pipeline -1250 Km • 80% population served 	<ul style="list-style-type: none"> • Treatment- 80 MLD • 80% of the generation • 4 STPS- Secondary level • 20% population unserved 	<ul style="list-style-type: none"> • 2 MLD- Agriculture • 0.5 MLD- Green cover • Rest all is River Discharge for sustaining Natural Ecosystems
Ambition	Enhance sewage collection to 100% by 2030	Secondary level Treatment 100 % by 2030	100% Reuse by 2025
Carbon Emission Reduction & Economic Opportunity	Avoid: 90% emissions due to uncollected wastewater	Carbon Credit-Methane capture, Sludge Management	To reduce energy consumed for Water Abstraction (91% of total) by half by 2025
Unique Initiatives	* Drone based Surveillance	* In situ- Nature-based Treatment	* Piloting the Purple Revolution
Alignment with International & National Agenda/ Funding	<ul style="list-style-type: none"> • UNFCCC (Cities Race to Zero and Race to Resilience) • Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0) 	<ul style="list-style-type: none"> • Swachh Bharat Mission - Urban 2.0 • Jal Shakti Abhiyan • Majhi Vasundhara Abhiyan • Namami Gange mission: Urban River Management Plan (URMP) 	<ul style="list-style-type: none"> • National Framework for Safe Reuse of Treated Water • FSSAI – The Eat Right India Initiative • Proposed National Task Force on Wastewater CPHEEO, MoHUA
Impact	<ul style="list-style-type: none"> • Pinpoint geolocation in hard to reach area • Image processing and artificial intelligence for mapping Influx/ Effluent discharge locations 	<ul style="list-style-type: none"> • Reduced Eutrophication • Safer and cleaner water for downstream areas • Higher Biodiversity Index, Migratory birds sighted 	<ul style="list-style-type: none"> • First Wastewater Reuse Association • Climate Smart Initiative • Sustainable, Safer agricultural value chains
Scale-up and Replication	Online and Integrated (ICCC) monitoring and surveillance of all open urban water locations	Extending the <i>In situ</i> treatment to all open urban water systems	Allocating at least 30% of treated water for Agriculture and remaining to Industries and Urban Usage.

PROTOTYPE - PURPLE REVOLUTION AT ZALTA VILLAGE

Key Components

1. Community and Multi-Stakeholder Approach

- Formation of the First of its kind Wastewater ReUse Association Sukhana Jalkranti (Jan 2020)

2. ULB and Regulatory Support

- MoU between AMC and Zalta GP – in local language (Jan 2022)
- Allocation of **2 MLD** water by the AMC (Feb 2022)
- **Tariff structure** guidelines by GoM, MWRRA, Draft **GO** on water allocation

3. Finance- Farmers Contribution

- Infrastructure:~ 40% Contribution by the farmers
- Water: INR 1000/annum/farmer – paid by farmers (Mar 2022)

4. Special Infrastructure

Dedicated used water Conveyance system from STP to farmlands

5. Leveraging Technology

- Integration of Solar Energy
- Sensors to detect contaminants in the soil and crops.
- Flow meters to monitor water use



SECTORAL WASTEWATER REUSE | SCALE-UP PLAN

1

Padegaon STP
(10 MLD)

Urban Use- Safari Park,
Slaughter House,
Afforestation (Proposed)

2

Salim Ali Lake STP
(5 MLD)

Urban Use-
Bibi ka Maqbara, Forest
(Proposed)

3

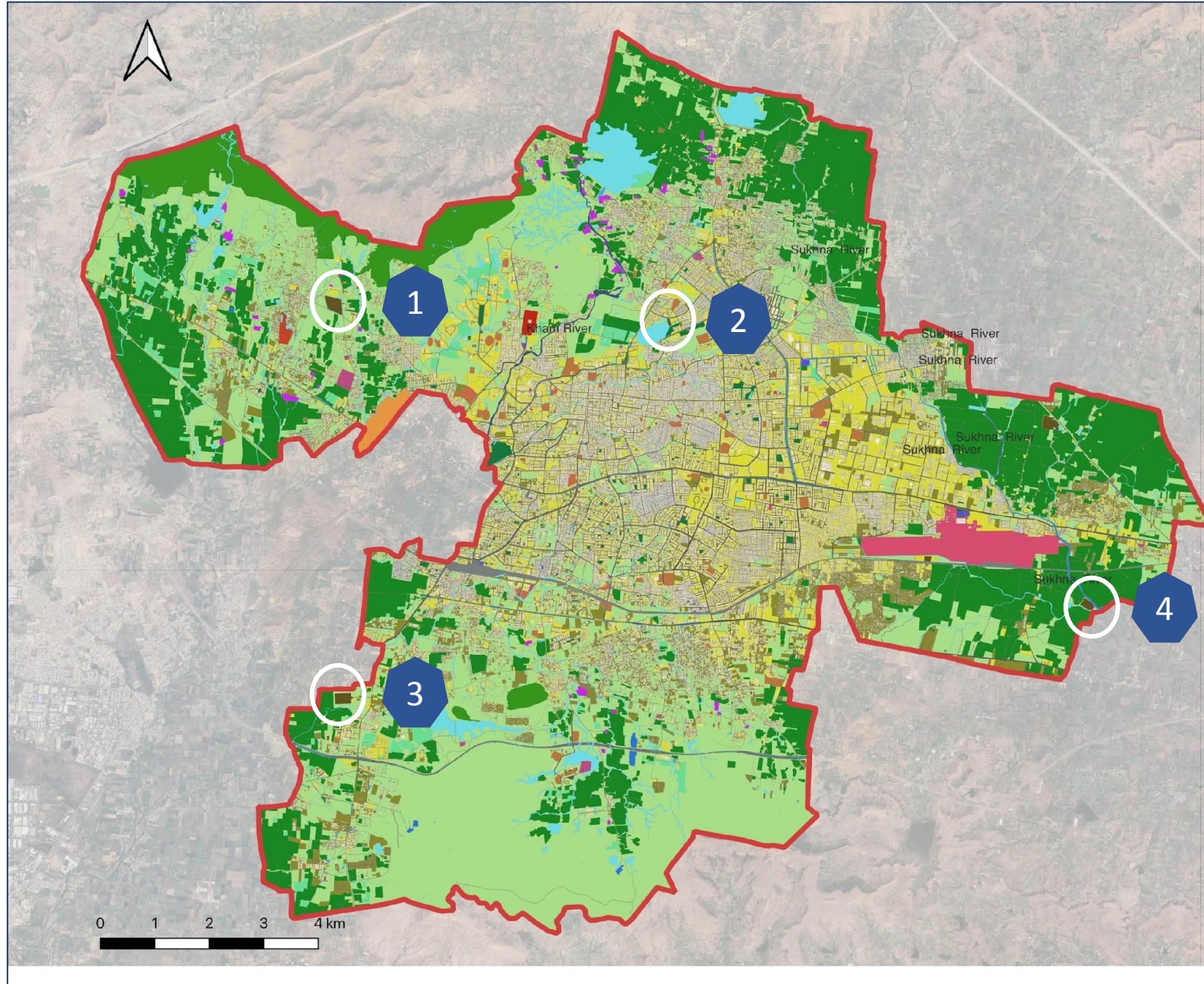
Kanchanwadi STP
(161 MLD)

Industrial & Commercial
Use (Proposed)

4

Zalta STP
(35 MLD)

Agriculture and Fodder
Scale up of Pilot Project

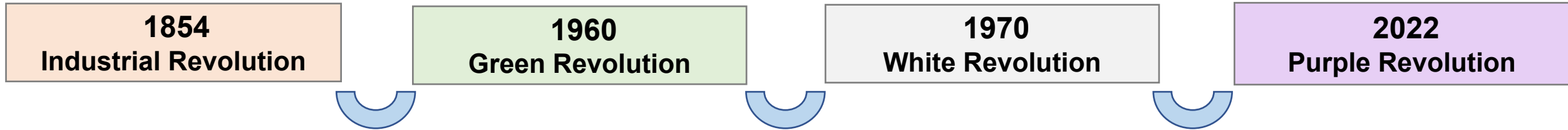


Base Map- Aurangabad

LEGEND

- █ AMC_Boundary
- LULC
- █ Agriculture
- █ Airport Area
- █ Brick Creation Area
- █ Bridge
- █ Cantonment Area
- █ Dam/Barrage/Embankment
- █ Divider
- █ Footpath
- █ Forest
- █ Golf Course
- █ Grave Yard
- █ Monument
- █ Open Land
- █ Open Land - Residential Unoccupied
- █ Open Land (In Residential)
- █ Others
- █ Park and Garden
- █ Parking Area
- █ Plantation
- █ Play Ground
- █ Quarry & Mines Area
- █ Railway Property
- █ Road
- █ Statue
- █ Substation
- █ Traffic Island
- █ Treatment Plant
- █ Water Bodies
- Water_Bodies_Poly
- █ Kham River
- █ Sukhna River

WELCOME TO THE ERA OF PURPLE REVOLUTION



Food & Agriculture

- Enhancing farm productivity
- Reducing the usage of chemical fertilizers
- High Potential for Carbon Sequestration
- Safer Food Value Chains

Industries

- Alignment with Global Sustainability Development (SDG) Goals and Standards
- Compliance to discharge norms and ZLD
- Enhanced water security leading to higher industrial output & productivity

Urban & Commercial

- Bridge the demand and supply gap for growing urban areas.
- Renewable, a perennial source of water for urban secondary application.
- Reduced treatment and energy cost, achieving higher water use efficiency.



OUR MESSAGE

WELL BEGUN IS HALF DONE | There is No Better Time to Begin Than 'NOW'

DON'T BE AFRAID TO MAKE MISTAKES | Pilot - Implement - Learn - Repeat

CONVERGE | Schemes - Resources - Mandates | All of Government & All of Society Approach

INSPIRE & CULTIVATE LEADERSHIP | At All Levels | Across Domains

BELIEVE | Despite All Odds

OUR SECRET SAUCE

It's Never About the Money, It's about your Will, Passion, Commitment & Dedication

STRONGER TOGETHER : ROLE OF MULTI-LEVEL COLLABORATION

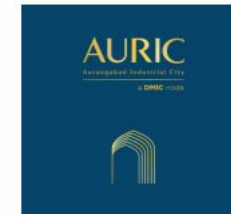
NATIONAL LEVEL



STATE LEVEL



LOCAL LEVEL



OUR UNIQUE C.P.G. MODEL | Citizens - Pvt. Sector - Government | 'सबका साथ, सबका विकास, सबका विश्वास, सबका प्रयास और सबका कर्तव्य'



**NAMAMI
GANGE**

niu
National Institute of Urban Affairs

**WATER & ENVIRONMENT
VERTICAL**

G20
INDIA 2023

U2
URBAN URBAN URBAN

URBAN RIVER MANAGEMENT PLAN

AURANGABAD

AURANGABAD MUNICIPAL CORPORATION

AURANGABAD SMART CITIES
DEVELOPMENT CORPORATION LIMITED

Maharashtra

HIGHLIGHTS

The First in India for now 'Seasonal Rivers' focussed on addressing a 'Comprehensive Water Agenda'

The First for a Non-Ganga City.

TRANSFORMING THE LANDSCAPE

Revolutionising the Data Ecosystem

Systems & Design Thinking

Mainstreaming into Master Plans

Strengthening International Collaborations & Partnerships

WHEN YOU SOLVE 'FOR' INDIA | YOU SOLVE FOR THE 'WORLD'

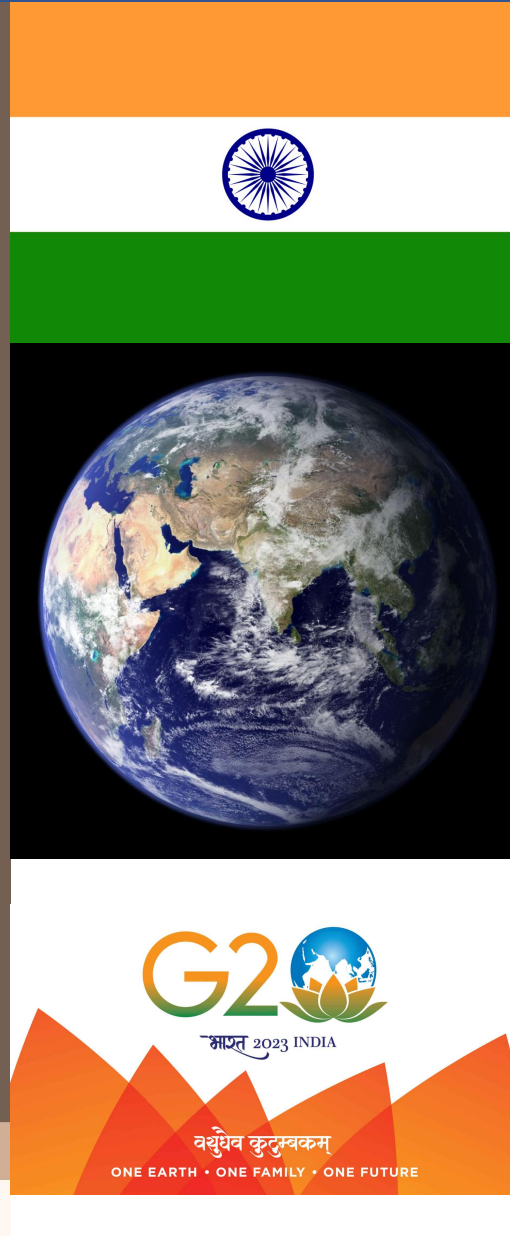
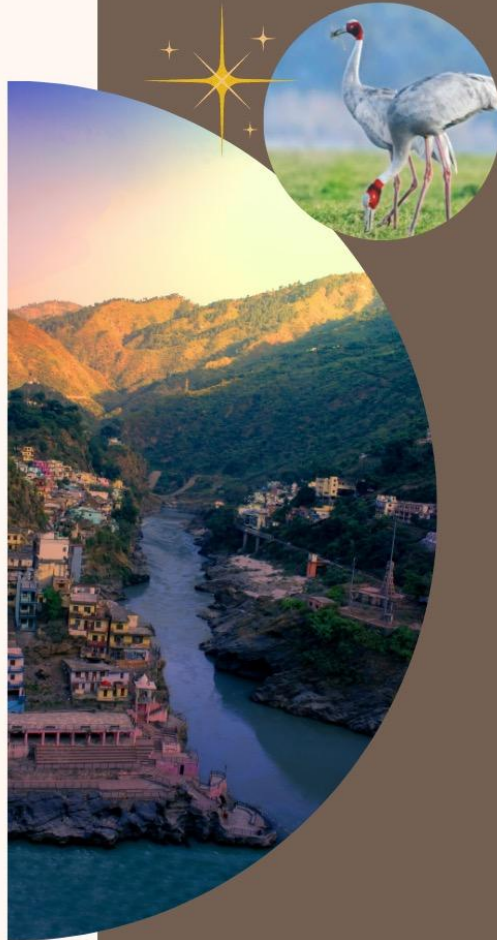


Won India!

Namami Gange has been awarded as UN World Restoration Flagship!

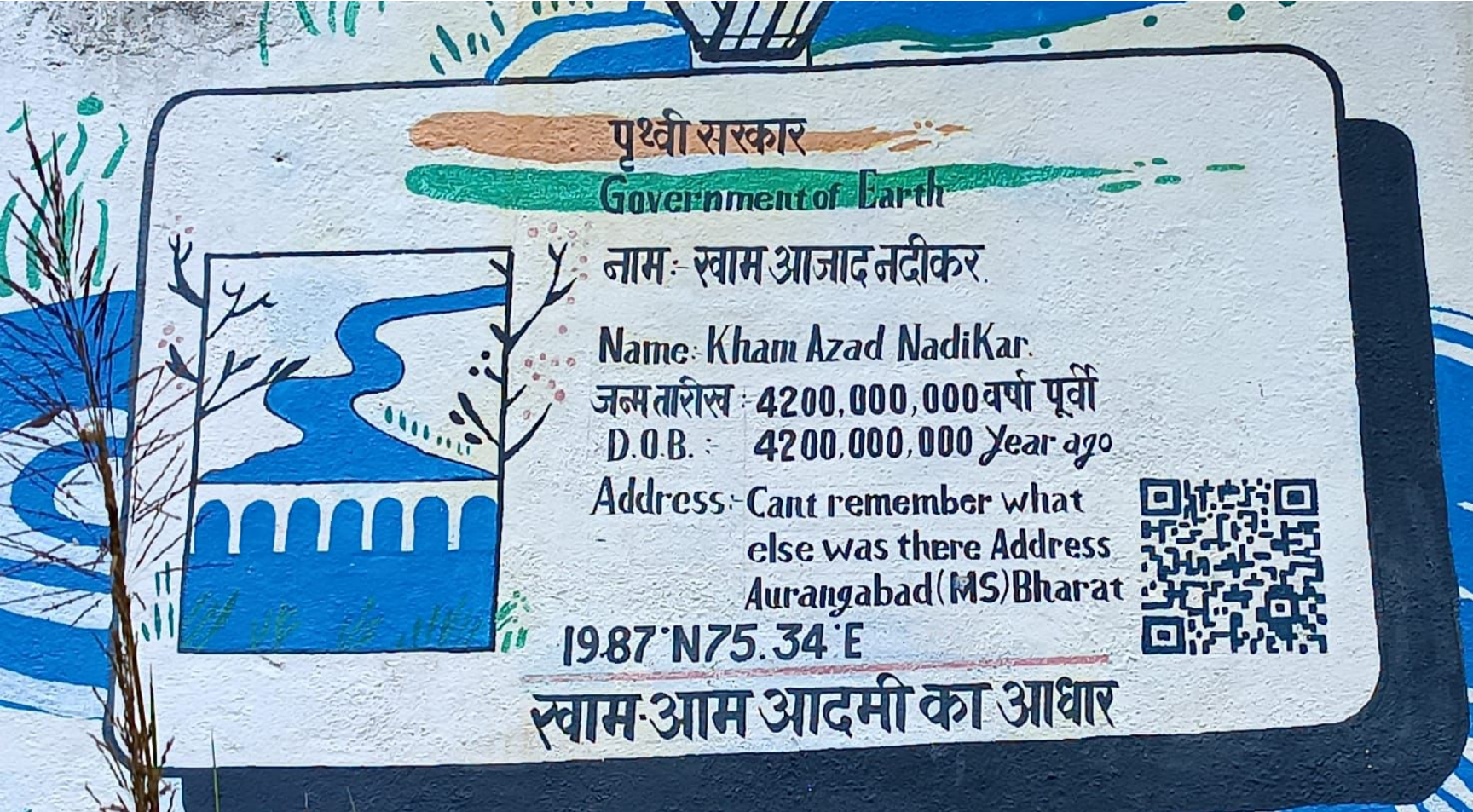
This means we have been selected from over 160 submissions from 60 countries as one of the ten best examples of large-scale ecosystem restoration.

#GenerationRestoration



WHEN YOU SOLVE 'WITH' INDIA | YOU SOLVE FOR 'HUMANITY'

THE STORY OF CH. SAMHAJINAGAR - WAS, IS AND WILL BE THE STORY OF WATER



THANK YOU!



सत्यमेव जयते
Government Of India



भारत 2023 INDIA



Ministry of Housing
and Urban Affairs
Government of India



Ministry of Environment, Forests &
Climate Change
Government of India



National Institute of Urban Affairs



WRI INDIA
— ROSS CENTER



WORLD BANK GROUP
Water