

Water challenges and opportunities for businesses in India

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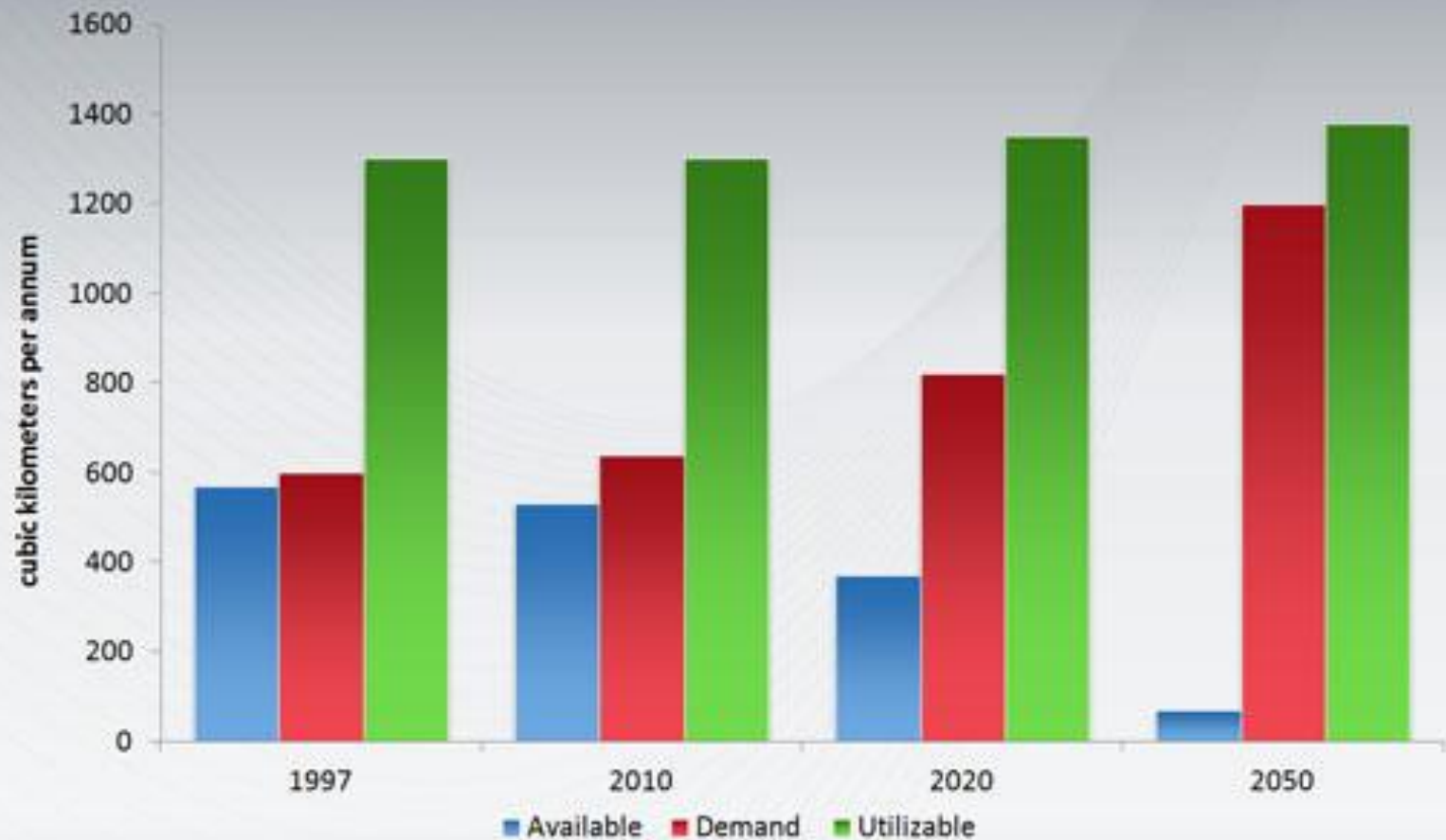
The CEO Water Mandate
Mumbai
March 5th, 2013

Presentation outline

- Water challenges in India
- TERI's Initiatives
 - Assessing climate change vulnerability and adaptation strategies for Maharashtra state.
 - Comprehensive plan for integrating wetlands in water management chain.
 - Khandeshwar lake complex: A sustainable model for wetland preservation.
 - Sustainable strategies to control algal blooms and water quality improvement through re-naturalization
 - Navi Mumbai: Eco-City Project
- Opportunities for Collaboration

Water Demand and Supply in India

Utilizable water, demand, and available water



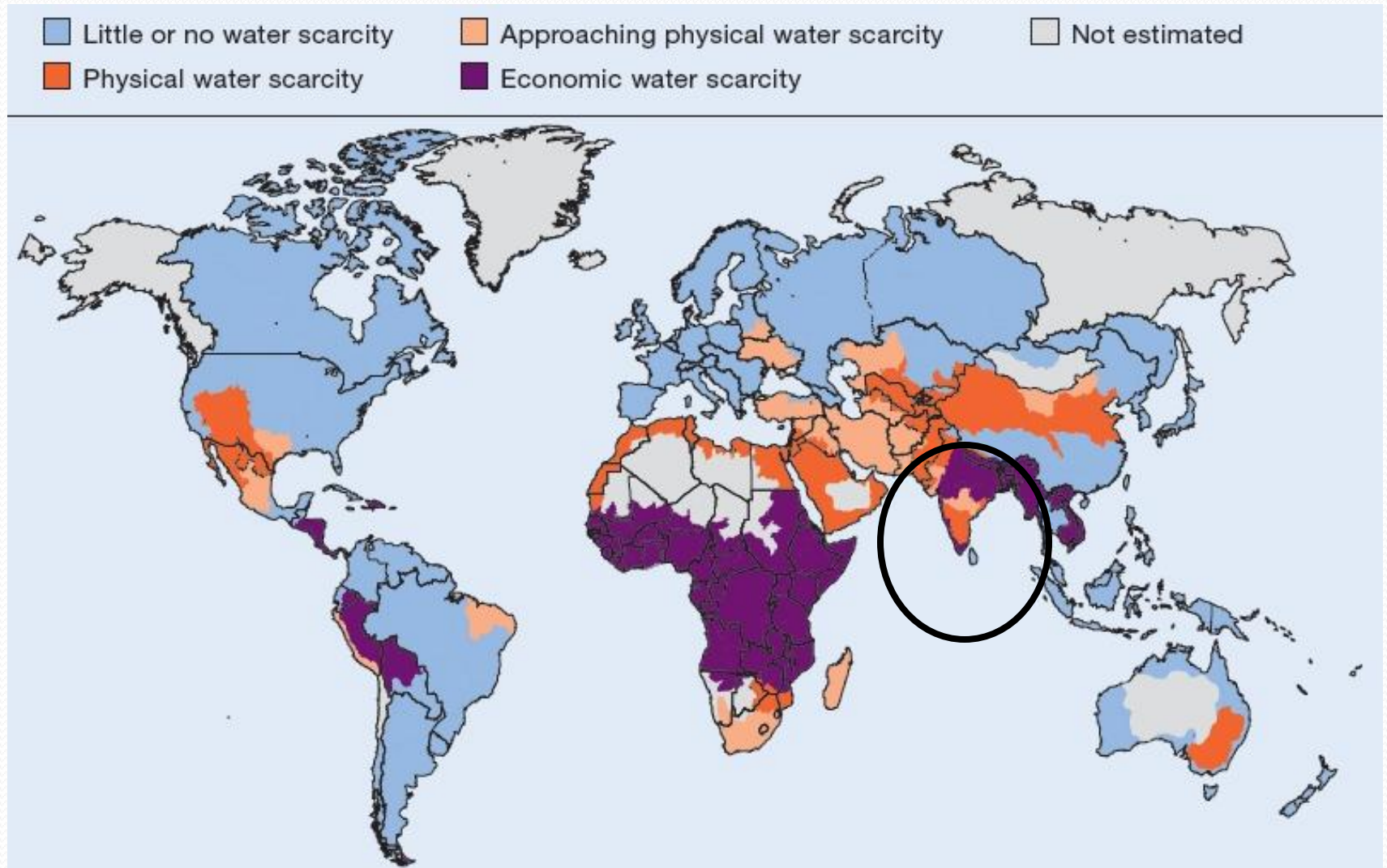
Source: World Bank Report on Water India

Per capita water availability is reducing due to increasing population.

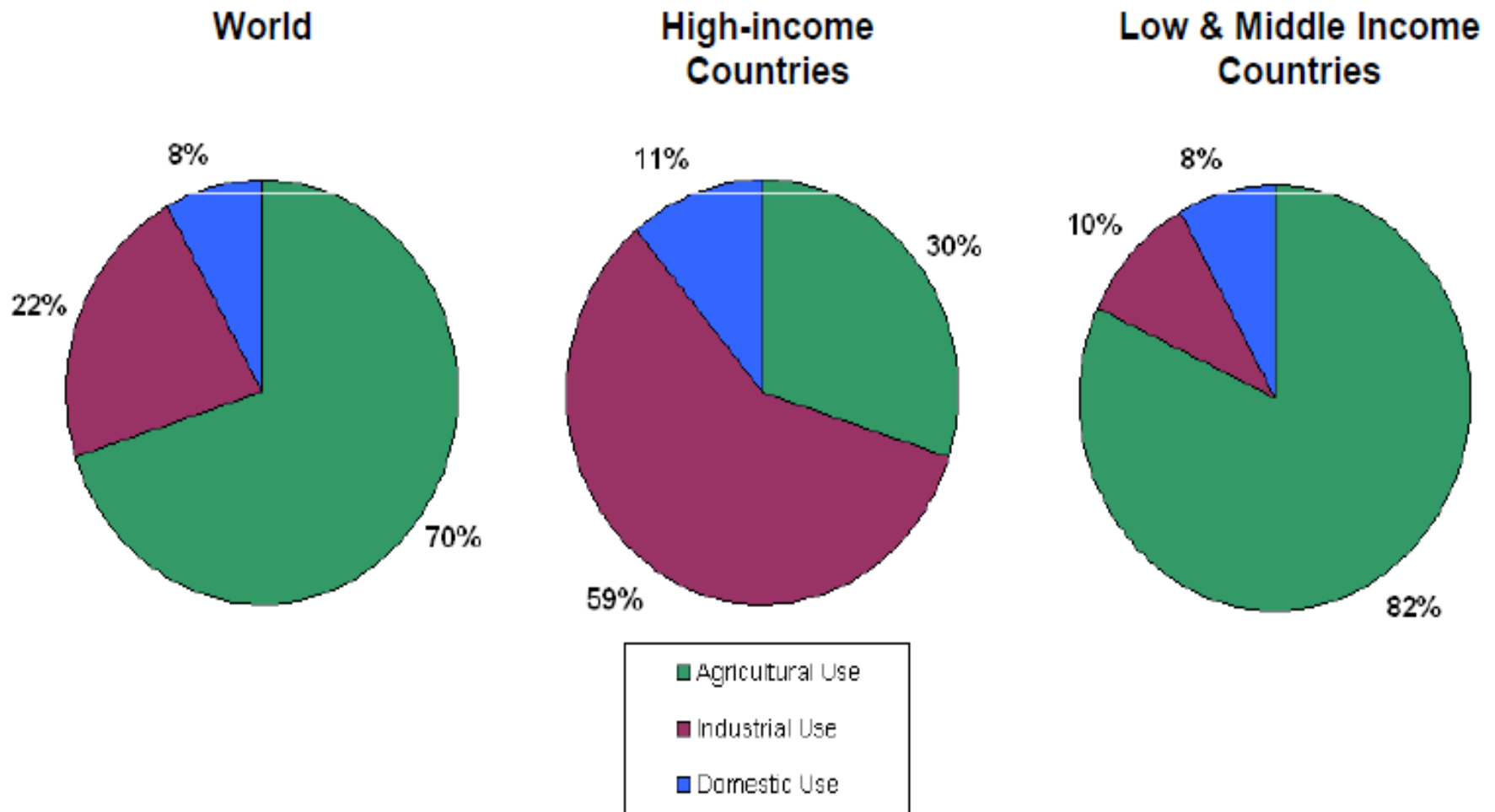
**Average annual per
capita water availability
according to 2001
census
1816 cubic m.**

**Average annual per
capita water availability
according to 2011
census
1545 cubic m.**

Water scarcity in India



Competing freshwater uses



Hindustan Times, Jan 23, 2013

Farmers forced to **hack** orchards

IN MARATHWADA Water scarcity decreases agricultural produce by 70-80%; commodity prices rise by 30% in markets



Dharmendra Jore
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PAITHAN: Like many other farmers in the Aurangabad district, Nagorao Kulkarni nursed his sweet lime orchard with love, labour and money.

Last week, he ordered that his years of his labour — his 700-tree farm — be axed because of lack of water. His farm began earning him handsome profits a couple of years ago, but the situation is bleak now.

Kulkarni's farm is barely 2km away from Jaikwadi dam's left canal, which has been dry for months because of deficient rainfall. The dam is just 6km from the farm, but it is of no use. With just 6.5% of usable stock, the government has restricted its use for drinking water. Water scarcity has already reduced agricultural production by 70% to 80%.

Dyaneshwar Mhaske, whose three-acre sweet lime plantation is near Kulkarni's, is also thinking of doing the same. His wife Kaushalya, who removed burnt sweet limes from her trees, could barely control her emotions. "We raised these plants like children

10,000 HECTARES OF FRUIT PLANTATIONS UNDER THREAT



■ Farmers are forced to cut down sweet lime trees as they fear there will not be sufficient rainfall in the coming months.

STATUS CHECK

AURANGABAD, JALNA, BEED AND OSMANABAD in central Maharashtra are the most affected by drought this year.

Along with grains, farmers there cultivate cash crops such as sugarcane, sweet lime, pomegranate and cotton.

The 46-year-old Jaikwadi dam in Paithan has just 6.5% usable stock, which the government wants to send as drinking water to villages and towns via tankers and pipelines.

The water scarcity has reduced kharif (summer) production by 70-80% in the region. The rabi (winter) crops are worse off.

Official statistics show that supply of most grains till December dipped by 80% as compared to last year. Commodity prices have gone up in local markets.

GOVERNMENT GIVES FARMERS A FEW TIPS

The government wants farmers to take up water scarcity as a challenge and prepare for a better future. Last week, state agriculture commissioner Umakant Dangat offered farmers a 3-point scheme to help handle the problem:

- Prune 30% branches to save the plant
- Use mulch to conserve water. Mulch is material used to cover the soil surface to maintain moisture
- Increase drip irrigation, as it saves water and fertiliser.



HT PHOTOS: SANTOSH HARHARE



■ Jaikwadi dam's left canal has been dry for months now because of deficient rainfall.

FARM TANKS: The government has allowed unlimited farm tanks (artificial) in each affected district. It also offers 50% subsidy for constructing community tanks, which many horticulturists could use together. Any individual farmer can have a tank of a minimum size of 30x30x3 metres.

Crops dead, now to keep cattle alive

IN MARATHWADA With crops failing miserably, farmers hope milk produce will sustain them but water and fodder scarcity has already reduced the yield by 40%



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ASHTI/KADA (BEED DISTRICT): Faced with water and fodder scarcity, Gohinath Bonde and his wife Sunita left their home last September to take their 14 malnourished cattle to an animal shelter in Kada, near Ashti in Beed district.

The Bondes are among the 1,000 people from 17 villages who left their homes and braved the hard winter at the hilly, open-air 50-acre animal shelter at Kada to ensure their cattle don't die of hunger. With crops failing across central Maharashtra, farmers are pinning their hopes on dairy farming to earn them money. Ashti tehsil rears most of the 50 lakh cattle in central Maharashtra, and is one of the largest milk-producing tehsils in the state. But the water and fodder shortage has brought down milk yield by 30% to 40% in the tehsil.

"We were among the first batch that came here with cattle in September because we needed water and fodder for our cattle to survive. The money we earn from them will sustain us through the season," said Gohinath. Sunita helps him feed the cattle — dairy cows, buffaloes and bulls — housed in a temporary shed built by the family.

One of the eight shelters in Ashti tehsil, the Kada cattle facility has 3,000 animals. It is being run by Mahesh Cooperative Sugar Factory,



■ More than 1,000 people from 17 villages have moved to the animal shelter at Kada because of fodder and water scarcity.

which could not start this year because sugarcane crops failed miserably. According to government norms, each shelter can house up to 3,000 animals. The government gives shelter operators Rs60 daily for 15kg fodder for every big animal (cows and buffaloes) and Rs30 daily for 7.5kg fodder for every small animal (calves).

It's a hard bargain for farmers as they have to set up their own sheds using their own materials. Those who live in villages close to the shelter get food from home, while others

cook at the shed. Some people have travelled with their cattle from villages as far as 40km to 50km from the shelter.

While farmers complain that not enough fodder is provided at the shelter, operators say that the poultry government grant for fodder, which has recently been reduced by Rs20 for each animal, is insufficient. "The fodder quantity should be doubled because cattle such as jersey cows need more food," said Gopal Pache who has 23 malnourished cattle, most of which he bought for Rs50,000 each.

Suraj Mandhare, deputy commissioner (revenue), Marathwada division, said the government readily approves shelters when there is demand. He did not comment on the grant, but said money was made available in advance to the district administration.

Shivaji Vishwanth Kolhe, Mahesh Sugar Factory's nodal officer, disagreed, "If that is the case, then many of us have not got our costs reimbursed. The administration takes months to give us money and also deducts deposits from our money."



■ Shelter operators say government grant is not enough; farmers rue fodder at shelters is insufficient. HT PHOTOS: SANTOSH HARHARE

Rabi crop fails in 3,905 villages

Acknowledging the failure of rabi (winter) crops across the state, the government on Tuesday declared scarcity — which includes a paucity of crops, fodder and water — in 3,905 villages without waiting for a final assessment report. Of these, the most number of affected villages are in central Maharashtra (1,574) followed by western Maharashtra (1,245) and northern Maharashtra (886). Earlier, 123 tehsils were declared scarcity-hit because of failure of kharif (summer) production. These villages will get government aid such as employment guarantee, drinking water and the facility to move cattle to animal shelters in their respective blocks.

HTC, MUMBAI

THE BLEAK FODDER STORY IN CENTRAL MAHARASHTRA

The fodder for cattle, mainly sugarcane, is being transported from tehsils in western Maharashtra at high costs.

Water is being brought from the few available sources, but farmers fear that those too will soon dry up. They are also afraid that there will be no fodder left, if sugarcane farmers sell the entire crop to factories.

The scene at the district's animal shelters too is abysmal. The government has reduced the grant to shelter operators by Rs20 recently — it is now Rs60 daily

for 15kg fodder for big animals (cows and buffaloes) and Rs30 daily for 7.5kg fodder for their calves.

The water and fodder shortage has brought down milk yield by 30% to 40% in the tehsil. Farmers say the 15kg fodder given at animal shelters is too little for dairy cows.

To increase milk yield, farmers are taking loans to nourish their cattle. They say the total cost of production of milk (Rs20 a litre) is much more than the selling price (Rs11 to Rs14 a litre).

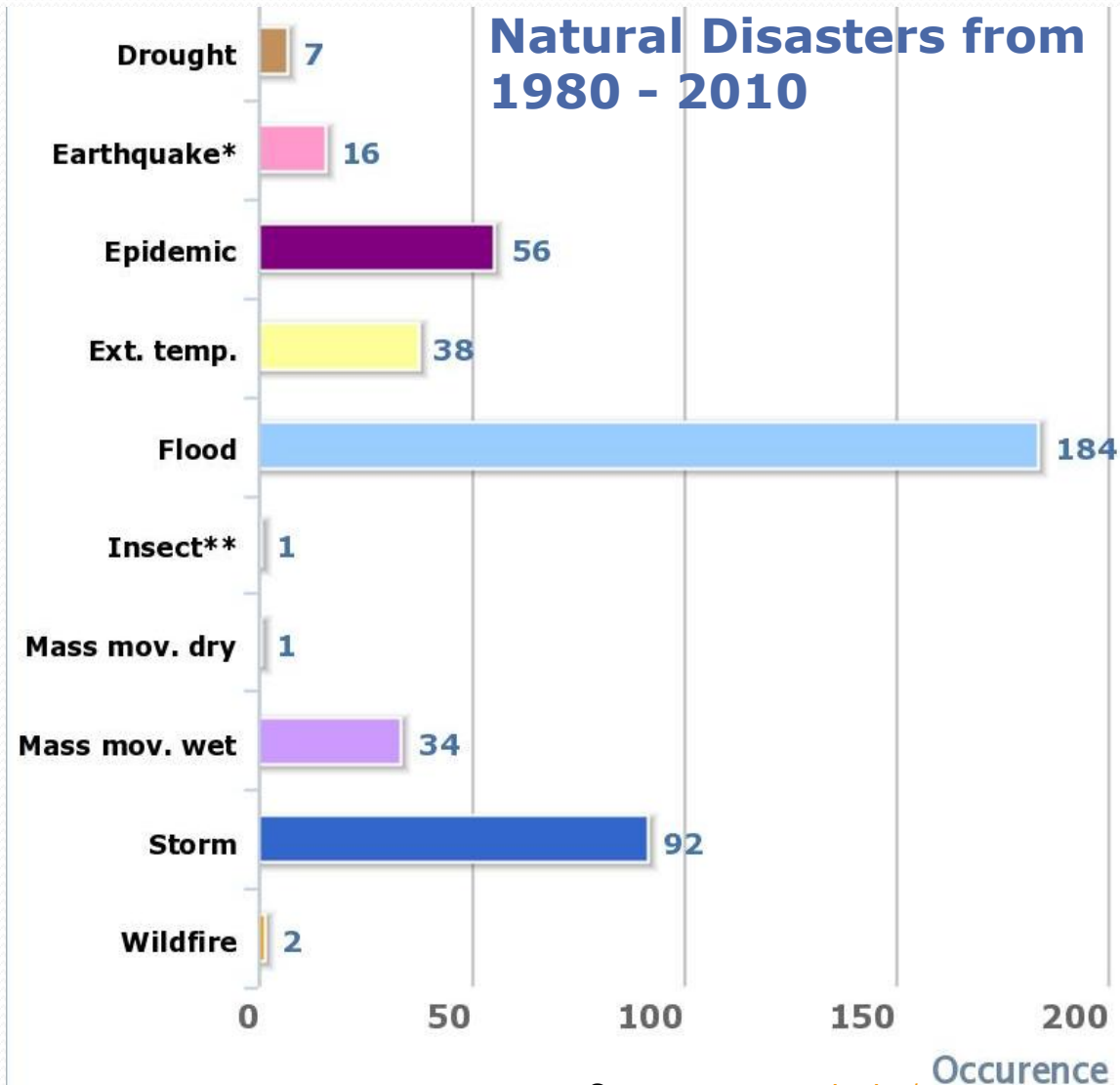


Compounding Impacts

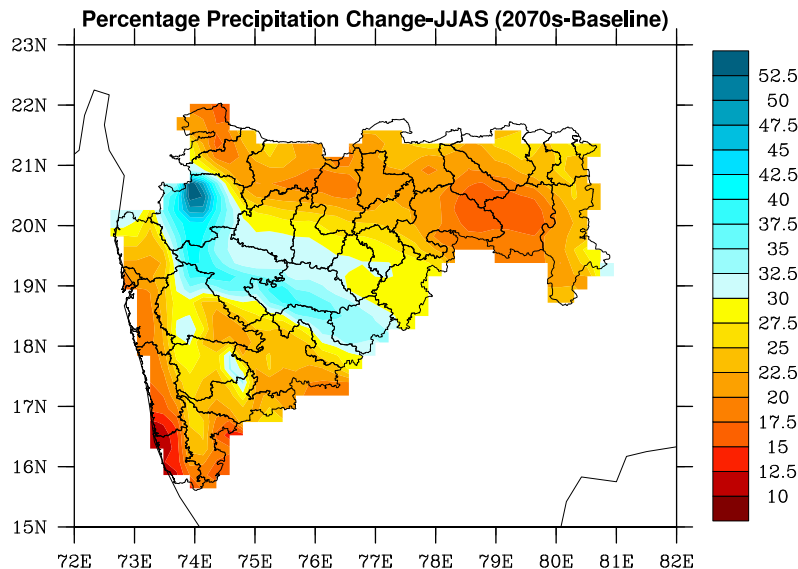
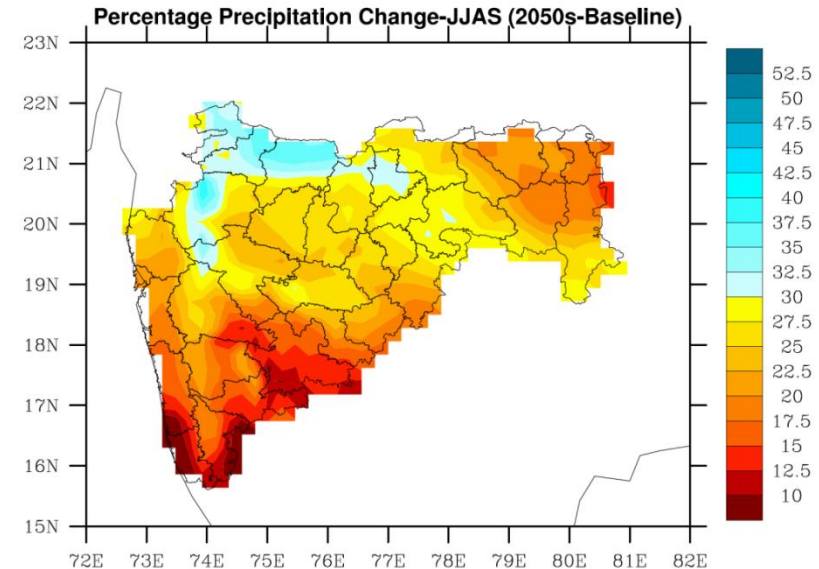
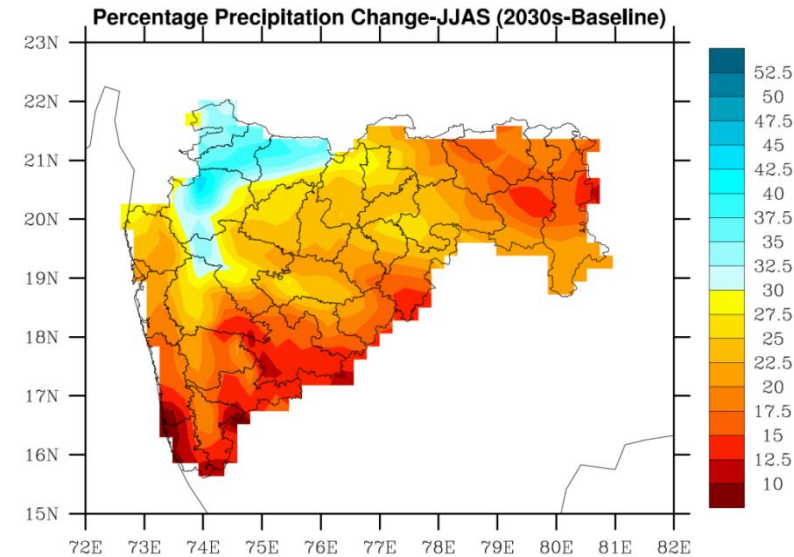
The number of extreme climatic events like flooding and drought are likely to increase due to climate change.

**Average
people
affected per
year: (approx.)** **4.9 crore**

**Economic
damage per
year : (approx.)** **8529 crore**

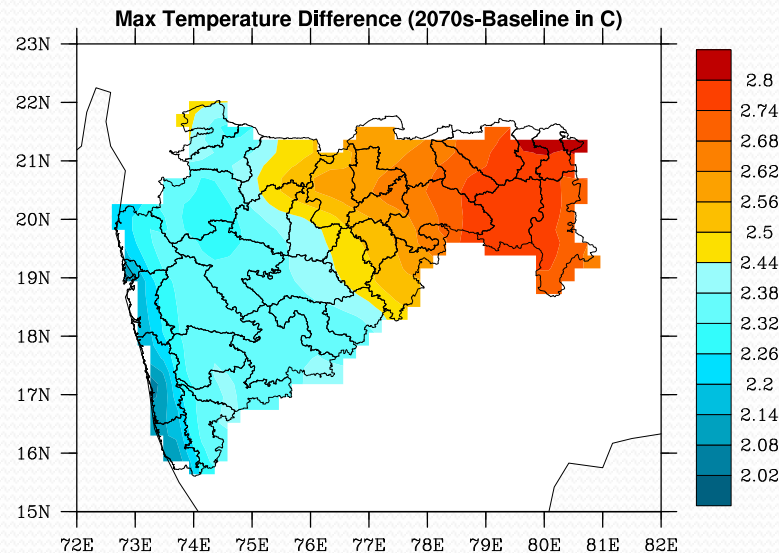
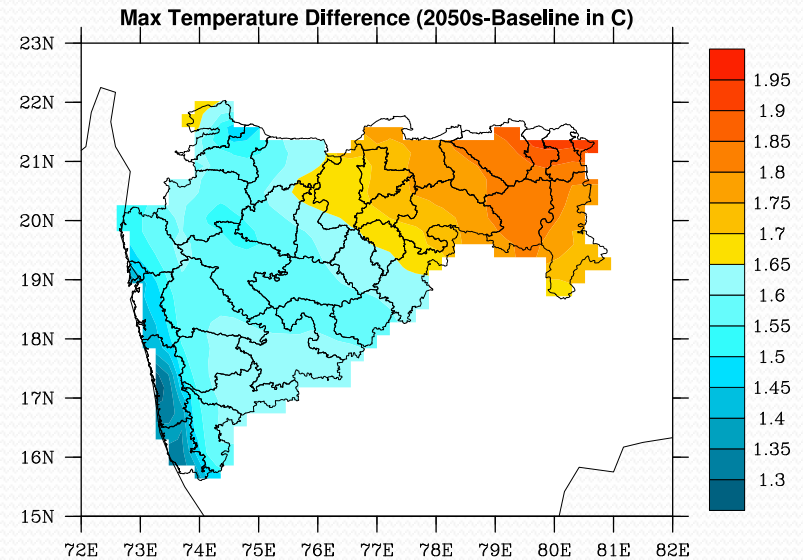
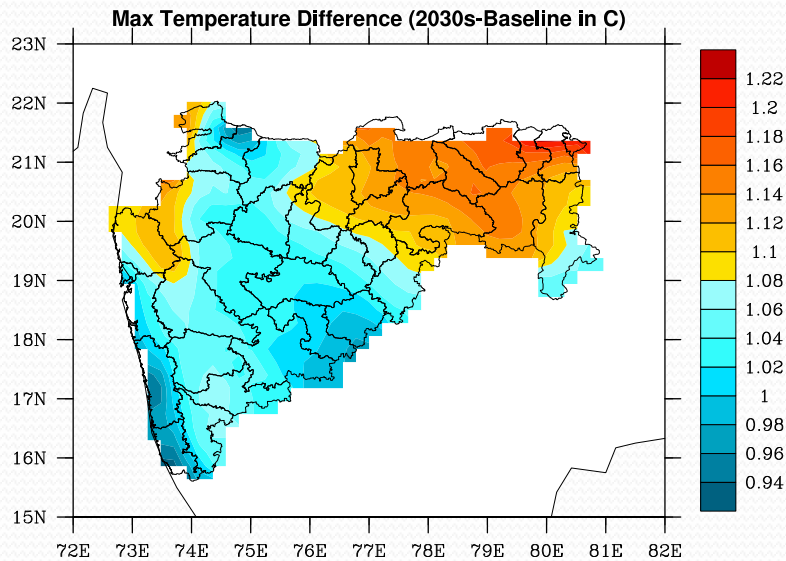


Percentage increase in Rainfall in 2030s, 2050s and 2070s wrt baseline (1970-2000) in Maharashtra



- **Overall increase in rainfall over Maharashtra**
- **Changes are likely to be more pronounced (> 30 % wrt baseline) over the northern parts of the state for 2030s and 2050s and the central parts for 2070s**

Annual Mean Maximum Temperature Anomalies for 2030s, 2050s and 2070s wrt baseline



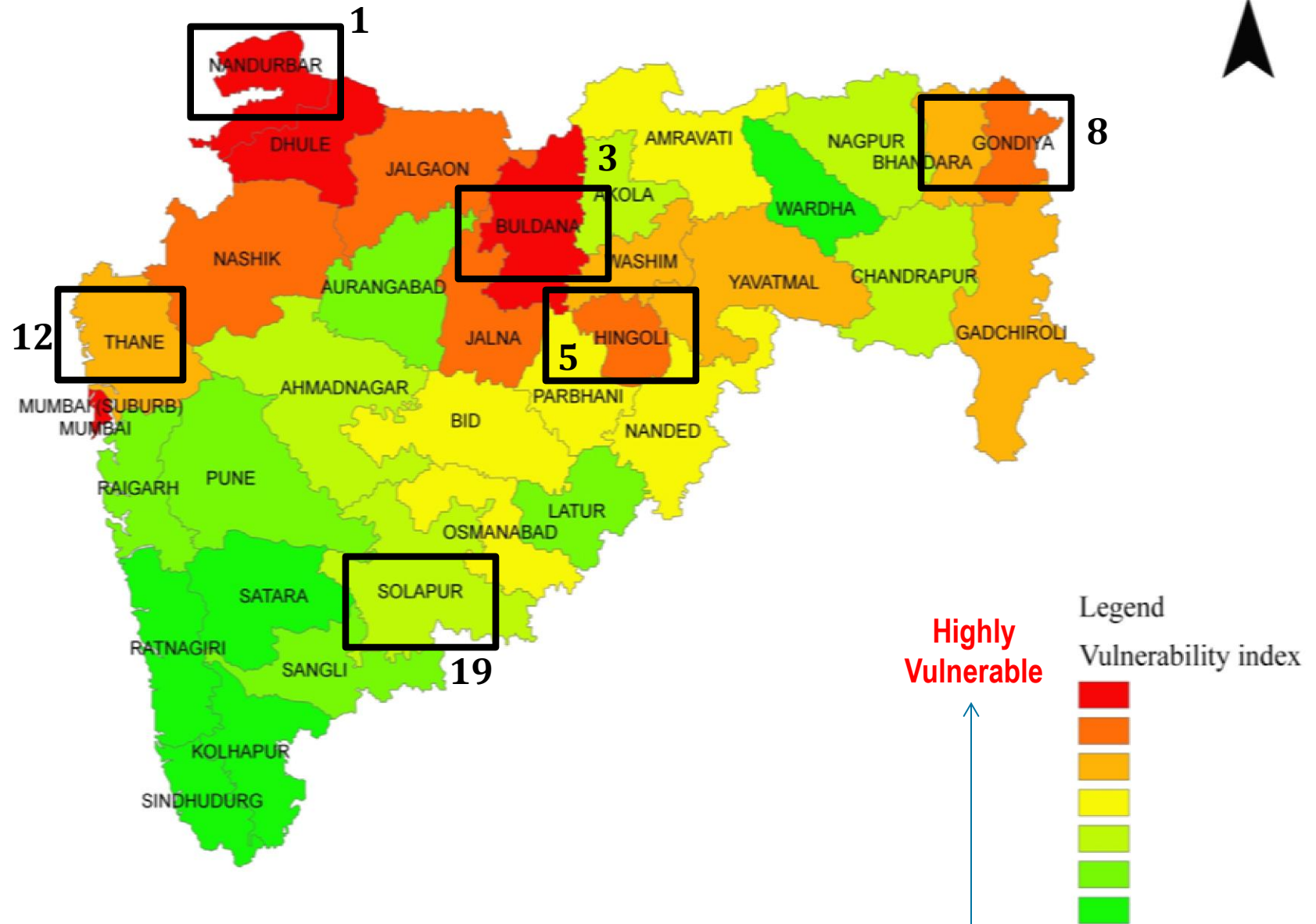
- Increase in maximum temperatures/ day time temperatures

2030s: 0.94 – 1.22 degree Celsius

2050s: 1.3 – 1.95 degree Celsius

2080s: 2.02 – 2.8 degree Celsius

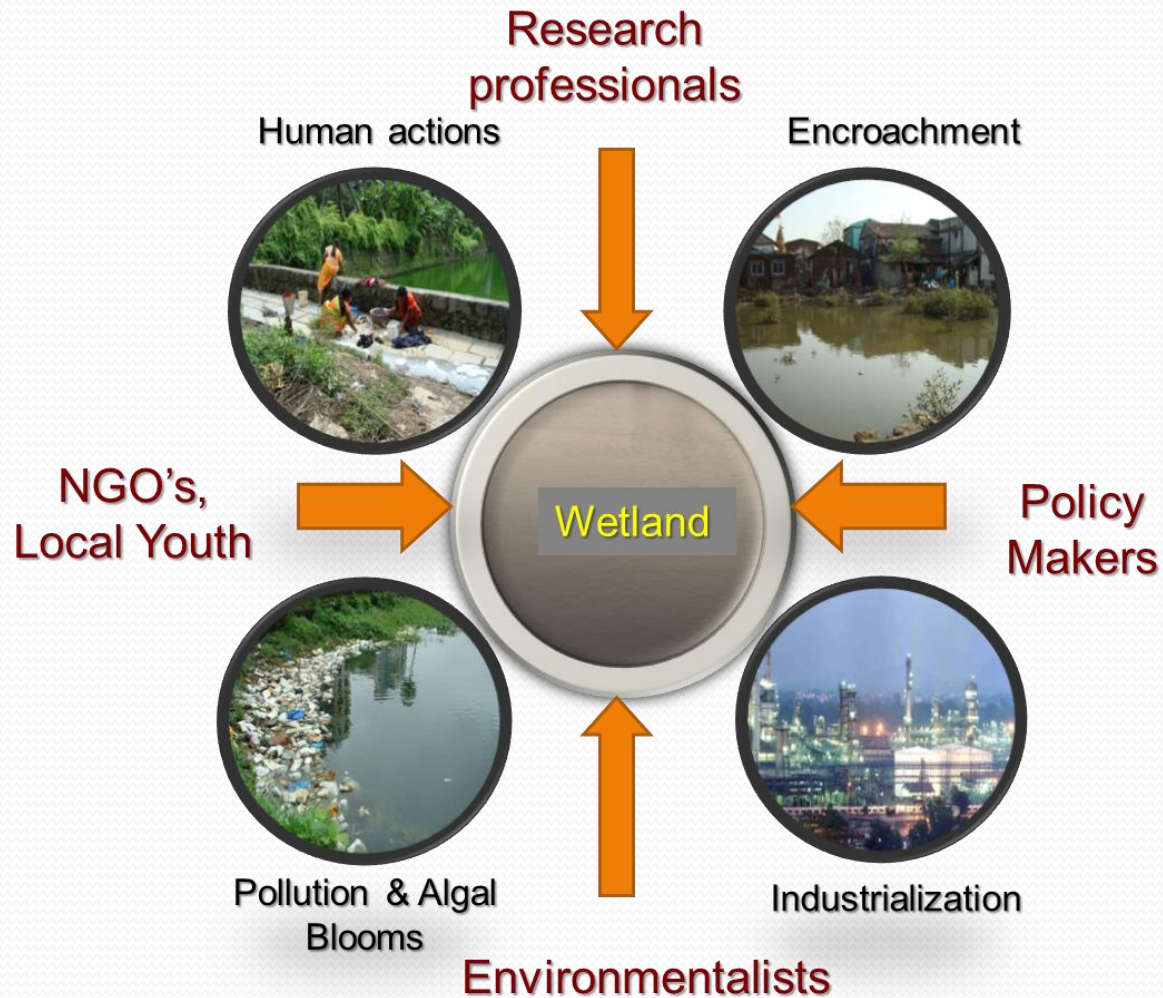
Macro-level Vulnerability Index for Maharashtra



Case Studies: Highlights from 6 districts of Maharashtra

- Increased rainfall variability and falling ground water levels are adversely impacting water availability for irrigation and drinking.
- Observed (and projected) variability in rainfall patterns . stressing on the needs to store water .
- Falling ground water levels
- Contamination of the water (Surface as well as ground) with pollutants such as nitrates, fluorides , sewage, dumping of waste etc.
- Reduction in drinking water availability.
- Increased water scarcity.
- Encroachments and deterioration of wetlands in the urban fabrics.
- Reducing areas and significance of the wetlands in cities as well as rural set ups.

Wetland Management Program (WeMaP)



February, 4, 2013



Inauguration of the brainstorming session on “Developing urban wetlands: need, gaps, and way forward” at the hands of Shri J. K. Banthia, Hon’ble Chief Secretary, GoM and Smt Waheeda Rehman, Ambassador of TERI’s WeMaP, Dr. R.K. Pachauri, DG, TERI and M.K. Srivastava, Principal Secretary, UD, GoM

Resolutions

- To develop a policy paper focusing on urban wetlands.
- To suitably amend policies and by laws for regulating development around wetlands.
- To identify sites for dumping of construction debris in urban areas, the absence of which ends up in wetlands getting regarded as wastelands.
- To better disseminate information about available resources- financial and technical, so as to facilitate conservation of wet lands.
- To build capacity through imparting training to city engineers and town planners highlighting the significance of wetlands and technological interventions for wetland restoration.

Objectives of WeMaP

- **Corporate level**
 - Business model for integrating wetlands in water management plans.
- **Government level**
 - Developing models with financial and environmental sustainability for long term preservation of wetlands.
 - Apex Body to ensure conservation and sustainable use of water and wetlands.
- **Community level**
 - Adopting wetlands of historic and environmental significance for its long term conservation.

CASE STUDIES-

Comprehensive Plan for Wetland Restoration and Development for BPCL's LPG Bottling Plant at Uran, Navi Mumbai





Pond Crystal

Total Volume = $65(l) \times 36(b) \times 1.5(d)$
= 3510kL

Pond Prism

Total Volume = $335(l) \times 40(b) \times 1.5(d)$
= 20100kL

Challenges in restoring, developing and integrating the wetlands in the water management chain

- Reclamation of the wetlands for development activities
- Incursion of creek water in the wetlands
- Possibility of flooding during monsoon
- Direct discharge of waste water in the wetlands
- Less water holding capacity of the wetlands

Return on investment

Total investment (estimated INR)	Annual Savings (INR)	Return on Investment (ROI)
19,24,976	2,94,000	6.55 years
(Strategies)	(14,700kL* 20INR)	$19,24,976 / 2,94,000$

Sustainable strategies to control Algal Bloom and water quality improvement through re-naturalization

- Innovative strategies to control algal bloom.
- Emphasis on enhancing biodiversity and a strong food web.
- The interaction between the biotic and abiotic factors
- Nutrient sink and riparian zone around the lake.



The project site at Central park,
Kharghar, Navi-Mumbai

Reuse of STP treated water for irrigation in the central park



Release of STP treated water



Problem Definition : Algal Bloom



**Pitching and cementing
along the periphery of
water body**

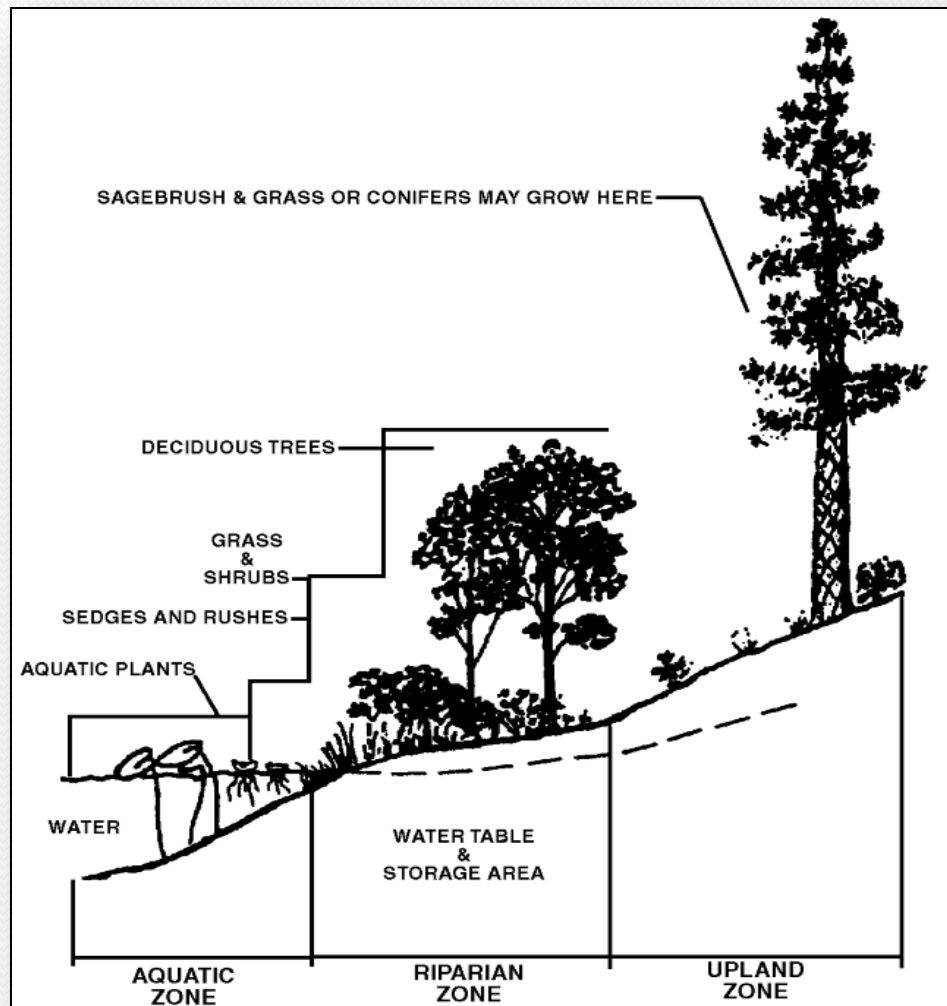


Severe algal bloom



Lack of food chain

Lack of Riparian Zone



Sustainable Approaches



Riparian zone



Nutrient sink



Introduction of biodiversity to develop a micro-ecosystem and food chain

Construction of lotus ring



- Nutrient sink
- Facilitates renaturalization of water
- Interaction of biotic and abiotic factors

Development of riparian zone

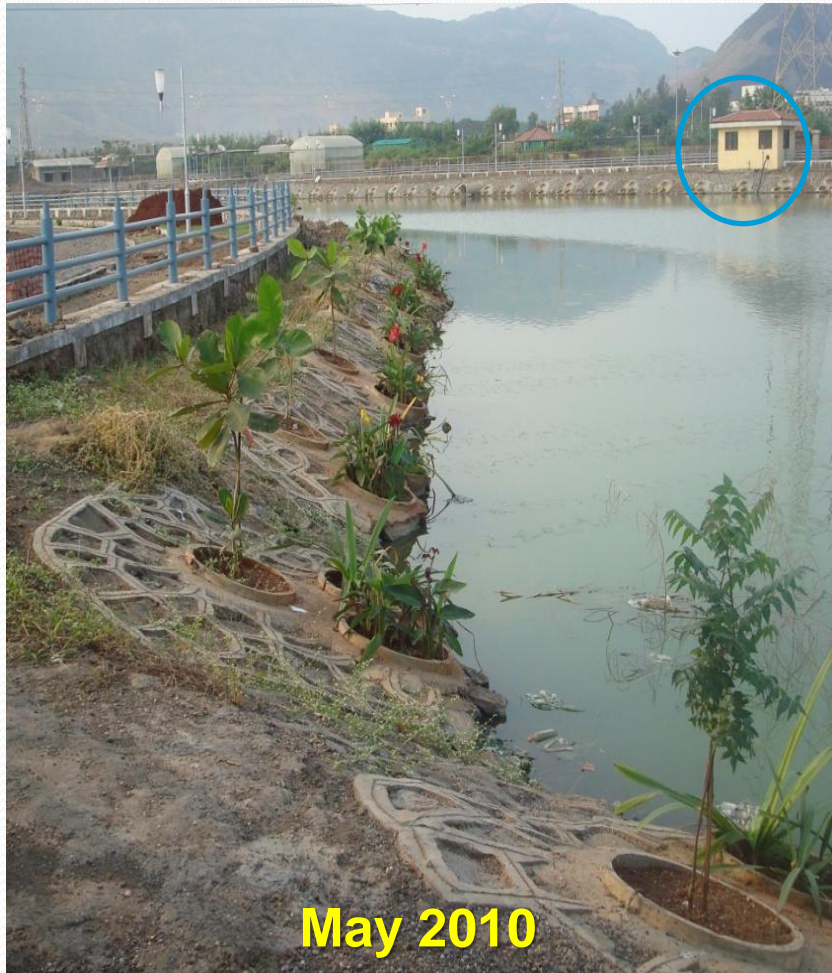


Before



After

Established riparian zone





Khandeshwar Lake

A Model for Sustainable Wetland Preservation

A Model for Sustainable Wetland Preservation

To develop a model with financial and environmental sustainability



Recreational Boating Facility



Cafeteria



Botanical Theme Park



NIWARA



Theme Park



Shops

Addressing the social issues

- Idol immersions during festivals
- Washing of clothes in lake water
- Presence of invasive exotic species of plants like Water Hyacinth and Ipomoea
- Disposal of organic waste from the temple
- Indiscriminate disposal of waste by local residents and visitors



Solutions

- De-weeding of the lake with the help of local community. E.g. Local fishermen
- Root-zone filter near the point-source of temple wastewater
- Collection, segregation and disposal of organic waste for vermi-composting
- Renovating CIDCO guesthouse into a green building
- National Institute for Wetland Analysis, Research & Application (NIWARA)
- Employment opportunities



Inauguration of the renovated lake complex



Shri. Ashok Chavan, *Hon'ble Chief Minister- Maharashtra* inaugurating the NIWARA complex in presence of Dr R.K Pachauri, *DG-TERI* (3 from L) and Shri. G. S Gill, *VC & M.D, CIDCO* (2 from L) and other dignitaries

RAVI – TARU

A solar tree



The Impact-





Navi Mumbai: Eco-City Project



Prepared for:
Navi Mumbai Municipal Corporation



Release of miniature version of Bio-diversity Panel at launch of Eco-City project



(From L to R) Dr. Anjali Parasnis, Associate Director TERI, Shri. Sagar Naik , Hon'ble Mayor NMMC, Shri. Ganesh Naik, Minister of State for Renewable and Non-Conventional Energy, GoM, Shri. Sharadchandraji Pawar, Hon'ble Union Minister Agriculture, GoI, Shri. Bhaskar Wankhade Hon'ble Municipal Commissioner, NMMC

Programs for Water conservation and wise usage

- **Residential Sector-**

- Green Building, Faucets- Mandatory, orientation for domestic help, recycling of water, Dual plumbing

- **Industrial Sector-**

- Water Auditing, Mandatory water usage, use of recycled sewage water, Integrative approaches, adoption of water bodies, sponsorship for wetland management

- **Government Sector-**

- Policy level interventions, incentives, retrofitting of Gov buildings, wetland preservation, Training and Capacity Building.

Green Rating for Integrated Habitat Assessment (GRIHA)

Tool to facilitate design, construction, operation of a green building ,and in turnmeasure “greenness” of a building in India



What gets measured gets managed

Reduce water use in the building

- ❑ **Conventional approach (the 'water is plenty' phenomena)**
- ❑ **Most buildings use conventional water fixtures that have high flow rates**
 - ❑ **Toilets - 13.5 lpf**
 - ❑ **Urinals – 7.5-11 lpf**
- ❑ **The focus is more on aesthetics and less on performance**
- ❑ **This along with careless usage habits leads to tremendous wastage of**
- ❑ **GRIHA approach**
- ❑ **Use of efficient plumbing fixtures, sensors, auto control valves, and pressure reducing devices for reduction in water consumption**
 - ❑ **Water efficient fixtures**
 - ❑ **Toilets – 3/6 lpf or 2/4 lpf**
 - ❑ **Urinals – 0.4 lpf**
 - ❑ **Auto control valves**
 - ❑ **Pressure reducing device**
 - ❑ **Aerators – reduce flow to 2 lpm**
 - ❑ **Composting toilets**

Opportunities for collaboration

- Models for integrating wetlands in the water management chain
- Developing models with financial and environmental sustainability
- Wetland status report
- Water budgeting
- Analyzing the vulnerabilities of water resources to increasing climate fluctuation
- Water recycling
- Conservation of Biodiversity and wild life

Potential partners/ Stakeholders

- Corporate sector
- Municipal corporations
- Special planning authority like MMRDA
- Government departments
- IUCN
- Local communities

A scenic photograph of a calm lake under a clear blue sky. In the distance, a small sailboat with a blue cover is visible on the water. The foreground shows a rocky shoreline with large, moss-covered stones. The water is clear, revealing the rocks beneath the surface. On the right side, there are green trees and foliage. The overall atmosphere is peaceful and serene.

Thank you!

28.08.2011 12:11

