Degradation leading to Depletion of Our Biosphere – Would SDGs help nourishing the Biosphere?

KNOW MORE TO ACT, NO MORE NEGLECT

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SD Goal 6: Clean water and sanitation

- **Water scarcity affects more than 40 percent of the global population, and that figure is projected to rise.**
- **2.6 billion people have gained access to improved drinking water sources since 1990, but 663 million people are still without.**
- **Each day, nearly 1,000 children die due to preventable water and sanitation-related diseases.**
- **Women in sub-Saharan Africa collectively spend about 40 billion hours a year collecting water. This significantly impacts their employment opportunities.**
- **2.4 billion people worldwide do not have access to basic sanitation services like toilets or latrines.**
- **80 percent of wastewater from human activities is discharged into waterways without any pollution removal**
- **Many thousands of birds and animals die everyday due to lack of water, fodder and food and heat**

- **Should we be proud of virtual water?**

SD Goal 13: Climate action

- From 1880 to 2012, average global temperature increased by 0.85°C.
- The Arctic's sea ice extent has shrunk in every decade since 1979, with 1.07 million km² of ice loss every decade.
- From 1901 to 2010, the global average sea level rose by 19 cm as oceans expanded due to warming temperatures and melting ice.
- Greenhouse gas emissions continue to rise and are now more than 50 percent higher than their 1990 level.
- For each 1 degree Celsius of temperature increase, grain yields decline by about 5 percent.
- Since 1970, the number of natural disasters worldwide has more than quadrupled to around 400 a year.

How the terminologies have changed in the last 20 years?

- Climate change
- Climate management and adaptation
- Climate neutral
- Climate action
- Climate mitigation and resilience
- Climate crisis
- Climate victims and Climate refugees
- Climate emergency
- Climate catastrophe
- Climate collapse

SD Goal 14: Life Below Water

- The ocean covers three quarters of the Earth's surface and represents 99 percent of the living space on the planet by volume.
- The ocean contains nearly 200,000 identified species, but actual numbers may lie in the millions.
- As much as 40 percent of the ocean is heavily affected by pollution, depleted fisheries, loss of coastal habitats and other human activities.
- The ocean absorbs about 30 percent of carbon dioxide produced by humans, buffering the impacts of global warming.
- More than 3 billion people depend on marine and coastal biodiversity for their livelihoods.
- Globally, the market value of marine and coastal resources and industries is estimated at US$3 trillion per year, about 5 percent of global GDP

Emerging threats in the ocean:

- Spread of ocean dead zone
- Rapid depletion of Oxygen level in oceans
- Spread of dead sea due to increasing level of salinity

SD Goal 15: Life on land

- Around 1.6 billion people depend on forests for their livelihoods.
- Forests are home to more than 80 percent of all terrestrial species of animals, plants and insects.
- Worldwide, 2.6 billion people depend directly on agriculture to earn a living.
- Of the 8,300 animal breeds known, 8 percent are extinct and 22 percent are at risk of extinction.
- Up to as 80 percent of people living in rural areas in developing countries rely on traditional plant-based medicines for basic healthcare.
- Of the more than 80,000 tree species, less than 1 percent have been studied for potential use.

Stunning information

Humans constitute just 0.01% of all life on earth
but have destroyed
83% of wild mammals – study
(The Guardian, Mon 21 May 2018)

SDGs 6, 13, 14 and 15 are interwoven

In simple terms, these SDGs signify the rudiments of protecting our biosphere, namely,

- **land**
- **Water**
- **Sea**
- **Climate action**
- **Please remember, these elements of biosphere do not act in isolation; they have a very close interaction among them. Also play a very critical role in contributing to the lives and livelihoods of people**
- **This simply means that distortion or disturbance to this biosphere beyond a critical level would be disastrous or even be catastrophic**

The most fundamental questions:

- Overall climate is changing, monsoon conditions are becoming erratic, What happens if the overall, a given water cycle is disturbed and so the occurrence of extreme events such as droughts and floods and with more intensity

- Are we prepared for it?

- To what extent have we understood and prepared to handle even the normal monsoon and climate conditions?

- Would it mean that we utterly lack to understanding and preparedness for the changing climate and monsoon conditions?

- Do we any idea on what is called “increasing atmospheric and ecological stress”??

Impacts of Climate Change

- Rising Sea Levels – 44 cm by 2070 (IPCC V AR); This estimate is now considered conservative

- 5-9 m when world 2 deg warmer (Paleo-climatic studies)

Implications:

- **Increased coastal extreme events**
- **Coastal flooding**
- **Seawater invasion and intrusion**
- **Sea erosion**
- **Climate refugees**
- **Loss of coastal wet lands, estuaries**

ATMOSPHERIC COLLAPSE

Global Footprint Day – just passed July 29th!!!!

Atmospheric oxygen depletion and toxic emissions remain the greatest environmental threat to what is called Operational Atmospheric Collapse (OAC).

OAC is currently predicted for mid-November 2065

After 2065, life is possible only in sealed structures

This is the global context in which we need to discuss the Chennai city's or Tamil Nadu's conditions and preparedness for resiience

Current Scenario

Competitive politics, competitive populism, competitive markets
The whole economy, polity and society center around Growth and Development
Net result:

- Rapid urban expansion
- Massive industrialization
- Uncontrolled rural-urban migration and conversion of rural poverty into urban poverty
- Enormous rise in demand for land and fast diminishing urban space
- Swift, mindless and unscientific changes in land use

Growth and Development directly depend upon the given biosphere, ecosystem services and endowment of natural resources (natural capital)

Do we ever acknowledge this fact?

Some of the key natural resources such as Forests, small water bodies, estuaries, brackish-water lakes and creeks, mangrove forests, groundwater depletion, soil moisture, wet lands and so on are fast disappearing and depleting

PARADOX - Technology driven, Growth and Development

The United Nations World Water Development Report 2015 alerts:

"The consequences of unsustainable growth, unsustainable development pathways and governance failures have affected the quality and availability of water resources, compromising their capacity to generate social and economic benefits".

This is precisely the crux of the issue which needs to be seen in the context of growing consumerism in India, where the middle and upper middle class population constitute over 700 millions – Alarming!!!!

The Prime Minister of India while addressing the Fifth Governing Council Meeting of Niti Aayog said "**Goal to make India a 5-trillion-dollar economy by 2024** is challenging, but achievable, with the concerted efforts of States".

I am nervous about this statement: Let us not get into the debate whether or not it is achievable, but let us first worry about sustaining the current 1.78 trillion dollar Indian economy's current growth rate at 6.4% and maybe, try pushing it little further up to 7%. Indeed, even this modest task is going to be challenging given the current and escalating water stress being confronted in the economy and the rate at which our bio-sphere is getting degraded

Utility of demographic dividend

The key question that needs to be addressed in this context is,
Whether, we are in a position to reap the benefits of demographic dividends?

The doubt arises particularly because of increasing unemployment along with depletion of natural capital at an increasing rate – ***our ecological footprint indicator is red***

State Action Plan on Climate Change

Towards Balanced Growth and Resilience

Government of Tamil Nadu, 2013

The focus areas identified were

- *Water Resources*
- *Coastal Area Management*
- *Sustainable Agriculture (and allied sectors)*
- *Forest & Bio-Diversity*
- *Sustainable Habitat*
- *Energy Efficiency*
- *Renewable Energy*
- *Knowledge Management*

What we need are

- ***Livelihood security***
- ***Food security***
- ***Water security***
- ***Health security***

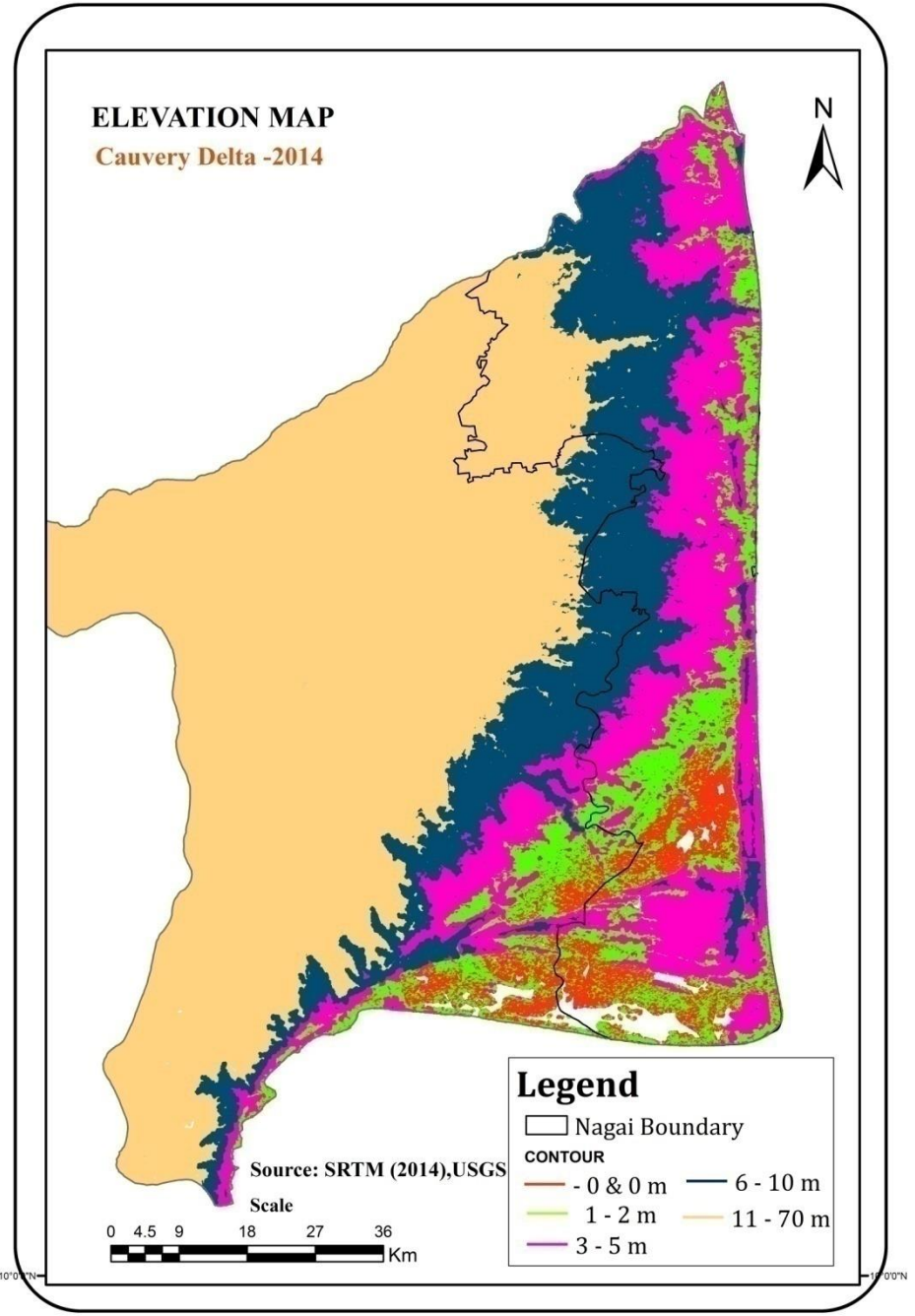
Divergence between theory and practice

Quick Examples:

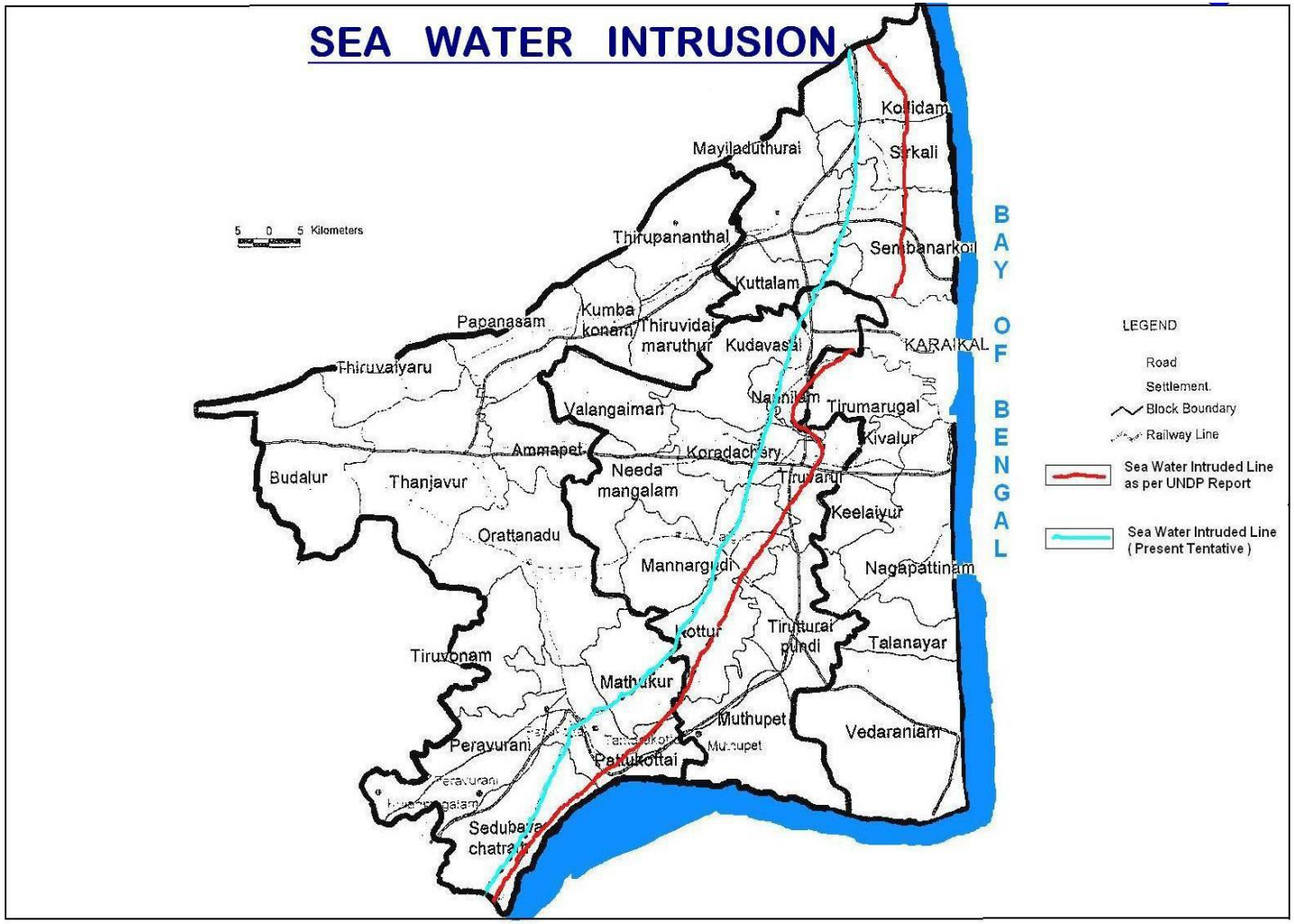
- Cauvery delta – food security, wetland management, sea erosion, land use change and overall vulnerability
- Climate Change, Groundwater regime and economy
- Haphazard land use changes leading to distortions in land and water scape
- Chennai floods 2015
- Droughts in Tamil Nadu 2016, 2018, 2019
- Urban landscape, urban fundamentals and urban floods
- Kerala floods 2018, 2019
- Floods in Karnataka 2019
- Drought in Tamil Nadu 2019

Elevation levels in the delta districts

Source: SRTM (2014), USGS



Seawater intrusion in the Delta Districts



Source: Cauvery Delta Modernization Plan 2008 - printed in. Support to the National Water Mission NAPCC Appendix - 4 Cauvery Delta Sub Basin, p.30

Climate Change and Groundwater regime

Another important cause of worry but never taken into account seriously is the declining groundwater conditions

The depletion process has set to begin in many parts of India which may lead to desertification process if unchecked.

The Indian states of Tamil Nadu, Rajasthan, Gujarat, parts of Maharashtra, Punjab, and Haryana will be the worst affected where the extraction is hugely high compared to what is recharged.

India's groundwater economy at the moment is in a serious state of condition. Groundwater contributes to over 70% of gross irrigated area, 80% drinking water needs and 90% of industrial water needs in India.

One need not wait for the climate change to see the negative impact in the groundwater economy of India but it is already in a critical state of condition. If unchecked, the climate change will have a devastating impact on Indian economy and growth prospects

More you pump, more energy do you use only to add to CO_2 emissions while at the same time contributing to depletion of not only GW and also soil moisture leading to desertification

KERALA FLOODS

Is there a fundamental causal link between land use changes and floods?

The available data suggests yes

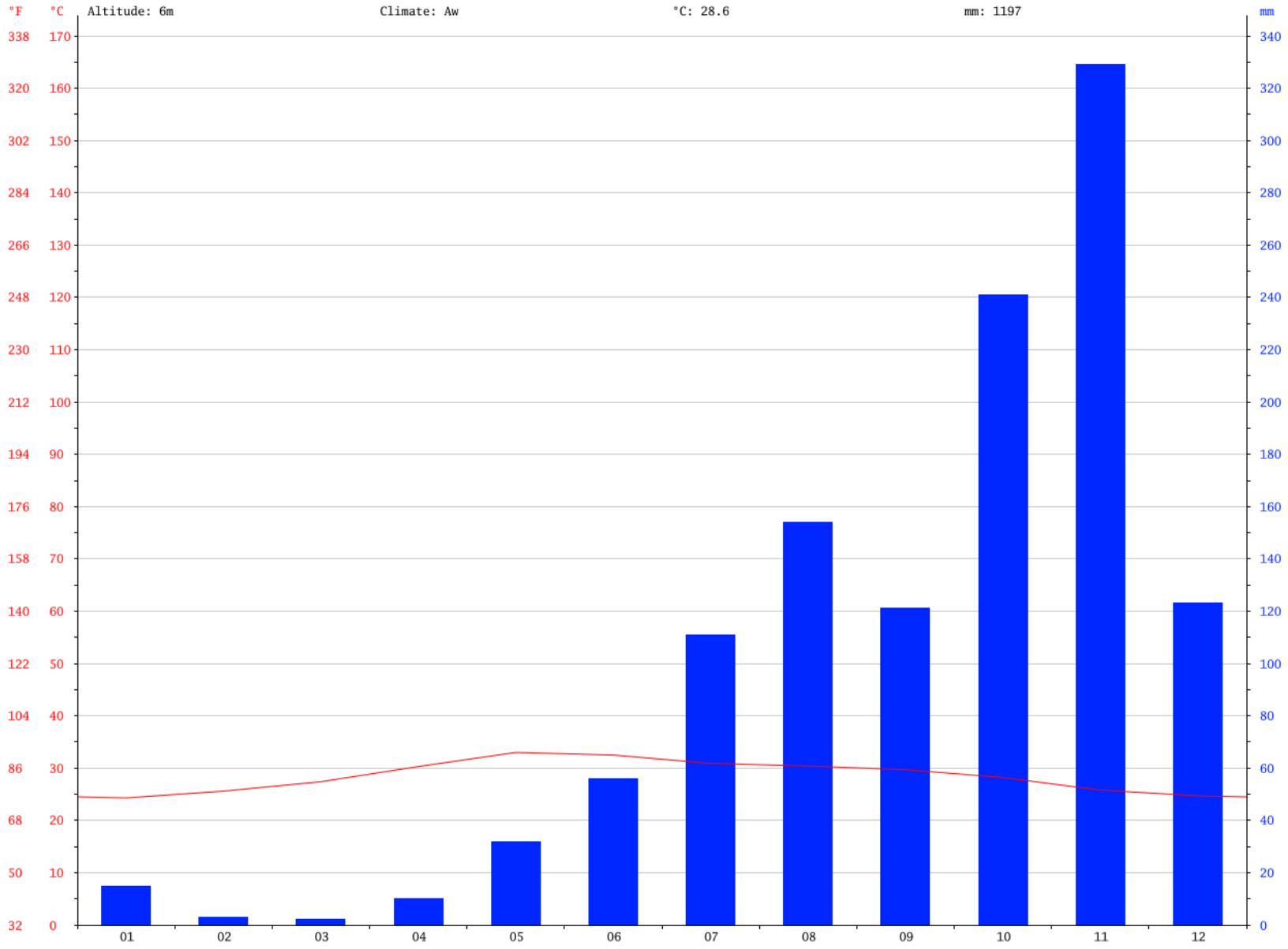
The Kerala disaster 2018, 2019 are the clear testimony – it's manmade

How fabulous, important and extra-ordinary the Western Ghats is? Some of the reasons why we should respect the Western Ghatts:

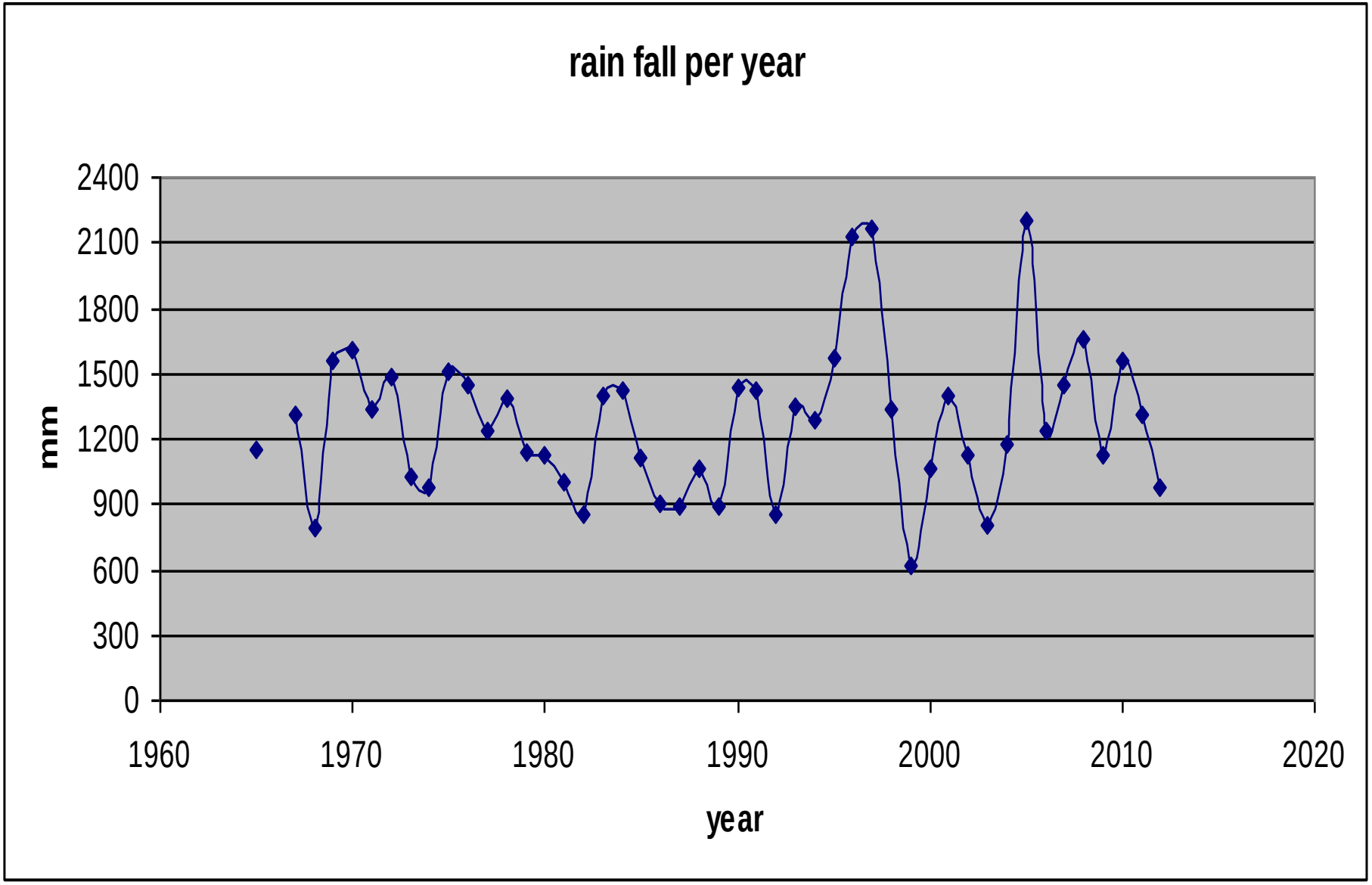
- The Western Ghats, which is regarded as the **Water Tower of South India**, runs over a length of 1600 KM, covering a total area of about 160,000 sq km
- Western Ghats is one of the ecologically very sensitive zones in South Asia and one of the richest hot spots in the world for bio-diversity
- This is also the place where all the crucial rivers of South India originate – such as Cauvery, Krishna, Godavari, Periyar and numerous others
- Three of the world's Ramsar Conventions listed wetlands – Lake Sasthamkotta, Ashtamudi and the Vembanad-Kol —are in Kerala
- Kerala's rainfall averages 2,923 mm (115 in) annually
- Rainfall in some of Kerala's drier areas the average rainfall is 1,250 mm (49 in); But the mountains of the eastern Idukki district receives more than 5,000 mm of rainfall annually.

URBAN LAND AND WATER SCAPE – THE CASE OF CHENNAI FLOODS 2015

Chennai - Climate and Weather Graph - Do we ever respect it?



Average annual rainfall at Chembaramabakkam, Poondi, Red Hills and Cholavaram, 1965-2012



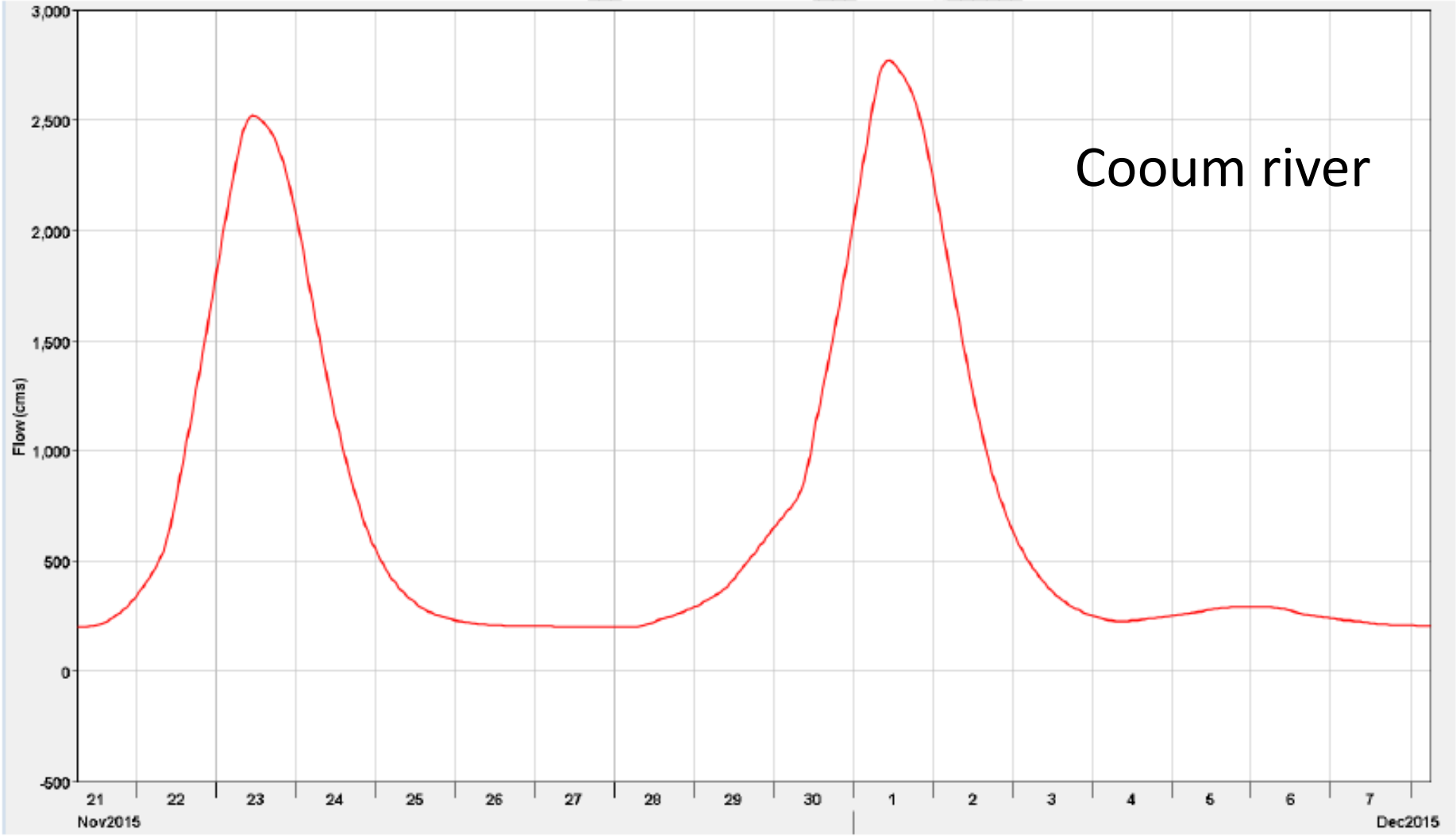
Source: CMWSSB

Fundamentals of urban world

- MEASURE AND UNDERSTAND LANDSCAPE
- Density of drainage
- Upstream and downstream water sheds and ecology
- Understand the Hydro-geography

- Elevation
- Maintaining the given slope and gravity

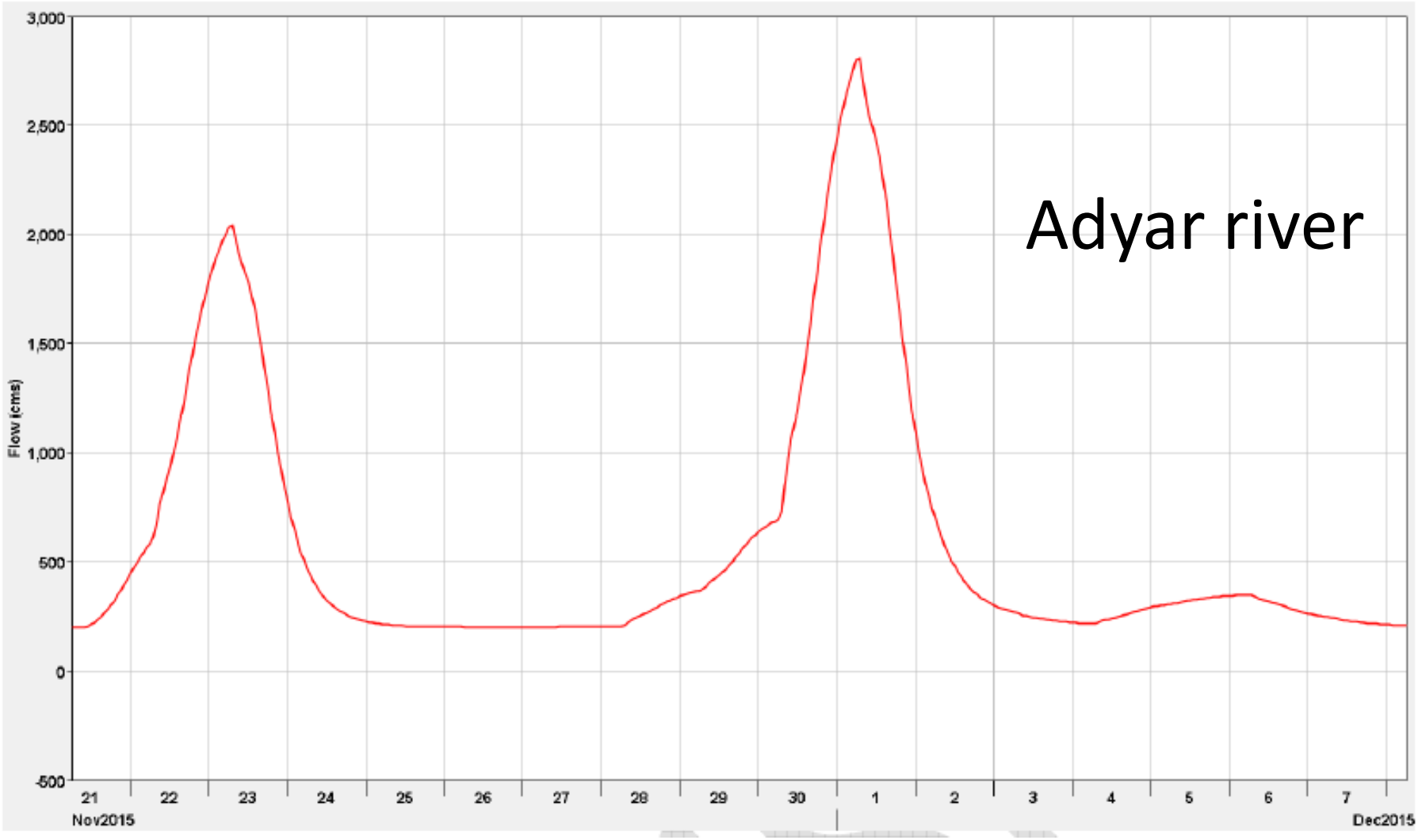
- Ecological hot spots



Computed flood hydrograph of Cooum River

Source: NRSC/ISRO: Hydrological Simulation Study of Flood Disaster in Adyar and Cooum Rivers, Tamil Nadu, 2015

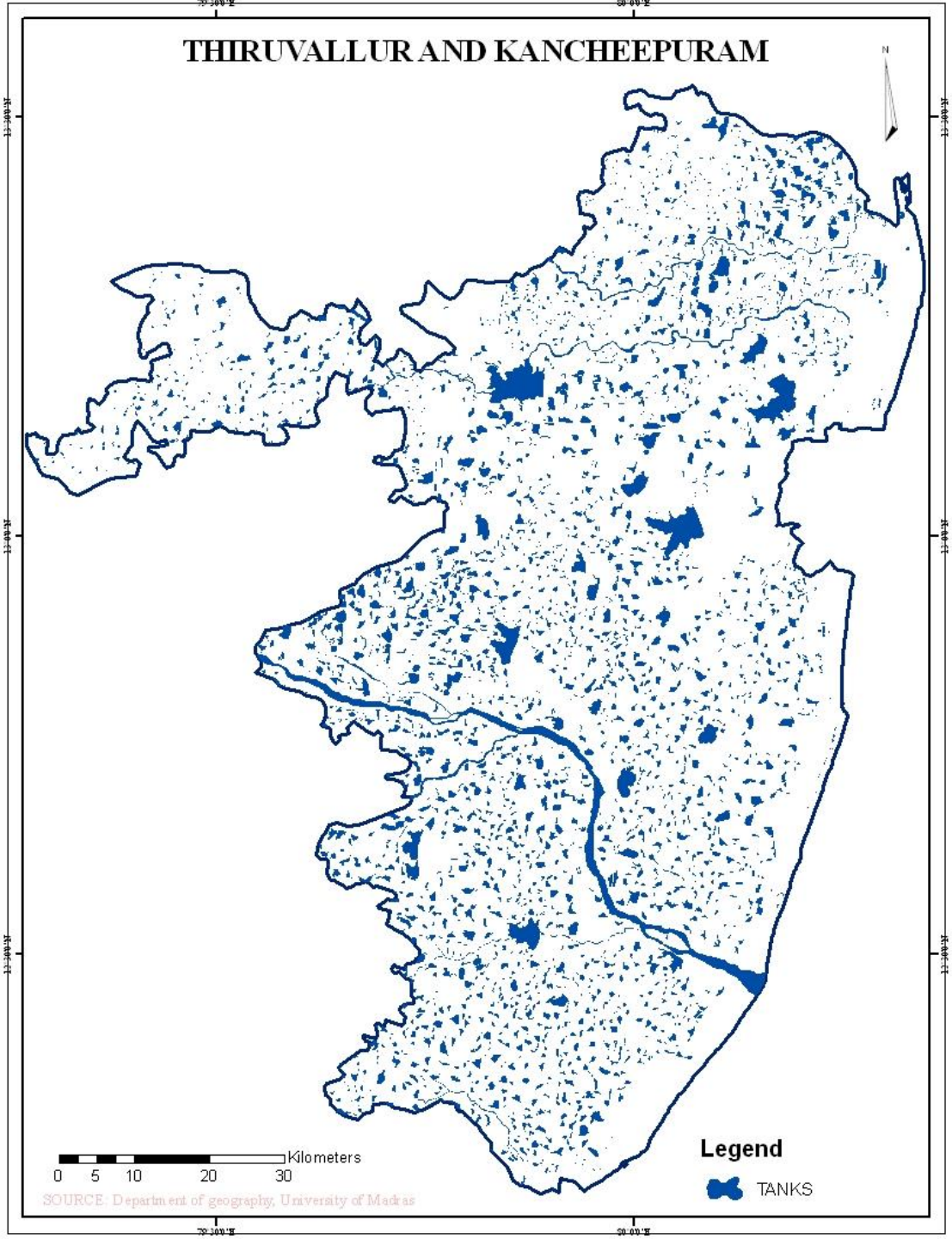
Maximum carried was 2800 cub meters which is 98,881 cubic feet/sec



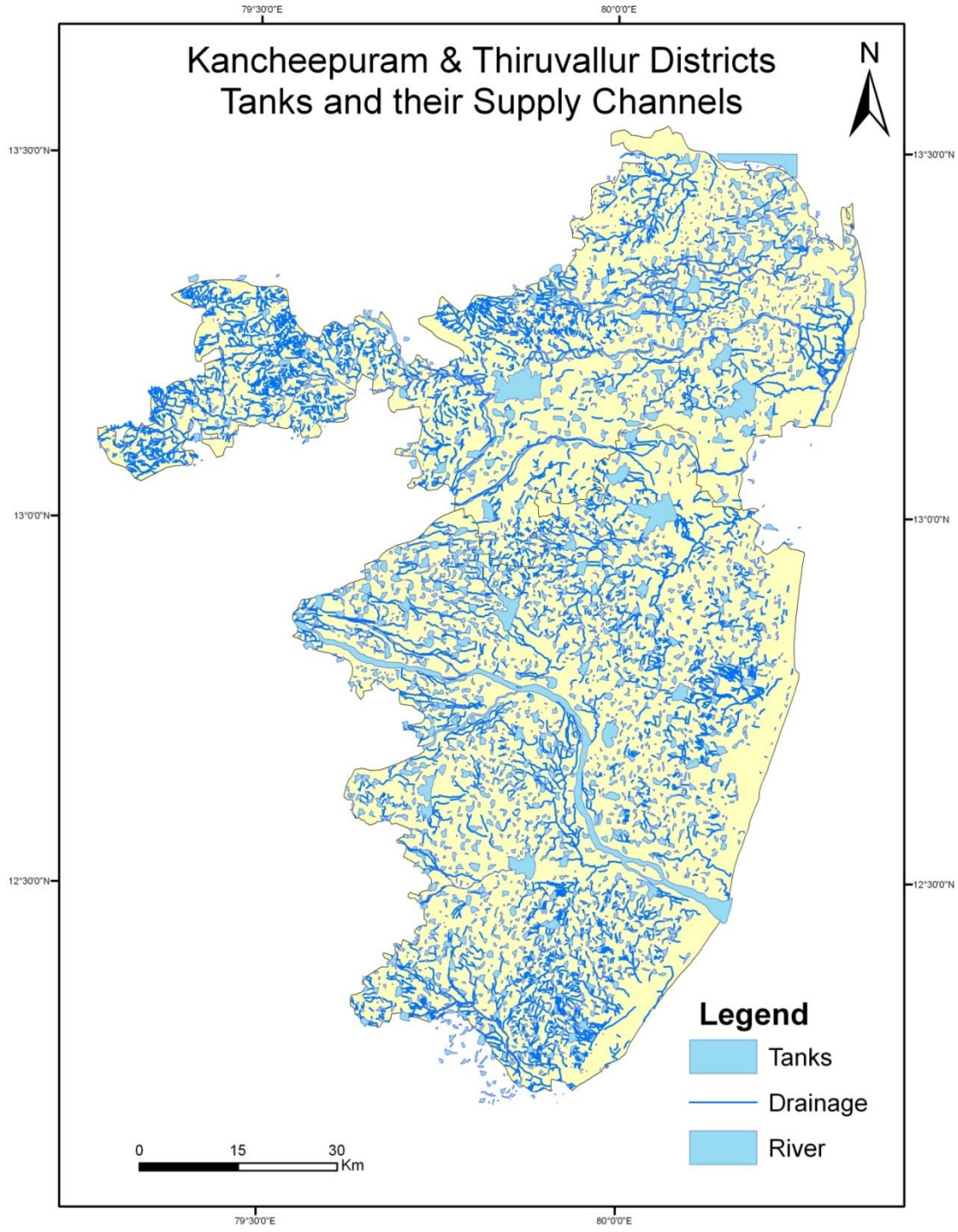
Computed flood hydrograph of Adyar River
Source: NRSC/ISRO: Hydrological Simulation Study of Flood Disaster in Adyar and Cooum Rivers, Tamil Nadu, 2015

1 cubic meter is 35.3147 c.ft and the maximum carried was 2850 cub meters which is 100,647 c.ft / sec

UPSTREAM – DOWNSTREAM WATERSHEDS



WATER BODIES IN TIRUVALLUR AND KANCHEEPURAM DISTRICTS



DRAINAGE MAP OF TIRUVALLUR AND KANCHEEPURAM DISTRICTS

So called severest drought in Chennai and in Tamil Nadu

Rainfall in the year 2018:
Chennai – 754 mm
KPM – 833 mm
TVR – 733 mm

Compare this figure with the average annual rainfall of Bengaluru (860mm) and Jaipur (550mm)

This is the overall context in which we set our goals:

- *To achieve water secure India / South India*
- *To participate in the nation building by way of contributing towards Sustainable Development*
- *To contribute positively to*
  - ***Carbon foot print***
  - ***Water foot print***
  - ***Ecological footprint***
- *Knowledge creation and dissemination for overall welfare*

Our immediate Commitments

- To emphasize and take forward the message that water is the key input without which no developmental /economic / social activity is possible
- Building multi-stakeholders' platform for knowledge creation, bringing together science, technology and practice together
- To develop an action plan in order to achieve the larger goal of sustainable development and nation building
- To highlight and emphasize the fact that "the business as usual" for industries is not going to be possible anymore; Need to be more proactive to live in harmony with the endowed biosphere

And,

Our slogan should remain

"be water positive"

Building Multi-Stakeholders' Platform (MSP)

The key stakeholders with whom the CII and industries should develop cordial working relationship are

- Government (the elected representatives) and bureaucracy
- Academic institutions / researchers
- Farmers and farmers' associations
- Urban water users (Residents' welfare associations, Builders' associations)
- Urban designers, architects layout developers
- NGOs
- Youth clubs
- Others

Some of the key issues that we would like to pick up for policy intervention are the following:

- Create awareness of the changing rainfall and monsoon conditions
- To stress the criticality of rainfall accounting, water accounting / budgeting and water audit protocols
- To emphasize the critical need for measuring water footprint for all water users
- To enhance water use efficiency and increase productivity per unit of water
- The paramount need for groundwater recharge
- To work towards resilient villages and resilient cities
- To work towards achieving zero liquid discharge in a finite time
- To promote non-conventional energy generation and use
- Green belt development, 10% of land area be reserved for tree cover and water saving measures
- To make rain water harvesting compulsory in every household in urban areas and in industry
- To make every industry aware of the need for recycling the waste water generated (promoting the concept of own your waste) and to emphasize the need for **being water-positive**

To sum up

The whole idea of this Working Group are,

“To emphasize on taking a departure from the business as usual approach”

“To find and stimulate climate resilient and sustainable pathways in order to promote sustainable growth and overall welfare level of the economy and the people of this country”.

Thank you