

Impact of urbanization on rivers of Chennai

KAVITHA. A.

Abstract:

Water has become the fundamental requirement for people across all cultures and regions not just for drinking or cleaning purposes but for ritual or recreation people seek water's edge. While reading the record of civilization the events and developments that have occurred along the world's coasts, rivers, bays, and lakes depicts the involvement and importance of water bodies.

It is quite amazing, and interesting to ponder on the numerous characteristics of this single body called 'water'. Water – a solvent, Water – a cleanser, Water – Quencher of thirst, Water – a coolant, Water – a compound from which every organism is created.

Most of our activities have had an inseparable impact upon the Rivers. We depend on these water bodies for transportation and commerce, to carry goods, provide food and other substances across nations, and, to carry away our wastes. Centuries of such water treatment have shown their effect most acutely on urban rivers. Many communities in the past began to observe urban waterfront areas as possible assets rather than treating them as valuable resources.

This careless attitude amongst people started to wide spread across different places at different times leading to major deterioration and pollution of these resources.

Objective: This paper involves in study of urban rivers which was once a natural source for drinking and other activities now because of urbanization it had turned in to a drainage ditch. The focus is more on the reasons for the transformations, their impacts and some design solutions with River Cooum as a case.

Key words: Urbanization; impacts on rivers; transformations of water ways; pollution of urban rivers; Cooum River.

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1. Introduction:

Water which was considered as the elixir of life has now become a commodity where people need to pay even for a glass of water. Water is the major environmental issue of the 21st century; all other concerns are much lighter in comparison.

As we know, 98% of water on the planet is available as saline in the oceans and therefore unusable for drinking. Fresh water is naturally negligible to only 2%, of which the majority is in the form of glaciers and polar ice caps. Roughly, 0.36 % is in underground aquifers, and about the same makes up to our land bodies like lakes and rivers. Though our earth is surrounded by water, the usable portion is very minimal. With the constant increase in population, researchers say that the water resources cannot suffice this huge mass of people and that it will become even scarcer in near future.

Another point to be noted is, this huge demand for water has drastically changed the water quality because of excessive pollution on the available water.

In today's context people interpret rivers as a carriage where they dump all the garbage and let out sewers into the waterways.

It falls as an obligation of every citizen to strongly reconsider on this current issue, the oscillation between the past, present and what is about to come.

2. Importance of rivers through ages:

Through the ages the role of rivers were considered vital for many reasons like,

- Evolution of civilization
- Spiritual & religious
- Recreation & ecotourism
- Aesthetic
- Educational
- Sense of place
- Cultural heritage

Apart from the use for

- Food and
- Fresh water , the multi uses of rivers are
- Hydro electric power
- Irrigation -eg. Damodhar valley, Mettur dam etc

- Transport - *Buckingham canal, etc*
- Fertile alluvial soil - *agriculture along the river banks*
- Tourist attraction - *Venice*
- Domestic uses- *drinking , washing etc*
- Industrial use - *river water used for cooling its machines*
- Rivers as natural boundaries between countries - *the Mekong River separates Laos from Thailand*

2.1. Based on the different uses of rivers, the outlook of the riverfronts changes as,

2.1.1. Commercial,

When Water had become a commodity, the river fronts had obviously become a commodity.

2.1.2. Cultural,

As part of the beliefs and practices followed by the people in most of the religions, waterfronts serve as a dwelling place for the socio-cultural activities.

2.1.3. Educational & environmental,

Rivers provide habitat to many plants, animals and even human beings. Studies and Researches on river ecosystem emerge out to understand its complex and changing environments. It also helps to explain why human activities can have more drastic effects on water quality and animal life.

2.1.4. Historic,

Epics, poems and historic events have showcased on many river fronts in a dynamic way by calling "Water as the elixir of life"

2.1.5. Recreational,

Spending leisure time on the water bays is a common practice in recent urban waterfront developments. Wherever fences are cut open or when private waterfront land is crossed, this desire is made physically apparent. Whether for fishing, swimming or even for excretion, our intrepid urban dwellers walk towards the nearby water bodies to contaminate it despite the erected barriers.

KAVITHA. A, *Landscape Architect & Assistant Professor, Department of architecture, School Of Architecture And Planning, Anna university, Chennai-25, Tamilnadu, India.*

2.1.6. Residential,

“We have a priceless beauty spot in our river and could easily make it so that homes and even business places would be remodeled to face the river instead of having their back doors to it. The plan drawn up proposed to build stairways down to the river bank... and to place benches there for the use of the public.” Robert H.H.Hugman on the Paseo del Rio, san Antonio, 1935.

2.1.7. Working & transportation.

Due to the high demand in trade and transport, our local waterways are changing, the old bridges are replaced with new ones - and the structures being built and moved, change our perceptions while traveling along it. There are many changes taking place in and around our local waterways.

3. Transformations of riverfronts:

When compared to the past, the present status of riverfronts has transformed or deteriorated because of one main invasion which is “urbanization”. By definition, change means to give a completely different form or appearance to, but progress suggests forward movement or advancement. Many of these changes are fine, as long as it means progress but in vain.

4. Causes for transformation:

When the natural process of the river water cycle is altered it results in lots of transformations in the river and also on the riverfront.

- When the natural terrain is altered (encroachments on the water catchment area) - water flow is interrupted and so water stagnates.
- Percolation of water does not occur because of non permeable surfaces in the urban zone.
- Excessive tapping of water and less percolation rate reduces the water table in the river.
- Desire and high demand to accommodate more buildings.
- Illegal sewage outfalls; illegal dumping of building rubble, debris; open air defecation
- Population growth; densification; slum development

- Lack of political will, co-ordination among institutions, inability to solve environmental problems, improper/ inadequate management, poor planning, lack of public awareness and knowledge.

4.1. Flood plain and flood way:

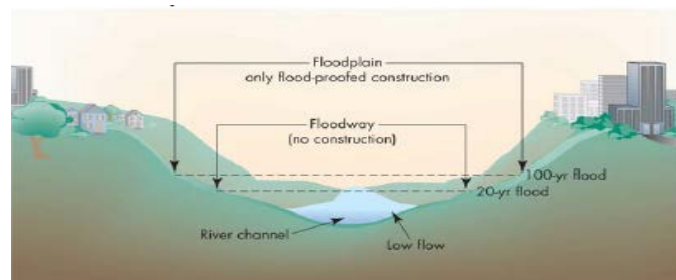


Fig. 1. The flood way and the flood plain is the area next to the river channel, which floods during monsoon and also known as riparian zones.

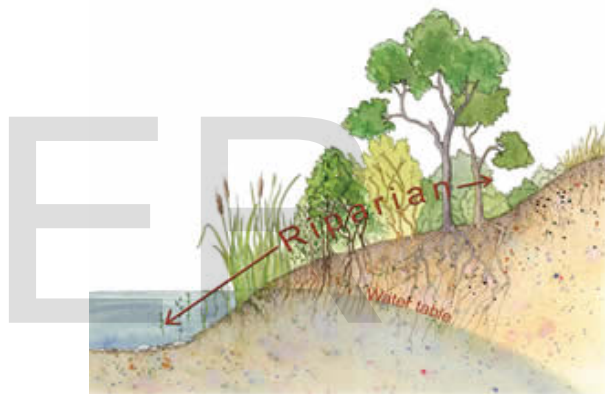


Fig.2. When the riparian zone is altered because of people's intervention in the name of development and urbanization, without proper knowledge of the ecosystem, then it is harmful to such ecosystem.

4.2. River water-hydrological cycle:

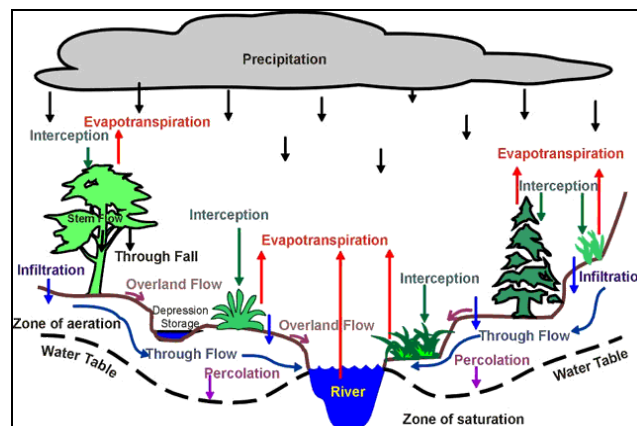


Fig.3. Natural process of a river showing hydrologic cycle

A river which is nourishing in terms of its hydrological cycle enriches the 3 main ecosystems namely the aquatic (water ecosystem), riparian (water and land and the upland (land).

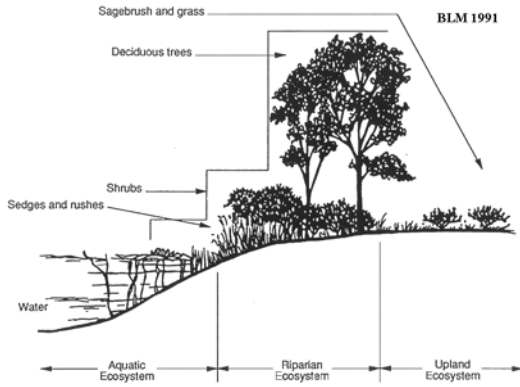


Fig.4. Different ecosystems along the banks of a river

5. Urban River estuaries:



Fig. 5. Adyar Estuary, Chennai - Impacts of urbanization

Places where ports exist at the mouths of large rivers which join the sea." They are the outfall regions of the river, making the transitional zone between the fluvial and marine environs. Most of the great metropolitan cities of the world have developed around the estuaries.

A large proportion of our populations in urban regions live within 100 km from the coast, including on the shores of estuaries. The urban development is upsetting the natural balance of estuaries thereby threatening their health. We cause danger to our estuaries by polluting the water and by building on the lands surrounding them.

6. Case of an urban river in Chennai- River Cooum

The River Cooum, once a fresh water source is today a drainage course collecting surpluses of 75 small tanks of a minor basin. The length of the river is about 65 km, of which 18 km, fall within the Chennai city limits. This was once a Fishing River & boat racing ground and now has borne the "gift" of the city's unplanned-ignorant exploitation. The upper catchment area which lies in the

rural zone (32km) is still utilized for agriculture and for water supply. Whereas the peri urban (24 km) and urban zone (16km) suffer in great water pollution through solid waste dumping and encroachments.

In a dry season, the river is found contaminated with polluted water discharged by Chennai water Board (from ETP) and by a large number of surrounding industries -- About 30 per cent of the untreated sewage gets into the Cooum river.



Fig.6.Cooum river estuary – cooum mouth has become a deposit creating breeding ground for mosquitoes and dangerous diseases.

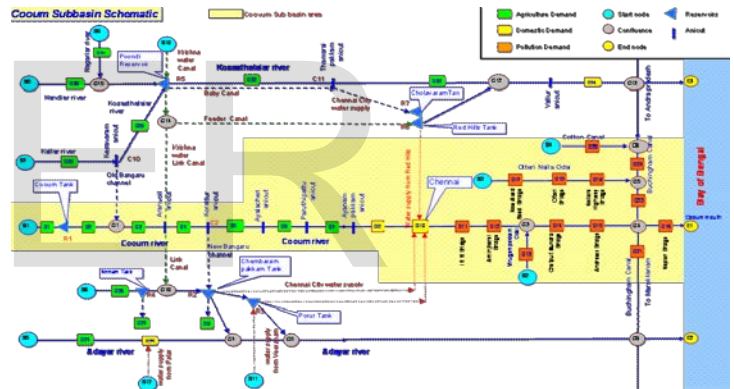


Fig. 7. Schematic layout of the Cooum River showing the water quality in different zones like the urban, periurban and rural zones.

The rural and peri-urban zones are not affected by urbanization hence water remains pure and is used for many domestic purposes whereas the urban zone is highly polluted and water flow is stopped because of encroachments and excessive sewage.

6.1. Present status of Cooum River...

- Famous for its Historical background but notorious for its stench.
- Infact, the name "Cooum" is nowadays pronounced by people only for mockery in relation to its bad state.

- Coom is presently a river spoiled by filth and pollution and the water quality is considered to be highly toxic and completely non-potable.
- The 2004 tsunami cleaned the mouth of the river - but the pollution is back within a short period.

6.2. Results of transformation:

When compared to the past, the present status of coom has transformed a lot during the course of time, the major transformations are ...

The ill effects of transformations are,

- CHANGES IN WATER QUALITY - potable water into toxic and non potable.
- CHANGES IN WATER USAGE - waterways turned into sewage dumps.
- CHANGES IN AESTHETICAL QUALITY - now as an eyesore.
- LAND USE CHANGE - when river fronts are not user friendly.
- Increase in POLLUTIONS - sewage, sullage etc.
- Leads to many HEALTH HAZARDS.
- SLUM DEVELOPMENT AND ENCROACHMENTS along the banks of the river.
- INCREASE IN INDUSTRIALIZATION decreases the alertness towards protecting the natural beauty.
- A river stretch which was once considered as the "REACHING SALVATION", NOW ACTS AS A DRAINAGE DITCH.
- Once LEISURE BOATING activities took place but now it is unpleasant to even imagine boating there.

6.3. Problems in Urban zone:

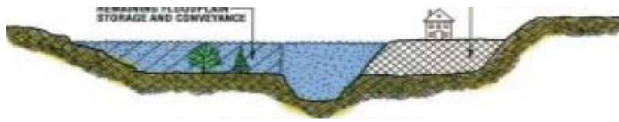
- Basically an urban sewer -Acts as an eyesore within the city limits.
- Illegal encroachments along banks of the river.
- Non -coverage by the sewerage system of approx. 30% of the population along the banks of the coom.
- Flooding and overflowing during monsoon; slow flow and stagnation (dry season)

- Blockage by sandbar resulting from littoral drift at the mouth, no free flow to the sea. The river bed level at mouth is below mean sea level.(#-1.0m)
- Heavy pollution load- high BOD, low or nil DO, high SSC.
- Illegal sewage outfalls; illegal dumping of building rubble, debris; open air defecation
- Population growth; densification; slum development
- No tourism and recreation- no walkways, lawn, gardens, parks: unsafe for pleasure boating, bathing, swimming, fishing; denial of sustainable tourism asset.
- Lack of political will, co-ordination among institutions, inability to solve environmental problems, improper/ inadequate management, poor planning, lack of public awareness and knowledge.
- Land values near coom are depressed.

6.4. Solutions and guidelines...

- Rehabilitation of the encroached areas.
- Proper planned sewerage system with interceptors to collect the sewers and pump it to the STPS.
- Strict enforcement of laws against illegal sewage outfalls.
- The land use along coom can be changed by selling to public private partnerships for river front developments and to avoid any future encroachments.
- Through River front developments tourism and recreational facilities can be improved.
- Proper gradient to be maintained for easy flow of water and adequate dredging and desilting measures to be taken to avoid stagnation.
- Strict rules to control and stop pollution to the river.
- Measures like bioremediation techniques can be adapted to decolorize and de-odorize the existing water.
- Mouth of the river should be widened and measures to desilt the sand bars like groynes.

Fig.8. Fill reduces flood plain storage and conveyance -Remaining floodplain storage and conveyance



6.5. Design Interventions . . .

6.5.1. At policy level ...

Regenerating the Coom- An important natural element of Chennai's urban landscape.

6.5.1.A. Parallel to the river:

Extension of landscape along the river to protect the riparian zone from having a continuous link all along the river.

6.5.1.B. Perpendicular to the river:

Selected zones of river edge development that brings in accessibility and usability across the river to form an intermediate link with river.

Fig. 9. Coom river zones of intervention



6.5.2. At zone level:

- Desiltation and sludge removal to maintain the slope of the river for easy flow...
- Restoration of water bodies for resolving the problem of water source to river in urban areas ...
- Conservation measures for existing water bodies/tanks of coom sub basin...
- Urban reuse of water bodies-
- Proposals along the river to stop future encroachments
- To create as urban ecological and recreational zone

7. Conclusions:

Is it impossible to sustain industrialization and urbanization development without compromising with our rivers and water resources? By definition, change means to give a completely different form or appearance to, but progress suggests forward movement or advancement. I

think I am okay with many of these changes, as long as it means progress. Saving living creatures and taking out old rusty, broken or dangerous structures and replacing them with modern, state of the art technology or an attractive village, well, I'd call that progress.

Any advancements along with saving the nature's potentials is what I truly call as progression and not otherwise.

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