**DECENTRALISED SEWAGE TREATMENT WILL SAVE INDIA’S RIVERS**

* **Urbanization is the most important factor causing degradation of regional water regimes.**
* **Why systems based on conventional centralised STPs are destined to fail?**
* **How can decentralization of treatment avoid the pitfalls of conventional STPs?**
* **How would the alternative decentralised treatment system work in practical terms?**
* **Urgent need to pinpoint unplanned Urbanization as the single most important factor responsible for degradation of regional water regimes (and environment as a whole)**
* **How can ecologically conscious planning and management of cities reverse the tide of wholesale degradation of Nature?**
* **What roles should different stake-holders play?**

**How does urbanization adversely affect water regimes of river basins?**

Cities claim huge quantities of water. This water is brought to them from distant rivers. Inter-basin transfer of water and river linking is already taking place at many places for this particular purpose without adequate debate at policy levels. Flow of the river from which water is extracted is thus adversely affecting lives of the people living on their banks without taking them into confidence,

Domestic use (mainly for urban areas) is the first priority as per the water distribution policy of the government. Therefore water which was originally stored irrigation is diverted to cities, affecting the agricultural production as well.

In the cities the water brought from long distances is made potable and supplied to the citizens. Citizens use this water for just one use in a city like Nagpur and thereafter the ‘waste-water’ flows into the sewer system. Water brought from long distances and cleaned to a potable level thereafter becomes a source of pollution. This water makes even the smallest rivers like Nag, Pili, Pohra and Dhora (which were not perennial rivers) to flow round the year, while long stretches of perennial rivers like Pench and Kanhan dry up due to dams and over-extraction.

75-80% of pollution load in the rivers is urban sewage. Anyone can observe that after passing in the vicinity of a town of city, every river has been polluted in this manner. Downstream rural areas are worst affected by this because they have no capacity to treat this highly polluted and toxic sewage.

Authorities have been trying to address the pollution problem by the conventional centralised sewage collection (sewer lines) and treatment system by installing huge Sewage Treatment Plants (STPs). However due to inherent flaws in the system, this approach has not succeeded.

**Inherent flaws and serious limitations in the systems based on conventional centralised STPs:**

1. Raw domestic sewage is comparatively easy to treat (especially if there is two pipe system separating gray and black water). Allowing domestic wastewater to mix with other pollutants in the sewers or open drainage channels makes treatment impossibly complicated and extremely costly.
2. STPs become production centres of highly toxic and resistant varieties of bacteria and viruses; which are provided with the ideal environment to become resistant to dissolved and diluted medicines, which then flow downstream into the rural areas.
3. STPs are supposed to be built at the downstream edge of the city; but the city very quickly grows beyond the STP location as well as into un-connected basins. For example, in Nagpur the City has already grown beyond Bhandewadi and Pardi and beyond other locations where STPs are located. The City has already started growing in the catchment areas of Wena, Kolar and Kanhan rivers, where no STPs are proposed.
4. Since sewage collection is the costliest factor in centralised sewage treatment, rivers, rivulets and tributaries within the city which are used as ‘drainage’ channels in a ‘planned’ manner.
5. It is impossible to lay a fool-proof system of sewage collection where every drop of sewage can be directed towards STP locations; because various parts of the city lie in different watersheds and have varied kind of land uses and built forms. Large part of sewage therefore continues to flow through various channels without any treatment.
6. Along all these channels, sewage seeps into the groundwater, for which there is no treatment.
7. Since measures to treat the sewage within the City are not taken up, there is no water being recycled and reused within the city. The treatment takes place at the edge of the city, and recent improvements in technology (SBR) have been introduced because it suits theft by the power plants.
8. Condition of the river does not improve in the slightest; all the untreated sewage flows to the downstream rural areas.
9. Dams were originally created for irrigation, but water is now diverted to the city. Large quantity of this water is now proposed to be supplied as a very cheap water source to power plants, which, it is claimed will get rid of the pollution. However these power plants will in effect get rid of the water itself, by vaporising the same, and the pollution will go into the soil in adjoining rural area. This is a novel way discovered by the combination of City Administration and / Industrial Lobby to illegally divert water from irrigation to industry, and contaminate the soil with toxic waste; all in the name of pollution control.
10. In the rainy season; the volume of sewage water combined with storm water is much more than the capacity of the STP. During those months, the sewage generally is allowed to flow untreated.
11. A high input of energy and chemicals is required for day-to-day operation of STPs; and even with such inputs, STPs do not provide secondary and tertiary treatment.
12. There is no monitoring or accountability for toxic and carcinogenic substances remaining in the partially treated effluent. In practical terms, this treatment may be suitable remedy for; say, diorrhea, but makes no attempt to find remedy for much more serious conditions like cancer.
13. Many STPs in the country are routinely shut down due to non-payment of electrify bills, non- procurement of chemicals and shortage of personnel.
14. Citizens / NGOs have little or no role / no responsibility in the operation of the centralised systems.

**Decentralised systems can overcome these lacunae of the conventional treatment systems:**

1. Domestic waste water contains biodegradable elements. Separation of black water (faecal matter) and grey water is very much possible by using two-pipe system. Although a better system would be to make people understand the extremely harmful effects of cosmetic / cleaning products on themselves and on the environment and to use harmless products as in the past. Primary treatment is very much feasible in the form of baffle reactors (much improved septic tanks) in almost every plot or location. Secondary treatment in the form of anaerobic filters can be provided in every locality / mohalla and green bridges / reed beds can be provided intermittently in the river channels. Together, these measures will ensure clean water in all channels of the river at every stage.
2. Treated, semi-treated water could be recycled and reused for identified purposes.
3. Entire city areas, including expanding areas would get covered in this system automatically.
4. Existing STPs could be upgraded and used for additional secondary and tertiary treatment as the water flows out of the city. This treated water could also be safely re-circulated on a larger scale.
5. Citizens / NGOs / Authorities would share the responsibility, making the exercise of water treatment manageable and feasible.

**How would a Decentralised system work in practical terms?**

In rural areas, septic tanks are installed as there is no sewer collection system. However there are serious limitations of a two or three compartment septic tank, as it merely worked as a settling tank and does not treat the water to a desired level. And the soil, supposedly, takes care of the further treatment.

Such a system cannot work in an urban situation because the large quantum of effluents would pollute the entire groundwater and soil. However, a combination of much improved septic tanks (Similar to Baffle Reactors used in DEWATS systems along with suitable culture) and existing sewer systems would be able to address the problem in a satisfactory manner. Baffle reactors, which have a linear series of appropriately sized compartments rather than just two or three chambers, treat the wastewater to a much greater degree (80 to 90%). This much improved water can be released into sewer lines and through them into the natural drainage. Black-water effluent could be given further treatment at topographically identified locations by the local bodies by way of anaerobic filters. Further treatment in the form of green bridges / reed-beds etc could be given in the natural drainage channels. Expertise for all these methods are readily available and the same could be put together to provide satisfactory solutions. In the open natural water courses exposure to the Sun and atmospheric oxygen would also have a positive effect and by the time the waste-water reaches the main river streams, it could achieve close to natural state of cleanliness. It would also be possible to re-use the partially treated water within the city itself, rather than letting it go after just one use. The water (and also manure) could certainly be used for landscaping and also for recreation. Downstream rural areas would also get clean water for domestic use as well as for cultivation. A time may come, when, as is being done in places like Singapore, wastewater is brought to potable level for drinking purpose as well.

This would require, on one hand, change in intentions / mindset of the urban-industrial governance structure and framing of appropriate bylaws together with solutions / models by the authorities. Rather than spending on massive centralised projects, money could be better spent in providing subsidy to the people for converting to two-pipe system and installing anaerobic baffle reactors in their plots.

**What are the other ways in which Unplanned Urbanization adversely affects River regimes?**

Urbanization phenomenon that we are experiencing today is unprecedented in Human history; representing a shift of our civilization from a predominantly Rural based Society into an Industrial Urban Society. However we have chosen to disregard the unprecedented nature of this phenomenon and are dealing with it in a sluggish manner as if cities were merely an expansion of earlier smaller settlements. This deliberately indifferent approach is preventing us from coming to grips with this phenomenon.

Cities represent physical manifestation of the current for of urban-industrial-corporate colonialism. Just as the British thought that every resource in India is theirs to loot; the emerging urban-industrial set-up in India thinks that it is their right to claim every resource by hook or by crook. Rural areas surrounding the cities are probably the worst affect by this exploitation.

Uncontrolled Urbanization is the single massive factor causing degradation of the environmental components like water, biodiversity, land, air and other resources. Cities have acquired regional proportions to completely obliterate the existing natural systems such as water regimes, biodiversity corridors and even topography. Unless we deal with this phenomenon competently and more importantly, with the right intent, we would not be able to reverse the tide of environmental degradation; and in this process we would also fail to revive our dying rivers.

**Ecologically conscious planning and management of cities can reverse the tide of wholesale degradation of Nature.**

While acquiring regional proportions, cities are presently not required to take care of the existing “natural and biodiversity corridors” such rivers, hill chains, and important forested areas. Regional and City level Development Plans should provide for preservation of the “Natural and Biodiversity Corridors”. The most natural of the Biodiversity corridors would be the Rivers and their tributaries. These should be treated as the principal biodiversity corridors of the city.

Secondary biodiversity corridors should then connect with these principal corridors to form a self-supporting ecosystem within each city. Presently, 10 to 15% open spaces are supposed to be scattered around in pockets. Many of these open spaces get encroached upon because their location or their role does not seem to have any intrinsic basis. However Nature does exist in such fragmented manner. Natural systems need to be continuous and need to have a certain size. If the presently scattered parks and playgrounds are linked together by way of tree plantation of native identified species along roads or at other appropriate locations (including in private plots by urging the citizens) the secondary biodiversity corridors as mentioned above can be created.

With ecosystems regenerating from within the cities, rather than becoming a huge burden on the environment, cities could become the saviours of the environment in their regions. Massive tree plantation along the river beds would help in revival of the rivers themselves by retaining soil along the banks, and by retaining groundwater and facilitating recharge in the river basin. Smaller shrubs / reed beds etc would help in pollution abatement.

**Envisaged roles of Citizens, Authorities, NGOs and Professional bodies etc in achieving the desired objectives:**

Cities have the necessary resources and the administrative apparatus to undertake above-mentioned eco-friendly measures. Citizens / Students / NGOs could contribute to these exercises in a massive and decisive manner if the Government / Planners / Local bodies promote such projects.

**Citizens:** could consciously reduce water usage, install two pipe systems and give appropriate treatment, recycle grey water within the premises, release black water into sewers only after 1st stage treatment, undertake Rainwater Harvesting and clean and actively use the nearest open well.

**Authorities:** could accept and internalise concepts for better water management and ecosystem development; prepare Development Plans accordingly; promote/facilitate participation of citizens, NGOs and students; take steps to make DEWATS and RWH mandatory; enforce pollution laws effectively; clean and use existing water-bodies (at least for emergency supply) rather than solely depending on distant water sources and create new water-bodies locally.

**NGOs, Professional Bodies:** could conduct vigorous awareness raising campaigns to prepare the citizens’ mindset towards sustainable practises; undertake research and development projects; act as pressure groups to ensure effective implementation of actions and strategies.

**Educational Institutions/ Students/ Teachers:** could include environment related local issues in the curriculum; encourage field visits and studies; undertake ecosystem development / tree plantation projects; re-inculcate the spirit and culture of voluntary work for social causes.