The Urban Pollutions and Its Sustainable Cure

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ABSTRACT

Urban landscapes have some perennial problems like water pollution, air pollution, depleting aquifer, water scarcity, and sewage. Though they look unsolved as of today, but these are all linked towards sustainable living and understanding of the natural ecology. Vaidic Science has a sustainable solution for all these, and the same is also implemented successfully in many places across the country. The author is one of the designated partners of Vaidic Srijan LLP, which is a Limited Liability Partnership firm formed in March 2021. He and his partner have built their technology for "resurrection of the native ecology" for restoration and rejuvenation of Soil, Water and Air.

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INTRODUCTION

Today, we are living in urban concrete jungles. 2008[1] was the first year in the modern history of the human race on the planet, when the urban population exceeded the rural population for the first time.

If we look at all the historic cities, all were dwelt on the banks of a waterbody, be it a river or a sea or even huge lakes or wetlands. The key reasons for this were, the natural abundance and the connectivity. Since water a natural flow, waterways were the cheap mode of transportation. Moreover, Wetlands also ensured the natural biodiversity to dwell, thus there was good availability of drinking water and for irrigation too. All human economic activities need a lot of water and therefore they could develop economic activities only around the centres which had abundant sources of water.

But the population rise started consuming more and more resources and eventually the abundance started turning into scarcity.

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Moreover, human beings changed their lifestyles from an eco-friendly sustainable life to unhealthy, unsustainable luxurious life against the natural harmony. This caused further depletion of the resources. And finally in the year 2008, United Nations came up with a new need for Mega cities or what we call as the Smart Cities of today. Since the resources are limited and the population is exploding, we need to smartly prioritise the resources and use them in more efficient ways. Resources like electricity, water, traffic management, security & surveillance, healthcare, transport system and so on – all urban necessities have to be planned intelligently.

In 2012[2], United Nations Summit in Rio de Janeiro came up with yet another concept for "Sustainable Development Goals", or what we know as UNSDGs of today.

URBAN ISSUES: AN OVERVIEW

Urban areas be it planned or unplanned face some of the key peremial problems, one of the major being population explosion. While we can identify and work on the root cause of increasing population itself, which is exodus from the rural to urban areas, but that's a long-term approach. As the world needs quick fixes today, we need to isolate the problems and amalgamate the resolves too. So the best way forward is to start listing down the issues:

1. Sewage – A 2015 research in University of Tehran, estimated a per capita sewage production of 186 liters per day per human being, while the estimated treatment was found to be 136 liters per day per human, which means a deficit of 50 liters per person per day[3] and this gap will continue to rise every day, because our approach of building a sewage treatment plant (STP) is neither sustainable nor economically viable.

   And ultimately this waste water lands up in a natural waterbody, making it contaminated too. Water has been made as the *de facto* waste transport media.

2. Drinking Water Scarcity – UNICEF, is a global organisation, supported by United Nations, which in turn is supported by almost all the countries on the planet today. They work in 190+ countries across the globe, collect data, give aid and conduct surveys.[4] And one of their report says:

   (a) Four billion people — almost two thirds of the world's population — experience severe water scarcity for at least one month each year.

(b) Over two billion people live in countries where water supply is inadequate.

(c) Half of the world's population could be living in areas facing water scarcity by as early as 2025.

(d) Some 700 million people could be displaced by intense water scarcity by 2030.

(e) By 2040, roughly one in four children worldwide will be living in areas of extremely high water stress.

But is this happening? People have the opinion that, population burst is the key reason. They are wrong.

The key reason is – contamination of the water resources. We let lose our domestic sewage and industrial effluents in the natural waterbodies (lakes, ponds, river, rivulets, wetlands, etc.), none of the land locked waterbodies are left with drinkable water. And because these are the only water resources for our race, we are facing the scarcity.

3. Air Pollution – All the landlocked cities have this problem in common. Air pollution is consistently on rise in all the landlocked cities. Fortunately the coastal cities are spared naturally, due to the presence of sea and oceans around.

   Air pollution kills an estimated seven million people worldwide every year. World Health Organization (WHO) data shows that almost all of the global population (99%) breathe air that exceeds WHO guideline limits containing high levels of pollutants.[5] Many studies have demonstrated a direct relationship between exposure to particulate matter (PM) and negative health impacts. Smaller-diameter particles (PM2.5 or smaller) are generally more dangerous and ultrafine particles (one micron in diameter or less) can penetrate tissues and organs, posing an even greater risk of systemic health impacts.

   PM particles are free floating solid particles in air, which are positively charged and do not get an adequate surface to land, thus they keep floating in spite of the natural gravitational pull.

   The quick fix that the city administrations look at – is installation of smog towers, which is again another unsustainable idea. You can't put the entire city on man-made ventilators, a failure of which will suffocate the entire city.

4. Polluted Waterbodies – for various natural or man-made reasons majority of the urban waterbodies are eutrophic today.

   Eutrophication is characterised by excessive plant and algae growth due to the increased availability of one or more limiting growth factors needed for photosynthesis such as sunlight, carbon dioxide, and nutrient fertilizers. Eutrophication occurs naturally over centuries as lakes age and are filled in with sediments. However, human activities have accelerated the rate and extent of eutrophication through both point-source discharges and non-point loadings of limiting nutrients, such as nitrogen and phosphorus, into aquatic ecosystems (i.e., cultural eutrophication), with dramatic consequences for drinking water sources, fisheries, and recreational water bodies. For example, aquaculture scientists and pond managers often intentionally eutrophy water bodies by adding fertilizers to enhance primary productivity and increase the density and biomass of recreationally and economically important fishes via bottom-up effects on higher trophic levels – Definition by nature magazine.[6]

5. Depleting Aquifers – Thanks to the recent developments in boring technologies the over extraction or exploitation of the aquifers has been on all time rise, coupled with non-recharge avenues, today we see a sharp year over year decline in the underground water tables in majority of the urban areas.

   The newly formed Jal Shakti Mantralaya in 2019, was created in India due to the rising water stress in the country. The Hon'ble Minister Shri G S Shekhawat, gave this statement in the same year of formation that "54 per cent of the country is under acute water stress, while the underground aquifer is already depleted by 22 per cent".[7] While the established environmental magazine *Down to Earth* from Centre for Science & Environment (CSE), published a report that "The groundwater level in India has declined by 61 per cent between 2007 and 2017..."[8].

It is clear that the mechanical structures or electric / fossil fuel powered machines aren't a sustainable approach at all. We need new approaches, new ideologies and new viewpoints to make the changes and interventions sustainable.

THE SUSTAINBLE APPROACH

India is the oldest surviving civilisation on this planet. By this virtue, we must've have had cracked the sustainability code for living in absolute harmony with nature. We've had the oldest surviving civil constructions on the planet, which have stood the test of time. From monolithic temple structures to forts to sea link bridges link Ram Setu – all of them have survived for over centuries, and are scientifically proven to be completely man-made structures.

Even the archeological remains of the cities, if we look at ancient Indian civilisations – all of them have been an integral part of the civic fabric. Be it the Harappa, Sinauli, RakhiGarhi, DholaVira or even further back in history for the descriptions that we find in the epics for the cities of Hastinapur, Ayodhya or Indraprastha – were excellent examples of town and city planning or what we call as the urban infrastructures. And we had all sustainable structures in place – from rain water harvesting to flood water harvesting, flood mitigation to drought mitigation, even tidal waves management and response systems were in place in this country.

Just about a millennium back, Bundela kings planned the city of Datia on a rocky plateau without any perennial source of water, in such a way that it remained pollution free and drought free for a complete millennia. Because they planned it based on sustainable Vaidic Science and we lived in unsustainable lifestyles inspired by the European values and standards.

Vaidic Science has been based upon the basic and holistic understanding of life and nature. It is the most comprehensive database upon the sustainable living in absolute harmony with nature. Therefore it is ecological and continuous. This is what creates the basic underlying principles of our social structures, civic society, science, arts, culture, and all other forms of knowledge. That's why we say, Soil, Water and Air – aren't dead substances, but living ecologies, which make life possible on the planet. And the moment we differentiate them from dead substances to living ecologies, the entire treatment or the approach changes. Because every life form or living ecology has been blessed with a basic feature of 'self-healing' by nature. Thus our approach changes from physical cleaning to boosting the metabolic rates.

If we closely look into the above mentioned perennial urban problems, all are linked to soil, water and air only. Sewage – is the waste water problem, drinking water scarcity – is again a water problem, air pollution – is all about relationship between water and air, polluted water bodies – are all linked to soil, water and air pollution and depleting

aquifers – is again associated with relationship between soil and water. If we are able to solve this jigsaw puzzle of relationship between soil, water and air, the ripple effect would solve all the problems. So let's understand the natural ecology in deeper details.

UNDERSTANDING WETLANDS AND WATERBODIES

Landlocked waterbodies and wetlands contain, the only one per cent of the Water on the planet meant for the use of terrestrial beings, including planets, animals, birds, insects and humans – who reside on the land surface, unlike the marine life which can use marine water too. These wetlands are unique structures in more than one way –

1. These are the only places, wherein soil, water and air – all come in direct contact. This creates the biggest possible pool of microbiota habitat, creating an apt environment for natural biodiversity and ecosystem services.

2. These are the only structures, which can do carbon emissions as well as sequestration, rest all the beings or structures will either remain emitters or remain as sinks for their entire lives.

And therefore specialised arrangements created by nature have been showered upon with many natural responsibilities:

1. **Between Soil and Water –** The bottom of every surface natural waterbody or wetland is the soil layer. Water grinds the bottom soil, converts it into silt, which passes through the soil layers and establishes a link between the surface waterbody and the aquifer. This is called the soil capillary link, through which water travels vertically between surface and aquifer, depending upon the pressure. The link is used for aquifer recharge in monsoon, while the same link is used to recharge the surface waterbody during peak of summers. This also maintains the mineral cycle, when water travels between the two layers, it carries the minerals along either ways.

2. **Within the Water –** within the waterbody there is an aquatic food chain. The autotrophic single celled organisms perform photosynthesis and produce oxygen, which gets trapped between the water molecules as Dissolved Oxygen (DO). These microbes are consumed by planktons, which are themselves a natural feed for bigger organisms like fishes. Fish excreta in turn is consumed and neutralised by the single celled microbes. Thus, the food chain gets established and goes on and on.

3. **Between Water and Air –** For photosynthesis naturally the carbon sequestration will be done by absorption of the Green House Gases (GHGs) from air. Moreover, the top surface of the waterbody in its natural condition is negatively charged, while the Particulate Matter (PM) which are the key pollutants of air are positively charged. Thus they naturally get attracted to the water surface and the air pollution is mitigated.

Now this brings us to the solution. If the native condition of the water bodies and wetlands are restored, the five key perennial urban problems will get solved sustainably.

RESURRECTION OF THE NATIVE ECOLOGY

This is one of the latest approaches in restoration and rejuvenation of the waterbodies and wetlands, wherein the approach is not to clean the water, but to "Resurrect the Native Ecology of the Wetlands" thereby enabling the native metabolism of the ecosystem to consume the contaminants instead of the physical removal in all the three ecosystems of soil, water and air.

Once the ecology is resurrected following functions get naturally restored:

1. **Aquifer recharge and water harvesting –** opening of the soil capillaries happens due to ecological dredging. And the same also makes the waterbody perennial, does flood mitigation and drought prevention.
2. **Ambience correction –** foul smell eradication, mosquito colony abolishment, removal of algal bloom, water color and viscosity improvement, water weed consumption, etc. all the ambience correction activities happen naturally. This also ensures the reduction in threat of vector borne and waterborne diseases to ensure a better public health.
3. **Air pollution mitigation –** with carbon sequestration and PM absorption, the air quality improvement also happens naturally.

There have been a lot of success stories on the above concept across the country, including the national capital of Delhi,[9] and states of Uttar Pradesh[10], Madhya Pradesh,[11] Telangana,[12] Punjab[13] and many more.

This solution is developed by Vaidic Srijan LLP, and it is termed as Cownomics™ Technology.

The solution helps in achieving the following, with this 100 per cent indigenous technology:

1. In situ treatment of water bodies
2. Rain water harvesting and aquifer recharge
3. Air pollution, flood (water logging) and drought mitigation
4. Water abundance for drinking and irrigation
5. Sewage problem solution

The ripple effect of "Resurrect the Native Ecology of the Wetlands and Waterbodies" is there in agriculture and animal husbandry too, since the resurrected water naturally transforms in to neuro-immuno booster for plants and animals.

There is a remarkable improvement in the aquatic life due to restoration of aquatic food chain, which also results into the return of birds, bees and butterflies around the waterbody. Life exuberates in all forms around the water body, due to creation of a micro-climate around the wetland / water body, for the simple reason that the native ecology in all the three possible habitats for microbiota gets resurrected (soil, water and air).

THE PROCESS

The Science[14] of Vaidic Srijan LLP / Cownomics™ Technology is purely dependent upon the ecology, environment and natural and life sciences. As per Vaidic Sciences, each waterbody has a different ecosystem, which needs to be studied in detail to understand.

So their process is to conduct a detailed study of the Waterbody / Wetlands by studying various aspects like agro-climatic zone, water quality, air quality index, sludge quality, aquifer details, contamination levels, type and kind of problems (like water viscosity, algal blooms, weed infestation (type of weed and population), aquatic life, foul smell, water or vector borne diseases spread or threat, vegetation on the embankment region and so on).

Based on this study, they carefully select certain herbs and prepare a medicine, which is 100 per cent botanical extract of the selected herbs/ shrubs / trees and plants. This is what they call as the 'Cownomics™ Extract'.

This extract is intensified through amalgamation of the concentrate with fresh water from the same agro-climatic zone as the geographical

location of the water body to be treated, and this homogenous mix is poured in the waterbody in early morning time of the sunrise.

In presence of sunlight, the medicine is synthesised by the aqua-ecology and then the resurrection process starts.

The process is divided into three phases, namely, Resurrection (three months), Restoration (three months) and Rejuvenation (six months), which completes a one-year time period, after which the waterbody is back in its original native condition, and has developed enough immunity to sustain the present pollution load for a few years. Ideally, just a minor maintenance is good enough to keep the water body going on for years together.

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