



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 5, May 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



Analysis of Waste Water Treatment

Mr. Dongare Ramesh Bhalchandra

HOD, Department of Science, Bharati Vidyapeeth Institute of Technology, Navi Mumbai, Maharashtra, India

ABSTRACT: nowadays many water resources are polluted by anthropogenic sources including household and agricultural waste and industrial processes. Public concern over the environmental impact of wastewater pollution has increased. Several conventional wastewater treatment techniques, i.e. chemical coagulation, adsorption, activated sludge, have been applied to get rid of the pollution, however there are still some limitations, especially that of high operation costs. the utilization of aerobic waste water treatment as a reductive medium is receiving increased interest thanks to its low operation and maintenance costs. additionally, it's easy-to-obtain, with good effectiveness and skill for degrading contaminants. This paper reviews the utilization of waste water treatment technologies to get rid of contaminants from wastewater like halogenated hydrocarbon compounds, heavy metals, dyes, pesticides, and herbicides, which represent the most pollutants in wastewater.

KEYWORDS: Sewage, Aerobic, Treatment, Technologies.

I. INTRODUCTION

Water, food and energy securities are emerging as increasingly important and vital issues for India and therefore the world. Most of the river basins in India and elsewhere are closing or closed and experiencing moderate to severe water shortages, brought on by the simultaneous effects of agricultural growth, industrialization and urbanization. Current and future water demand could be met by enhancing water use efficiency and demand management. Thus, wastewater/low quality water is emerging as potential source for demand management after essential treatment. An estimated 38354 million liters per day (MLD) sewage is generated in major cities of India, but the sewage treatment capacity is merely of 11786 MLD. Similarly, only 60% of commercial waste water, mostly large scale industries, is treated. Performance of state owned sewage treatment plants, for treating municipal waste water, and customary effluent treatment plants, for treating effluent from small scale industries, is also not complying with prescribed standards. Wastewater- irrigated fields generate great employment opportunity for female and male agricultural laborers to cultivate crops, vegetables, flowers, fodders which will be sold in nearby markets or to be used by their livestock. However, there are higher risk associated to human health and therefore the environment on use of wastewater especially in developing countries, where rarely the wastewater is treated and enormous volumes of untreated wastewater are getting used in agriculture.

II. WATER AVAILABILITY AND USE

India accounts for two .45% of acreage and 4% of water resources of the planet but represents 16% of the planet population. Total utilizable water resource within the country has been estimated to be about 1123 BCM (690 BCM from surface and 433 BCM from ground), which is simply 28% of the water derived from precipitation. About 85% (688 BCM) of water usage is being diverted for irrigation (Figure 1), which can increase to 1072 BCM by 2050. Major source for irrigation is groundwater. Annual groundwater recharge is about 433 BCM of which 212.5 BCM used for irrigation and 18.1 BCM for domestic and industrial use (CGWB, 2011). By 2025, demand for domestic and industrial water usage may increase to 29.2 BCM. Thus water availability for irrigation is predicted to reduce to 162.3 BCM. With this population growth-rate (1.9% per year), the population is predicted to cross the 1.5 billion mark by 2050. thanks to increasing population and every one round development in the country, the per capita average annual freshwater availability has been reducing since 1951 from 5177 m³ to 1869 m³, in 2001 and 1588 m³, in 2010. it's expected to further reduce to 1341 m³ in 2025 and 1140 m³ in 2050. Hence, there's an urgent need for efficient water resource management through enhanced water use efficiency and waste water recycling.

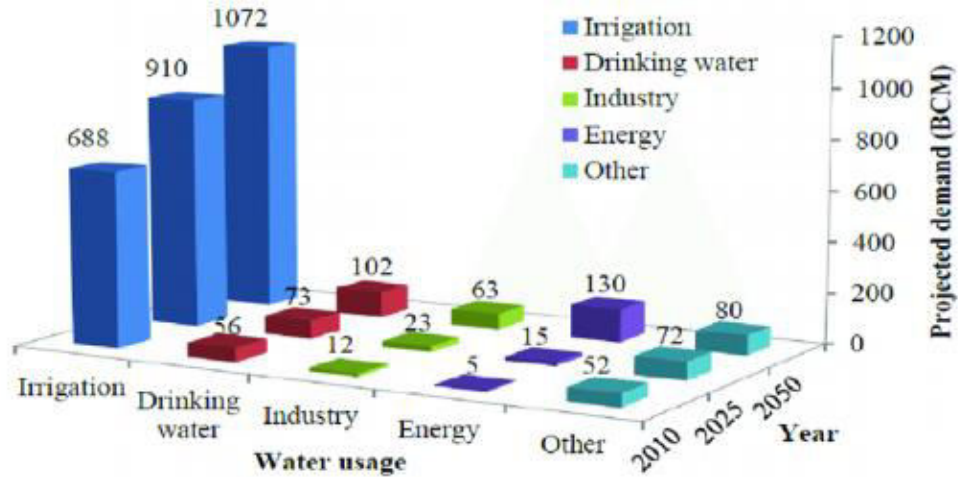


Fig1: Projected water demand by different sectors

III. WASTEWATER PRODUCTION

With rapid expansion of cities and domestic watersupply, quantity of gray/wastewater is increasing within the same proportion. As per CPHEEO estimates about 70-80% of total water supplied for domestic use gets generated as wastewater. The per capita wastewater generation by the class-I cities and class-II towns, representing 72% of urban population in India, has been estimated to be around 98 LPCD while that from the capital TerritoryDelhialone (discharging 3,663 MLD of wastewaters, 61% of which is treated) is over 220 LPCD (CPCB, 1999). As per CPCB estimates, the entire wastewater generation from Class I cities (498) and Class II (410) towns within the country is around 35,558 and 2,696 MLD respectively. While, the installed sewage treatment capacity is simply 11,553 and 233 MLD, respectively thus, overall analysis of water resources indicates that in coming years, there'll be a twin edged problem to affect reduced water availability and increased wastewater generation thanks to increased population and industrialization. In India, there are 234-Sewage Water Treatment plants (STPs). In class-I cities, oxidation pond or Activated sludge process is that the most commonly employed technology,covering 59.5% of total installed capacitySeries of Waste Stabilization Pondstechnology is additionally employed in 28% ofthe plants, though its combined capacityis only 5.6%.

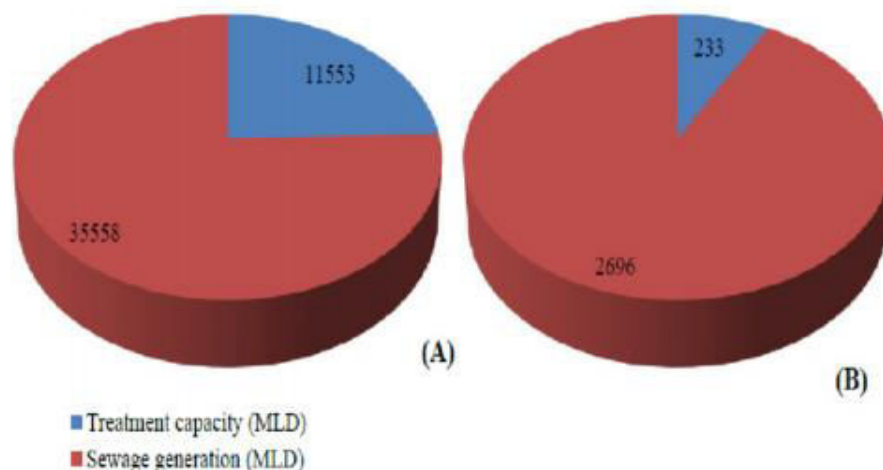


Fig:2. Sewage generation and treatment capacity in 498 Class I cities and 410 class II towns in India.

IV. WASTE WATER TREATMENT PROCESS

Conventional methods of treating waste water- The CPCB has studied the functioning of water treatment plants, the prevailing raw water quality and water treatment technology, etc across the country. As per its findings, the subsequent process has been followed by these plants for treating waste water:

(i) Aeration- Aeration involves bringing air or other gases in touch with water to Convert volatile substances from liquid to gaseous state and Dissolves.



Fig: 3. Aeration

(ii) Coagulation and Flocculation: The process of coagulation and flocculation may be broadly described as a

Chemical/physical process of blending or mixing a coagulating chemical into a stream then gently stirring the blended mixture. Coagulation- Herein, a coagulant (say, alum) is thoroughly mixed with raw water which causes neutralization of charge of particles. The coagulant chemicals, inorganic and/or organic in nature, when added to water at an optimum dose (normally within the range of 1 to 100 mg/l) cause destabilization. Flocculation- After coagulation, the water is then flocculated, i.e. it is gently stirred to reinforce the contact of destabilized particles and to create floc particles of optimum size, density, and strength to be subsequently removed by settling or filtration.

(iii) Sedimentation and filtration: The flocculated water is then taken to sedimentation tanks / clarifiers for removal of flocs and thereafter to filters where the remaining turbidity is removed.

(iv) Backwashing of filters: because the amount of solids retained during a filter run increases, bed porosity decreases. Before they start breaking through the filter, backwashing is required to wash the bed.

(v) Disinfection: Disinfection of a potable water system is that the specialized treatment for destruction or removal of organisms in water which are capable of causing disease. For such disinfection, the chemical that has been predominantly used is chlorine. This chlorination system consists of six separate subsystems:

- └ chlorine supply;
- └ storage and handling;
- └ safety provisions;



- └ chlorine feed and application;
- └ diffusion, mixing and contact; and
- └ The system .

VI. USE OF BIO-TECHNOLOGIES FOR WASTE

water treatment According to the CPCB, fortreatment of waste water, use of biological methods are often a more cost effective option than use of conventional treatment systems. The bio-technology is less expensive, easy to work and does not produce secondary pollutants. A few instances of bio-technologies used for treatment of wastes are described below:

i) Anaerobic technology- The application of anaerobic technology avoids heavy machinery and reduces the land requirement for the waste water treatment plant. The anaerobic process includes the utilization of the acclimatized microbes for transforming complex macromolecules of organic matter present in waste water into biogas. Also, the stabilized sludge from anaerobic process may be free from strong or foul odors. The output that it produces, i.e. biogas and digester-sludge are often utilized as an alternate source of energy and as a fertilizer respectively.

ii) Duckweed based waste water treatment- For the aim of fixing a low cost waste water treatment technology which can also utilize the nutrients in waste water. It's great ability to scale back the suspended solids, bacterial and other pathogens from wastewater. As per its findings, this technique can be used for little towns or in rural/semi-rural areas, where land is out there and harvested duckweed are often used for different economic uses.

iii) Enzymatic treatment- Oxidative

Enzymes like peroxidases are used for removal of toxic organic and recalcitrant compounds from beverage sources as well as from industrial effluents.

iv) Bio-filters- The environmentally

Sustainable and economically viable biofilters technology uses earthworms and beneficial microbes to interrupt down organic waste present within the waste water and also converts the energy, carbon and other elements of the waste to bio-nutritional products like humus and bio-fertilizer.

VII. WASTE WATER USE

Insufficient capacity of wastewater treatment and increasing sewage generation pose big question of disposal of waste water. As a result, at the present, significant portion of waste water being bypassed in STPs and sold to the nearby farmers on charge basis by the Water and Sewerage Board or most of the untreated waste water find its way into river basins and indirectly used for irrigation. In areas like Vadodara, Gujarat, which lack alternative sources of water, one among the foremost lucrative income-generating activities for the lower social strata is that the sale of wastewater and renting pumps to lift it has been reported that irrigation with sewage or sewage mixed with industrial effluents leads to saving of 25 to 50 per cent of N and P fertilizer and results in 15-27% increase in the next crop productivity, over the traditional waters. It's estimated that in India about 73,000 ha of (Strauss and Blumenthal, 1990) peri-urban agriculture is subject to wastewater irrigation. In peri-urban areas, farmers usually adopt year-round, intensive vegetable production systems (300-400% cropping intensity) or other perishable commodity like fodder and earn up to 4 times more from a unit land area compared to freshwater.

VIII. PRACTICE ON DIFFERENT ASPECTS OF WASTEWATER

Bio-refineries wastewater

Treatment - Bio-refineries for the production of fuel ethanol produce large volumes of highly polluted effluents.

Anaerobic digestion is typically applied as a first treatment step for such highly loaded wastewaters. At the present, the anaerobic biological treatment of biorefinery effluents is widely applied as an effective step in removing 90% of the



Chemical Oxygen Demand (COD) within the effluent stream. During this stage, 80–90% BOD removal takes place and biochemical energy recovered is 85–90% as biogas. To reduce the BOD to acceptable standards, the effluent from an anaerobic digestion step requires further aerobic treatment. However, biological treatment processes alone aren't sufficient to satisfy tightening environmental regulations. A proper choice of tertiary treatment can further reduce color and residual COD. yet one more approach is to use algae. The advantage of wastewater treatment using algae is that one can reduce the organic and inorganic loads, increase dissolved oxygen levels, mitigate CO₂ pollution and generate valuable biomass by sequential use of heterotrophic and autotrophic algal species and therefore the generated biomass are often an excellent source of 'organic' fertilizers. This particular aspect of algae can help remediate highly polluted wastewaters.

Municipal wastewater treatment using constructed wetlands –Constructed wetlands (CWs) are a viable treatment alternative for municipal wastewater, and numerous studies on their performance in municipal water treatment are conducted. an honest design constructed wetland should be ready to maintain the wetland hydraulics, namely the hydraulic loading rates (HLR) and therefore the hydraulic retention time (HRT), because it affects the treatment performance of a wetland. Indian experience with constructed wetland systems is usually on an experimental scale, treating different sorts of wastewater. one among the main constraints to field-scale constructed wetland systems in developing countries like India is that the requirement of a relatively large acreage that's not readily available. Subsurface (horizontal vertical) flow systems, generally associated with a few 100 times smaller size range and three times smaller HRTs (generally 2.9 days) than the surface flow systems (with about 9.3 days HRT, Kadlec), are therefore being considered to be the more suitable options for the developing countries. Shorter HRTs generally translate into smaller land requirement. Batch flow systems, with decreased detention time, have been reported to be related to lower treatment area and better pollutant removal efficiency. Thus, batch-fed vertical sub-surface flow wetlands seem to possess an implication for better acceptability under Indian conditions.

Wastewater application methods -Farm workers and their families practicing furrow or flood waste water irrigation techniques are at the very best risk. Spray/sprinkler irrigation results in the highest potential deposit of the salts, pathogens and other pollutants on the crop surfaces and affects nearby communities. Drip irrigation is that the safest irrigation method but suffers from clogging of the emitters, counting on the wastewater total suspended solid concentrations. Use of appropriate filters such as gravel, screen and disk filters in combination with drip systems has been observed to tremendously reduce the clogging and coliform incidence.

Post-harvest interventions -Postharvest interventions are a crucial component for health-risk reduction of wastewater-irrigated crops and are of particular importance to deal with possible on-farm pre-contamination, and also contamination which will occur after the crops leave the farm. The health hazards could be markedly lowered with adoption of a number of the low cost practices like repeated washings, exposure of the produce to sunlight and raising the crop on beds, removing the 2 outermost leaves of cabbage and also, cutting above some height from ground level.

IX. CONCLUSION

In developing countries like India, the problems related to wastewater reuse arise from its lack of treatment. The challenge thus is to seek out such low-cost, low-tech, user friendly methods, which on one hand avoid threatening our substantial wastewater dependent livelihoods and on the other hand protect degradation of our valuable natural resources. the utilization of constructed wetlands is now being recognized as an efficient technology for wastewater treatment. Compared to the conventional treatment systems, constructed wetlands need lesser material and energy, are easily operated, have no sludge disposal problems and may be maintained by untrained personnel. Further these systems have lower construction, maintenance and operation costs as these are driven by natural energies of sun, wind, soil, microorganisms, plants and animals. Hence, for planned, strategic, safe and sustainable use of wastewaters there seems to be a requirement for policy decisions and coherent programs encompassing low-cost decentralized waste water treatment technologies, bio-filters, efficient microbial strains, and organic / inorganic amendments, appropriate crops/ cropping systems, cultivation of remunerative non-edible crops and modern sewage water application methods.

REFERENCES

1. A. D. Mande, B. R. Kavathekar, A. S. Langade, N. G. Lasankute, S. H. Patle, (2018), "Low Cost Household Water Treatment Systems: A Review", International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 7 Issue 03.
2. Indrani Guin, Susheel Kumar Gupta, (2017) "Low Cost Methods of treatment of water for domestic purposes in Rural Areas", International Journal for Scientific Research & Development, ISSN: 2321-0613, Vol. 4, Issue 12.
3. S. Gautam, S. Ahmed, A. Dhingra, Z. Fatima, (2017), "Cost Effective Treatment Technology for Small Size Sewage Treatment Plants in India, Journal of Scientific & Industrial Research, vol. 76, pp. 249-254.



4. ElZein Z, Abdou. A, Abd EL Gawad. I. (2016), “Constructed wetlands as a sustainable waste water treatment method in communities” (2016)pp, ISSN:605-617 ELSEVIER.
5. KarnapaAjit. (2016) “A Review on Grey Water Treatment and Reuse”, International Research Journal of Engineering and Technology (IRJET) vol:03 Issue:05, may2016.
6. Sameer S Shastri (2014) “Zero Waste Disposal System for Multi-Storied Building.
7. NargesshAmabadi, HasanBakhtiari, NafiseKochakian, MahamoodFarahani, (2015) “The investigation and designing of an onsite greywater treatment system at Hazrat-e-Masoumeh University”, Qom, (IRAN) ISSN: 1337- 1346.
8. SandhyaPushkar Singh, Nusrat Ali, Sabih Ahmad, Dr. J.K. Singh, Manoj Kumar,(2015), “A Study on Grey Water Treatment Processes: A Review”, International Journal for Scientific Research & Development, ISSN (online): 2321-0613, Vol. 3, Issue 08.
9. Prof. K.D. Bhuyar, Mr.Amit. R. Lohakare, Mr.TejasPatil, Mr.YogeshGhode, Ms.SofiyaSayyad, (2015), “Treatment of Water by Membrane BIO Reactor”, International Journal for Scientific Research & Development, ISSN: 2321-0613, Vol. 2, Issue 12.
10. Vijaya V Shegokar et.al.(2015),”Design and Treatability Studies of Low Cost Grey Water Treatment with Respect to Recycle and Reuse in Rural Areas”.(ISSN):2319-7706 Volume 4 number 8 (2015) pp.



INNO  **SPACE**
SJIF Scientific Journal Impact Factor

Impact Factor:
7.512

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details