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Comparative Case Study of Tertiary Water Treatment Plant

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Abstract: *The Indian peninsula is facing a severe drought, thanks to a mix of monsoon failure within the last half of 2018, sustained heatwaves between May and June, and underperforming rainfall within the half of 2019. Majority of Indians are directly hooked in to water for his or her regular activities further as industries. Tertiary water treatment plant helps in decreasing the demand of water. this can be conventional kind research. The main objective of the study is to analyse the benefits of tertiary water treatment plant.*

This research paper deals with the comparative study of Canadian tertiary water treatment process with Indian secondary water treatment process. From this comparative study we conclude that approximately 17% of population receives tertiary-level (or “advanced”) treatment in Canada while there's no tertiary process involved in India thanks to which we can't utilize water like Canada and reduce the water scarcity in India by using tertiary water treatment process

Keywords: *Tertiary water treatment plant, secondary water treatment process , Canada, India*

I. INTRODUCTION

As India hurdles towards a more developed country, **one** amongst the casualties has been the deteriorating state of **the environment** is drought and lack of proper sewage treatment process. Rapid industrialization has, unfortunately, hiked up **the** quantity of pollutants to water bodies. Since in todays present scenario a number of the states of India is facing water scarcity thanks to which, people **of** those states aren't even getting enough H₂O to fulfill their basic needs. Meanwhile sewage treatment through tertiary method may be a reasonably redemption to fulfill the gap **of** obtainable H₂O and consumed one. Treatment of wastewater by Secondary means may be a general practice in India however water obtained from secondary process can't be directly used for household or industrial work. Water treated through Tertiary method may be used for household **in** addition as industrial purposes. Tertiary water treatment process involves Filtration followed by Air/Steam Stripping, **process**, Adsorption, Membrane separation process, action process, Precipitation, Oxidation and Reduction and last is Disinfection. This research paper deals with the comparative study of waste water treatment process of Canada and India. Here we compare the values of the particular water quality checking parameters like B.O.D. C.O.D., pH are one amongst those factors whose values we are visiting compare between the tertiary water treatment in Canada to the values of Secondary water treatment in India and during this comparison we will see the clear difference between these values showing us that what quantity the water treated from tertiary water treatment is clean as compared to secondary water treatment and by this study we will see that how will this treated water are helpful for us to decrease water scarcity in India.

Table 1.1 Effluent quality standards established by the WSER (Government of Canada, 2012)

| Effluent parameter | Regulated concentration |
|---|-------------------------|
| CBOD ₅ | Average 25 mg/L |
| SS | Average 25 mg/L |
| Total Residual Chlorine (TRC) | Average 0.02 mg/L |
| Un-ionized Ammonia (NH ₃ -N, 15°C) | Maximum 1.25 mg/L |

Table 1.2: Effluent quality standards comparison between secondary and tertiary treatment by the Kuwait Jahra Sewage Plant

| Parameters | Secondary Effluent | | | | Tertiary Effluent | | | |
|------------|--------------------|-------|-------|------|-------------------|------|-------|------|
| | Max. | Min. | Ave. | Std. | Max. | Min. | Ave. | Std. |
| TSS(mg/L) | 33.7 | 17.7 | 23 | 5.45 | 10.3 | 2.7 | 4.01 | 2.17 |
| BOD(mg/L) | 33.5 | 19.5 | 25.6 | 5.1 | 17.2 | 3.5 | 10.19 | 4.27 |
| VSS(mg/L) | 23.3 | 13.6 | 17.95 | 3.24 | 18 | 0.5 | 3 | 3.5 |
| TN(mg/L) | 27 | 10.20 | 16.25 | 4.89 | 26.2 | 7.6 | 15.79 | 5.6 |
| TP(mg/L) | 22.10 | 6.90 | 13.65 | 4.98 | 33 | 12.5 | 12.9 | 7.3 |

Table 1.3.: Comparison of tertiary treated effluent to standards of KEPA and MPW guidelines for wastewater reuse in landscape irrigation in Kuwait

| Parameters | Tertiary Effluent | EPA | MPW |
|------------|-------------------|---------|-----|
| pH | 7.5 | 6.5-8.5 | 7.6 |
| BOD(mg/L) | 10 | 20 | 3 |
| COD(mg/L) | - | 100 | 54 |
| TSS(mg/L) | 4 | 15 | 8 |

Table 1.4.: Effluent quality standards of secondary treatment in India

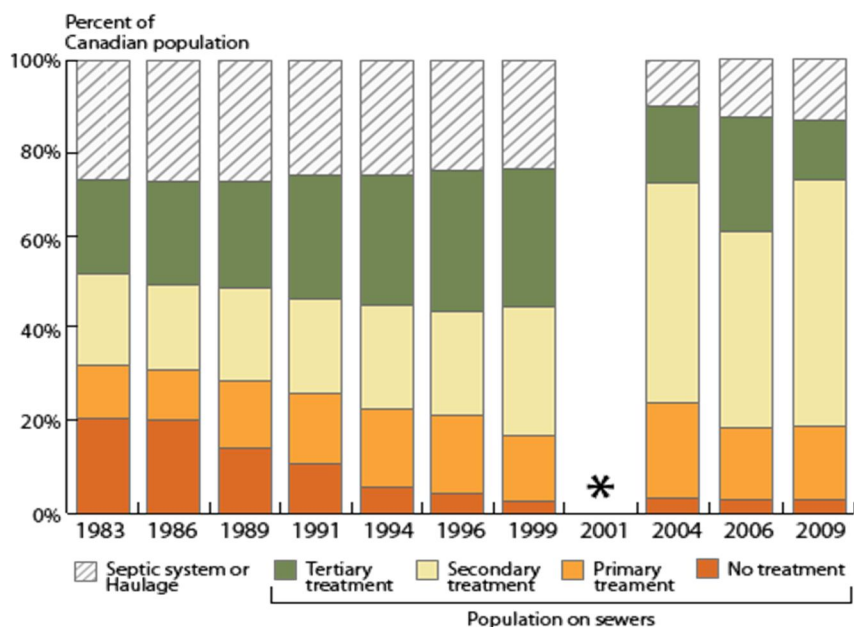
| Parameters | Sampling Points | Min. | Max. | Ave. |
|------------|-----------------|------|------|------|
| pH | Inf. | 6.9 | 8.8 | 7.5 |
| | UASB | 6.8 | 8.1 | 7.2 |
| | FPU | 7.0 | 8.2 | 7.4 |
| COD(mg/L) | Inf. | 363 | 1194 | 754 |
| | UASB | 152 | 950 | 403 |
| | FPU | 120 | 446 | 238 |
| BOD(mg/L) | Inf. | 141 | 365 | 258 |
| | UASB | 545 | 184 | 130 |
| | FPU | 42 | 154 | 96 |
| SS(mg/L) | Inf. | 169 | 920 | 410 |
| | UASB | 103 | 860 | 380 |
| | FPU | 63 | 622 | 262 |

By these tables we can analyze the difference between the readings from all these places (Canada, Kuwait and India) and we can see the difference between the values of B.O.D., C.O.D. and others and can say that there is a good difference between the tertiary water treatment and other level of water treatment and value of the these readings show how much tertiary water treatment is cleaning the water and so we can say that if we implement the tertiary water treatment in India and it will be helpful for us to get some extra water to decrease amount of water scarcity .

II. RESEARCH METHODOLOGY

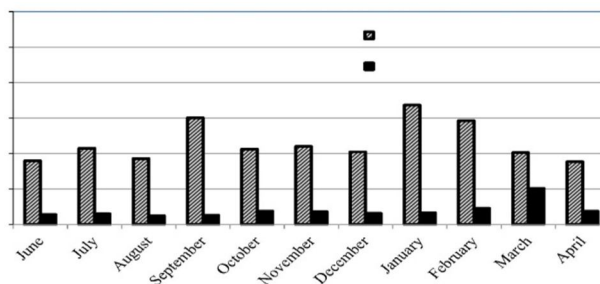
Study was started with identification of drought condition of a number of the Indian states also less availability of water. Water treatment process in India is followed up to secondary process only. However, a number of the countries are using Tertiary water treatment method out of which one is Canada. After identification of the matter, the aim, objectives and also the methodology were framed. The study is administered for geographical conditions and existing water treatment process in India. Primary and secondary data is collected from several sources then comparison is created that how Tertiary water treatment process is more advantageous than Secondary process.

So by seeing those tables within the introduction we are able to see the main differences between the secondary and tertiary water treatment values and by seeing those values we are able to say that tertiary water treatment is sweet as comparison to other treatment facility for treating water and after cleaning this water from tertiary water treatment process water is been supplied to 17% of total population of Canada and same in Kuwait so we must implement this in India so we are able to use that unusable water for a few work.

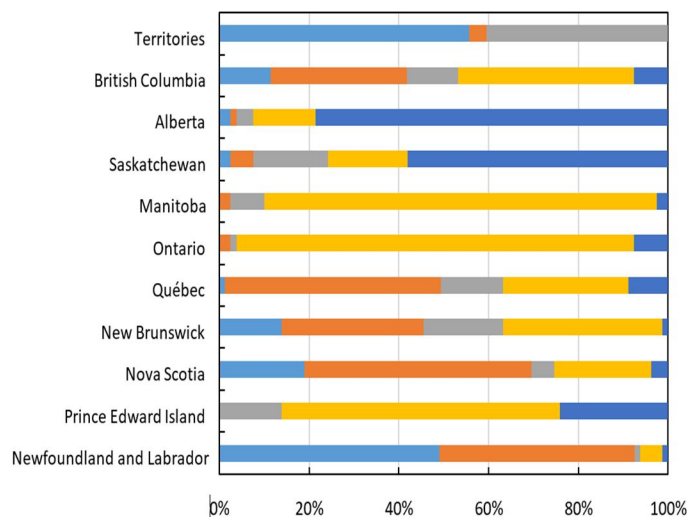


Municipal Water and Wastewater Survey 2004-2009. Environment Canada.

The majority of Canadians have access to sewage collection systems, but the treatment of wastewater varies nationally from no treatment to advanced facilities. According to the 2009 Municipal Water and Wastewater Survey (MWWS), 87% of Canada's population is served by sewerage connected to some type of treatment, and this proportion has remained stable since the late 1980s (MWWS: Environment Canada, 2011). The remaining population is served by septic systems (12%) or sewage haulage (0.5%). Of the population receiving some form of wastewater treatment, the majority (79%) had their wastewater effluent treated at a secondary level or higher. The most common form of secondary treatment was mechanical treatment (~55%), 7% of the population receive secondary treatment in waste stabilization ponds (often termed "lagoons" or "aerated facultative lagoons"). Approximately 17% of population receives tertiary-level (or "advanced") treatment, while 18% of the population receives primary treatment, and 3% receives no or preliminary wastewater treatment

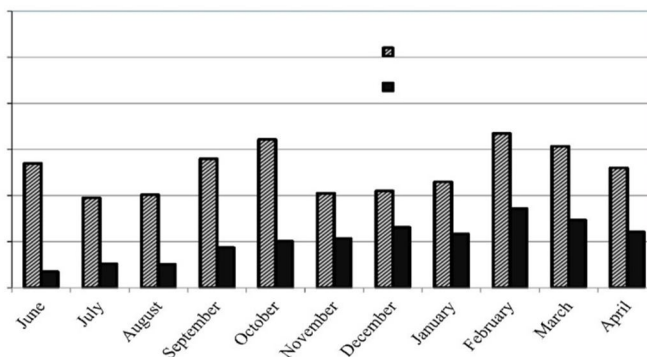


The state of waste water treatment in Canada



- None/preliminary
- Primary
- Secondary-WSP
- Secondary-mechanical
- Tertiary

The state of waste water treatment in Kuwait



A. Quality Evaluation of Tertiary Treatment Effluent in Jahra Sewage Plant, Kuwait

- 1) Hatched Bar shows Secondary treatment
- 2) Solid Bar shows tertiary water treatment

B. Monthly Variation Of BOD In Secondary And Tertiary Treated Effluent

- 1) Hatched Line shows secondary water treatment
- 2) Solid Bar shows tertiary water treatment

III. CONCLUSION

The interpretation of TWTP is very encouraging step that each city should plant. It gives us the emancipation to reuse the sewage water directly for Household or Industrial purposes. By using the TWTP, we can eliminate the use of fresh water in many different field of work. Sewage water treated from Tertiary water treatment is that much purge that it can be used for washing of cloths, utensils and other industrial works. Since Tertiary water treatment is costlier process so it is not used in India at present. However, by analyzing the scenario of water scarcity in India there is urge need of instalment of Tertiary water treatment process.



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