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# Wastewater Treatment Plants: Operations and Characteristics

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***Abstract***

*The life process of the aquatic creatures has been faced most critical issues due to the escalating rate of water pollution through water wastages pour out from the industrial areas. Overall under water ecosystem most negatively impacted through the throw out of industrial waste water within the water bodies all around the globe. The process of waste water treatment plants most significantly provides the assistance to separate harmful elements from the water and reduce the water pollution rate in the atmosphere. The entire study has been performed to discuss the operations and characteristics of waste water treatment plants. It has also been analysed the impact of waste water treatment plants in the atmosphere. The qualitative type of data has been gathered using secondary data collection process to evaluate the topic. Data published in peer reviewed and authentic online sites published onwards 2019 has been taken within the inclusion criteria. The process of waste water treatment plants helps to separate pollutants and harmful chemical elements from the waste water. The entire study has been found that process of waste water treatment plants provides assistance to reduce water pollution but it involve with some risks associated with air pollution in the atmosphere.*

***Keywords***

*Atmosphere, Waste water treatment, water pollution,*

## INTRODUCTION

The increasing crisis in the environment most negatively harms the mental and physical wellness of the people all around the globe. It has been imposing a critical threat on the livelihood process of each individual worldwide. The transmission of a number of pollutant particles in the atmosphere has been most significantly affected on environmental sustainability throughout the globe. Water is the basic needs of each living creature, plant and human in the global area. The deteriorated conditions of the water substances have created a serious trouble for the humans and animals to avail pollution free water in order to spend their entire life process effectively. It is said that water is the life source of each living individual. The unavailability of usable and drinkable water has been threatening the world which has been increasing day by day due to high amounts of pollutant mixes within the water bodies all around the globe. Hence, in order to sustain the life process of each living being in this world it becomes essential to ensure to take action to reduce the pollution rate within water worldwide.

Most of the water available in the earth are actually frozen in the polar areas as ice, where a large number of water substances are actually belongs to sea areas which are actually salt water and not drinkable, the reaming water available under earth's surface area and various water substances as river, ponds, lakes and many other sources. In numeric value just 0.5% water is actually usable for the living beings in the planet [1]. The amount of operational water for the living organism is reducing with an apex pace with the increasing amount of ***water pollution*** all around the globe. The high amount of populated water disposals with a high rate of trained and blown water within seaside's and ocean have brought forth a serious challenge for the sea creatures and devastated the ecosystem of the water life in the global periphery. The consumption of highly polluted water substances harms the physical wellbeing of the humans, animals, and plants as well as makes the most negative impact on the natural life process and operational activities. Hence, it becomes highly essential to take steps ahead to reduce the amount of ***water pollution*** and avail a healthy and lucid future.

The implication of ***waste water treatment*** most significantly helps to reuse the waste water substance in operational works and helps to reduce the rate of ***water pollution*** in the environment. Business organizations need a huge amount of water in order to perform their various industrial tasks effectively as well as have to dump a large quantity of water in the atmosphere which causes a critical issue of ***water pollution*** worldwide. The techniques and process of ***wastewater treatment*** not only helps to reduce pollution rate in water bodies but also provides a key assistance to the business companies to avail a continuous availability of water through recycling water. It also helps to reduce the water crisis all around the globe. The study has kept its focus on discussing operations and characteristics of ***wastewater treatment.*** Various concepts and learning helps to know the applications and assistance of ***wastewater treatment*** will be analyzed effectively within the study. It helps to perform the entire study efficiently and comes forth with a proper output result from the entire study.

## MATERIALS AND METHODS

### Research Design

The entire study has counted ***wastewater treatment*** as the key concentration within the entire study. It will also discuss the impact, operations and characteristics of the ***wastewater treatment*** while performing the study. Though, it is highly necessary to gather a huge amount of topic oriented data and information in order to perform the study effectively and explore the topic. An inductive design in order to perform a study provides the key assistance to collect a large amount of topic oriented data on a certain topic [2]. Hence, an inductive design has been used in order to perform this particular study.

### Research Type

The topic of the study actually demands to collect various non-numeric and textual data and information in order to evaluate a certain topic. It will help to bring forth effective results and help to gain proper insights of the application, operation, influence, characteristics of the ***wastewater treatment***. Qualitative data and information are actually non-numeric and provide the support of textual information within a study and enhance the quality of the overall study effectively [3]. Hence, the qualitative type of data has been taken in order to perform this particular study.

### Data collection process

In order to gain an effective output while performing the overall study, it becomes highly essential to gather a large amount of data and information through accessing the internet. The secondary data collection process within a study actually helps to gather a large set of data through accessing various peer reviewed and authentic online sites, e-magazines, online articles and journals and helps to perform the study more constructively [4]. Thus, the entire study will be performed through gathering a large amount of data and information through a secondary data collection process.

### Inclusion and exclusion criteria

The primary data collection process has been taken within exclusion criteria within the study. The data and information published before 2019 on the internet has also been shortlisted within the exclusion criteria within the study. The qualitative data which are published in authentic and peer reviewed online articles and journals onwards 2019 has been taken within the inclusion criteria while performing this particular study.

### Choice of the topic

It becomes mostly necessary to take steps towards improving the condition of the “Adam's ale” to cope up with the high rate of pollution in the worldwide periphery as well as to ensure the sustainability of the life races within the globe. The implication of ***wastewater treatment*** mostly helps to reduce the increasing rate of ***wastewater treatment*** and aquatic crisis in the international periphery. The study on ***wastewater treatment*** helps to gain insights of the operations and execution of ***wastewater treatment*** and helps to decrease the rate of ***water pollution*** all around the globe.

## RESULTS

### Concepts of waste water treatment

The entire task taken place with the process of ***wastewater treatment*** has kept its pivot in removing waste materials within the water aquatic scrap. The overall tasks performed with ***wastewater treatment*** helps to detach contamination from the water. The most of the ***wastewater pollutants*** within the water has come from the high rate of hot water, fluid wastes disposed of by industrial companies in their working areas within the aquatic bodies as river, lake, ocean and many others. The entire process which has been brought about with ***wastewater treatment*** has been performed using various technical, chemical as well as biological processes which helps to treat waste water disposed from the industrial areas and helps to pull out pollutant particles from the fluid [5]. Various technological infrastructures as well as gadgets has been introduced in recent days business market periphery which provide the opportunity to implicate superior ***wastewater treatment*** in order to reduce ***water pollution*** as well as to improve environmental sustainability.

Various technological and mechanical processes used with ***wastewater treatment*** to do away with harmful substances from the water, chemicals to make effective purification of the water as well various biological processes also have been used within the ***wastewater treatment*** in order to remove pollutants from the wastewater. It has used a high efficiency purification technique known as ultra-filtration which most effectively helps to drag out unhealthy particles from the waste water and assist to proceed with water recycling within the industrial areas. The escalating rate of ***water pollution*** can be mitigated through applied ***wastewater treatment*** within the industrial areas and helps to improve aquatic ecosystems all around the world. The entire process involved ***wastewater treatment*** keeps its eye on flow of the waste water through thin filter members with little pores, only the water, salts and charged molecules able to go through the membrane and detach the harmful chemical particles from the water [6]. It also harmful bacteria and other micro biological elements break down with harmless by-products within the water during the process of ***wastewater treatment.***

The entire quality of water is actually enhanced through ***wastewater treatment*** and provides superior assistance to reduce industrial pollution through water wastage disposals. The entire waste water which has been dispatched after using within an industrial area entered with the aeration tank, where it mixed up with the sludge elements. The mixture of wastewater and the sludge elements within the aeration tank goes through various mechanical, chemical and biological operations where the total amount of waste water gets rid of harmful biological and chemical pollutants and further filtered through membranes to remove the existence of the harmful elements from water [7]. It helps to make use of the water again as well as helps to solve resource scarcity issues

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all around the world. A number of private and public sector institution in the world has been implemented the techniques of ***wastewater treatment*** in order to mitigate the ***water pollution*** issues in the global market and to improve the physical wellness of the people all around the world.

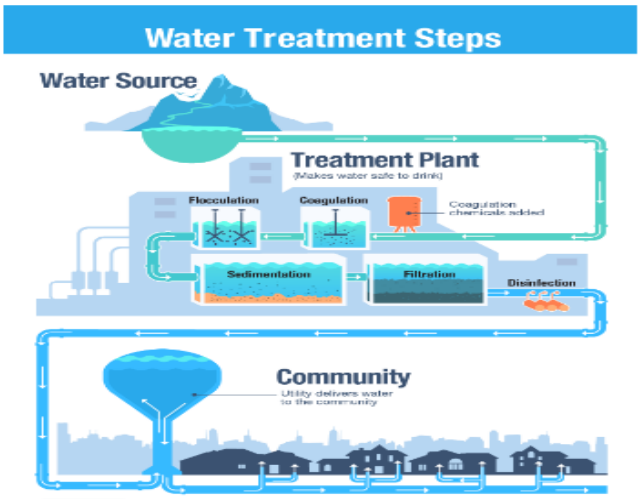


**Figure 1:** Steps within wastewater treatment

**Impact of wastewater treatment on the environment**

The overall process of wastewater treatments provides a key impact in order to reduce the rate of ***water pollution*** and to enhance the environmental sustainability in the world. A number of chemical and biological elements which actually reduce the quality of the water have been involved with the water wastages in the industrial sectors. The disposal of the waste water with a huge amount of pollutant elements mixed up within it has been causing a high rate of environmental pollution and affecting life in the aquatic ecosystem. The process within the ***wastewater treatment*** mostly helps to separate harmful substances from the water which provides the assistance to reduce the rate of injurious and unfavourable particles from industrial waste water and helps to improve environmental sustainability.

The reduced rate of pollutants which are disposed of in the water bodies as industrial waste provide the kept assistance to deal with increasing ***water pollution*** issues globally which actually assists to strengthen the well-being of the environment throughout the globe [8]. The increment of pathogenic organisms within the water, reduction of the oxygen rate within the water, lack of nutrients for the lives within marine, increased rate of chemical sediments, radioactive pollutants and many others which mostly weaken the condition of the water is known as ***water pollution.*** The cases of ***water pollution*** impose a direct and highly negative impact on the overall presence of life on earth. It has come forth in various negative scenarios and physical crises humans as well as other creatures in the globe. The process takes place within ***wastewater treatment***, and helps to enhance the usable worldwide [9]. The overall presence of the harmful chemical and molecular substance within the water waste can be easily removed from water while using ***wastewater treatment.***

In spite of the superior impact of the ***wastewater treatment*** to reduce the increasing rate of ***water pollution*** in the global periphery, it also has various negative impacts on the atmosphere. The use of ***wastewater treatment*** actually needs a well source of energy and involves a high rate of carbon emission on the air, it actually weakens the sustainability of the environment in the global periphery [10]. The demand for energy sources within wastewater ***treatment*** causes a high rate of air pollution and increases the existence of greenhouse gasses within the environment which causes global warming in the world. Business organizations in the worldwide business market surroundings have to keep their focus on making balance in use of ***wastewater treatment*** in order to achieve desired environmental impact to strengthen sustainability. The responsible attitude towards implication of ***wastewater treatment*** provides the assistance to improve the condition of the atmosphere and enhance the environmental sustainability all around the globe.

**Operations and characteristics of waste water treatment plants**

The case of ***wastewater treatment*** has been involved with a number of versatile characteristics as well as operations within itself. There are basic two steps which are involved within the overall process of ***wastewater treatment*** which are primary and secondary which are going to be discussed here in detailed manner. It provides the help to know the operations and characteristics which are involved with ***wastewater treatment.*** The entire tasks of ***wastewater treatment*** have its superior involvement with allowing the solid and larger particles to be sediment and removed with the assistance of the upgraded technological equipment in primary step [11]. Most pollutants with a higher density and molecular radius separate from the waste water while performing the primary stage of the ***wastewater treatment***. It mostly helps to improve the quality of the water, though it is not able to purify the water from the components with a lesser radius. A large number of molecular components are not removed within the initial stages of the ***wastewater treatment***.

In the second stage of the ***wastewater treatment*** the molecules and substances with lesser molecular radius have been separated. Various chemical and biological elements have been used while performing the second stage of ***wastewater treatment*** and perform a superior purification of waste water and make it reusable [12]. It provides the key assistance to destroy all harmful biological substances such as bacteria, viruses, protozoa and many others from the water and helps to enhance the quality of water. The basic four operations which have been performed within ***wastewater treatment*** which are physical water treatment, biological water treatment, chemical treatment and sludge treatment [13]. The basic four operations which have been performed with ***wastewater treatment*** have the ability to detach non-desired substances from the water and reduce the rate of ***water pollution*** in the world. In technological treatments a number of highly effective mechanical equipment is used to

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make sedimentation and removal of the large components from the water bodies. In biological treatment, various biological reactors are used which help to demolish harmful molecular elements from the water. In further areas of chemical treatment various chemical reactions occurred which helps to remove radioactive and injurious chemical components from the water. In modern days upgraded ***wastewater treatment*** both of the primary and secondary stages are used to ensure an out and out purification of the water.

Various different characteristics of ***wastewater treatment wastewater treatment*** can be witnessed with the overall interests and needs. The specific treatment technique has also been involved with the specified tasks and intention of the industry to industry. It actually differentiates the operations and the characteristics of ***wastewater treatment*** in global business market surroundings. Major components which are used in order to perform ***wastewater treatment*** are respectively "bar screen", "chamber of grit", "comminutors", "pre-separation tank", "primary tank settlers", "secondary settling tank", "biological filters", "sludge handler" [14]. It most significantly helps to separate unnecessary and harmful components from the water bodies and helps to take forward steps towards reducing ***water pollution*** all around the world.


**Figure 2:** Wastewater Treatment Process

**Major challenges involve with wastewater treatment plants**

The implication of wastewater treatment is not only considered as a boon to mitigate water pollution issues but also brings forth the critical damage in the atmospheric air through increasing a large amount of carbon and other greenhouse gasses in the environment. The overall use of waste water treatments involves a high amount of mechanical energy through accessing various traditional energy sources and emits a large amount of carbon dioxide in the atmosphere which causes a critical damage in the sustainability of the environment and brings forth air pollution [15]. The overall sludge disposal and sewage through biochemical processes most negatively impact on the atmosphere and causes a high rate of air and solid pollution. It is a key issue which has been involved with ***waste water treatment***. The environmental issues caused due to ***wastewater treatment plants*** can be considered as the key challenge regarding the process. Though, the arrival of various upgraded modern equipment, and eco-friendly proceedings could be helpful in order to mitigate the environmental challenge in ***wastewater treatment plants***. It will help to improve the environmental sustainability most efficiently through using ***wastewater treatment plants*** while reducing the rate of water pollution as well as through taking the edge off the air pollution issues related with the techniques.

## DISCUSSION

The entire study has been performed in order to find the operations and characteristics of the wastewater treatment plants. It has been discussed a number of concepts which mostly helps to understand the topic and come forth with the most effective output result. As discussed with the study, the definition of ***wastewater treatment plants*** is actually the process of storing and performing various chemical, biological and mechanical processes in order to remove the harmful substances from the water. It provides the key assistance to drag out various chemical, biological, and radioactive elements which mostly decrease the quality of water and helps to make the water filtered to make proper reuse. The overall support which is provided through ***wastewater treatment plants*** mostly helps to deal with the increasing rate of water pollution as well as helps to reduce wastage of water in the industrial areas.

There are a number of different mechanical steps used within the ***wastewater treatment plants*** which mostly reduce large foreign and harmful particles from the water whereas biological treatment helps to remove harmful bacteria's, protozoan, viruses and many other substances from the wastewater. On the other hand, the radioactive and chemically pollutant elements mostly removed within the chemical treatments perform within ***wastewater treatment plants.*** The study also found the mechanical process done with the primary stage of the ***wastewater treatment*** where biological and chemical reactions in order to remove smaller pollutants and harmful particles perform with the secondary part of the ***wastewater treatment plants***. The study has discussed the advantages and disadvantages of the ***wastewater treatment plants*** in the environment. It has been found that the concepts and usages of ***wastewater treatment plants*** helps to mitigate water pollution issues whereas it impacts negatively on the air due to high rate of carbon emission.

The overall operational tasks and characteristics involved with the ***waste water treatment*** process have also been discussed within the entire study. In initial steps the ***wastewater treatment*** has kept its focus on separating the larger particles and pollutant elements with a high density from the water through taking a superior quality purification membrane within it. The larger particles have been easily gone through the pores within the purifying membrane and make the water more appropriate to make it for reuse. The molecular, biological and smaller chemical particles from the water body do not get separated from the water in the primary stage of ***wastewater treatment.*** In the succeeding stage of

***wastewater treatment*** it makes a use of various superior mechanical, actinic as well as enzymatic and biological processes which helps to remove or destroy most of the harmful chemical, radioactive and biological impurities from the water.

The wastewater from the industrial area can be decontaminated through using these processes of ***wastewater treatment*** and provide the assistance to the business companies to reduce their negative impact on the water bodies throughout the globe as well as decrease the chance of water pollution. Different mechanical and technological parts which are involved with the entire proceedings of the ***wastewater treatment*** have also been analysed within the study. The negative impact which has been possessed through ***wastewater treatment*** in the environment has also been discussed within the entire study which has been come forth with the findings that the process of ***wastewater treatment*** increases the risk of air pollution within the environment. The mechanical and technological processes involved with ***wastewater treatment*** use a high amount of natural sources of energies and emit a large rate of greenhouse gasses in the atmosphere. It actually causes a high rate of air pollution and weakens the sustainability of the environment. It has become essential to apply the use of renewable sources of energies within ***wastewater treatment*** to reduce its negative impact on the atmosphere. It most significantly helps to enhance the sustainability of the environment all around the globe.

## CONCLUSION

The entire study has been performed to understand the process of ***wastewater treatment*** and to gain proper insight about operations and characteristics of ***wastewater treatment plants***. Various concepts which help to develop an empirical idea about the ***wastewater treatment*** has been analysed within the discussion which helps to bring forth the most suited idea on the topic taken in order to perform the study. It provides the key assistance to know operations and characteristics of the ***wastewater treatment plants***. Different technical stages which have been taken in order to perform ***wastewater treatment*** have been canvassed within the overall discussion of the study. Business organizations all around the globe can be able to imply the process of ***wastewater treatment*** in their operational and functional area which mostly helps to reduce the rate of ***water pollution*** and helps to reduce negative impact of emitting ***waste water*** within the water bodies.

The entire study also involved itself to evaluate the impact of ***wastewater treatment*** on the environment. The study has been showcased that the entire process of ***wastewater treatment*** has its superior ability to mitigate water pollution issues while in negative note it comes forth with critical air pollution issues in the environment. Business companies in the international periphery have to take up their steps forward while keeping their concentration on making a proper balance and maintaining sustainable policies to reduce the high rate of carbon emission in ***wastewater treatment***. It will provide a key assistant to improve the health of the atmosphere and enhance environmental sustainability all around the globe.

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