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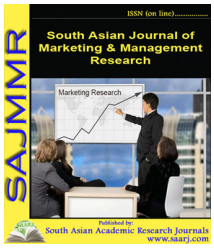

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MANAGING WASTE WATER THROUGH THE AGES: A HUMAN HISTORY

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ABSTRACT

Even though there has been a lot published on the history of water delivery systems, there isn't much on wastewater management. This is unexpected since a lack of sanitation has the same, if not larger, impact on human development as a lack of clean water. While addressing waste treatment may carry a stigma, cleanliness is generally seen as a major demand on financial and political resources, as well as humanity's development. A overview of the literature on the development of sewage disposal through time and its effect on human health and the environment is provided. Hopefully, this knowledge will raise historical understanding in order to influence future legislation and technological advancements. The study emphasizes the link between environmental contamination and the capacity to quantify it, as well as how advancements in scientific understanding have influenced pollution management. The impact of political and social events on wastewater management is also highlighted. A sanitation history has been created, highlighting major advancements in wastewater treatment and advances in analytical environmental sciences. This review was prepared with the hope that historical research demonstrating the communal experience and "philosophy of sanitation" may inspire future challenges.

KEYWORDS: *Environmental, Waste water, Management.*

1. INTRODUCTION

It's amazing how much history can be discovered at the end of a sewage system, from food to sanitary practices, medicines and birth control pills to more personal sexual behaviors. There is no more dependable source of a society's traditions and behavior than its waste products, and this truth is beyond civilization's comprehension. There is no social analysis that is more accurate than a wastewater analysis. “The history of mankind is mirrored in the history of sewers,” says the author, “it has served as a haven for crime, cunning, social protest, religious liberty, thinking, thievery, and everything else that the human law has punished or has persecuted is concealed in that hole.” What is in the sewer does not lie, and it restores equilibrium with the precision of a

level. The quest for truth is left in its wake. Disclosure occurs inside this seemingly fleeting yet explosive contact point between civilization and its wastes: "There, the bottom of a bottle denotes inebriation, a basket-handle denotes domesticity, the core of an apple that has entertained literary opinions reverts to an apple core, the effigy on the big soul becomes openly covered in verdigris, Caiaphas' spittle collides with Falstaff's pukin, and the louis-d'or from the coming-house jostles the nail from which hangs the rope's Everything that was previously rouged has been washed away[1].

1.1.Historical considerations

The development of sanitation techniques may be split into five major eras in a timeline.

- The beginnings.
- The Roman Empire
- The Sanitary Dark Age.
- The Industrial Revolution and the Age of Sanitary Enlightenment
- The era of strict environmental regulations

The Beginnings Humans (Homo sapiens) have been on the planet for nearly 200,000 years, the majority of that time as hunter–gatherers with ever-growing populations. The earliest human settlements were dispersed across large regions, and the trash they generated was returned to the earth and degraded naturally. Because they were tiny nomadic hunter–gatherer groups, disposal issues were minimal. Around 10,000 years ago, humanity built permanent settlements and adopted an agricultural lifestyle, ushering in a new age. With human settlement came environmental consequences. The disposal of human excreta was handled via holes in the ground until the creation of the first sophisticated civilization, as described by the Mosaic Law of Sanitation[2].

1.2.Empire of Mesopotamia:

Ancient Civilization, according the literature, spanned portions of Africa, Southern Europe, the Middle East, and Asia all the way to India. The Mesopotamian Empire was the first civilization to officially address sanitary issues resulting from communal living, according to historical sources. There are remnants of houses linked to a drainage system to take away wastes, as well as latrines leading to cesspits, among the ruins of Ur and Babylonia. Unfortunately, despite the existence of this complex system, most Babylonians dumped trash and feces into the unpaved streets, which were regularly filled with clay, ultimately increasing the street levels to the point that steps had to be constructed down into homes[3], [4].

1.3.Indus Civilization :

Indus Valley wastewater management was well advanced. That area has a sophisticated and technologically evolved urban culture. The community's quality of life indicates considerable understanding and application of urban planning, as well as effective municipal administration and a strong focus on cleanliness. the fact that the Indus civilization was densely populated and that "open squatting" was frowned upon Houses were linked to drainage channels as early as 2500 BCE, and effluent was not allowed to run straight to the street sewers without first being treated. Wastewater was first pumped into a tiny sump via tapered terra-cotta pipes. When the sump was approximately 75 percent filled, solids settled and collected in the sump, while liquids spilled into drainage pipes on the roadway[5].

1.4.Egyptian:

The better homes at Hierakonpolis, as according Herodotus' account (Histories II), included limestone bathrooms and toilet seats. A slightly sloped stone-slab floor would be installed in the bathroom, and battered stone slabs would be used to border the walls to a particular height (about half a meter) to guard against moisture and splashing. Water was drained from the bathroom by placing a basin under the spout of the floor slab, or by drainage pipes flowing through the outside wall into a vessel or directly into the desert sand. Less well-off people who couldn't afford a limestone toilet utilized toilet stools with a ceramic bowl below. Furthermore, temporary toilets were made out of toilet stools with a hole in the center and a clay pot underneath, which were often buried with important figures. The feces was collected in sand-filled jars and dumped into holes outside the house's walls, the river, and even the streets[6].

Civilization in Greece the Greeks were pioneers in the development of modern sanitation systems. Archaeological research have shown clearly that contemporary water management methods have their origins in ancient Greece. They discovered toilets that looked like Egyptian toilets in the Minos Palace in Knossos and the west side of the so-called "Queen's room" in Phaistos. They were linked to a closed sewage system that is still operational after four thousand years (Figure 2). a comprehensive description of Knossos' sewage system, which extends over 150 meters The Ancient Greeks (300 BC to 500 AD) had public latrines that discharged wastewater and rainfall into pipelines that led to a collecting basin outside the city. The wastewater was then transported to agricultural areas through brick-lined conduits, where it was utilized for irrigation and fertilization of crops and orchards. The pipe system's design is understood based on archaeological evidence. Wastewater went from the building via one set of pipes to a bigger channel in the road, which then flowed to larger main channels and finally into a single collector. Archaeologists discovered a system similar to this between the Acropolis and the hill, where a succession of canals converged in a single collector[7].

Figure 1: Parts of the sanitary and storm sewage systems of Knossos Palace[8]**.**

1.5.Period of the Romans:

The Romans were excellent engineers and administrators, and their systems were on par with contemporary technology. One of the wonders of the ancient world is Rome's water system. The water in Rome is well-known, and much has been written about it. The effect of wastewater

management on Roman living has received much less attention. Although sewage and water pipes were not invented by the Romans, they were definitely improved by them since they were previously existent in other Eastern civilizations. The Romans continued the Assyrians' engineering efforts, transforming their ideas into massive infrastructure that served all of the people. The Romans controlled the water cycle from collection to disposal, creating parallel networks to gather spring water as well as dispose of storm but also wastewater. They were the inventors of the first integrated water service[9].

1.6.The development of wastewater treatment technology:

Although it is essential to understand different wastewater treatment procedures, the purpose of this article is to outline the most significant advances in the history of wastewater treatment rather than to provide comprehensive explanations that can be obtained elsewhere.

The first line of defense Gravity sedimentation is used to remove heavier particles during primary treatment. Trenches and pits, which have been used for millennia to remove heavy particles prior to application with the goal of decreasing the burden on the land to prevent clogging, were the oldest type of primary treatment. Minoan Tylissos, Palace of Knossos, and HagiaTriada all had sedimentation tanks. L.H. Mouras developed the "fosses Mouras," a cesspit with input and exit pipes that dropped below the water surface, creating a water seal. Donald Cameron patented septic tanks in 1895, which improved on this concept. The Imhoff tank, built by Karl Imhoff in 1906, was a step forward and is currently in use throughout the globe. Until the implementation of the Clean Water Act in 1972, which required secondary treatment, primary treatment was the most prevalent method of wastewater treatment in the United States.

1.7.Treatment in the second stage:

Bacteria convert carbonaceous (organic) elements in wastewater to carbon dioxide, water, and energy for re-growth in secondary treatment. Secondary subsequent advancements relied on two fundamental kinds, which lead to the idea of the fooling filter. The very first trickling filtration was built in Salford, near Manchester, England, in 1893, and many more were used to cleanse wastewater from towns or cities throughout the United Kingdom from 1895 until about 1920. The trickling filter in its current form was never patented.

Attached growth (biofilms) as well as suspended growth (therapy) Microorganisms may attach to and develop on a fixed substrate such as rock or plastic in attached growth systems. BOD is reduced when wastewater runs through this aerated biofilm. The biomass and wastewater are continuously combined in a suspended growth system, resulting in a decrease in BOD. In a later sedimentation stage, the particles are removed, and the bulk of the liquid is reintroduced to the process.

1.8.Attached development:

The notion that wastewater might be purified in this manneraroundthe end, the usage of microorganisms started to appear.During the nineteenth century The Edward Frankland Foundation was founded in 1870 by Edward Frankland.Many of the fundamental concepts of filtration through the soil on which much of the research is basedCooper (2007) said that subsequent advancements were dependent (Cooper, 2007). This resulted in thetricking filter idea. The first trickling filter was invented in 1893.was erected in Salford, England, near Manchester, and has been operational sinceMany others were employed to remediate wastewater[10].

2. DISCUSSION

It's amazing how much history can be discovered at the end of a sewage system, from food to sanitary practices, medicines and birth control pills to more personal sexual behaviors. There is no more dependable source of a society's traditions and behavior than its waste products, and this truth is beyond civilization's comprehension. There is no social analysis that is more accurate than a wastewater analysis. Although there has been a lot published on the history of water delivery systems, there isn't much on wastewater management. This is unexpected since a lack of sanitation has the same, if not larger, impact on human development as a lack of clean water. While addressing waste treatment may carry a stigma, cleanliness is generally seen as a major demand on financial and political resources, as well as humanity's development. The development of wastewater management through time and its effect on human health and the environment is provided. Hopefully, this knowledge will raise historical understanding in order to influence future legislation and technological advancements. According to the British Medical Association and the American Medical Association, wastewater treatment is the single most important factor in public health and lifespan. This timeline demonstrates how waste treatment has improved economic circumstances, public health, and lifespan. All people on the planet must have access to clean drinking water and sanitation. This is a human right as well as a wonderful equalizer. The study emphasizes the link between environmental contamination and the capacity to quantify it, as well as how advancements in scientific understanding have influenced pollution management. The impact of political and social events on wastewater management is also highlighted. A sanitation history has been created, highlighting major advancements in wastewater treatment and advances in analytical environmental chemistry. This review was prepared with the hope that historical research demonstrating the communal experience and "philosophy of sanitation" may inspire future challenges.

3. CONCLUSION

The long history of urban ecology, wastewater disposal, and social and cultural traditions come to mind when it comes to sewage disposal. Dispersion and dilution were the most frequent, but not necessarily the best, management strategies for a long time. Unfortunately, they are still performed in many impoverished countries and abroad. The path to proper wastewater management legislation has been long and convoluted. Many countries have not embraced wastewater management methods because of corruption or a misunderstanding of the economic benefits of wastewater management, rather than ignorance. Even in impoverished countries, technology is accessible to everyone. Despite the benefits of decentralized systems for small populations and rural areas far from large treatment facilities, many individuals in developing countries do not have access to sanitation. Technical progress is needed to enhance sanitation and waste management in impoverished nations, but taboos, reservations, and social boundary constraints must be carefully addressed. Wastewater treatment is the single most significant element in public health and longevity, according to the British Medical Association and the American Medical Association. This timeline depicts how waste treatment has benefited the economy, public health, and longevity. Clean drinking water and sanitation must be available to everyone on the globe. This is both a human right and a fantastic equalizer..

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