

# The Market for Integrated Water and Wastewater Management – A Sustainable Solution in Africa

<sup>1</sup>Devang A Shah

<sup>1</sup>Assistant Professor,

<sup>1</sup>Civil Engineering Department,

<sup>1</sup>Parul Institute of Technology, Vadodara, India

**Abstract :** Though endowed with natural resources and biodiversity, Africa is predominantly poor and full of oppressed people. The continent has huge growth potential if one can implement solutions to challenges like conflicts, mismanagement of resources, illiteracy and wrong beliefs. The vested interest of rich nations who are resource-hungry is exploiting African countries for since long. Now it is time to use sustainable development technologies bestowed by modern science to better this resource-rich continent. The African people must be encouraged to identify their indigenous wealth and use natural intellect, instincts to become entrepreneurs of sustainable products derived from the natural endowment in Africa. Integrated water and wastewater management will lead the continent towards a prosperous future. The ideas related to such sustainable growth with relevant economics are discussed here. The inclusion of economics will ensure private players' involvement in reliving the government's economic burden and creating services in the shortest possible time.

**IndexTerms - Integrated approach, Sustainable Solutions, sewage disposal, developing countries, water reuse, economics, emerging market.**

## I. INTRODUCTION

Being the second-largest continent with rich biodiversity and generously endowed natural resources Africa is world-famous for its forests and strongly built human population. Considering the minerals, forests, and other natural wealth Africa should be a highly prosperous and flourishing continent. On the contrary, Africa is having a maximum population living below the poverty line. There is a lack of proper resource handling and policy for economic growth. In the absence of such good governance, the potential of Africa is being wasted. Researchers have reported the untapped business potential and highlighted the possibility of Africa being the next biggest growth market. They have enlisted the major five bold business opportunities. The first one is the fast-growing and urbanizing population; the second one is Africa is adopting industrialization, the third one is the establishment of the drive for the infrastructure set up in Africa, the fourth one is innovation application to unleash the agricultural and resource wealth and the fifth one is an increase in the digital and mobile accessibility. These five major opportunities are required to be tapped to their fullest potential to transform Africa and upbringing sustainable balance in the world.

## II. INTEGRATED WATER AND WASTEWATER MANAGEMENT FOR THE SUSTAINABLE AND PROSPEROUS AFRICA

### 2.1 Water Stress

A country is identified as "water-stressed" when the country's annual freshwater supply is less than 1700 m<sup>3</sup> / capita. A country is experiencing "water scarcity" when the country's annual freshwater supply is less than 1000 m<sup>3</sup> / capita [1].

As per a study conducted in 2017, the World Health Organization and the United Nations International Children's Emergency Fund documented that approximately 2.2 billion people do not have access to sanitized water sources. Sub-Saharan Africa had the largest number of water-stressed countries than any other place on the planet. Out of an estimated 800 million people who live in Africa, 300 million live in a water-stressed environment. The situation is going to be worst as per the prediction due to the physical and economic scarcity of water. Therefore, there is an urgent need to identify alternate sources which are robust and economical.

The lack of access to safe water is one of the primary causes of poverty in Africa. 1 in 8 people on the planet do not have access to clean, safe water - that's the equivalent of nearly one billion people! Of the 783 million people without access to clean water, 40% live in sub-Saharan Africa, and more than 320 million people lack access to safe drinking water.

### 2.2 Poor Sanitation

In countries in sub-Saharan Africa with the best water coverage, 1 in 4 people still lack adequate sanitation. In addition, rural residents are often in a more compromising state than urban residents if we consider the lack of access to water and sanitation. Funding is uneven and insufficient in the area, according to UNICEF.

Most overseas development aid goes to countries that are already doing well. While water and sanitation access are far behind in rural areas, both external and domestic funding goes primarily to urban systems. It is reported that 115 people in Africa die every hour from diseases related to poor sanitation, poor hygiene, and contaminated water.

Lack of access to poor sanitation means lost man-hours at work, stunted growth in children and poor female education. The root cause of the evil is the lack of funds to create the infrastructure for proper collection, transport, treatment and disposal of sewage. So, a solution that can generate revenue to solve the infrastructure scarcity is badly needed.

### 2.3 Economic Value of Sewage

Sewage is a rich source of nutrients and causes pollution and eutrophication if discharged in an uncontrolled manner to inland water bodies. However, if controlled reuse of treated / untreated sewage is carried out, it can bring laurels in agricultural yield. As found by the researchers the recovery of the nutrients from wastewater produced worldwide could result in a revenue generation of \$13.6 billion globally, with \$9.0 billion from the recovery of nitrogen, \$2.3 billion from phosphorus and \$2.3 billion from potassium. Water and Sanitation Program (2005) and later publications have highlighted the technical feasibility and importance of the ecological sanitation approach; however, it was also mentioned that the adoptability was poor, and maybe the reason is lack of comfort and ease in utilizing the approach. The conventional method of collection and treatment of sewage is well adopted and followed in several countries across the globe and hence it is better to target treated sewage reuse.

World Health Organization (2006) has published detailed guidelines for direct reuse of untreated sewage in agriculture. The reuse of untreated or treated sewage must be promoted to tap the unused nutrients and generate much-needed revenues satisfying sanitation demand.

### 2.4 Water Reuse is a Key?

The World Bank (2017) has mentioned that wastewater can be a valuable resource and economic opportunity, especially in urban and water-scarce environments. Though the fact is well established worldwide by several successful water reuse projects, full acceptance is not attained in the engineering and administrative fraternity. A brief review of the literature in this regard is presented here.

A detailed study in this regard with a case study of Vadodara Urban Development Authority had been carried out to evaluate the feasibility of the treated sewage reuse in the domestic, industrial and agricultural sector. The complete design and analysis of existing and proposed components with real-life cost and related data had been carried out with micro detailing to arrive at realistic results. The IRR for the water reuse project considering 30 years span is 12% or higher if the treated sewage prices are kept almost the same as per the present rate of fresh water in the scenario where sewage treatment plants are existing up to secondary treatment. This is the normal case in the case of urban setup. If a completely new provision is required, then the project has IRR higher than 9% at twice the cost of freshwater supply without considering environmental benefits.

Thus, water reuse in a planned manner for the treated sewage will solve pollution and health hazards and generate handsome amounts of revenue capable enough to create the much-needed sanitation infrastructure.

Further, the nutrients in wastewater will be utilized safely and properly, producing better yield and preventing eutrophication. It can be stated that this kind of reuse will ensure a natural balance of carbon, nitrogen and sulfur cycle etc.

The IRR of higher than 7% is sufficient for the world bank to pass the loan for any social welfare project. One can get an IRR higher than 14%, which is lucrative to private players also to invest the funds. The public-private partnership and BOOT (Built, own, operate and transfer) is the best model for the sustainable project as proven in road projects.

## III. FUTURE IMPERATIVE

So, more and more private and public funding should be diverted to the creation of sanitation infrastructure capable enough to reuse the water in the domestic, industrial and agricultural sectors. This implementation will produce revenues and help create more and better infrastructure leading to a healthy and sustainable society in Africa.

The proposed solution highlights a market of more than the US \$ 50 billion in Sub Saharan Africa, creating job opportunities, encouraging the sustainable use of resources, better agricultural yields and reducing pollution and related health hazards. Thus, integrated wastewater management will lead to reduced water stress and prosperity.

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