

## Chapter 13

# Access to Safe Drinking Water: A Low Income Sustainable Water Purification System

**Robert Cecil Willems**  
*Leamis International Ministries, USA*

**Steve A. MacDonald**  
*Dare County Schools, USA*

### ABSTRACT

*The focus of this chapter is to demonstrate that providing safe drinking water to communities in Majority World countries, specifically Kenya, Africa, is easily accomplished. Any water system, in order to be successfully constructed in impoverished Majority World communities, must be simple and inexpensive and the benefiting community must have a vested interest and ownership for the system to be effective. Establishing a vested interest by water recipients requires that the people providing the water purification technology understand the culture and worldview of the water system recipients. This approach is supported by literature review but more so by empirical evidence gathered by both authors.*

### INTRODUCTION

The World Health Organization (WHO) reports that diarrhea is a waterborne disease that kills around 760,000 children each year and is the second leading cause of death in children under five years old. There are nearly 1.7 billion cases of diarrhea each year. Diarrhea is both preventable and treatable (World Health Organization [WHO], 2015). WHO lists access to safe drinking water as the first key measure to prevent diarrhea.

Safe water supplies, hygienic sanitation and good water management are fundamental to global health. The global disease burden could be reduced by approximately 2.7% by increasing access to safe drinking water, improving sanitation and hygiene, and improving water management to reduce risks of waterborne infectious disease, especially diarrheal disease (WHO, 2015). Efforts to improve water, sanitation and

DOI: 10.4018/978-1-4666-9559-7.ch013

hygiene interact with each other to boost overall health. Access to sanitation techniques such as simple latrines in communities that lack water treatment systems prevents drinking water contamination from human waste and reduces infection. High-tech public health measures may not necessarily be the best practice while frequent hand-washing with soap and safe storage of drinking water are low-cost, high-impact practices. Investment to improve drinking water, sanitation, hygiene and water resource management systems makes strong economic sense. The Stockholm International Water Institute reported in 2004 that there is a potential for a three to thirty-four United States Dollar (USD) benefit to be realized for every one USD invested in reaching the United Nations Development Program Millennium Development Goals for safe drinking water (Sanctuary, Tropp & Berntell, 2004). In addition to the value of saved human lives, other benefits include higher economic productivity, more education, and increased healthcare savings.

Historically speaking, the developed, western countries have viewed Africa as an impoverished continent that required an immense amount of help to alleviate the suffering of its people. To that end governments and faith based and non-government organizations (NGO) have poured an immense amount of economic aid into Africa looking to correct problems that prevent those countries from becoming economically stable and self-sufficient. According to Development Initiatives, \$5.9 trillion US dollars are being spent each year in more than half of all developing countries (Development Initiatives, 2013). While recognizing that these expenditures are intended to be of major benefit to Majority World countries, most of the programs contain elements of paternalism which creates dependency and a sense of entitlement.

There are five types of paternalism: resource, where the solution to poverty is grounded in financial and material resource donation; spiritual, where the benefactor believes the materially poor can be taught much about spiritual concerns; knowledge, where the assumption is that the poor do not have good ideas about how to do things; labor, when the work is done for those who can do for themselves; managerial, where a time and efficiency model is the most expedient (Corbett & Fikkert, 2009). Corbett and Fikkert (2009) contend that paternalism must be avoided at all costs.

The colonialism of Africa, which started in the mid 1800s and continued till the 1970s, changed the face of the economic, political and social fabric of the colonized countries forever (Settles, 1996). Oliver and Atmore reported that economic development and education were left up to the private sector (as cited in Settles, 1996, p. 9) but the colonizing countries controlled the foreign trade tax which was designed to benefit the colonizing country, not the colony (as cited in Settles, 1996, p. 9). This situation persisted after the end of colonialism and the effects are still felt today. The infrastructure of transportation and human services in Kenya, most notably in sanitation and water supply, is extremely underdeveloped by western standards. This infrastructure underdevelopment is due to the withdrawal of colonizing country control in the 1960s and an African worldview that interrupts the western process of development. This African worldview will be discussed in following sections.

The objective of this chapter is to present a specific example of an extremely effective way of making safe drinking water available to millions of people in the Majority World. Simple, cost effective, and empowering preventative solutions, such as the system discussed here, can lead to safe, reliable water supplies for all. These solutions need not involve intervention by the major economic and political powers. Providing safe water will require a decentralized process that involves participation and sustainability (Marshall, 2011).

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/access-to-safe-drinking-water/140181](http://www.igi-global.com/chapter/access-to-safe-drinking-water/140181)

## Related Content

---

### Environmental Vulnerability to Climate Change in Mediterranean Basin: Socio-Ecological Interactions Between North and South

Ahmed Karmaoui (2018). *Hydrology and Water Resource Management: Breakthroughs in Research and Practice* (pp. 61-96).

[www.irma-international.org/chapter/environmental-vulnerability-to-climate-change-in-mediterranean-basin/187627](http://www.irma-international.org/chapter/environmental-vulnerability-to-climate-change-in-mediterranean-basin/187627)

### Monitoring of Groundwater Suitability for Irrigation Under Severe Arid Conditions: Case Study of Aquifer in Rjim Maatoug, Tunisia

Soumaya Hajji, Sedki Karoui, Nabila Allouche and Salem Bouri (2022). *Handbook of Research on Water Sciences and Society* (pp. 599-618).

[www.irma-international.org/chapter/monitoring-of-groundwater-suitability-for-irrigation-under-severe-arid-conditions/299901](http://www.irma-international.org/chapter/monitoring-of-groundwater-suitability-for-irrigation-under-severe-arid-conditions/299901)

### Anammox Process: Technologies and Application to Industrial Effluents

Ángeles Val del Río, Alba Pedrouso Fuentes, Elisa Amanda Giustinianovich, José Luis Campos Gomez and Anuska Mosquera-Corral (2017). *Technologies for the Treatment and Recovery of Nutrients from Industrial Wastewater* (pp. 264-289).

[www.irma-international.org/chapter/anammox-process/170027](http://www.irma-international.org/chapter/anammox-process/170027)

### Dihydroxyfumaric Acid: A Review of Transformations, New Derivatives, Importance, and Applications

Natalia Bolocan and Gheorghe Duca (2023). *Fundamental and Biomedical Aspects of Redox Processes* (pp. 198-223).

[www.irma-international.org/chapter/dihydroxyfumaric-acid/324215](http://www.irma-international.org/chapter/dihydroxyfumaric-acid/324215)

### Magneto Ferrofluid Flow

(2025). *Numerical and Analytical Approaches in Magnetohydrodynamic Fluid Flow* (pp. 191-210).

[www.irma-international.org/chapter/magneto-ferrofluid-flow/362780](http://www.irma-international.org/chapter/magneto-ferrofluid-flow/362780)