

Chapter 1

Water Safety, Security, and Sustainability: Emerging Trends and Future Pathways

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ABSTRACT

Access to safe, secure, and sustainable drinking water resources is of paramount importance and an existential challenge worldwide, especially for the scientific community at a time of dynamic global urban and economic development. The issue is shared among both developed and developing nations since all nations require adequate levels of good quality water at a reasonable cost. The authors address a fundamental question of how to make drinking water systems safe, secure, and sustainable to meet current and future needs using emerging trends in contamination monitoring and remediation while keeping such resources secure. From a policy standpoint, the authors discuss effective water treatment and better distribution management systems for sustainable water supplies. Since the issue of water supply is highly diverse, the chapter presents myriad water supply challenges from a holistic viewpoint by reviewing data on global water stress and recommends methods for contamination remediation. The authors present a sustainable landscape of water using risk assessment modalities for water systems.

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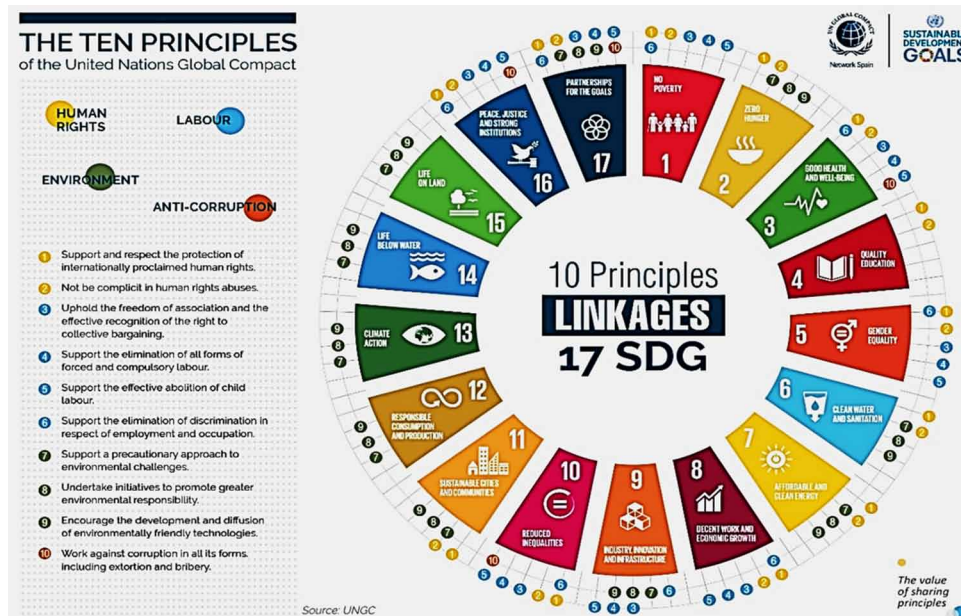
INTRODUCTION

Environmental pollution has become a global challenge many years ago. The diversity and volume of pollutants provoke unpredictable impacts to the state of the biosphere and life quality, water resources being the most affected by the pollutants. It is practically impossible to produce the necessary amount of “chemical magic” to clean the natural waters from hundreds of millions of tons of anthropogenic pollutants.

Framing the Global Challenges

Water is considered to be the natural resource of paramount importance as it affects all living organisms as well as the rest of our natural environment. Despite the simple molecular structure, this unique chemical substance exists in three physical states: liquid, gaseous and solid and is found everywhere in the Earth’s stratosphere, troposphere, and the entire Universe. Collectively, mankind must bear the overall responsibility for its use, reuse, treatment, safety, and protection of the planet’s water resources. This comprehensive approach is clearly reflected in three environment-related principles, out of the total number of ten, established by the United Nations Global Compact, with the close linkage to the 17 UN Strategic Development Goals (UNSDG), outlined until the year 2030 (UN General Assembly, 2015), as shown in Figure1.

Figure 1. The linkage of the principles established by the United Nations Global Compact, with the UN Strategic Development Goals (<https://www.sdg.services/principles.html>)



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