

# *Effects of Seawater Pollution on Wireless Signals: A Review*

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**Abstract**— Seawater pollution is a significant hazard to marine ecosystems and humans, requiring immediate attention and effective mitigation techniques. The present review paper investigates the complex link between seawater pollution and wireless signal transmission, examining the possible interplay, difficulties, and possibilities resulting from this interaction. The research investigated the numerous contaminants that affect maritime ecosystems, such as chemical compounds, microplastics, and oil spills, and analyzed their effects on wireless signal propagation. The impacts of signal interference produced by pollution exponentially grow and decrease wireless communication in terms of network performance in coastal locations, would be paramount to achieving accurate marine life. However, prospects for research and development in this field have been explored to underline the importance of multidisciplinary collaboration to overcome complex issues. The review study's goal is to foster a deeper understanding of the relationship between seawater pollution and wireless signal propagation domains and provide valuable insights to researchers, policymakers, and stakeholders working to preserve and manage our marine ecosystems.

**Index Terms**—Keywords—Seawater; Pollution; Wireless-link; Signal Propagation

## I. INTRODUCTION

In recent years, there has been a growing concern regarding seawater pollution and its impact on marine ecosystems and human health. Seawater pollution is a pressing global environmental concern with far-reaching implications for marine ecosystems and human populations. The contamination of marine environments by various pollutants, including chemical substances, microplastics, and oil spills, has been extensively documented and calls for urgent attention. As advancements in wireless communication technologies continue to revolutionize the way we connect and exchange information, it is essential to understand the potential interplay between seawater pollution and wireless signal transmission [1][2].

Seawater pollution poses significant challenges to wireless signal propagation in coastal regions. Pollutants can lead to signal attenuation, degradation, and interference,

reducing signal strength, increasing error rates, and degrading network performance. Chemical substances, such as heavy metals and industrial pollutants, can introduce additional obstacles to wireless signal propagation, affecting the reliability and efficiency of wireless communication systems along coastal areas [3][4]. Moreover, the accumulation of microplastics, which are tiny plastic particles dispersed throughout the oceans, can further impede wireless signal transmission due to their physical characteristics and potential for signal absorption and scattering [5][6][7][8].

While saltwater contamination poses difficulties for wireless signal transmission, wireless technologies also show considerable promise for monitoring and controlling pollution in marine environments. Using wireless networks, remote sensing technologies, and underwater sensor networks can give significant data on pollution levels, allowing for more timely and precise monitoring. When paired with modern analytics and machine learning algorithms, this data may be used to identify pollution sources, analyze environmental damages, and devise effective mitigation measures [9][10][11]. As a result, wireless technologies provide a prospective option for better knowledge, management, and preservation of maritime ecosystems.

This investigation paper will delve into the intricate relationship between seawater pollution and wireless signal transmission by examining the various types of pollutants contaminating marine environments, their effects on wireless signal propagation, and the challenges they pose to coastal wireless communication. Furthermore, explore the potential benefits of leveraging wireless technologies to monitor and mitigate seawater pollution, highlighting innovative approaches and successful case studies. By synthesizing existing research and identifying knowledge gaps, this review aims to offer a comprehensive understanding of the interplay between seawater pollution and wireless signal transmission, ultimately contributing to developing effective strategies for mitigating pollution and ensuring the sustainable management of our marine ecosystems.

The paper aims to explore the complex relationship between domains, examining the impacts of seawater pollution