Chapter 10
The Impact of 6G Technology on Environmental Ecosystems and Human Life

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ABSTRACT

The advent of 6G technology promises significant advancements that could reshape environmental ecosystems and human life. By providing ultra-low latency and immense bandwidth, 6G will enhance smart cities, supporting efficient energy management and reducing carbon footprints. The integration of AI-driven solutions may optimize resource use, facilitating sustainable practices across industries. Moreover, 6G will enable remote monitoring of ecosystems, allowing for real-time data collection on biodiversity and environmental health. This connectivity can drive conservation efforts, enabling swift responses to ecological threats. However, the increased energy consumption associated with 6G infrastructure raises concerns about sustainability. Balancing technological advancement with ecological stewardship will be essential, as society navigates the complexities of pervasive connectivity. Ultimately, the responsible development and deployment of 6G can foster a harmonious coexistence

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between technology, nature, and humanity.

INTRODUCTION

The advent of 6G technology, anticipated to be rolled out in the late 2030s, promises to revolutionize communication and connectivity in ways that are currently hard to envision (Matinmikko-Blue et al., 2020). Building upon the foundations laid by previous generations of mobile networks; 3G, 4G, and 5G. 6G aims to provide unprecedented data rates, ultra-reliable low-latency communication, and a vast spectrum of connectivity (Hexa-X-II, 2023). More than just an upgrade, 6G is poised to catalyze transformative shifts in a multitude of sectors, including healthcare, transportation, education, and entertainment (Yrjola, & Ahokangas, 2023). However, the potential of 6G goes beyond mere technological advancement; it also raises critical questions about its environmental and social implications (Elkington, 1997).

As society becomes increasingly interconnected, the impact of technology on environmental ecosystems and human life cannot be overstated (Matinmikko-Blue et al., 2023). The proliferation of mobile technology has already led to significant changes in how we interact with our surroundings, with both positive and negative consequences (Nchofoung & Asongu, 2022). 6G, with its projected capabilities, might compound these effects, amplifying resource consumption, altering land use, and impacting biodiversity, while simultaneously offering solutions to some of the pressing challenges of climate change (Buzzi et al., 2016).

This chapter seeks to delve into the multifaceted implications of 6G technology. It will explore how the implementation of this advanced telecommunications infrastructure could reshape environmental ecosystems through changes in energy consumption patterns, resource utilization, and waste generation (Huang et al., 2019). Additionally, it will examine the ways in which 6G has the potential to enhance human life by improving access to education, healthcare, and economic opportunities (Ojutkangas & Rossi, 2021). As we stand on the brink of this technological watershed, it is imperative that we assess both the benefits and drawbacks to ensure that the deployment of 6G aligns with sustainable practices and promotes the well-being of both people and the planet (Ahokangas et al., 2013).

BACKGROUND

Understanding the impact of 6G technology necessitates a historical context surrounding the evolution of communication technologies (Matinmikko-Blue et al., 2023). The progression from analog to digital communication has been marked by