

# Chapter 12

## Integrating Cutting–Edge Technologies for Enhancing Environmental Monitoring and Public Health

**R. Anto Arockia Rosaline**

*School of Computing, SRM Institute of Science and Technology, Kattankulathur, India*

**G. Padmapriya**


*School of Computing, SRM Institute of Science and Technology, Kattankulathur, India*

**Prithi Samuel**

 <https://orcid.org/0000-0001-5648-8891>

*School of Computing, SRM Institute of Science and Technology, Kattankulathur, India*

**M. Suresh Anand**

 <https://orcid.org/0000-0002-1055-6083>

*School of Computing, SRM Institute of Science and Technology, Kattankulathur, India*

### ABSTRACT

*Integrating advanced technologies like AI, IoT, remote sensing, and biotesting is transforming environmental monitoring, enabling precise tracking of environmental hazards that impact public health. As urbanization, industrialization, and climate change heighten health risks such as air and water pollution these tools provide real-time data and predictive insights crucial for proactive health interventions. For instance, IoT sensors in major cities monitor pollutants continuously, supporting timely public health advisories. Remote sensing via satellites and drones offers extensive geographical coverage, helping identify pollution patterns tied to factors like traffic or industrial activity. Bioindicators and microbial assays further enhance detection of water and soil contaminants, providing crucial data for environmental policies and health protections. By combining these innovations, environmental monitoring not only becomes more responsive and preventive but also supports efforts toward environmental justice, ensuring that health risks are addressed equitably across communities.*

DOI: 10.4018/979-8-3693-8532-6.ch012

## 1. INTRODUCTION

The intricate relationship between environmental health and public health is becoming increasingly complex due to factors such as urbanization, industrialization, and climate change (Dong et al., 2021). While these processes contribute to economic development, they often result in environmental degradation that adversely affects human health (Quito et al., 2023).

Environmental degradation has evolved into a global concern with significant implications for human health. For instance, urban emissions and industrial pollutants have been linked to increased respiratory and cardiovascular diseases (Purohit, 2023). Water contamination from industrial runoff and inadequate waste management poses risks of waterborne diseases and toxic exposures (Thanvisitthpon et al., 2018). Soil degradation due to overuse of agrochemicals and deforestation undermines food security and agricultural sustainability. Climate change exacerbates extreme weather events and intensifies vector-borne diseases, further challenging public health systems (Osman et al., 2021).

In this context, environmental monitoring plays a crucial role in protecting public health. Systematic observation and analysis of environmental parameters enable the early detection of hazards and inform timely interventions (Dong et al., 2021).

Integrating environmental monitoring with public health strategies enhances societal resilience. Data-driven insights allow policymakers to implement targeted interventions, such as stricter emission controls and improved waste management systems. Public health systems can proactively address emerging health threats, thereby reducing morbidity and mortality associated with environmental hazards (Quito et al., 2023).

Addressing the intertwined challenges of environmental and public health necessitates a collaborative, multidisciplinary approach. Stakeholders, including governments, researchers, industries, and communities, must work together to align human activities with sustainability principles, ensuring a healthier future for subsequent generations (Purohit, 2023).

### 1.1. Background on Environmental Challenges and Public Health

The increasing prevalence of health problems linked to environmental factors is an escalating global concern that threatens public health on an unprecedented scale (Gordon-Larsen et al., 2006). Modern urbanization, industrialization, and climate change have aggravated these challenges, resulting in dire consequences for human health and well-being (Patz & Kovats, 2002).

#### 1.1.1. The Alarming Growth of Environmentally-Induced Health Issues

The increasing prevalence of health problems linked to environmental factors is an escalating global concern that threatens public health on an unprecedented scale. Modern urbanization, industrialization, and climate change have aggravated these challenges, resulting in dire consequences for human health and well-being (Nardone et al., 2021).

22 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/integrating-cutting-edge-technologies-for-enhancing-environmental-monitoring-and-public-health/376408](http://www.igi-global.com/chapter/integrating-cutting-edge-technologies-for-enhancing-environmental-monitoring-and-public-health/376408)

## Related Content

---

### A Recent Systematic Review on Simulation Modeling and Emergency Departments

Soraia Oueida, Seifedine Kadry and Pierre Abi Char (2017). *International Journal of Public Health Management and Ethics* (pp. 40-68).

[www.irma-international.org/article/a-recent-systematic-review-on-simulation-modeling-and-emergency-departments/193582](http://www.irma-international.org/article/a-recent-systematic-review-on-simulation-modeling-and-emergency-departments/193582)

### Study of the Potential Impact of Microplastics and Additives on Human Health

Ranjit Barua, Debasish Banerjee and Sumit Bhowmik (2022). *Assessing the Effects of Emerging Plastics on the Environment and Public Health* (pp. 128-147).

[www.irma-international.org/chapter/study-of-the-potential-impact-of-microplastics-and-additives-on-human-health/305546](http://www.irma-international.org/chapter/study-of-the-potential-impact-of-microplastics-and-additives-on-human-health/305546)

### Challenges Facing Adverse Drug Reactions Reporting and Counterfeit Drugs Monitoring

(2018). *Advanced Systems for Improved Public Healthcare and Disease Prevention: Emerging Research and Opportunities* (pp. 135-154).

[www.irma-international.org/chapter/challenges-facing-adverse-drug-reactions-reporting-and-counterfeit-drugs-monitoring/202937](http://www.irma-international.org/chapter/challenges-facing-adverse-drug-reactions-reporting-and-counterfeit-drugs-monitoring/202937)

### Timing of the First Antenatal Care Visit and Associated Risk Factors in Rural Parts of Ethiopia

Lema Abate Adulo, Sali Suleman Hassen and Asrat Chernet (2022). *International Journal of Applied Research on Public Health Management* (pp. 1-12).

[www.irma-international.org/article/timing-of-the-first-antenatal-care-visit-and-associated-risk-factors-in-rural-parts-of-ethiopia/282746](http://www.irma-international.org/article/timing-of-the-first-antenatal-care-visit-and-associated-risk-factors-in-rural-parts-of-ethiopia/282746)

### The Role of the State in Health Management, a Comprehensive Analysis: State and Health Management

Muhammad Farooq Umer (2026). *Enhancing Client, Family, and Community Health Management: Self, Society, State, Systems, and Spirituality* (pp. 321-346).

[www.irma-international.org/chapter/the-role-of-the-state-in-health-management-a-comprehensive-analysis/384824](http://www.irma-international.org/chapter/the-role-of-the-state-in-health-management-a-comprehensive-analysis/384824)