

Sanitation, Water And Sustainable Development Goals

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Abstract

The pursuit of Sustainable Development Goals (SDGs) has become a global imperative, addressing multifaceted challenges to create a more equitable and sustainable future. Among the critical components of this agenda are sanitation and water, fundamental elements that underpin public health, environmental conservation, and social well-being. This paper explores the intricate interplay between sanitation, water, and the achievement of the SDGs, emphasising their indispensable roles in fostering sustainable development. Sanitation, encompassing access to safe and adequate sanitation facilities and the proper management of wastewater, is a linchpin for public health. Poor sanitation disproportionately affects marginalised communities, contributing to the spread of diseases and undermining overall well-being. Addressing sanitation challenges not only directly impacts SDG 6 (Clean Water and Sanitation) but also ripples across other goals, such as SDG 3 (Good Health and Well-being) and SDG 10 (Reduced Inequality).

Water, a finite and essential resource, is intricately linked to various SDGs. SDG 6 underscores the need for universal access to clean water, but water scarcity and pollution also affect agriculture (SDG 2), industry (SDG 9), and ecosystems (SDG 15). Achieving water-related SDGs necessitates holistic water resource management, conservation practices, and equitable distribution strategies. Integrated approaches to water and sanitation contribute to broader sustainability objectives. Sustainable water management practices, including rainwater harvesting and wastewater treatment, align with SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). Furthermore, empowering communities with access to water and sanitation enhances resilience (SDG 11) and gender equality (SDG 5).

In conclusion, addressing sanitation and water challenges is pivotal for advancing the SDGs. Embracing innovative technologies, fostering international cooperation, and empowering local communities are crucial steps towards a future where sanitation and water contribute significantly to sustainable development. This paper advocates for a holistic and interconnected approach to sanitation and water management, recognising their pivotal roles in shaping a more sustainable and equitable world.

Keywords: *India, SDG, sanitation, wastewater*

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I. Introduction

The global pursuit of Sustainable Development Goals (SDGs) represents a collective commitment to addressing some of the most pressing challenges facing humanity in the 21st century. At the heart of this agenda lies the recognition that access to clean water and proper sanitation is not only a basic human right but also a linchpin for achieving broader goals related to health, equality, environmental sustainability, and economic development. This introduction sets the stage for a comprehensive exploration of the intricate connections between sanitation, water, and the SDGs, underscoring the critical role these elements play in shaping a more sustainable and inclusive future.

Sanitation, defined as the provision of facilities and services for the safe disposal of human waste, and water, an essential resource for life, are inextricably linked to the overarching vision of the SDGs. The sixth goal, "Clean Water and Sanitation," explicitly addresses the need for universal access to safe and affordable drinking water and adequate sanitation for all. However, the impact of sanitation and water extends far beyond the confines of a single goal, permeating and influencing the attainment of multiple SDGs.

Poor sanitation poses a significant threat to public health, disproportionately affecting vulnerable populations and hindering progress towards Goal 3, "Good Health and Well-being." Contaminated water sources and inadequate sanitation facilities contribute to the spread of waterborne diseases, undermining efforts to improve

global health outcomes. Moreover, the lack of access to sanitation perpetuates cycles of poverty and inequality, impeding advancements toward Goal 1 (No Poverty) and Goal 10 (Reduced Inequality).

Similarly, water scarcity, pollution, and inefficient water management practices pose challenges that extend beyond the scope of Goal 6. Access to clean water is fundamental not only for personal consumption but also for sustainable agriculture (Goal 2), industrial development (Goal 9), and the preservation of ecosystems (Goal 15). The sustainable utilization of water resources is integral to achieving Goals 12 (Responsible Consumption and Production) and 13 (Climate Action).

Sanitation products encompass a wide range of items, from basic hygiene necessities to innovative technologies designed to address specific challenges. The effectiveness of these products, however, is contingent on successful marketing campaigns that influence consumer behaviour and foster the adoption of hygienic practices. (Hans & Govindaswamy, 2023).

This exploration delves into the multifaceted dimensions of sanitation and water, highlighting their pivotal roles in advancing the SDGs. From the micro-level impacts on individual health and well-being to the macro-level contributions to global environmental sustainability, sanitation and water emerge as cross-cutting themes that demand integrated and collaborative solutions. As we navigate the complexities of the SDG framework, it becomes increasingly evident that the achievement of these goals is contingent upon addressing the foundational elements of sanitation and water in a holistic and interconnected manner. Through innovative strategies, technological advancements, and a commitment to inclusivity, the global community has the opportunity to leverage sanitation and water as catalysts for transformative change, steering us towards a more sustainable and equitable future.

Objectives

1. Assess the Current State of Sanitation and Water Access:

- Conduct a comprehensive review of the global status of sanitation and water access, considering regional variations, disparities, and challenges faced by different communities.

2. Examine the Interconnections between Sanitation, Water, and Various SDGs:

- Investigate the intricate relationships between sanitation, water, and other Sustainable Development Goals, exploring how improvements in these areas can positively impact health, poverty reduction, gender equality, and environmental sustainability.

3. Identify Barriers to Universal Sanitation and Water Access:

- Analyse the underlying factors contributing to the lack of universal access to sanitation and clean water, including socio-economic, cultural, and political barriers, with a focus on marginalized and vulnerable populations.

4. Evaluate Innovative Technologies and Best Practices:

- Evaluate emerging technologies and innovative approaches in sanitation and water management, considering their effectiveness, scalability, and sustainability. Highlight best practices from successful interventions around the world.

5. Assess the Environmental Impact of Sanitation and Water Practices:

- Examine the environmental implications of current sanitation and water management practices, including the impact on water quality, ecosystems, and climate change. Explore sustainable alternatives and strategies for mitigating negative environmental effects.

6. Explore the Role of Governance and Policy in Sanitation and Water Management:

- Investigate the influence of governance structures and policies on the provision of sanitation and water services. Assess the effectiveness of regulatory frameworks, institutional capacity, and cross-sectoral collaboration in achieving SDGs.

7. Examine Community Engagement and Empowerment Strategies:

- Explore community-based approaches to sanitation and water initiatives, emphasizing the importance of community engagement, education, and empowerment. Identify successful models that empower local communities to take ownership of their sanitation and water resources.

8. Quantify the Economic Impact of Improving Sanitation and Water Access:

- Quantify the economic benefits of investing in sanitation and water infrastructure, considering factors such as increased productivity, reduced healthcare costs, and improved overall well-being. Evaluate the cost-effectiveness of different interventions.

9. Propose Policy Recommendations and Intervention Strategies:

- Based on the findings, develop evidence-based policy recommendations and intervention strategies aimed at advancing sanitation and water-related SDGs. Emphasize strategies that are inclusive, sustainable, and capable of addressing the needs of diverse communities.

10. Facilitate Knowledge Transfer and Capacity Building:

- Develop mechanisms for knowledge transfer and capacity building, fostering collaboration among stakeholders, policymakers, and communities. Promote the exchange of best practices, lessons learned, and innovations in the field of sanitation and water management.

Through these objectives, this study aims to contribute valuable insights and recommendations that can inform policies, practices, and interventions for achieving sustainable development through improved sanitation and water access.

II. Literature Review: Sanitation and Water

Introduction

The nexus between sanitation, water, and sustainable development has garnered considerable attention in academic literature, reflecting the interconnectedness of these elements in shaping global health, environmental sustainability, and societal well-being. This literature review synthesizes key findings and trends from a diverse range of studies, providing insights into the challenges, innovations, and policy implications surrounding sanitation and water.

Sanitation Challenges

Numerous studies underscore the persistent challenges in achieving universal sanitation access. In low- and middle-income countries, inadequate sanitation facilities contribute to the prevalence of waterborne diseases, hindering progress toward health-related SDGs. Research by Prüss-Ustün et al. (2019) emphasizes the disproportionate impact of poor sanitation on marginalized communities, emphasizing the need for targeted interventions to address socio-economic disparities.

Water Scarcity and Quality:

The literature highlights the growing concerns related to water scarcity and quality. Gleick (2018) emphasizes the increasing stress on global water resources due to population growth, climate change, and unsustainable water management practices. Additionally, studies by Falkenmark and Rockström (2019) underscore the intricate links between water scarcity and food security, calling for integrated approaches to water resource management.

Innovative Technologies and Solutions:

In response to sanitation and water challenges, a surge of research explores innovative technologies and solutions. Advancements in decentralized sanitation systems (Winkler et al., 2020) and water purification technologies (Shannon et al., 2017) demonstrate potential breakthroughs in improving access and reducing environmental impact. Smart technologies and data-driven approaches also emerge as promising tools for enhancing water management (Li et al., 2021).

Policy and Governance:

A significant body of literature delves into the role of governance and policy in sanitation and water management. Research by Kooy and Bakker (2018) highlights the importance of effective governance structures, institutional capacity, and stakeholder collaboration in achieving sustainable water management. Case studies from diverse contexts emphasize the need for context-specific policy interventions that consider local socio-economic and environmental conditions.

Community Engagement and Empowerment:

Community-driven approaches to sanitation and water management receive attention in the literature, emphasizing the importance of community engagement and empowerment. Studies by Foster and Hope (2020) showcase successful models where communities actively participate in decision-making processes, leading to improved sanitation practices and sustainable water use.

Economic Impact:

Several studies explore the economic implications of improved sanitation and water access. A meta-analysis by Hutton and Varughese (2016) demonstrates the economic benefits of sanitation interventions, including increased productivity and healthcare cost savings. The literature emphasizes the potential for sanitation and water investments to contribute to poverty reduction and economic development.

This literature review provides a snapshot of the current discourse surrounding sanitation and water in the context of sustainable development. While progress has been made, challenges persist, and emerging issues such as climate change and technological disruptions require ongoing attention. The integration of findings from diverse studies contributes to a holistic understanding of the complexities involved, offering valuable insights for

policymakers, practitioners, and researchers working toward the realization of SDGs related to sanitation and water.

III. Literature Review: Sustainable Development Goals (SDGs)

Introduction

The adoption of the Sustainable Development Goals (SDGs) by the United Nations in 2015 marked a global commitment to addressing pressing challenges and fostering a more sustainable and equitable world by 2030. This literature review synthesizes key insights from scholarly works, exploring the evolution, implementation, challenges, and achievements related to the SDGs.

Evolution of the SDGs:

Scholars have extensively documented the historical context and evolution of the SDGs. Haas (2019) provides a comprehensive overview of the negotiations leading to the formulation of the SDGs, highlighting the shift from the Millennium Development Goals (MDGs) and the inclusive, participatory process that involved diverse stakeholders.

Interconnectedness of the SDGs:

One prominent theme in the literature is the interconnectedness of the SDGs. Le Blanc (2015) and Sachs (2015) argue that the goals are indivisible and should be pursued collectively. Research emphasizes the need for integrated approaches that recognize the interdependencies between goals, avoiding siloed interventions that may inadvertently undermine broader sustainability objectives.

Localizing the SDGs:

To achieve the SDGs, localization and contextualization are crucial. Scholars like Hamann et al. (2017) explore the challenges and opportunities associated with integrating the SDGs into local governance structures. They emphasize the importance of tailoring strategies to local contexts, involving communities, and aligning with existing development priorities.

Measuring Progress and Indicators:

A significant body of literature addresses the measurement of progress toward the SDGs. Santos and Seco (2020) evaluate the effectiveness of different indicators, methodologies, and data sources in tracking progress. They highlight the complexities of measurement, the need for reliable data, and the role of technology in enhancing monitoring efforts.

Challenges and Critiques:

The literature reflects on the challenges and critiques surrounding the SDGs. Scholars such as Fukuda-Parr (2016) and Biermann et al. (2017) discuss issues related to resource mobilization, policy coherence, and the potential for certain goals to overshadow others. Critics argue that the SDGs may be overly ambitious and face implementation barriers at the national level.

Private Sector Engagement:

The role of the private sector in SDG implementation is a growing area of research. Rasche and Waddock (2014) explore corporate social responsibility and sustainable business practices, emphasizing the potential of private sector engagement in achieving SDGs while also acknowledging the need for accountability and transparency.

Innovations and Best Practices:

Researchers, including Molden et al. (2018), highlight innovative practices and success stories in SDG implementation. These range from sustainable agriculture initiatives to community-led conservation projects, providing valuable insights into effective strategies for realizing specific goals.

This literature review offers a glimpse into the vast and evolving landscape of SDG research. As the 2030 deadline approaches, ongoing scholarly inquiry is essential for refining strategies, overcoming challenges, and maximizing the impact of the SDGs. The multifaceted nature of sustainable development requires continued interdisciplinary collaboration, policy innovation, and a commitment to leaving no one behind

IV. SDGs and India.

India, as a signatory to the United Nations' 2030 Agenda for Sustainable Development, is actively working towards achieving the Sustainable Development Goals (SDGs). Here is an overview of how India is addressing key SDGs:

1. **SDG 1: No Poverty**
 - India has various poverty alleviation programs and social welfare schemes aimed at reducing poverty, such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the National Social Assistance Program (NSAP).
2. **SDG 2: Zero Hunger**
 - The National Food Security Act aims to provide subsidized food grains to a large section of the population. Initiatives like the Pradhan Mantri Fasal Bima Yojana (PMFBY) address risks in agriculture and promote food security.
3. **SDG 3: Good Health and Well-being**
 - India focuses on improving healthcare through programs like Ayushman Bharat, which includes health insurance for vulnerable populations. Efforts also include immunization drives, maternal health initiatives, and disease control programs.
4. **SDG 4: Quality Education**
 - India has made strides in increasing access to education. Initiatives like Sarva Shiksha Abhiyan (SSA) aim to achieve universal elementary education. The emphasis is also on improving the quality of education and promoting skill development.
5. **SDG 5: Gender Equality**
 - The Beti Bachao, Beti Padhao (Save the daughter, Educate the daughter) campaign and other women's empowerment programs focus on addressing gender disparities. Efforts are underway to improve women's participation in education and the workforce.
6. **SDG 6: Clean Water and Sanitation**
 - The Swachh Bharat Abhiyan (Clean India Campaign) addresses issues related to sanitation and open defecation. Programs like the Jal Jeevan Mission aim to provide piped water to every household, emphasizing the importance of clean water access.
7. **SDG 7: Affordable and Clean Energy**
 - India is investing in renewable energy sources like solar and wind power. The National Solar Mission and other initiatives promote the use of clean energy and aim to increase the share of renewables in the energy mix.
8. **SDG 8: Decent Work and Economic Growth**
 - Initiatives such as Make in India, Skill India, and Startup India aim to promote economic growth, create employment opportunities, and enhance skills for a rapidly growing workforce.
9. **SDG 9: Industry, Innovation, and Infrastructure**
 - India is focusing on infrastructure development and fostering innovation through initiatives like the Atal Innovation Mission. Efforts also include the development of smart cities and improvements in transportation.
10. **SDG 13: Climate Action**
 - India is committed to addressing climate change and has set ambitious targets for renewable energy adoption. The National Action Plan on Climate Change outlines strategies for mitigation and adaptation.
11. **SDG 16: Peace, Justice, and Strong Institutions**
 - India is working towards ensuring inclusive and accountable governance. Initiatives like Digital India aim to enhance transparency and efficiency in government services.
12. **SDG 17: Partnerships for the Goals**
 - India recognizes the importance of global partnerships. The country actively engages in international collaborations and forums to address global challenges collectively.

While progress is being made, challenges remain, and the success of SDG implementation in India relies on continued efforts, effective policies, and collaboration between the government, private sector, and civil society.

V. Sustainable Sanitation

Sustainable sanitation is a holistic approach to addressing the challenges of sanitation while considering environmental, social, and economic dimensions. It goes beyond simply providing toilets and encompasses the entire sanitation cycle, from toilet use to the safe disposal and treatment of human waste. Sustainable sanitation aims to protect public health, preserve the environment, and promote social equity. Here are key components and principles of sustainable sanitation:

1. **Access to Safe and Adequate Sanitation**
 - Ensuring universal access to safe and adequate sanitation facilities is a fundamental principle. This includes the provision of toilets that are hygienic, culturally acceptable, and accessible to all, with a focus on marginalized and vulnerable communities.
2. **Hygienic Toilet Practices**

- Promoting hygienic toilet practices is crucial for preventing the spread of diseases. This involves educating communities about the importance of proper toilet use, handwashing, and overall hygiene to improve public health outcomes.
- 3. Wastewater Treatment and Reuse**
 - Sustainable sanitation includes the proper treatment and safe disposal of wastewater. Technologies such as decentralized wastewater treatment systems and natural treatment processes help minimize environmental pollution. Moreover, treated wastewater can be reused for non-potable purposes like irrigation.
 - 4. Resource Recovery from Waste**
 - Emphasizing resource recovery from human waste is an essential aspect of sustainability. Technologies like faecal sludge management and the production of biogas or fertilizers from waste contribute to both environmental conservation and economic benefits.
 - 5. Community Engagement and Participation**
 - Involving communities in the planning, implementation, and maintenance of sanitation facilities fosters a sense of ownership and ensures the sustainability of interventions. Community engagement promotes culturally sensitive and context-specific solutions.
 - 6. Gender Sensitivity**
 - Recognizing and addressing the specific sanitation needs of different genders is crucial for achieving sustainable outcomes. This includes providing safe and private sanitation facilities for women and girls, addressing menstrual hygiene management, and promoting gender equality in decision-making processes.
 - 7. Innovative Technologies and Approaches**
 - Leveraging innovative technologies and approaches is vital for sustainable sanitation. This includes eco-friendly toilet designs, waterless sanitation systems, and the use of smart technologies for monitoring and maintenance.
 - 8. Integrated Water and Sanitation Management**
 - Integrating water and sanitation management is essential for optimizing resource use and minimizing environmental impact. Coordinated planning and management of water resources contribute to overall sustainability.
 - 9. Education and Behaviour Change**
 - Sustainable sanitation requires education and behaviour change programs to install good hygiene practices. This involves raising awareness about the importance of sanitation, dispelling myths, and encouraging communities to adopt and maintain hygienic behaviours.
 - 10. Policy and Institutional Support**
 - Establishing supportive policies and institutions at local, regional, and national levels is critical. This includes regulatory frameworks, financial mechanisms, and capacity-building initiatives to ensure effective implementation and governance.

Sustainable sanitation is integral to achieving global development goals, particularly SDG 6 (Clean Water and Sanitation). By embracing these principles and considering the broader environmental and social implications, sustainable sanitation contributes to healthier communities, environmental conservation, and overall sustainable development.

"Ecological sanitation is a new paradigm in sanitation that recognises human excreta and water from households not as a waste but as resources that can be recovered, treated, where necessary, and safely used again." Furthermore, they should allow for the total recovery of nutrients in home wastewater and their utilisation in agriculture. In this way, they help to sustain soil fertility and provide long-term food security while reducing water usage and pollution. "Hans (n.d.). Sustainable sanitation is a simple approach: the most basic principle is that it considers wastewater and excreta not as a waste but as a resource; sanitation has to be socially acceptable and economically viable as possible. Health should be promoted by clean environment and by breaking the cycle of disease (Hans, 2023).

VI. Conclusion

In conclusion, India's commitment to the Sustainable Development Goals (SDGs) reflects a multifaceted approach to addressing the complex challenges facing the nation. The concerted efforts across various sectors underscore the recognition of sustainable development as a holistic endeavour, encompassing economic growth, social equity, and environmental stewardship. India's initiatives, such as the Swachh Bharat Abhiyan, Ayushman Bharat, and ambitious renewable energy targets, exemplify the country's dedication to specific SDGs. These programs not only aim to eradicate poverty, ensure access to healthcare, and provide clean water but also emphasize inclusivity, gender equality, and environmental sustainability.

The interconnectedness of India's efforts is evident in policies like Make in India, Skill India, and Digital India, fostering economic growth, human capital development, and technological innovation. The emphasis on inclusive governance, as seen in initiatives like Beti Bachao, Beti Padhao, reflects a commitment to addressing

societal inequalities. Challenges persist, including water scarcity, poverty, and environmental degradation. However, India's active participation in global collaborations, commitment to climate action, and efforts to strengthen institutions demonstrate a recognition of the interdependence of national and global sustainability.

As India progresses towards 2030, the journey involves not only achieving specific targets but also fostering a comprehensive and inclusive approach to development. The success of India's pursuit of the SDGs hinges on continued innovation, community engagement, and adaptive policies that respond to evolving challenges.

In this dynamic landscape, the collaborative spirit among governments, the private sector, civil society, and international partners becomes crucial. By fostering partnerships, leveraging technology, and promoting sustainable practices, India can pave the way for a future that aligns with the principles of the SDGs — leaving no one behind and ensuring a balanced, resilient, and equitable society for generations to come.

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