
INDUSTRIAL ENTERPRISES AND ENVIRONMENTAL IMPACT: NAVIGATING CHALLENGES AND FOSTERING SUSTAINABILITY

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Abstract: Human civilizations have relied on water sources for survival throughout history, yet this reliance has inadvertently led to widespread water pollution across various environmental domains. Inadequate sanitation infrastructure exacerbates the spread of diseases, posing significant public health risks. Despite interdisciplinary efforts, anthropogenic activities continue to threaten environmental integrity and human well-being. Preserving water quality is urgent, requiring proactive measures to mitigate pollutant ingress. The technosphere, shaped by human intervention, diverges from the natural realm, altering environmental dynamics. Industrial enterprises significantly contribute to environmental pollution, particularly in water contamination. Untreated wastewater discharge and agricultural activities challenge water quality, impacting human health and ecosystems. Addressing these challenges demands collaboration among governments, enterprises, civil society, and citizens. Socially responsible initiatives are vital, as is public engagement in decision-making processes. Global warming exacerbates environmental issues, necessitating proactive measures. Industries must prioritize sustainable practices to safeguard environmental and human health.

Keywords: environment, protection, water, pollution, raw material, ecology.

1. INTRODUCTION

Human impact on environmental conservation

Ecology studies the mutual relations between organisms and the environment, on which the maintenance of individuals and populations of organic species and their communities in nature depends. It is a science that studies the distribution and density of populations of organic species, lifestyle and behavior in given environmental conditions. Therefore, it can also be defined as the science of the manifestations of the struggle for survival. During evolution, all living things have adapted to a certain range of effects of certain environmental factors. The intensity of the optimal effect of environmental factors is precisely determined for each type of organism. Any change in the intensity of the effect of environmental factors, in relation to the optimal range of their effect, reduces the vital activity of the organism. This results in the possibility of the continued existence of the organism. The necessary conditions for the survival of the organism disappear when the effect of cofactors reaches maximum or minimum values (Ricklefs & Miller, 2000). This intricate relationship between organisms and their environment is further explored in various ecological studies and publications. For instance, Biočanin's work on environmental pollutants sheds light on the impact of human activities on ecosystems (Biočanin, 2011). Similarly, Hawken's seminal work, "The Ecology of Commerce: A Declaration of Sustainability," delves into the intersection of business practices and environmental sustainability, advocating for a more environmentally conscious approach to commerce (Hawken, 1994). In understanding specific ecosystems, Jovanović's research on the ecology of water provides valuable insights into the dynamics of aquatic environments and the challenges they face (Jovanović, 2002). Furthermore, Kimmerer's exploration of indigenous wisdom and scientific knowledge in "Braiding Sweetgrass" offers a holistic perspective on the relationship between humans and the natural world, emphasizing the importance of traditional ecological knowledge (Kimmerer, 2013). Addressing contemporary environmental concerns, Kolbert's "The Sixth Extinction: An Unnatural History" presents a sobering account of ongoing mass extinctions and their implications for biodiversity (Kolbert, 2014). Additionally, Savić and Terzija's comprehensive work on ecology and environmental protection highlights the critical need for conservation efforts and sustainable practices (Savić & Terzija, 2018). As our understanding of ecology evolves, recent publications such as "Under a White Sky: The Nature of the Future" by Kolbert and "Ecology: The Economy of Nature" by Ricklefs and Miller continue to contribute to the discourse on environmental challenges and solutions (Kolbert, 2019; Ricklefs & Miller, 2019).

Furthermore, reports such as the "Annual Report on the State of the Environment" provide valuable insights into current environmental conditions and trends, informing decision-making and policy formulation (Annual report on the state of the environment, 2020). From the dawn of human existence, individuals have recognized the paramount significance of the environment, acknowledging its pivotal role in providing the fundamental prerequisites for life. Similar to all organisms inhabiting Earth, humans are intricately interconnected with the entirety of the natural world, forming an inseparable component of the ecological fabric that sustains their existence (Reports and environment not KEK, 2021). The imperative for socially responsible initiatives undertaken by corporations transcends geographical boundaries, emerging as a global imperative. At its essence lies a noble intent, serving as a

foundational premise for achieving objectives that benefit both the corporate entity and the broader society within which it operates (Hawken, 1994). Indeed, the viability of long-term competitiveness for any company hinges upon the implementation of socially responsible project endeavors (Reports and Gjendjes Mjedisore në KEK, 2022). Conversely, enterprises that integrate socially responsible practices into their organizational ethos and strategic framework stand poised to reap positive outcomes for their stakeholders (Kolbert, 2019).

Nevertheless, the contemporary economic landscape demands adaptability and innovation from companies. In a realm characterized by cutthroat competition and elevated risks, profit-driven enterprises are compelled to navigate aggressive business paradigms. Amidst this backdrop, corporate behemoths wielding considerable influence assume global responsibilities by actively addressing political, economic, and environmental challenges (Savić & Terzija, 2018). Yet, humanity's relentless exploitation of natural resources has precipitated a perturbation of the delicate ecological equilibrium, evoking nature's response in the form of climate change (Kolbert, 2014). The concept of socially responsible business encapsulates the ethos of modern enterprise, with global warming emerging as a tangible consequence of anthropogenic activities (Kimmerer, 2020). Concurrently, the evolving business milieu, alongside shifting ethical paradigms, underscores the imperatives of responsible water resource management strategies (Nešković, 2011). Public engagement in decision-making processes stands as a cornerstone of citizen participation in matters of societal significance, reflecting not merely democratic ideals but also the very sustenance of contemporary livelihoods and developmental trajectories (Annual report on the state of the environment, 2020).

Nonetheless, prevailing skepticism among citizens regarding their efficacy in influencing decision-makers, compounded by perceptions of corruption and information asymmetry, dampens enthusiasm for civic engagement (Ricklefs & Miller, 2000). It is imperative to recognize global warming not as a speculative abstraction but as a palpable reality, profoundly impacting both the natural environment and human well-being. The emergence of extreme weather events over the past two decades underscores the urgent need to confront climate change head-on, lest humanity confronts an existential crisis jeopardizing its very way of life (Biočanin, 2011). In essence, climate disturbances, particularly global warming, represent formidable environmental challenges of our era, precipitated by human actions. These challenges, including those pertaining to water scarcity and quality, necessitate concerted efforts and proactive measures to mitigate their deleterious effects and safeguard the planet for future generations (Marsenić, Đuković, & Bojanić, 2004).

2. INDUSTRY'S DOMINANCE IN ENVIRONMENTAL POLLUTION

In the pursuit of improved living conditions, humanity has sought to alter existing ecological systems and create new ones, shaping environments that provide the means for a healthier and higher quality of life. Thus, the technosphere emerges as a product of human labor, influence, and ingenuity, representing a significant modification of the environment wherein human habitation is humanized. Environmental protection, consequently, stands as a paramount endeavor in modern times, rooted in ecological understanding of environmental dynamics and the principles of sustainable development (Savić & Terzija, 2018). Among the most pressing environmental concerns is water pollution, predominantly stemming from municipal and industrial wastewater discharge into water bodies devoid of adequate treatment (Reports and environment not KEK, 2021). Insufficient purification facilities exacerbate the problem, leading to the release of inadequately treated wastewater, thereby jeopardizing water quality and ecological balance (Biočanin, 2011). Furthermore, agricultural and industrial activities contribute substantially to water pollution, with untreated wastewater, leachate from landfills, and thermal pollution from industrial processes emerging as significant sources of contamination (Kolbert, 2014). The repercussions of environmental degradation extend beyond ecological concerns to encompass profound implications for human health. Pollution of air, water, and soil, alongside exposure to radiation and noise pollution, poses acute and chronic health risks for individuals and ecosystems alike (Kimmerer, 2020). The escalating volume of wastewater discharged into natural water systems exacerbates the situation, leading to widespread contamination and compromising water quality essential for drinking and agricultural purposes (Nešković, 2011). Global warming, a consequence of human activities, underscores the urgent need for concerted action to mitigate climate change's adverse effects. Human-induced alterations to atmospheric composition precipitate a rise in global temperatures, triggering extreme weather events and disruptions to ecosystems worldwide (Marsenić, Đuković, & Bojanić, 2004). These climate shifts, marked by increased evaporation, reduced precipitation, and prolonged droughts, pose dire consequences for water resources, exacerbating water scarcity and threatening global water supplies (Ricklefs & Miller, 2019). In essence, the industrial sector emerges as a significant contributor to environmental degradation, necessitating proactive measures to curtail pollution and foster sustainable practices. Addressing these challenges demands interdisciplinary collaboration, informed decision-making and concerted efforts to safeguard the environment and human well-being for generations to come.

3. INDUSTRIAL WATER POLLUTION: A GLOBAL CHALLENGE

The expansive reach of human activity encompasses the entirety of the global ecosystem, exerting a profound impact on the biosphere. Human influence manifests through various channels, including alterations to physical environmental conditions, shifts in biodiversity, and the introduction of non-native species into ecosystems (Kolbert, 2019). Industrialization and urbanization processes further compound these impacts, leading to environmental pollution and consequential health hazards (Kimmerer, 2013). Concurrently, the exploitation of natural resources and the utilization of energy sources engender environmental degradation, necessitating stringent regulations and sustainable practices to mitigate adverse effects (Hawken, 1994). Central to industrial development is the exponential growth in water consumption, resulting in the discharge of vast quantities of wastewater back into water bodies, albeit in a chemically altered state. To address this issue, systematic monitoring of industrial wastewater discharge is imperative, alongside the implementation of comprehensive water management strategies (Savić & Terzija, 2018). Collaborative efforts involving stakeholders at all levels, including policymakers and the general public, are indispensable in devising effective solutions to combat chemical pollution originating from industrial complexes and agricultural activities (Nešković, 2011). Globalization and technological advancements present novel challenges, foremost among which is the imperative of environmental safety. Misconceptions regarding water abundance underscore the urgency of accurately assessing water resources and implementing measures to ensure their sustainable management (Ricklefs & Miller, 2019). Recent years have witnessed a surge in national and international discourse surrounding water resource management, underscoring the pressing need for concerted action to preserve this invaluable natural asset (Reports and Gjendjes Mjedisore në KEK, 2022). In conclusion, industrial activities constitute a significant contributor to water pollution, necessitating proactive measures to safeguard water resources and mitigate environmental degradation. Collaborative efforts, informed decision-making, and public engagement are essential in addressing these challenges and fostering sustainable development practices that prioritize environmental conservation and human well-being.

4. WATER'S IMPACT ON INDUSTRIAL GROWTH

Sustainable development constitutes the cornerstone of global progress, aiming to address present needs while safeguarding resources for future generations. At its core lie the principles of economy, energy, ecology, and social justice, encapsulated in the concept of the four E's (Equity) (Hawken, 1994). Sustainable development entails a delicate balance between economic advancement, environmental preservation, social equity, and prudent energy utilization, ensuring the holistic well-being of society (Kolbert, 2014). However, despite the aspirations for sustainable development, numerous public water supply systems, particularly in rural areas, struggle to meet the basic demands of users during dry periods (Savić & Terzija, 2018). Water scarcity and compromised water quality often result in recurrent water shortages and usage restrictions, highlighting the imperative for effective water management strategies (Nešković, 2011). Sewerage systems play a pivotal role in this regard, facilitating the collection, transportation, and purification of wastewater to ensure environmental integrity and public health (Reports and environment not KEK, 2021). In industrial contexts, water holds multifaceted significance, serving as a vital resource for various economic activities, including manufacturing processes, cooling systems, and agricultural irrigation (Kimmerer, 2013). The consumption of water by industrial enterprises, whether from public or private sources, often exerts significant pressure on water availability for other users, exacerbating water scarcity concerns (Biočanin, 2011). Industrial water usage can surpass that of the general population by threefold or more, underscoring the need for efficient water allocation and management practices (Marsenić, Đuković, & Bojanić, 2004). As a critical national and security asset, water demands sustainable utilization to prevent the depletion of resources for future generations (Ricklefs & Miller, 2000). Access to clean drinking water, essential for human survival, has historically influenced geopolitical dynamics, with regions experiencing water scarcity often grappling with tensions and conflicts (Annual report on the state of the environment, 2020). Thus, sustainable water management practices are indispensable for fostering socio-economic development, environmental resilience, and global stability.

5. MANAGING WASTEWATER FROM KOSOVO AIB THERMAL POWER PLANT

This study aims to provide an overview of wastewater management in the municipality of Obilic, Republic of Kosovo, focusing particularly on wastewater generated by industrial activities, notably thermal power plants. Given that industrial entities typically discharge wastewater into communal sewage systems, analyzing industrial wastewater management necessitates an understanding of the broader communal wastewater treatment infrastructure. Achieving sustainable development objectives requires collaborative efforts involving governments, private enterprises, civil society, and citizens to ensure the preservation of environmental quality for future generations. Municipal wastewater treatment is a key priority outlined in various strategic documents and official

policies addressing water management (Reports and Gjendjes Mjedisore në KEK, 2022). Energy constitutes a vital component of human endeavors, underpinning societal progress and economic development. In Kosovo, the energy sector, particularly the electricity segment, plays a pivotal role in fostering economic growth (Reports and environment not KEK, 2021). The Kosovo Energy Corporation (KEK) diligently monitors and assesses the environmental impact of its operations, regularly disseminating objective reports to relevant governmental bodies, local municipalities, and stakeholders (Kolbert, 2019). Raw water serves as a crucial resource for steam generation and equipment cooling in thermal power plants. However, before utilization, water undergoes chemical treatment processes such as softening, decarbonization, and demineralization to ensure compliance with turbine operational standards (Biočanin, 2011). Nevertheless, improvements in water and wastewater management practices are imperative to align with Kosovo legislation, European Union directives, and international environmental protection standards (Savić & Terzija, 2018). A robust and sustainable energy infrastructure is essential for societal development, enabling an enhanced quality of life and driving economic progress. However, the Kosovo Energy Corporation, while crucial for economic advancement, also exerts a significant environmental footprint (Nešković, 2011). Balancing energy needs with environmental conservation mandates concerted efforts to enhance sustainability practices and mitigate adverse ecological impacts for a resilient and prosperous future (Marsenić, Đuković, & Bojanić, 2004).

6. CONCLUSION

The collective examination of the multifaceted relationship between industrial enterprises and the environment underscores the urgency of addressing pressing environmental concerns. Human activities, spanning epochs, have exerted a profound impact on the biosphere, altering ecological landscapes and precipitating widespread environmental degradation. The unrelenting exploitation of natural resources, coupled with inadequate wastewater management practices, has engendered water pollution, threatening water quality and human health. Industrialization and urbanization processes further compound environmental challenges, necessitating stringent regulations and sustainable practices to mitigate adverse effects. Collaborative efforts involving governments, private enterprises, civil society, and citizens are indispensable in achieving sustainable development objectives and preserving environmental integrity for future generations.

The imperative for socially responsible initiatives undertaken by corporations transcends geographical boundaries, emerging as a global imperative. Nevertheless, prevailing skepticism and information asymmetry dampen enthusiasm for civic engagement, necessitating concerted efforts to foster public participation in decision-making processes. Global warming, exacerbated by human activities, underscores the urgent need for proactive measures to mitigate climate change's adverse effects and safeguard the planet for future generations. In essence, industrial activities constitute a significant contributor to environmental degradation, necessitating interdisciplinary collaboration and informed decision-making to foster sustainable development practices that prioritize environmental conservation and human well-being.

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