ENVIRONMENTAL CHEMISTRY IN URBAN REVITALIZATION: CASE STUDIES AND CRITICAL INSIGHTS

Arup Kumar Poddar

Article History: Received: 26.02.2023 **Revised:** 11.04.2023 **Accepted:** 27.05.2023

Abstract

In-depth research into the potential of environmental chemistry to revitalise city ecosystems is presented. It delves into the relevance of environmental chemistry to the study of urban ecosystems, as well as its practical applications. The importance of environmental chemistry in detecting pollutants, developing effective mitigation techniques, and promoting successful urban redevelopment is demonstrated through an analysis of case studies from Love Canal, Cheonggyecheon stream, and the Lower Don River. The need for multidisciplinary methods, the persistence of environmental problems, the possibility of unexpected consequences, and so on are all emphasised. The article suggests that combining interdisciplinary approaches with environmental chemistry and favourable conditions is essential for effective urban regeneration. To maintain the long-term health of urban ecosystems, these results highlight the significance of coupling environmental chemistry with larger approaches to urban management.

Keywords: Environmental Chemistry, Urban Ecosystems, Urban Revitalization, Green Infrastructure, Nature-based Solutions, Interdisciplinary Approaches

Professor in Law, The West Bengal National University of Juridical Sciences (NUJS), Kolkata, India
[**Orcid Id:** 0009-0008-4493-7037]

DOI: 10.48047/ecb/2023.12.2.022

1. Introduction

Numerous natural and manmade causes cause the urban ecology to be dynamic and ever-changing. Pollution has far-reaching effects on both people and the environment because it alters ecosystems. Understanding, controlling, and reducing this pollution requires in-depth familiarity of environmental chemistry. This article delves into how environmental chemistry can be used in the development of green infrastructure and other nature-based solutions to restore urban ecosystems. The importance of environmental chemistry in solving urban environmental problems is highlighted through a comparison of case studies from different parts of the world. Complexities and difficulties are discussed critically, with an emphasis on the necessity for interdisciplinary methods, proactive initiatives, and supporting conditions. In the article's final sections, the most important findings are discussed, along with their implications for the future of urban renewal.

Restoring urban ecosystems relies heavily on the insights into pollutant behaviour, impacts, and mitigation that environmental chemistry provides. National and international environmental laws, which can vary in their strictness and enforcement, govern the majority of how environmental chemistry is used in this context.

The Water (Prevention and Control of Pollution) Act (1974) and the Environmental Protection Act (1986) are two landmark pieces of legislation in India that establish guidelines for managing environmental pollution. Standards for waste discharge into aquatic bodies are established by these regulations (Singh, 2007). They also require enterprises to remediate their effluents. Lack of enforcement, insufficient resources, and a gap between policy and research are just some of the obstacles that stand in the way of India's urban redevelopment projects making use of environmental chemistry. Further, rather of proactively reviving urban ecosystems, these policies primarily focus on regulating pollution (Narain, 2012).

The application of environmental chemistry to urban renewal is affected by a number of worldwide multilateral environmental agreements (MEAs). A few examples are the Minamata Convention on Mercury and the Stockholm Convention on Persistent Organic Pollutants. Environmental chemistry is used to handle urban environmental challenges, but it is influenced by conventions that establish norms and criteria for the management of certain contaminants. Compliance and enforcement may also be difficult with these principles (Clapp, 2001), and they may not directly address the unique difficulties of urban renewal.

National and international regulations provide a fundamental framework for controlling environmental chemistry in urban rehabilitation, but its efficacy typically rests on concerns of enforcement, funding, and the ability to translate scientific information into effective policy. It's possible that in the future, we'll need to work on things like increasing compliance and building more holistic strategies for managing urban environments.

Understanding Urban Ecosystems

The complex relationships between urban creatures and their built surroundings must be investigated in order to get insight into urban ecosystems. Natural and anthropogenic (man-made) elements coexist in urban ecosystems, which are characterised by dense human activity and a built infrastructure (Miller, G., & Spoolman, 2019). Parks and greenways are examples of 'green' spaces, while 'grey' spaces include man-made structures like buildings and roads (Pickett, S. T. A., Cadenasso, M. L., & McGrath, B., 2013).

Heterogeneity, or variability, is an essential aspect of urban ecosystems. Physical, biological, and social aspects such as structures, plant and animal species, and human populations are all part of this (Cadenasso, M. L., Pickett, S. T. A., & Schwarz, 2007). For instance, a city park could be home to several species of trees, birds, insects, and microbes, as well as being frequented by people of many ages, occupations, and backgrounds (Gaston, K. J., vila-Jiménez, M. L., & Edmondson, J. L., 2013).

variations in urban ecosystems occur on a variety of timescales, from the short-term (daily temperature and human activity variations) to the long-term (expansion and decay of the city) (Alberti, M., 2016). Natural processes like weather patterns and human activities like building, driving, and dumping trash also contribute to this ever-changing landscape (Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M., 2008).

Urban ecosystems, however, encounter many obstacles. Air and water pollution, biodiversity loss, and the "heat island effect," in which urban regions are warmer than their rural neighbours, are all examples (Rizwan, A. M., Dennis, L. Y., & Chunho, L. I. U., 2008). There are also a lot of social problems, such as unequal access to parks and disagreements on where to put buildings (Boone, C. G., Cook, E., Hall, S. J., Nation, M. L., Grimm, N. B., Raish, C. B.,... & Redman, C. L., 2012).

Despite these obstacles, knowledge of urban ecosystems might help shape more eco-friendly urban planning. By valuing and expanding urban green spaces, we can foster thriving communities that are good for people and the planet (Tzoulas, Korpela, Venn, Yli-Pelkonen, Kamierczak, Amierczak, Niemela, James, & James, 2007).

Basic Concepts of Environmental Chemistry

Understanding the natural world and the effects of human activities on the environment requires knowledge from many different scientific disciplines; environmental chemistry is one such topic. Examining chemical and biological processes in the natural world, including those that take place in the air, water, soil, and living things found there (Manahan, S. E., 2017).

Chemical transformation and mobility are fundamental ideas in environmental chemistry. The term "environmental fate" is commonly used to describe the path that chemicals take in the natural world. Substances may be transported by air, water, or soil, while those undergoing transformation undergo alterations to their chemical structure as a result of various chemical processes. Time and either biological or photolytic processes lead to chemical breakdown, a process known as degradation (Schwarzenbach, R. P., Gschwend, P. M., & Imboden, D. M., 2017).

The principle of conservation of mass states that in a closed system, neither matter is created nor destroyed, and is thus another fundamental idea. Spiro, T. G., & Stigliani, W. M. (2012) argue that this theory is foundational for comprehending the nutrient cycling of carbon, nitrogen, and phosphorus in ecosystems.

How chemicals affect environmental health and quality is another topic of study in environmental chemistry. These effects can be studied on several dimensions, from the molecular interactions that affect pollutant behaviour to the broader implications on ecosystems and climate change (Jacob, D. J., 1999).

Environmental risk assessment, or the study of the potential negative effects of exposure to hazardous compounds, is the final topic covered by environmental chemistry. (Paustenbach, D. J., 2002) This is critical for informing environmental rules and standards.

Importance of Environmental Chemistry in Urban Ecosystems

Understanding and controlling urban ecosystems rely heavily on environmental chemistry. It's important for several reasons, including preventing pollution, improving public health, designing more sustainable cities, and fostering long-term growth (Manahan, S. E., 2017).

Understanding and reducing pollution is the first major field where environmental chemistry is essential. Particulate matter in the air, metals in the soil, and organic chemicals in the water are just some of the common pollutants found in urban environments. Transport, industry, garbage collection, and power generation are just a few of the many industries that contribute to these pollution problems. (Schwarzenbach, R. P., Gschwend, P. M., & Imboden, D. M., 2017) Environmental chemistry gives the means to detect these pollutants, comprehend their paths in the environment, and evaluate their possible implications.

Environmental chemistry's importance to public health is intrinsically linked to its role in pollution control. Air pollution and lead poisoning are just two examples of the hazards that can be found in urban areas and how they can negatively affect people's health (Landrigan, P. J., Fuller, R., Fisher, S., Suk, W. A., Sly, P., Chiles, T. C., & Bose-O'Reilly, 2018). By looking at these consequences from a chemical perspective, we may develop strategies to lower exposure and promote public health.

The field of environmental chemistry also offers useful information for city planners and architects. Urban soils have the potential to store water and mitigate flood risks, and it helps us understand the role of green spaces in sequestering carbon and reducing air pollution (Pickett, S. T. A., Cadenasso, M. L., & McGrath, 2013). These findings can be used to shape urban planning policies that improve cities' environmental efficiency and robustness.

Finally, environmental chemistry is a key component of eco-friendly city planning. New renewable energy systems, trash recycling technology, and low-impact construction materials are just a few examples of how this research helps to lessen the environmental toll of city life. Emissions requirements for vehicles and businesses, water quality laws, and waste management plans are just a few examples of how this research has informed policy and practise (Jorgensen, S. E., & Fath, B. D., 2014).

Environmental chemistry's role in urban ecosystems is, in short, crucial for many reasons. It's crucial for figuring out how to make cities more sustainable, resilient, and healthful in the face of environmental issues.

2. Case Studies: Application of Environmental Chemistry in Urban Revitalization

Numerous urban regeneration efforts throughout the world have relied heavily on environmental chemistry for important insights into dirty site remediation, sustainable urban infrastructure design, and public health improvement.

Environmental chemistry has been used to address urban environmental challenges such as the Love Canal tragedy in New York City. Environmental scientists were instrumental in the cleanup efforts after it was discovered in the late 1970s that a residential neighbourhood had been built on a former chemical waste dump, causing serious health problems for nearby residents. They determined what kinds of harmful compounds were there, such as chlorinated hydrocarbons, and assessed how those substances would move through the environment. In light of this knowledge, containment system building and other remedial measures were planned (Lewis, R., 1980).

An great example of the use of environmental chemistry in urban architecture and planning may be seen in the cleaning up of the Cheonggyecheon stream in Seoul, South Korea. The stream was extremely contaminated before its rehabilitation since it had been covered by an elevated motorway. By analysing the stream's contamination levels, environmental chemists helped create a treatment system to restore water quality and contribute to the restoration project. The Cheonggyecheon is now a thriving urban park that helps reduce the negative effects of urbanisation on the environment by lowering temperatures and increasing airflow (Kim, G., Miller, P., & Nowak, 2014).

The rehabilitation of Canada's Lower Don River relied heavily on environmental chemistry. The river's environment has been severely degraded and polluted due to heavy industrialization in the 19th and 20th centuries. The contamination in the river sediments and surrounding soils, as well as the effects on water quality, were evaluated by environmental chemists. This insight guided the creation of cleanup plans, which in turn helped the river recover and become an important part of the city's green infrastructure (Perks, W., 2018).

The importance of environmental chemistry to city renewal is evident in each of these examples. By providing a deeper understanding of the composition, behavior, and effects of pollutants in the urban environment, environmental chemistry contributes to the development of effective strategies for remediating pollution, designing sustainable urban spaces, and improving public health. These contributions are crucial for transforming urban areas into more sustainable, livable, and resilient environments.

Table-1 Visual Representation of the Case Studies

Indicator	**Love Canal, New York, USA**	**Cheonggyecheon Stream, Seoul, South Korea**	**Lower Don River, Toronto, Canada**
Location	New York, USA	Seoul, South Korea	Toronto, Canada
Problem	Chemical waste dump	Stream pollution, urban decay	River pollution, ecosystem degradation
Key Contaminants	Chlorinated hydrocarbons	Various industrial pollutants	Industrial pollutants, sediment contamination
Role of Environmental Chemistry	Identification of pollutants, evaluation of environmental fate and transport	Contamination assessment, design of water treatment system	Assessment of contamination, impacts on water quality
Mitigation Strategies	Construction of a containment system	Stream restoration, water treatment	Remediation strategies, green infrastructure
Outcome	Cleanup of waste dump, health risk mitigation	Restoration of a clean, vibrant urban park	Successful revitalization, improved water quality
Timeframe	Late 1970s - Ongoing	2003 - 2005	Late 20th century - Ongoing
References	Lewis (1980)	Kim, Miller, & Nowak (2014)	Perks (2018)

2. Result

The preceding table draws parallels and differences between three separate case studies in which environmental chemistry played a major role in urban redevelopment.
All three cases -- Love Canal in New York, USA (Lewis, 1980), the Cheonggyecheon stream in Seoul, South Korea (Kim, Miller, & Nowak, 2014), and the Lower Don River in Toronto, Canada (Perks, 2018) -- involved situations where human activities had led to severe environmental pollution, with significant consequences for public health and ecological integrity. Industrial activities were related to the principal contaminants in all three cases, illustrating the pervasiveness of this type of pollution in metropolitan areas.
In these situations, environmental chemistry played an essential role in determining which toxins needed to be addressed and how. Chlorinated hydrocarbons and their environmental fate were identified using environmental chemistry in the Love Canal case, leading to the creation of a containment system to stop the spread of these pollutants (Lewis, 1980). Environmental chemists evaluated the level of contamination in the Cheonggyecheon and Lower Don Rivers, informing the development of treatment systems and remediation strategies that restored the health of the waterways and their surrounding ecosystems (Kim, Miller, and Nowak, 2014; Perks, 2018).
The results of these cases show how environmental chemistry has made major contributions to city renewal. Environmental chemistry was applied, and effective mitigation techniques were implemented, greatly bettering environmental conditions in each case despite serious initial contamination problems. Lower Don River was revitalised, enhancing its role as part of Toronto's green infrastructure network (Perks, 2018); Love Canal was cleaned up, reducing health risks for local residents (Lewis, 1980); Cheonggyecheon stream was transformed into a vibrant urban park (Kim, Miller, & Nowak, 2014).
On the other hand, the table reveals that the duration of these interventions was frequently extended over years and perhaps decades. This exemplifies the difficulty and duration of urban renewal and environmental cleanup projects. It highlights the importance of consistent work, long-term dedication, and the application of scientific methods like environmental chemistry in order to effectively tackle urban environmental concerns.
To sum up, the table shows how important environmental chemistry is for solving urban environmental problems. Although each case was unique in terms of location, problems, and local context, environmental chemistry played a critical role in illuminating the nature of the environmental challenges at hand, informing the development of mitigation strategies, and ultimately contributing to the success of urban revitalization.

3. Discussion

Insightful comparison of three different applications of environmental chemistry to urban environmental concerns is provided above by the outcome. On the other hand, it brings up a number of important issues that need to be discussed.
First, the importance of environmental chemistry in identifying and fixing pollution issues is demonstrated by the Love Canal, Cheonggyecheon stream, and Lower Don River examples. The presence of pollutants, their origins, and how they behave in the environment were all explained with the help of environmental chemistry. (Lewis, 1980; Kim, Miller, & Nowak, 2014; Perks, 2018). However, while the successful outcomes in each case

demonstrate the value of environmental chemistry, they also underscore the importance of interdisciplinary approaches. Environmental remediation and urban revitalization involve not just scientific understanding, but also engineering solutions, policy interventions, community engagement, and economic considerations. The role of environmental chemistry should therefore be seen as part of a broader suite of tools and approaches.

Secondly, the outcomes in each case indicate that environmental chemistry can contribute significantly to the improvement of environmental conditions and the revitalization of urban spaces. However, these positive outcomes should be weighed against the complexity and long-term nature of the problems. The contamination issues at Love Canal, Cheonggyecheon stream, and Lower Don River arose from years or even decades of pollution. Remediation efforts also took several years, and in some cases are still ongoing (Lewis, 1980; Kim, Miller, & Nowak, 2014; Perks, 2018). This underlines the fact that while environmental chemistry can provide solutions, it is not a quick fix. Prevention is often better than cure, highlighting the importance of proactive measures, such as pollution prevention and control, to avoid such problems in the first place.

Thirdly, the table paints a rather consistent picture of success, indicating that using environmental chemistry always results in better environmental conditions. However, this is not always the case. The movement of contaminants or the formation of new environmental issues are two examples of unintended consequences that could result from clean-up activities (Zimmerman, 2011). In addition, the focus on technical solutions may obscure the potential for negative impacts on local communities and the unequal distribution of environmental risks and rewards. This calls for more complex measures of success and failure.

Lastly, the table highlights the importance of sustained commitment and ongoing efforts in addressing urban environmental challenges. Yet it does not address the question of how such commitment and effort can be ensured. Effective urban revitalization requires not just scientific understanding and technical solutions, but also supportive policy frameworks, adequate funding, and public engagement (Angotti, 2015). Further research is needed on how these enabling conditions can be fostered.

In conclusion, the results underscore the significant role of environmental chemistry in addressing urban environmental challenges. Yet they also invite critical reflection on the complexities and challenges involved in environmental remediation and urban revitalization, the need for interdisciplinary approaches, and the importance of proactive measures and enabling conditions.

Key Findings

This article extensively explored the role of environmental chemistry in the revitalization of urban ecosystems, showcasing its vital importance in understanding and mitigating urban environmental problems.

1. Understanding Urban Ecosystems: Urban ecosystems are complex systems impacted by various natural and anthropogenic factors. Environmental chemistry plays a significant role in understanding these ecosystems, especially in terms of pollution sources, transport, fate, and effects of contaminants in the environment (Kim, Miller, & Nowak, 2014).
2. Basic Concepts of Environmental Chemistry: Environmental chemistry provides critical insights into the behavior and impacts of pollutants in the environment. This includes understanding the chemical reactions, transport processes, and effects of various contaminants in different environmental compartments (Lewis, 1980).
3. Environmental chemistry is crucial to urban ecosystems because it guides the

development of green infrastructure and other nature-based solutions. It supports sustainable management of urban environments and helps pinpoint pollution's origins (Perks, 2018).

4. The Love Canal, the Cheonggyecheon stream, and the Lower Don River case studies illustrated the practical use of environmental chemistry in resolving urban environmental challenges, which led to the revitalization of these waterways. Its importance in spotting major pollutants, guiding mitigation plans, and aiding in reviving cities was illustrated by these cases (Lewis, 1980; Kim, Miller, and Nowak, 2014; Perks, 2018).
5. Critical Discussion: The cases show how important interdisciplinary approaches are, how complicated and long-term environmental problems can be, how unpredictable the outcomes might be, and how crucial preventative measures and enabling conditions are (Zimmerman, 2011; Angotti, 2015).

In conclusion, environmental chemistry is an important resource for figuring out how to fix metropolitan areas' pollution problems. Although it offers helpful insights and solutions, effective urban revival requires additional interdisciplinary methods, proactive actions, and enabling conditions.

4. Conclusion

This paper concludes by emphasising the significance of environmental chemistry in reviving urban ecosystems. Understanding, managing, and reducing urban environmental problems can greatly benefit from the insights provided by environmental chemistry. Examples from Love Canal, Cheonggyecheon Stream, and the Lower Don River show how environmental chemistry may guide efficient cleanup efforts and promote positive changes in metropolitan areas. However, the study also emphasises the necessity for interdisciplinary methods, proactive initiatives, and supportive conditions due to the complexities and obstacles involved. Environmental chemistry is a useful method, but it needs to be combined with research from other fields, legislative changes, and citizen participation to get long-term results that stick. In order to develop sustainable urban ecosystems, the paper advocates for a comprehensive strategy that combines environmental chemistry with larger urban management tactics.

Key Recommendations

The key recommendations based on the findings of this article are as follows:

1. For better knowledge, management, and mitigation of urban environmental concerns, environmental chemistry should be more broadly applied in urban ecosystem management, as evidenced by the results of the aforementioned case study analysis. That's why it's crucial to improve green infrastructure and other nature-based solutions through the application of environmental chemistry to urban ecosystem management.
2. Encourage Multidisciplinary Strategies: Environmental chemistry can shed light on urban revitalization, but other scientific fields, policy interventions, and citizen participation are also needed. Urban environmental issues can be better understood and addressed through an interdisciplinary lens.
3. As the case studies have demonstrated, environmental problems typically have far-reaching effects and can be difficult to fix. Thus, preventative efforts, such as pollution prevention and control, should be prioritised to assist avert such issues in the first place.
4. Supportive legislative frameworks, proper finance, public participation, and capacity building are also necessary for successful urban rejuvenation to complement scientific knowledge and technical solutions. The science-policy interface, regulatory enforcement, and public

involvement in urban environmental management are all areas that could benefit from reinforcement to create these enabling conditions.

5. More study is needed to improve our understanding of the chemistry of urban environments and to create novel remedies. Likewise, capacity training is essential to improve urban managers', policymakers', and communities' abilities to use environmental chemistry in their daily activities.
6. It is important to take into account the unique environmental conditions, pollutant sources, socioeconomic issues, and cultural features of each city or region when using environmental chemistry to urban rejuvenation.

Finally, these suggestions highlight the importance of environmental chemistry in reviving urban ecosystems and the necessity of an all-encompassing, proactive, and context-specific approach. Healthy, sustainable, and resilient urban settings are possible with the help of these suggestions.

5. References

1. Alberti, M. (2016). Cities that think like planets: complexity, resilience, and innovation in hybrid ecosystems. University of Washington Press.
2. Angotti, T. (2015). Urban Agriculture: Long-Term Strategy or Impossible Dream?: Lessons from Prospect Farm in Brooklyn, New York. Public Health, 8(3), 111.
3. Boone, C. G., Cook, E., Hall, S. J., Nation, M. L., Grimm, N. B., Raish, C. B., ... & Redman, C. L. (2012). A comparative gradient approach as a tool for understanding and managing urban ecosystems. Urban ecosystems, 15(1), 795-807.
4. Cadenasso, M. L., Pickett, S. T. A., & Schwarz, K. (2007). Spatial heterogeneity in urban ecosystems: reconceptualizing land cover and a framework for classification. Frontiers in Ecology and the Environment, 5(2), 80-88.
5. Clapp, J. (2001). Toxic exports: the transfer of hazardous wastes from rich to poor countries. Cornell University Press.
6. Gaston, K. J., Ávila-Jiménez, M. L., & Edmondson, J. L. (2013). Review: Managing urban ecosystems for goods and services. Journal of Applied Ecology, 50(4), 830-840.
7. Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global change and the ecology of cities. Science, 319(5864), 756-760.
8. Jacob, D. J. (1999). Introduction to atmospheric chemistry. Princeton University Press.
9. Jorgensen, S. E., & Fath, B. D. (2014). Encyclopedia of environmental management. CRC Press.
10. Kim, G., Miller, P., & Nowak, D. (2014). Public health and economic impact of the Cheonggyecheon stream restoration project in Seoul, South Korea. Urban Forestry & Urban Greening, 13(3), 482-491.
11. Landrigan, P. J., Fuller, R., Fisher, S., Suk, W. A., Sly, P., Chiles, T. C., & Bose-O'Reilly, S. (2018). Pollution and global health – An agenda for prevention. Environmental Health Perspectives, 126(8), 084501.
12. Lewis, R. (1980). Love Canal: science, politics, and people. Lexington Books.
13. Manahan, S. E. (2017). Environmental Chemistry. CRC Press.
14. Miller, G., & Spoolman, S. (2019). Living in the Environment. Nelson Education Ltd.
15. Narain, S. (2012). Excreta matters: how urban India is soaking up water, polluting rivers and drowning in its

own waste. Centre for Science and Environment.

16. Paustenbach, D. J. (2002). Human and ecological risk assessment: theory and practice. John Wiley & Sons.
17. Perks, W. (2018). Lower Don River West Remedial Flood Protection Project: Detailed Impact Assessment. Toronto and Region Conservation Authority.
18. Pickett, S. T. A., Cadenasso, M. L., & McGrath, B. (2013). Resilience in Ecology and Urban Design. Island Press.
19. Rizwan, A. M., Dennis, L. Y., & Chunho, L. I. U. (2008). A review on the generation, determination and mitigation of Urban Heat Island. Journal of Environmental Sciences, 20(1), 120-128.
20. Schwarzenbach, R. P., Gschwend, P. M., & Imboden, D. M. (2017). Environmental organic chemistry. John Wiley & Sons.
21. Singh, H. (2007). Water law, policy and governance: India and the European Union. Routledge.
22. Spiro, T. G., & Stigliani, W. M. (2012). Chemistry of the environment. University Science Books.
23. Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, A., Niemela, J., & James, P. (2007). Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. Landscape and urban planning, 81(3), 167-178.
24. Zimmerman, A. P. (2011). Making a toxic wasteland: Environmental contamination and urban redevelopment. In Making the Geologic Now (pp. 124-129). Punctum Books.