Conclusion

Environmental Knowledge Commons – An Appraisal

Michael Mattioli and Jessica Steinberg

C.1 INTRODUCTION

Climate change, the accelerating loss of plant and wildlife species, and declining natural resources are some of the central challenges of our time. Individuals working alone cannot overcome problems of this scale. Instead, society needs shared pools of ecological information accessible to all and enriched by many – what we call "environmental knowledge commons."

This book has shown how such pools take many forms – from satellite data, to stormwater management, to patents. While each of these case studies offers a wealth of insights, there are still more lessons that can come from comparing them. This chapter draws together some of the most important insights of this kind.

C.2 KEY CHARACTERISTICS OF ENVIRONMENTAL KNOWLEDGE COMMONS

Before we examine the challenges and opportunities of environmental knowledge commons, it is helpful to look at what makes them unique. This section highlights the following themes, which emerged across the chapters:

1. The high complexity and interconnectedness of the natural systems knowledge commons aim to understand and manage;
2. The diverse range of stakeholders involved, from local communities to global institutions;
3. The complex (and at times contentious) interactions between these stakeholders; and
4. The need for governance structures spanning multiple sectors and scales.

By exploring each of these themes, we can better grasp both the challenges environmental knowledge commons face and their potential to address critical environmental issues.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

C.2.1 *Complexity and Interconnectedness of Environmental Systems*

Several authors remind us that natural processes connect places that are geographically distant, separated by mountains, oceans, and even continents. Draper and Sun (Chapter 3) vividly illustrate this point in its description of Iowa's nutrient runoff traveling the Mississippi and fueling blooms in the Gulf of Mexico, creating low-oxygen areas where fish cannot survive. Nordman et al. (Chapter 4) detail how city pavement, unlike soil, funnels polluted water into drains and eventually into local rivers. Harrington (Chapter 7) and Kurian et al. (Chapter 5) describe the movement of greenhouse gases, storms, floods, and droughts across borders, with farm communities in developing nations often facing the direst effects. Cesari and Sun (Chapter 6) turn the viewpoint skyward, to orbital debris and space operations, where small actions can have lasting consequences. The result is that we cannot consider any one environmental challenge in isolation – instead we must take seriously the externalities, and more concretely, the linkages between data and knowledge in different geographies, scales, and systems.

C.2.2 *Wide-Ranging Participants*

Each chapter highlights the remarkable variety of stakeholders – local, regional, and global, private and public – that can be involved with environmental knowledge commons. At the global level, organizations such as the United Nations and its specialized agencies serve as central coordinators of some international efforts. Harrington's work (Chapter 7) illuminates how bodies such as the United Nations Office for Outer Space Affairs and the World Meteorological Organization play crucial roles in space-based environmental data. These entities facilitate data sharing and establish the normative frameworks that guide our collective environmental stewardship on a planetary scale.

Madison (Chapter 9) describes a collaboration among several key players: international organizations such as the World Meteorological Organization and the United Nations Environment Programme; the United Nations General Assembly that endorsed the creation of the Intergovernmental Panel on Climate Change (IPCC); 195 member governments and their national delegations; the elected IPCC Bureau and its Executive Committee; specialized Working Groups and a Task Force; as well as Technical Support Units, hundreds of external contributing authors, and thousands of expert reviewers.

National governments and their agencies form another layer in this complex stakeholder landscape. Aagaard and Frischmann's examination of the US Forest Service (Chapter 2) offers a compelling case study of this. Here, we see a national agency managing forests for multiple, often competing uses. From timber harvesting to recreation, from conservation to economic development, the Forest Service must navigate competing interests among diverse stakeholders. This balancing act exemplifies the broader challenges in environmental governance.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

Local government agencies have emerged as key players in environmental initiatives in our urbanized world. Nordman et al.'s study of Detroit's Water and Sewerage Department (Chapter 4) showcases how city-level entities are at the forefront of implementing innovative solutions such as green stormwater infrastructure. These local initiatives, though addressing specific urban issues, add valuable insights to our overall environmental practices.

The private sector, previously seen mainly as a source of environmental challenges, has become part of the solution in many cases. From commercial satellite operators revolutionizing Earth observation to companies participating in green patent initiatives, private firms bring innovative technologies and resources. However, their involvement also raises critical questions about balancing private interests with the public good.

Nongovernmental organizations (NGOs) and academic institutions often play a crucial role in linking various stakeholders. These entities contribute cutting-edge research and facilitate collaboration among diverse groups. Nordman et al.'s description of The Nature Conservancy's role in promoting green stormwater infrastructure in Detroit exemplifies how NGOs can catalyze local environmental initiatives.

Local communities and Indigenous groups bring invaluable perspectives to environmental knowledge resources. Their traditional ecological knowledge, often developed over generations of close interaction with specific environments, provides insights that can complement and enrich scientific understanding. Bloom's account of Public Lab's collaboration with Palestinian communities in Jerusalem (Chapter 1) highlights both the importance of community involvement and the delicate balance between openness and local sovereignty in knowledge sharing.

The scientific community remains the foundation of our environmental understanding. Scientists from diverse disciplines contribute to our knowledge of complex environmental systems and develop potential solutions. However, as Aagaard and Frischmann astutely point out (Chapter 2), even scientific information is not immune to stakeholder interests – for instance, research funding can influence study outcomes – underscoring the need for rigorous peer review and diverse perspectives in knowledge creation.

Policymakers and decision-makers at various levels form another crucial stakeholder group. They rely on collective environmental data to inform policy decisions and are responsible for creating frameworks that govern these shared resources. Kurian et al.'s study in Jordan (Chapter 5), involving both academic experts and policymakers, illustrates the potential for collaborative approaches to climate change adaptation.

Finally, we must recognize the role of the general public in environmental knowledge sharing. Advancements in technology have enabled citizen scientists and community members to contribute meaningfully to data collection and analysis. This trend, evident in some space data initiatives described by Cesari and Sun (Chapter 6), has the potential to radically expand our collective environmental understanding.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

The varied interests and expertise of these stakeholders necessitate governance structures that are inclusive and adaptable. These structures must balance different interests, facilitate collaboration, and ensure equitable access to shared knowledge resources. Moreover, they highlight the importance of developing common languages and frameworks that can bridge the gaps between different stakeholder groups and their unique perspectives on environmental issues.

Collaborating across this diverse stakeholder landscape will be crucial. We can develop more effective and equitable approaches to environmental governance by fostering mutual understanding among these varied actors.

Identifying the stakeholders is only part of the equation; examining how they interact within the environmental knowledge commons is essential for effective collective management. If done successfully, the diversity of actors will be an asset to the development and management of environmental knowledge commons.

C.2.3 *Interactions and Relationships among Stakeholders*

In light of the wide variety of stakeholders involved, it is unsurprising that collaboration is not always smooth. Harrington (Chapter 7) describes tensions arising when government agencies become commercial data clients, risking "paywalls" around information that was once public. Aagaard and Frischmann (Chapter 2) depict conflicts among the people who hunt, hike, or log in a shared forest. Nordman et al. (Chapter 4) show how city fees and incentives can persuade property owners to adopt green measures, yet also require public education. Contreras (Chapter 8) warns that patent commons can fail if private incentives are misaligned. Draper and Sun (Chapter 3) note that investors and companies both rely on environmental, social, and governance (ESG) ratings, which can become confusing when agencies use varied standards. Kurian et al. (Chapter 5) offer a more optimistic take: In Jordan, stakeholders found common ground through data and consistent communication. Finally, Cesari and Sun (Chapter 6) note that while open data helps space sustainability, security concerns still limit access. The result is the emergence of a new set of questions about how to mitigate the trade-offs between security and environmental sustainability.

C.2.4 *Governance Across Many Levels*

The authors describe a variety of governance frameworks supporting environmental knowledge commons. These span international treaties to local ordinances. Harrington (Chapter 7) notes the importance of United Nations offices and cross-border instruments in overseeing satellite data. Aagaard and Frischmann's account of US forests (Chapter 2) reveals a single federal agency juggling everything from conservation to recreation. Nordman et al. (Chapter 4) locate ground-level projects under the umbrella of federal laws, such as the Clean Water Act. Contreras (Chapter 8) notes

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

that organizations such as the World Intellectual Property Organization (WIPO) can facilitate patent commons globally but need sustained commitment. Draper and Sun (Chapter 3) explain how ESG oversight may come from regulators, investor communities, or even consumer pressure. Kurian et al. (Chapter 5) credit success in Jordan to sustained coordination among ministries, experts, and local communities. Cesari and Sun (Chapter 6) see how data about near-Earth orbit might come from a single nation's program but remain relevant for every country with satellites.

While most of the governance frameworks discussed emphasize flexibility and adaptability, one highlights a critical tension between the need for authoritative decision-making and inclusive collaboration. Madison's discussion of the IPCC (Chapter 9) demonstrates how central expertise can guide complex environmental strategies. Sometimes, balancing authority with collaborative inclusion is essential to ensure decisions are both scientifically robust and adequately supported.

The polycentric nature of these governance structures allows for flexibility and adaptability in addressing complex environmental issues while also recognizing the importance of coordination and integration across different decision-making centers. As we face increasingly complex environmental challenges in the future, these governance structures will likely be crucial in fostering collaboration, ensuring access to knowledge, and developing effective strategies for environmental stewardship.

C.3 GOVERNANCE CHALLENGES AND EFFECTIVE APPROACHES

C.3.1 *Openness versus Protection*

The authors grapple with the fact that leaving knowledge open can spur innovation, but can also expose trade secrets or sensitive data. Harrington (Chapter 7) notes that some governments limit data access on security grounds; Contreras (Chapter 8) shows how companies fear losing competitive advantages if patents go unrestricted; Draper and Sun (Chapter 3) focus on the tightrope companies walk between transparency and revealing too much. Some wildlife data, Harrington points out, might aid poachers if made public.

C.3.2 *Adapting to Shifting Conditions*

Many chapters underscore the need to adapt. Aagaard and Frischmann (Chapter 2) call for robust structures that change in tandem with environmental conditions. Bloom (Chapter 1) recommends clear statements of values so that people know their shared principles even when circumstances evolve. Kurian et al. (Chapter 5) demonstrate how expert panels and ongoing learning can make climate strategies more responsive. Nordman et al. (Chapter 4) look at Detroit's green infrastructure, showing that each project yields lessons that can inform future decisions.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

C.3.3 *Legal and Regulatory Webs*

International treaties, national laws, and local rules intersect in these commons. Harrington (Chapter 7) references space treaties, while Nordman et al. (Chapter 4) point to the Clean Water Act, and Draper and Sun (Chapter 3) discuss emerging ESG disclosure standards. Contreras (Chapter 8) looks at patent rules that can accelerate green-tech distribution. Bloom (Chapter 1) raises ethical frameworks such as the CARE Principles that aim to protect community rights and ensure respect for local knowledge.

C.3.4 *Technology's Role*

The authors highlight that while advanced technologies hold immense potential to unify diverse environmental knowledge, inequities may arise if access and oversight remain the privilege of a select few. Harrington (Chapter 7) and Cesari and Sun (Chapter 6) describe satellites and other advanced systems that produce immense troves of data. Aagaard and Frischmann (Chapter 2) warn about bias in algorithms if oversight is lax. Contreras (Chapter 8) and Draper and Sun (Chapter 3) examine tools such as WIPO Green or blockchain that can match innovators with investors or secure data provenance. Meanwhile, Nordman et al. (Chapter 4) observe that "green infrastructure" integrates simple nature-based ideas with modern engineering. Each author acknowledges that technology can unify scattered knowledge, though it can also create inequities if only a few privileged players have access.

C.3.5 *Public Institutions as Catalysts*

Harrington (Chapter 7) lists space agencies such as NASA, while Aagaard and Frischmann (Chapter 2) show how the US Forest Service manages more than just the land – publishing research for many users. Contreras (Chapter 8) thinks government sponsorship is sometimes needed to keep patent commons afloat. Kurian et al. (Chapter 5) credit national ministries for coordinating climate adaptation. Nordman et al. (Chapter 4) see how local leadership can mobilize and inform property owners. And Cesari and Sun (Chapter 6) point out that sovereign nations remain responsible for their space activities under international law.

C.3.6 *Constraints and Building Capacity*

The authors illustrate that the very fabric of environmental knowledge commons is woven from finite resources – time, money, knowledge, and technology – which demand deliberate strategies in sustained funding, inclusive capacity building, and innovative incentives to ensure their resilience and broad participation. Aagaard

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

and Frischmann (Chapter 2) acknowledge that complex systems require continuous funding, while Contreras (Chapter 8) notes how collective projects can fade once early enthusiasm wanes. Cesari and Sun (Chapter 6) remind us that only a handful of players can afford next-generation space sensors. Harrington (Chapter 7) stresses capacity building – technology transfer and training – to broaden who can participate. Kurian et al.'s case of partnering local communities with experts (Chapter 5) shows that bridging different skill sets can yield resourceful solutions. Nordman et al. (Chapter 4) emphasize incentives that help property owners invest in practices they might not otherwise try.

C.3.7 *Policy Implications*

The chapters in this volume offer several important policy implications for managing environmental knowledge commons:

- Communication and Capacity Building: Harrington (Chapter 7) suggests a need for public communication strategies about the benefits of Earth observation data. This implies that policymakers should consider developing and implementing comprehensive outreach programs to educate the public and stakeholders about the value of environmental data. Additionally, capacity-building efforts should focus on interoperability to ensure that data can be effectively shared and utilized across different platforms and stakeholders. This may require policies that promote standardization of data formats and sharing protocols.
- Governance Strategies: Aagaard and Frischmann (Chapter 2) imply that understanding the relationship between environmental commons and knowledge commons can inform better governance strategies. Policymakers should consider how these relationships manifest in specific contexts to develop more effective management approaches. This might involve creating policies that explicitly recognize and address the interdependencies between physical environmental resources and the knowledge needed to manage them.
- Value-Based Governance: Bloom (Chapter 1) emphasizes the importance of developing and implementing value statements in knowledge commons governance. Policymakers should consider adopting democratic writing processes to create value statements that reflect diverse stakeholder perspectives and guide decision-making. This approach could be incorporated into policy development processes, ensuring that environmental knowledge commons are governed in ways that align with community values and priorities.
- Green Technology Dissemination: Contreras (Chapter 8) provides specific recommendations for improving green patent commons, including narrowing technical focus, conducting patent landscaping, and ensuring technology transfer. These strategies could be adopted by policymakers to facilitate broader dissemination of green technologies. Policies could be developed to incentivize

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

the formation of focused green patent commons and to support the necessary infrastructure for effective technology transfer.

ESG Valuation and Transparency: Draper and Sun (Chapter 3) suggest that policymakers should consider more flexible and transparent approaches to ESG valuation and governance. This may involve prioritizing truth, transparency, and tangible outcomes to restore trust in ESG efforts. Policies could be developed to standardize ESG reporting requirements and to create more robust verification mechanisms for environmental claims.

Integrating Expert Knowledge and Data: Kurian et al. (Chapter 5) highlight the importance of integrating expert knowledge with data-driven approaches in policymaking, particularly for climate adaptation strategies. Policymakers should consider using tools such as trade-off intensity analysis to inform decision-making in complex, nonlinear systems. This might involve developing policies that mandate the use of expert panels or similar mechanisms in environmental decision-making processes.

Balanced Incentives for Green Infrastructure: Nordman et al.'s research (Chapter 4) indicates that policymakers should consider both economic incentives and knowledge-sharing mechanisms to encourage green stormwater infrastructure adoption, as economic incentives alone may be insufficient. This suggests a need for comprehensive policy approaches that combine financial incentives with education and capacity-building initiatives.

Space Data Management: Cesari and Sun (Chapter 6) suggest that policymakers should consider frameworks for aggregating and sharing space-related data in ways that benefit all stakeholders, potentially leading to the qualification of such data as knowledge commons. This might involve developing international agreements or national policies that promote open access to space-derived environmental data while addressing security and commercial concerns.

Overall, these policy implications emphasize the need for interdisciplinary approaches, stakeholder engagement, and adaptive governance strategies in managing environmental knowledge commons. Policymakers should strive to balance open access with necessary protections, foster collaboration across sectors, and develop flexible frameworks that can adapt to the complex and evolving nature of environmental challenges.

Furthermore, policies should aim to address the resource constraints and capacity-building needs identified across the chapters. This could include developing funding mechanisms for the long-term sustainability of knowledge commons, investing in technological infrastructure to support data sharing and analysis, and creating programs to build human capital in environmental data management and interpretation.

By implementing policies that reflect these insights, decision-makers can help create more robust, equitable, and effective environmental knowledge commons that contribute to improved environmental management and sustainability efforts globally.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

C.3.8 *Future Directions*

As the field of environmental knowledge commons continues to evolve, several promising avenues for future research emerge from the diverse studies presented in this volume. These directions not only address current gaps in our understanding but also anticipate the challenges and opportunities that lie ahead in managing our shared environmental resources and knowledge.

Madison (Chapter 9) provides a compelling vision for future research. He argues that by juxtaposing the IPCC's role in synthesizing and translating climate science with similarly structured institutions – ranging from universities and research organizations to norm-governed creative communities – we can reveal shared structural features and decision-making modalities that cut across different domains. This approach not only enriches our understanding of how scientific authority is socially constructed and maintained but also offers practical insights for refining models of environmental policy design. In essence, Madison's framework encourages us to explore how diverse expert knowledge communities overcome social dilemmas in collaboration and communication, ultimately informing more robust strategies for managing and transmitting complex scientific information.

C.3.8.1 Investigating Complex EC–KC Relationships

A primary direction for future research, as highlighted by Aagaard and Frischmann (Chapter 2), is to delve deeper into the relationships between environmental commons and their associated knowledge commons. This involves exploring how specific features of environmental commons influence the governance of their corresponding knowledge commons and vice versa. Such research could provide valuable insights into designing more effective and adaptive governance systems that account for the interdependencies between physical resources and the knowledge required to manage them.

C.3.8.2 Retrospective Analysis of Environmental Commons Studies

Another promising approach is to conduct a retrospective empirical project revisiting prior environmental commons studies. This would involve mapping and analyzing the often understudied or implicit knowledge common aspects within these cases. Such an endeavor could uncover valuable lessons about the role of knowledge in environmental governance and help identify patterns or principles that may have been overlooked in previous analyses.

C.3.8.3 Enhancing Patent Commons for Green Technologies

In the realm of green technology, Contreras (Chapter 8) suggests focusing future research on developing more effective usage-tracking mechanisms for patent

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

commons. Additionally, there is a need to explore the potential of narrower, more targeted patent commons in specific technological areas. This could lead to more successful collaborations and faster innovation in critical environmental technologies.

C.3.8.4 Integrating Expert Knowledge with Data-Driven Approaches

Kurian et al. (Chapter 5) point to the potential of combining expert panels with supervised machine learning in environmental governance. Future research should explore how these approaches can be effectively integrated to design better governance systems. This integration could lead to more robust and adaptable monitoring frameworks for climate adaptation and other environmental challenges.

C.3.8.5 Standardization and Ethical Considerations in Space Data

As we extend our environmental concerns beyond Earth, Cesari and Sun (Chapter 6) highlight the need for research on standardizing space data formats. This standardization is crucial for effective global sharing and utilization of space-related environmental data. Moreover, future studies should address the ethical considerations in space resource exploitation, balancing the benefits of open data with the potential negative consequences of unrestricted access to information about space resources.

C.3.8.6 Evolving Role of Artificial Intelligence and Machine Learning

As Harrington mentions (Chapter 7), the evolving role of artificial intelligence and machine learning in data governance presents another critical area for future research. Studies should explore how these technologies can enhance our ability to collect, analyze, and share environmental data while addressing privacy, security, and equity concerns.

C.3.8.7 Cross-Disciplinary and Comparative Studies

Future research should also emphasize cross-disciplinary and comparative studies. By examining how different fields approach knowledge commons (e.g., comparing approaches in environmental sciences, digital spaces, and healthcare), we may uncover transferable insights and innovative solutions to common challenges.

C.3.8.8 Practical Applications and Policy Implications

Finally, future research should focus on translating theoretical insights into practical applications and policy recommendations. This includes developing and testing new institutional designs, governance mechanisms, and technological solutions to effectively manage environmental knowledge commons in various contexts.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

The field of environmental knowledge commons offers rich opportunities for future research that can significantly impact our ability to manage shared environmental resources sustainably. By pursuing these research directions, we can develop more sophisticated, adaptable, and practical approaches to environmental governance in an increasingly complex and interconnected world. The challenges we face in managing our environment are substantial, but so are the opportunities for innovation and collaboration in knowledge commons. As we progress, it will be crucial to balance theoretical advancement and practical application, ensuring that our research continues to inform and improve real-world environmental management practices.

C.3.8.9 Conclusion

As we close this exploration of environmental knowledge commons, we are reminded of the immense potential and responsibility that lies before us. Our planet's challenges are daunting, but the collective wisdom and innovative approaches showcased in this volume offer hope and direction. Environmental knowledge commons represent more than just shared information; they embody our collective capacity to understand, protect, and sustainably manage the natural systems that sustain us all.

The diverse case studies and analyses presented here demonstrate that effective environmental governance is not just about having data or technology but fostering collaboration, building trust, and creating inclusive systems that value diverse forms of knowledge. As we move forward, it is clear that the success of our environmental efforts will depend on our ability to break down silos, bridge divides between different stakeholders, and create governance structures that are as dynamic and adaptive as the ecosystems we seek to protect. By embracing the principles of environmental knowledge commons – openness, collaboration, and shared responsibility – we can build a more resilient and sustainable future for our planet and all its inhabitants. The path ahead is challenging, but with the insights and tools provided by environmental knowledge commons, we are better equipped than ever to face these challenges head on and create positive change for generations to come.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 15 Nov 2026 at 05:38:22, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009482134.015