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Digital-Environmental Poverty

Digital and Environmental Inequalities in the Post-Covid Era

Maria Laura Ruiu · Massimo Ragnedda

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Power, exclusion, and the widening gaps between those with agency and those without is the foremost question of our time among scholars across humanities and the social sciences. This series speaks to the main drivers of power and exclusion in contemporary society: digital technological advances that are rapidly transforming society. Titles in this series will investigate and propose different ways to think, analyse and understand inequalities in the digital age. Themes covered include, but are not limited to, how digital inequalities persist vis-à-vis economic class, gender, sexuality, race and ethnicity, aging, disability, healthcare, education, rural residency, networks, and global geographies, as well as the study of emergent forms of inequality related to AI, digital labor, the platform economy and networked individualism, cybersafety, cybercrime, gaming, and emotional well-being.

Our goal is to create a series at the centre of these debates, pushing the field forward. Thematically, the series will examine both problems and solutions. On the one hand, we welcome monographs that map out how diverse digital technologies are exacerbating inequalities or creating new ones. On the other hand, we also welcome monographs that chart out how these technologies can be used to tackle social exclusions and marginalization.

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Abbreviations

AI	Artificial Intelligence
BECTA	British Educational Communications and Technology Agency
CCC	Climate Change Committee
EKC	Environmental Kuznets Curve
EMT	Ecological Modernization Theory
DEP	Digital-Environmental Poverty
DEPF	Digital-Environmental Poverty Framework
DFID	Department for International Development
DPA	Digital Poverty Alliance
DPF	Digital Poverty Framework
EIP	Environmental Improvement Plan
GDSA	Government Digital Sustainability Alliance
HDI	Human Development Index
ICROA	the International Carbon Reduction and Offset Alliance
IoT	Internet of Things
ICT	Information and Communications Technology
ISPs	Internet Service Providers
ITU	International Communication Union
LDCs	Least Developed Countries
MDGs	Millennium Development Goals
ML	Machine Learning
MPI	Multidimensional Poverty Index
OEP	the Office for Environmental Protection
OPHI	Oxford Poverty and Human Development Initiative
PHDI	Planetary Pressure Adjusted Human Development Index
SDG	Sustainable Development Goal
ToC	Treadmill of Consumption

ToI	Treadmill of Information
ToP	Treadmill of Production
WSIS	World Summit of the Information Society
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
USO	Universal Service Obligation
WEF	World Economic Forum
WSIS	World Summit on the Information Society

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CHAPTER 1

Introduction. Between Digital, Socioeconomic, and Environmental Poverty

Beginning with the deconstruction of the concept of poverty, this book explores themes at the intersection of resilience, environmental threats, prosperity, and innovation to demonstrate how digital poverty is connected not only to socioeconomic inequalities but also to environmental poverty. The rapid digital acceleration that has characterized contemporary society in recent decades, notably accelerated by the COVID-19 pandemic, has profoundly reshaped societal structures and dynamics (Amankwah-Amoah et al., 2021; Anandan et al., 2022). It is particularly urgent for both scholars and policymakers to explore the repercussions of digital evolution on social inequalities and the evolving, nuanced nature of poverty in this digital age. To analyze and understand the complexity of digital poverty, there is a need to rethink the concept holistically by considering the intersecting nature of digital, socioeconomic, and environmental poverty.

First, we argue that poverty must be viewed through digital technological access and usage. In today's digital age, technology plays a crucial role in shaping access to information, resources, services, and opportunities. Various socioeconomic factors, such as income, education, and geographic location, play a pivotal role in influencing individuals' access to digital technologies and their capacity to develop digital competencies (Ragnedda et al., 2022), consequently shaping their participation in the digital realm

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(van Dijk, 2020a). While economic factors are undoubtedly crucial for ensuring access to technology, they are insufficient when individuals lack the skills and knowledge required to benefit from their use. Inability to participate in the digital world can exacerbate social and economic inequalities, hindering individuals from accessing education, job opportunities, healthcare, and other essential services. Therefore, it is vital to refrain from assessing individuals facing poverty solely in terms of their financial and economic limitations because adopting this perspective offers only a partial solution. We advocate considering the capability to use technology effectively and when needed the most as another critical aspect of poverty. Digital competencies are vital in empowering individuals to navigate the digital landscape, allowing them to improve their livelihoods and engage in a broader socioeconomic fabric (Marr, 2022). As argued elsewhere (Ragnedda & Ruiu, 2020), these two factors—access to digital technologies and the ability to master digital competencies—and their holistic union give rise to digital capital. A scarcity of digital capital can contribute to a certain degree of poverty, given its significant impact on people's socioeconomic prospects and overall well-being (Ragnedda et al., 2022). The concept of digital capital is intrinsically linked to the evolution of the digital divide and its role in perpetuating and exacerbating socioeconomic inequalities (Ragnedda et al., 2020). A person's ability to maximize the advantages offered by digital technology will affect their position within the social structure as well as their interactions and mobility within it.

In addition to accessing and using digital technology, the quality of the natural environment in which individuals reside plays a significant role in determining their poverty levels. People living in impoverished areas often face environmental degradation, inadequate sanitation, and limited access to clean water and green spaces. These environmental factors can have severe implications for physical and mental health, perpetuating a cycle of poverty that affects both the current and future generations. Moreover, a degraded environment can impact the quality of the available digital infrastructure, limiting opportunities for a beneficial digital experience. In contrast, increased digital adoption/penetration can contribute to a better environment and reduction in energy poverty through improved electricity efficiency and reduced reliance on fossil fuels. Many studies have shown how the digital dimension is intertwined with socio-environmental factors (Ha et al., 2022; Hosan et al., 2022; Shift Project, 2019; Irtyshcheva, 2021) by, for example, producing cascading impacts on healthcare, social, and environmental dynamics (Abdul et al., 2021). Digital transformation

also has the potential to educate citizens (Loock et al., 2013; Malhotra et al., 2013) about more sustainable behaviors (Hedin et al., 2019) and create new management settings that can either benefit or harm the natural environment (Henkel & Kranz, 2018). The effects of such a digital transformation can be either valuable or harmful to the natural environment, such as increasing electricity demand (Andrae, 2019; Salahuddin & Alam, 2016) and emissions (Strubell et al., 2019). This suggests a need to update our theoretical and policy kits to tackle poverty and promote digital sustainability, intended as the use of digital technologies to promote environmental, social, and economic sustainability that supports a sustainable future for all (Sparviero & Ragnedda, 2021). The emerging scientific debate on digital poverty has considered its interaction with environmental poverty only marginally. This book uses the concept of *Digital-Environmental Poverty*, as it encapsulates the multidimensionality of poverty and includes three pillars at its base: social, digital, and environmental poverty. Importantly, we argue that digital-environmental poverty is not only influenced by the structural conditions of the environment but also by the lack of environmental awareness, understanding, and engagement with policies and governance aimed at reducing the digital footprint and enhancing digital sustainability. Understanding Digital-Environmental Poverty might support policymaking to improve individuals' digital life/health and reduce the pressure on both the health and environmental systems while boosting the economy and business and better protecting the environment, which in turn can lower the costs of healthcare (Van Den Eeden et al., 2022).

Effective governance and policymaking require education, active participation, and understanding from all segments of society, including those experiencing poverty. We argue that marginalized communities often lack the means or opportunities to meaningfully engage in shaping policies that affect their lives. This exclusion can perpetuate a vulnerable status and hinder sustainable development initiatives. In this vein, one of the key aspects of our discussion is that a nuanced approach to framing digital poverty also needs to consider the exposure to environmental degradation/weather extremes, environmental regulation, opportunities to participate in environment-related decision-making and the overall social context, and the capacity, support, and motivations to use digital technologies sustainably. This creates conditions for citizens to understand and engage with the environment, which will, in turn, be reflected in their digital behavior and, consequently, the digital-environmental footprint. To

shed light on the intricate nature of poverty in the digital age, with particular emphasis on its multidimensional aspects and the interplay between its three fundamental pillars, this book aims to provide a deeper understanding of the complexities surrounding the evolution of digital inequalities, exploring their connection with digital acceleration and the environmental crisis. In this vein, there is a need to understand what pre-existing social, economic, and cultural determinants are worsening individual digital engagement, which in turn might affect the country's productivity and contribute to failing the Sustainable Development Agenda aimed at ending extreme poverty by 2030 (UN, 2022) by balancing the economic, social, and environmental impacts (Hallegatte et al., 2016).

Building upon the Digital Poverty Framework established by the Digital Poverty Alliance (2022), we elaborate on several key factors that contribute to the manifestation of digital poverty, including the environmental dimension. In summary, *Digital-Environmental Poverty* is divided into three sections. The first section begins by briefly analyzing the concept of poverty, its multidimensionality, and the need to comprehend it in terms other than economic, to situate poverty in the context of contemporary digital-environmental evolution. We theorize the evolution of poverty by framing the concept of poverty and discussing its evolution in the digital age. The second section specifically focuses on the environmental dimension of poverty. After framing and redefining the concept of poverty, keeping in mind the environmental and digital aspects, Section III presents case studies to illustrate how this concept might be useful in making sense of the interrelated relationship between social, digital, and environmental poverty. Finally, the conclusions provide recommendations for anticipating and reducing the risk of experiencing digital-environmental poverty.

More specifically, Chap. 2 starts by analyzing digital poverty beyond the mere dichotomic conceptualization—access versus no access or digital poor versus digital rich—and by focusing on the multilayered skills needed for e-inclusion. This first section argues that when determining whether people can fully participate in an increasingly digital society, the gaps to be considered extend beyond the initial facet of the digital divide (Ragnedda & Muschert, 2013), which is characterized by limited access to ICTs and digital infrastructure (the first level of the digital divide). They also involve deficiencies in digital skills and competencies (the second level of the digital divide) and an uneven distribution of benefits derived from accessing and using ICTs (the third level of the digital divide). In other words, this

section considers the so-called digital divide as a complex issue involving the intricate interplay of various factors, including different levels of skills and benefits gained through the use of ICTs, consistent access, quality of connectivity, types of devices being used, digital skills, motivation, confidence in using ICTs, the ability to protect personal privacy and safety, and the capacity to enhance the quality of life and well-being through the use of ICTs. In the context of the COVID-19 pandemic, transformation has taken place wherein digitalization has emerged as a crucial requisite for survival (De' et al., 2020; Xie et al., 2020). Rapid digital acceleration has disproportionately affected marginalized groups, such as low-income communities, rural populations, and disadvantaged minorities. Accessing and using digital technologies has become a civil right (Ragnedda, 2020), as it provides access to resources, opportunities, and knowledge that are often not accessible otherwise, including access to digital public services, health, job possibilities, and the ability to work remotely and socialize (Van Dijk, 2020b). Specifically, digital skills are associated with benefits for individuals and the economy in terms of improved employment prospects, financial capability, better health outcomes, and civic participation (Borda et al., 2022). In addition to being a barrier to entering the workforce, a lack of digital skills poses a threat to the nation's system as a whole, raising issues of concern for its ability to compete internationally (International Labour Organization, 2021). We also address the exacerbation of social inequalities due to global digital inequalities. At this level, certain countries have advanced significantly in terms of digital infrastructure, access to technology, and digital literacy, while others remained on the "wrong side" of the global digital divide (Norris, 2001). Countries with strong digital infrastructure and capabilities have a competitive advantage in the global economy, access a wealth of information and knowledge, and the ability to participate actively in the digital age. Conversely, countries with limited access to digital technologies find themselves marginalized, facing barriers to development, education, and opportunities (Ragnedda & Gladkova, 2020).

Chapter 3 goes in depth to conceptualize digital poverty and approaches to addressing digital inequalities. Moreover, this chapter also introduces algorithmic gaps and the Artificial Intelligence divide due to automatic judgments, which can be deceptively biased and operate invisibly. Escaping digital poverty also involves recognizing how algorithms influence daily life activities and avoiding being trapped in the digital cage created by predictive technologies. Considering these interconnected

aspects, Chap. 3 introduces the Digital Poverty Framework developed by the Digital Poverty Alliance (2022) to identify the constitutive determinants of digital poverty at multiple levels (structural/macro, circumstantial/meso, and individual/micro).

Finally, the first section introduces environmental poverty and its interplay with socioeconomic poverty. It refers to theoretical approaches from different disciplines that more or less optimistically interpret the relationship between economic development and environmental respect. We shall look into some existing approaches used to investigate the connections between poverty and the natural environment by simultaneously exploring two perspectives: one more oriented to how production processes and structural properties interact with individual behavior and one on how consumer practice can produce change. The chapter also explores the ecological values and consumption practices that shape individuals' environmentally conscious choices.

Section II adopts a comprehensive approach to examining Environmental Digital Poverty, recognizing the interconnectedness of social, digital, and environmental poverty. This section explores their interdependence as unified and encompassing concepts and phenomena. Specifically, Chap. 5 connects environmental transformation to digital transformation and draws on the Digital Poverty Alliance Framework by adding the environmental component to all levels included in the model. This chapter adds the status of the natural environment and its regulation as a structural determinant at the macro level. These structural determinants contribute to several factors, such as the available digital infrastructure (e.g. environmental conditions) and the existence of specific policies aimed at increasing digital efficiency in environmental terms. The natural environment also contributes to shaping the circumstances in which social actors operate (meso level) due to, for example, experiencing adverse environmental conditions/events (which in turn can affect the digital infrastructure) and opportunities available to citizens to participate in environmental decision-making. The possibility of engaging in the decision-making process related to digital sustainability and the experience of environmental degradation is added at the circumstantial level. Moreover, the revised version of the Digital Poverty Alliance Framework model adds environmental awareness/engagement, social networks, and motivation to use digital technologies sustainably as individual determinants. While intrinsic aspects might play a pivotal role in motivating users to engage with digital tools in an eco-friendly way, external social forces should also be considered. These

encompass the influence that social networks and shared values can have in shaping individual digital behaviors by determining acceptability. Therefore, individual motivation, environmental awareness, and engagement are essential for developing eco-friendly digital practices and savvy use of technologies to safeguard themselves and the surrounding environment. Our approach emphasizes the importance of fostering digital literacy and cultivating effective skills and competencies in leveraging digital tools to enhance quality of life, both at the individual and societal levels, while safeguarding the environment.

Chapter 6 adopts a Bourdesian perspective to focus on the circumstantial level of the new model, which is interpreted here as the point of interaction between structural and individual properties. It also defines the digital-environmental habitus as the result of such interaction but is also characterized by a transformative potential. This section concludes with some reflections on the long-term sustainability of digital consumption-based capitalism contextualized in a marked ecological degradation, also reflecting on the support needed at both the macro and micro levels while considering the intersection between the two types of intervention. In the last chapter of this second section, we provide some examples for each level considered by the revised Digital-Environmental Poverty Framework (micro/individual-meso/circumstantial-macro/structural). These examples aim to facilitate readers' comprehension of how efforts to address digital poverty can be integrated into initiatives against environmental poverty, highlighting the need for a holistic approach to address digital-environmental poverty.

Section III delves into case studies and best practices to reflect on effective approaches that combine digital post-pandemic recovery with environmental benefits. The section begins with a chapter that evaluates policies geared toward addressing digital poverty and environmental poverty in the UK. We briefly discuss the evolution of the UK policies aimed at tackling the inequalities arising from the diffusion and adoption of digital technologies. Chapter 9 offers a case study based on research conducted by the authors, investigating the digital-environmental habitus of individuals who may be at risk of digital poverty in England. This study sheds light on the complex relationship between digital access, environmental consciousness, and socioeconomic vulnerability, providing valuable insights into potential interventions. The third section concludes by presenting the lessons learned from the case studies and existing legislation. This final chapter aims to formulate guidelines that can orient future

policymaking and initiatives, by analyzing successful examples of policies aimed at reducing the digital divide while promoting environmental sustainability. It uses the Action Plan developed by the Coalition for Digital Environmental Sustainability—CODES (2022), "Sustainable Planet in the Digital Age", to contextualize the policies and examples discussed in this book, both from Western and non-Western countries. This plan provides a framework for advancing digital sustainability through collaborative efforts between private and public sectors. Through these case studies and policy insights, Section III seeks to contribute to the development of well-informed strategies that promote inclusive digital recovery, while safeguarding the environment and individuals. The aim is to identify pathways that maximize the potential for digital advancements to serve as a force for positive change while simultaneously addressing social inequalities and environmental challenges. Finally, Chap. 11 offers key takeaways and their corresponding policy recommendations, derived from the content presented in the book. This chapter seeks to present actionable insights that can inform and guide future policy considerations.

Overall, the book reflects upon the main drivers of poverty in the digital age by analyzing the interaction between recovery and environmental threats and exploring the potential educational power of the post-COVID era toward sustainable and efficient use of technologies in individuals' everyday lives. Automation and robotization may result in societal and environmental regression, high unemployment rates, and significant inequities. However, there are scenarios of social independence, efficiency, and emancipation. The direction we go will be greatly influenced by how digital technologies are integrated into the social structure, how we use them to protect the environment, and, overall, our capacity to use digital technologies rather than being used by them.

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PART I

Theorizing Digital Poverty

CHAPTER 2

From Poverty to Digital Poverty

2.1 Introduction

This chapter reviews the main debate and findings on the intersection between traditional forms of poverty and the rise of digital technologies. It starts by introducing the concept of poverty, albeit briefly (for a more comprehensive debate around poverty see Blocker et al., 2023; Lister, 2021; Spicker, 2007), acknowledging its multidimensional nature and emphasizing the need to analyze and understand it beyond the mere lack of financial resources or household income. This chapter aims to identify potential new dimensions that should be included in this concept, fostering a more comprehensive approach to addressing poverty in the digital age. It delves into the transformative influence of digital technologies as they intertwine with the daily experiences of individuals, influencing the definition and manifestations of poverty. Our focus is directed toward key definitions discussed in the literature related to digital disadvantages, including digital inequalities, digital exclusion, digital capital, and the digital divide. We posit that the conventional understanding of poverty necessitates a revision to account for the pervasive influence of digital technologies. In so doing, we reflect on the emergence of a new social group: the digital underclass. This marginalized segment of the population faces the risk of being left behind, primarily due to the rapid technology advancements imposed by the pandemic and the subsequent economic

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