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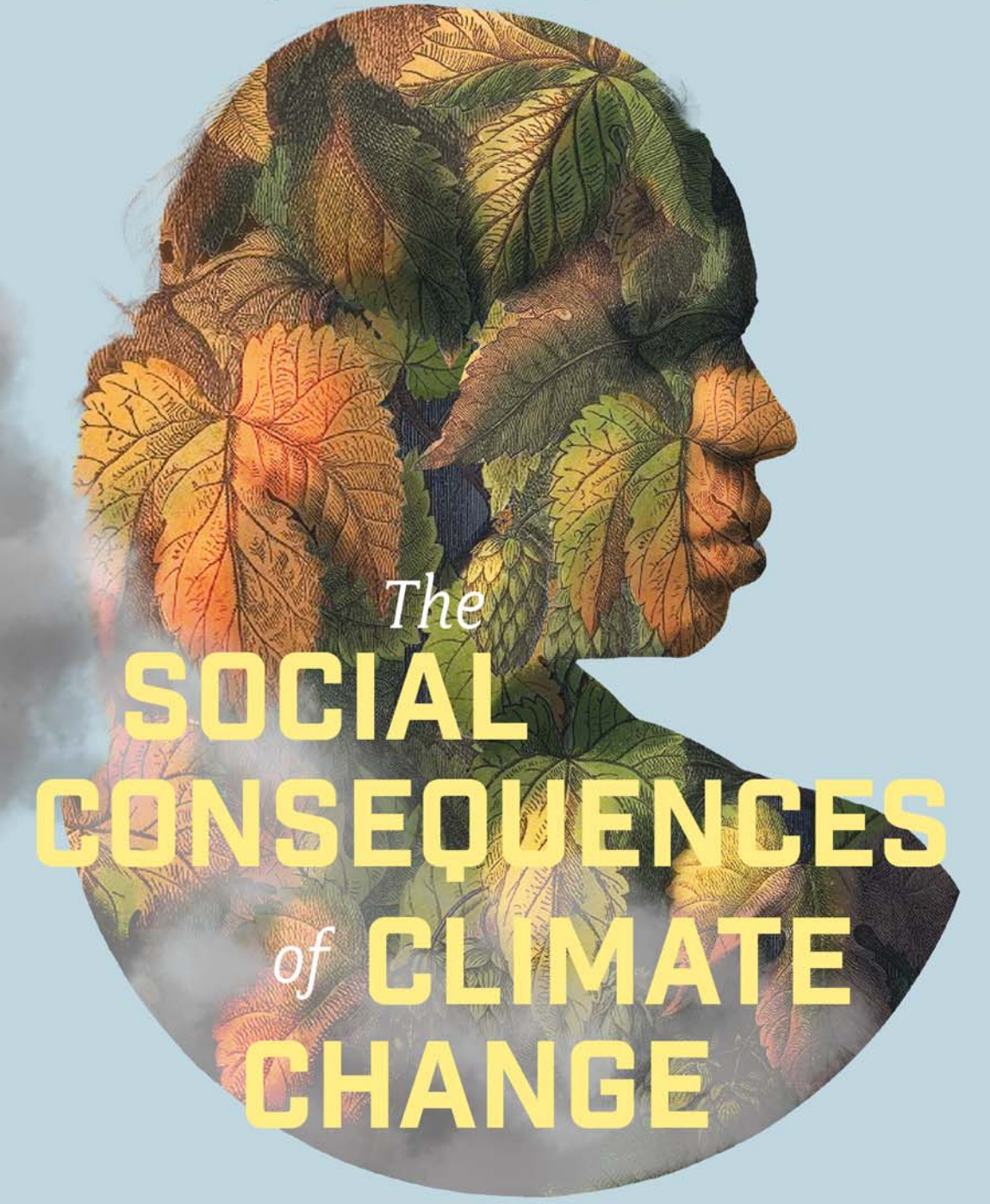

The SOCIAL CONSEQUENCES *of* CLIMATE CHANGE

DEBATES IN RESEARCH AND POLICY

The Social Consequences of Climate Change

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The Social Consequences of Climate Change: Debates in Research and Policy

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Emerald Publishing Limited
Emerald Publishing, Floor 5, Northspring, 21-23 Wellington Street, Leeds LS1 4DL

First edition 2025

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-83797-678-2 (Print)
ISBN: 978-1-83797-677-5 (Online)
ISBN: 978-1-83797-679-9 (Epub)

To the countless individuals and communities already experiencing the social consequences of climate change. Your resilience and strength inspire us...

This book is written for you and for a future where these struggles are lessened, where communities thrive, and where justice prevails.

Şuay Nilhan Açıkalın
Şefika Şule Erçetin

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Contents

About the Editors

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Preface

When we are approaching the end of the first quarter of the 21st century, humanity faced numerous challenges in global scale. Unfortunately, the world is under the shadow of the Russian–Ukrainian war and Palestine–Israeli conflict trying to adjust itself to untraditional challenges such as digital threats and climate change. I can imagine the feeling when you first read the word of climate change, still suspicious or somehow boring. Even some of the reader audience raised the question: Is climate change real?

This book focuses on the global, social, cultural, and economic problems of climate change and discusses the solutions and steps to be taken to address global climate change. The book contains 13 chapters dealing with different contexts of climate change. In the first chapter, Popovski examines the various impacts of climate change, including its effects on vulnerable communities, public health, migration patterns, economic disparities, and political stability. The chapter argues that combating climate change and addressing its social impacts should be a distinct purpose of the United Nations Organization, in addition to maintaining international peace and security, promoting economic and social development, and respecting and protecting human rights.

Upadhyay and Mehrotra analyze whether a human rights approach can be used to address climate change issues in India. They discuss the debate on the compatibility of aims in addressing climate change and realizing human rights, focusing on climate change issues in Uttarakhand, India. The text discusses the lack of effective adaptation policies and how this impacts the social and economic rights of those living in affected regions. The authors conclude that any strategy aimed at addressing climate change, whether through adaptation or mitigation, must consider the impact on individuals and communities, highlighting the significance of the human rights framework. Erçetin and Sarı present a metaphor to illustrate the dynamic interactions involved in climate change education. They focus on adapting Newton's cradle to the field of climate change education. Açıkalın provides a literature examination on how public policy can be more effective in combating climate change by applying complexity theory in two dimensions: reforming national policies and renewing cosmopolitanism on a local to global scale. By exposing the fragility of traditional models of governance of climate change, Brito set out on a bibliographic survey to enable a rediscovery of practices that promote responsible and socio-environmental justice at the international level. He focusses on conceptual and documentary definitions and presented cases illustrating the socio-environmental impacts of extreme weather

events that can lead to or exacerbate forced displacement for environmental reasons. Recognizing that education is one of the most powerful tools we have in combating climate change, Sönmez recommended the use of systems thinking in climate change education and education for sustainable development and proposed a framework in this context. Parallel with Sönmez, Batı discusses climate change, its potential problems, the effects of climate change in Turkey, policies implemented to address it, public awareness of climate change, and teacher education in the context of climate change in Turkey.

Jurgens discusses the "build, shop, work differently" approach and its potential to implement self-contained and sustainable neighborhoods. This can reduce unnecessary daily individual traffic and avoidable pollution. The author analyzes the use of technology and emphasizes the urgency of individual citizen responsibility. Erol and Kaplan examine the compliance of Istanbul Metropolitan Municipality's (IMM) strategic plans for the periods 2015–2019 and 2020–2024 with the 17 Global Development Goals of the United Nations. Their aim is to compare the compatibility of both plans, which were prepared with different political understandings, with the 17 Global Development Goals. The study aims to codify the aims and objectives of IMM's strategic plans in different periods and assess their compliance with the 17 Global Development Goals. Ecer and Güner analyze the measures taken by the EU to address environmental concerns and the impact of climate change within the framework of the EGD. They aimed to evaluate the EU's actions toward achieving a more sustainable environment, with a significant reduction in the negative effects of climate change and harmful gas emissions. Finally, Deniz, Ulutürk, and Başkara examine Turkey's efforts to address climate change both domestically and internationally. They analyze Turkey's climate change policies and legislative developments, with a focus on the government's agenda, legal and institutional frameworks. They also provide a comprehensive overview of Türkiye's political progress on climate change at both the national and international levels.

Editors
Şuay Nilhan Açıkalın and Şefika Şule Erçetin

Part 1

Old Topic With New Narratives

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Chapter 1

Air Pollution

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Abstract

This article examines the interconnections between climate change, air pollution, and their impacts on human health and the environment, with a focus on the Indonesian context. As one of the most biodiverse countries in the world, Indonesia faces significant challenges arising from climate change and air pollution, exacerbated by factors such as rapid urbanization, industrialization, and deforestation. The article discusses the various sources of air pollution in Indonesia, including vehicular emissions, industrial activities, biomass burning, and agricultural practices, and their contributions to greenhouse gas emissions. Furthermore, it explores the health implications of exposure to air pollutants, such as respiratory diseases, cardiovascular problems, and adverse birth outcomes, as well as the environmental consequences, including deforestation, loss of biodiversity, and disruptions to ecosystems. Finally, the article highlights the importance of policy interventions, technological innovations, and public awareness campaigns in mitigating air pollution and addressing the complex challenges posed by climate change in Indonesia.

Keywords: Climate change; air pollution; human health issues based on air pollution; environment; industrial activities

Air pollution is a lethal toll, and the evidence is indisputable. Air pollution is one of the greatest environmental risks to health, and it is a contamination of the indoor or outdoor environment by any chemical, physical, or biological agent that modifies the natural characteristics of the atmosphere. The repercussions of exposure to air pollution span a wide spectrum of health effects. These impacts can be delineated into immediate and enduring consequences. Short-term ramifications, which are temporary in nature, comprise ailments such as pneumonia or bronchitis. They also encompass discomfort, including irritation of the nasal

The Social Consequences of Climate Change, 3–10

doi:10.1108/978-1-83797-677-520241001

passages, throat, eyes, or skin. Additionally, air pollution can trigger symptoms such as headaches, dizziness, and queasiness. Malodorous emissions emanating from industrial facilities, waste disposal sites, or sewage systems are also classified as air pollution, albeit of a lesser magnitude. Long-term effects of air pollution can persist for extended periods, potentially even resulting in mortality. Chronic health conditions associated with air pollution encompass cardiovascular diseases, lung cancer, and respiratory disorders like emphysema. Furthermore, air pollution has the capacity to inflict enduring damage on the nervous system, brain, kidneys, liver, and other vital organs. Certain researchers posit that air pollutants may contribute to the occurrence of birth defects. Responses to various forms of air pollution vary among individuals, with young children and older adults, often possessing weaker immune systems, being particularly susceptible. Preexisting conditions such as asthma, cardiac ailments, and pulmonary diseases can be exacerbated by exposure to air pollution. Duration of exposure and the composition of pollutants are additional factors influencing the severity of health impacts (National Geographic, 2023).

Air pollution and climate change are intertwined phenomena, sharing common origins and interconnected impacts. The emissions of major pollutants not only degrade air quality but also play a significant role in altering the Earth's climate. Moreover, the sources of these pollutants often coincide with those of greenhouse gases, exacerbating the problem. WHO (2023a) stated that many of the drivers of air pollution (i.e. combustion of fossil fuels) are also sources of greenhouse gas emissions. Policies to reduce air pollution, therefore, offer a win-win strategy for both climate and health, lowering the burden of disease attributable to air pollution, as well as contributing to the near- and long-term mitigation of climate change. Air pollution is part of a web of global challenges, converging on health. The combustion of fossil fuels in transport, energy and industry sectors, the lack of clean, sustainable energy for households and health-care facilities, emissions from agriculture or mismanagement of waste and unsustainable land-use planning result in high levels of air pollution, intensifying the climate emergency and consequently ill health. It is a social, environmental and health crisis. The concept of global warming denotes a climatic shift characterized by elevated temperatures in both the atmosphere and oceans, influenced by both natural forces and human-generated air pollutants. This phenomenon is spurred by the amplification of greenhouse gas levels in the atmosphere, which, in turn, act as thermal insulators, ensnaring heat energy within the Earth's atmospheric envelope (National Geographic, 2023).

Ambient Air Pollution

Global data show that more than 90% of the population breathe air that exceeds WHO guideline limits and contains high levels of pollutants, with low- and middle-income countries suffering from the highest exposures. The issue of outdoor air pollution stands as a significant environmental and public health concern affecting populations across the globe, regardless of economic status. Both urban

and rural areas are impacted by ambient air pollution, which was estimated to result in approximately 4.2 million premature deaths worldwide in 2019 alone. This mortality rate is primarily linked to exposure to fine particulate matter (PM), contributing to the development of cardiovascular diseases, respiratory ailments, and various cancers. According to data from the World Health Organization (WHO), in 2019, around 37% of premature deaths attributable to outdoor air pollution were attributed to ischemic heart disease and stroke, while chronic obstructive pulmonary disease (COPD) and acute lower respiratory infections accounted for 18% and 23% of deaths, respectively. Additionally, respiratory tract cancers were responsible for 11% of these fatalities (WHO, 2022).

Residents of low- and middle-income nations bear a disproportionate share of the consequences of outdoor air pollution, with 89% of the estimated 4.2 million premature deaths occurring in these regions. The WHO South-East Asia and Western Pacific Regions face the heaviest burden. Recent assessments underscore the substantial impact of air pollution on cardiovascular health, highlighting its role in cardiovascular diseases and related fatalities. By mitigating air pollution levels, countries have the potential to alleviate the burden of various ailments, including stroke, heart disease, lung cancer, chronic respiratory diseases, and acute respiratory infections such as asthma. Enhancing air quality not only fosters improvements in public health but also facilitates socioeconomic development and promotes environmental well-being.

Pollutants

Air pollution encompasses a multitude of chemicals or particles suspended in the air, posing threats to the health of humans, animals, and plants, as well as causing harm to structures. Pollutants in the atmosphere manifest in various forms, including gases, solid particles, and liquid droplets. Pollution infiltrates the Earth's atmosphere through diverse pathways, with a significant portion stemming from human activities. Emissions from factories, vehicles, aircraft, and aerosol cans represent major anthropogenic sources of air pollution. Additionally, secondhand cigarette smoke is recognized as a significant contributor to air pollution. Conversely, certain types of air pollution, such as smoke from wildfires or ash from volcanic eruptions, occur naturally and are categorized as natural sources of pollution.

Air pollution tends to be particularly prevalent in densely populated urban areas, where emissions from numerous sources accumulate. In some instances, geographical features such as mountains or tall buildings can impede the dispersion of pollutants, resulting in the formation of a visible haze known as smog. Smog, characterized by a murky appearance, is a common occurrence in such locations. The term "smog" is derived from the combination of "smoke" and "fog," reflecting its composition and appearance (National Geographic, 2023).

There are several important air pollutants that impacted human health and environment. PM serves as a widely used proxy indicator for assessing air pollution levels. Extensive research has provided compelling evidence regarding

the adverse health effects linked to exposure to this pollutant. PM comprises various components, including sulfates, nitrates, ammonia, sodium chloride, black carbon, mineral dust, and water. These diverse constituents contribute to the overall composition of PM and play crucial roles in influencing air quality and its associated health impacts.

Beside particulate matter, there are also several gasses. Carbon monoxide (CO) is a toxic gas that is both colorless and odorless, making it imperceptible to human senses. It is generated through the incomplete combustion of carbon-based fuels like wood, gasoline, charcoal, natural gas, and kerosene. Ozone (O_3) at ground level, distinct from the protective ozone layer in the upper atmosphere, serves as a key component of photochemical smog. Ground-level ozone forms as a result of chemical reactions involving precursor gases under the influence of sunlight. Nitrogen dioxide (NO_2) is a gas commonly emitted during the combustion of fuels in transportation and industrial activities. Last but not least, Sulfur dioxide (SO_2) is a colorless gas with a sharp odor. It is produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores that contain sulfur (WHO, 2022).

The WHO Global air quality guidelines (AQG) serve as a comprehensive framework offering global recommendations on thresholds and limits for critical air pollutants associated with health risks. These guidelines are developed with rigorous methodology and transparency, relying on evidence-based decision-making processes. Alongside guideline values, the WHO Global AQG include interim targets aimed at facilitating a gradual transition from elevated to lower pollutant concentrations. Moreover, the guidelines provide qualitative guidance on best practices for managing specific types of PM, such as black carbon/elemental carbon, ultrafine particles, and particles originating from sand and dust storms. For these PM categories, where quantitative evidence is insufficient for establishing specific AQG levels, qualitative statements are offered to guide effective management strategies (WHO, 2022).

Household Air Pollution

In addition to ambient air pollution, household air pollution poses significant health risks, contributing to an estimated 3.2 million deaths annually as of 2020, with over 237,000 fatalities occurring among children under the age of 5. Approximately 2.3 billion individuals worldwide, roughly one-third of the global population, rely on open fires or inefficient stoves fueled by kerosene, biomass (including wood, animal dung, and crop waste), and coal for cooking purposes, thereby generating harmful household air pollution. Exposure to household air pollution is associated with the development of noncommunicable diseases such as stroke, ischemic heart disease, COPD, and lung cancer. Women and children, who often undertake household tasks such as cooking and gathering firewood, bear the brunt of the health burden stemming from the use of polluting fuels and technologies within households (WHO, 2023b).

Heating a household using substances like kerosene, wood, and coal can result in indoor air pollution. The emission of ash and smoke from these sources not only makes breathing challenging but also leaves residues that adhere to surfaces such as walls, food, and clothing. Moreover, naturally occurring radon gas, a carcinogenic substance, can accumulate within homes. Radon emanates from the Earth's surface and can pose significant health risks. However, affordable systems, when installed by professionals, can effectively mitigate radon levels. Certain construction materials, including insulation, can also pose health hazards to occupants. Additionally, inadequate ventilation within homes and individual rooms can promote the proliferation of toxic mold. Even a solitary colony of mold thriving in damp and cool areas of a house, such as between walls, can release spores into the air, leading to their dispersion throughout the entire household. Inhalation of these spores can result in adverse health effects (National Geographic, 2023).

Among the 3.2 million deaths attributed to household air pollution exposure, 32% are attributed to ischemic heart disease. Furthermore, data indicate that 12% of all deaths caused by ischemic heart disease, totaling over a million premature deaths annually, can be directly linked to exposure to household air pollution. After heart diseases, 23% of deaths are from stroke. Approximately 12% of all deaths due to stroke can be attributed to the daily exposure to household air pollution arising from using solid fuels and kerosene at home. In the context of lung diseases, among deaths associated with household air pollution, 21% are attributed to lower respiratory infections, 19% to COPD, and 6% to lung cancer. Exposure to household air pollution significantly increases the risk of childhood lower respiratory tract infections (LRI), nearly doubling the likelihood. Moreover, household air pollution accounts for 44% of all pneumonia deaths in children under the age of 5. Additionally, household air pollution poses a risk for acute lower respiratory infections in adults and contributes to 22% of all adult deaths resulting from pneumonia. Data also showed that 23% of all deaths from COPD in adults in low- and middle-income countries are due to exposure to household air pollution, and approximately 11% of lung cancer deaths in adults are attributable to exposure to carcinogens from household air pollution caused by using kerosene or solid fuels like wood, charcoal or coal for household energy needs (WHO, 2023b).

Effects to the Environment

Similar to humans, animals, and plants, entire ecosystems can suffer adverse effects from air pollution. Haze, akin to smog, constitutes a visible form of air pollution that obscures shapes and colors, even dampening sounds. Particles of air pollution eventually settle back onto the Earth's surface, directly contaminating bodies of water and soil. This contamination can prove detrimental, leading to crop failures or reduced yields and harming young trees and other vegetation. Sulfur dioxide and nitrogen oxide particles present in the air can combine with water and oxygen to form acid rain. Primarily emitted by coal-fired power plants

and motor vehicles, acid rain has far-reaching consequences. It alters soil composition, degrades water quality in rivers, lakes, and streams, damages crops, and accelerates the decay of buildings and monuments (National Geographic, 2023).

Carbon dioxide serves as a significant greenhouse gas, exerting a profound impact on global warming. It is released into the atmosphere primarily through the combustion of fossil fuels, including coal, gasoline, and natural gas. Modern society heavily relies on fossil fuels to power transportation, heat homes, and operate industrial facilities, consequently contributing to the emission of carbon dioxide. Additionally, other greenhouse gases emitted from both natural and human sources include methane, nitrous oxide, and fluorinated gases. Methane emissions are prevalent in coal plants and various agricultural processes. Nitrous oxide emissions stem from industrial operations, agricultural activities, and the combustion of fossil fuels in vehicles. Fluorinated gases, such as hydrofluorocarbons, are generated by industrial processes and are commonly used as alternatives to chlorofluorocarbons (CFCs), which have been phased out in many regions due to their role in depleting the ozone layer (National Geographic, 2023).

Globally, numerous countries have implemented measures to mitigate greenhouse gas emissions in order to address the challenges of global warming. One prominent example is the Kyoto Protocol, initially ratified in Kyoto, Japan, in 1997. This international agreement involves 183 countries committed to reducing their carbon dioxide emissions and collectively combating climate change.

Indonesia

On August 31, 2023, Jakarta – the capital city of Indonesia – residents woke up to a thick blanket of haze and news that the city was ranked the most polluted city in the world by Swiss technology company IQAir. Air pollution spikes in the months of June, July, and August are a regular feature of life in Jakarta, occurring annually with the onset of the dry season, following monsoonal patterns. This is when a lack of moisture in the atmosphere and other meteorological conditions combine with high emissions, mostly from the transport and industry sectors, to produce dangerously high levels of pollution. In 2023, El Niño and ever-rising human emissions have created an especially dangerous spike in pollution.

At least there are five things to know about air pollution in Jakarta, from its natural and manmade causes, to its health impacts, to what can be done now to reduce the number of bad air quality days and lessen the burden of pollution on Jakarta's more than 10 million residents. First one is weather patterns drive pollution spikes, secondly the El Niño that intensifies weather's impact on air pollution and thirdly models show dry season conditions and high emissions create pollution hot spots in Greater Jakarta and East Jawa. Fourthly, transportation is an important local source of Jakarta's pollution, added by fifthly that industry and power plants also contribute to poor air quality. It is clear that air pollution significantly impacts public health in Jakarta, and Jakarta can and should move on solutions for now and the future (WRI Indonesia, 2023).