
Routledge Handbook of Environment and Society in Asia

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East Asia and the environment

A thematic introduction

Paul G. Harris and Graeme Lang

For those of us who live in economically developed societies, it can be easy to forget that we are completely reliant on the natural environment for our prosperity, wellbeing, and survival. We rely on the environment for the most basic necessities of life, notably air, water, and food. We rely on the environment for material resources and energy that are used, whether directly or indirectly, to produce all of the material things that we take for granted. The environment and the resources that come from it are the raw materials for the majority of economic activity around the world. And, for most of us, the environment is important emotionally: with clean air and water, rich biodiversity, and natural vistas – and knowing that they are likely to thrive in the future – our sense of wellbeing is enhanced. That sense is undermined when air and water are polluted or when nature around us is degraded, overdeveloped, threatened or simply missing.

Because the resources and benefits from the environment come so easily to most of us – we seldom witness the direct environmental costs of resource extraction, for example – it is easy to forget that the state of the environment – whether it is able to supply human needs and more – is directly related to what all of us do. The environment seldom degrades by itself and resources do not disappear of their own accord. It is human and social behaviour that determines environmental health and, in turn, human and social vitality. Routinely, our behaviour is determined by the cultures and communities in which we live and by the institutions and government policies that largely shape our societies. In short, environment and society – broadly defined to include the actions and interactions of people and the associations and institutions they create – are unified, enormously so in cities and highly developed environments where the impacts of humanity are most obvious, but also in the remotest places on earth. Pollutants and ecological changes, often driven by demand for environmental resources in developed societies or by pollution coming from those places, have insinuated humanity into nature almost everywhere.

Nowhere is the connection between society and the environment more evident and potentially more harmful for the future of world than in Asia. (In this book we focus primarily on the societies and environments of East and Southeast Asia, although other parts of Asia are examined to a lesser extent.) It is, of course, true that Western societies have played at least as large a role in altering the natural environment, the effects of which will be felt for centuries,

with climate change being the most obvious and profound example of this. But, arguably, the future of the global environment will be determined in Asia, where countries with very large populations are developing rapidly, in the process adopting many of the environmentally harmful practices of the Western world. The most profound example of this is China. Alone it produces one-third of worldwide greenhouse gases causing global warming and other manifestations of climate change, and this pollution is on the increase. China's demand for natural resources is causing environmental destruction and severe threats to wildlife around the world. And China is using its newfound wealth to exploit other resources around the world to fuel its economy, with profound environmental consequences.

Meanwhile, the billions of people who live in China and other parts of Asia are already suffering the consequences of climate change and environmental pollution, even more severely than most people in the West. This means that the societies of Asia have a profound role not only in the future changes to the global environment, but also in the effects on individuals and societies of those changes and the individual and collective responses that will determine how much the environment declines further and whether it will be possible to cope with the changes that cannot be avoided. Asia is now at the epicentre of environmental change through both its causes and consequences. With this in mind, in this handbook we (the editors and contributors) explore the role of Asia, especially East and Southeast Asia, in shaping relationships between environment and society. We describe the human and policy contexts of environmental change across the region, in the process examining a wide range of environmental problems and their impacts. By describing and analyzing these relationships and contexts, we highlight key environmental problems, locate their causes and help to identify ways of possibly overcoming them in the future.

The handbook is organized into six additional parts. In Part II, we focus on several "human contexts" of environment and society in the region, specifically human rights, justice and literary imagination. Part III takes on questions of politics and policy, considering the roles of policy institutions, democratization, civil society, and corporations. In Part IV, we look at a variety of environmental issues, namely air pollution, solid waste, water and agriculture. Part V is dedicated to understanding the social implications of wilder places, in the process highlighting the region's use of fisheries, reef systems, forests, and animals. Part VI is dedicated to climate change, notably the drivers of the problem, its impacts and how societies are adapting to them, and what is being done to implement alternatives to fossil fuels. In Part VII, we (the editors) draw some conclusions about what the preceding chapters tell us about environment and society in Asia.

Human contexts

We begin our study of environment and society in Asia by looking at the basic unit of society: people. The way that people think, what they believe is just and how this affects behavior are central to the causes of pollution and resource use. The degree to which environment is considered something central to human life is vital for societal and policy change. This is evident in the extent to which the environment – particularly a healthy environment and access to its resources – is considered a right that should be enjoyed by individuals and communities. In Chapter 2, Anna Riddell makes the connections between the environment and human rights. Basing her analysis on the large body of environmental law, she examines the importance of simultaneously reducing the human impact on the environment and improving people's wellbeing. She argues that protecting the environment is one way to fulfill human rights, and indeed doing so may be essential to avoid violating the rights of people to life, health, and livelihoods. This is particularly

true in the case of vulnerable groups that are most directly dependent on a healthy environment, notably the world's poor and indigenous communities. At the same time, protecting human rights can bolster environmental protection. Riddell applies these ideas to East Asia, revealing the growing connections between environmental protection and human rights. She finds, however, that progress in the region has been slow. Legally binding provisions to codify human rights and environmental protection, and specifically their connections, are scarce in East Asia. Riddell's chapter suggests that this will have to change if environmental health and human wellbeing are not to be greatly undermined in coming decades.

Riddell's chapter is oriented toward regional relationships between environment and human rights from the perspective of legal justice. In Chapter 3, Piya Pangspa turns our attention to environmental justice *per se*. Drawing on case studies in Southeast Asia, especially from Cambodia and Thailand, she explores the different ways in which environmental justice is being fostered by civil society. There is now an understanding among many environmental scholars and even policymakers that social and environmental justice are closely connected. Indeed, new civil society organizations and movements have arisen as a consequence of the injustices that come from environmental pollution and appropriation of local natural resources. This highlights the interdependency of the natural environment and society as well as how this interdependency can be affected by policy decisions. But perceptions of environmental justice may vary from place to place. For example, they are likely to be contingent on local ethical traditions. As Pangspa notes, in Southeast Asia, discourses about environmental justice are largely premised on Buddhist conceptions of virtue and specifically what they say about the human relationship with the environment. By comparing activist civil society groups concerned about industrial pollution and illegal logging, Pangspa highlights the connection between social and environmental justice in a rapidly developing region. She shows how these groups increasingly influence environmental policies, although the extent of this influence depends greatly on the willingness of policymakers in the region to let them have it. One of the important capabilities of these organizations is to bring local knowledge into policy processes, not least because this knowledge sometimes contradicts the views of outside experts. This knowledge is coupled with distinctive local traditions and religions that influence views on environmental justice. Traditional respect for nature is often at odds with policymakers' efforts to promote economic growth, thus requiring a better balance between nature and development to achieve environmental justice.

Another human context for looking at the environment can be found in literature, particularly local kinds. In Chapter 4, Karen L. Thornber describes some of the ways in which local literature reflects environmental thought in the region, notably its ambiguities. East Asian literature is often perceived, particularly in the West, as celebrating the natural world. But Thornber points out that it is not this simple; local literature often portrays the way that people and societies have done great harm to the environment. Having said this, she believes that a "planetary consciousness" permeates much of the environmental literature from the region. Very importantly, however, she notes that local authors are not duped into accepting the perception that East Asia is in love with nature. Quite the opposite: they have often challenged official discourse and highlighted environmental challenges facing their societies, the region, and the world. Her objective is to analyze how literature from the region addresses the broader causes and consequences of these challenges. Different writers do this in different ways, through what Thornber calls "ecocamiguity." Writers use a variety of genres, styles, and approaches, but they share many of the same concerns about the human–environment relationship. Thornber's chapter explores the variety of East Asian environmental literature by analyzing a number of the most prominent authors of "ecodegradation," particularly from China, Japan, Korea, Taiwan, and Vietnam. She shows that examining this wide-ranging literature reveals the varied ways in which

East Asian societies have dealt with environmental and pollution issues in the contexts of their own cultures and histories. She also points to how these interpretations, and the manner in which they are expressed through literature, send important messages about environment and society across the region and indeed globally. She shows that local literatures can often negotiate ecological issues in very different ways. This may be the most important message from her chapter – that literature, and perhaps most importantly that from other places, can change the way we think about the environment and ultimately how we behave in our relationships to it.

Politics and policy

Ultimately human–environment contexts develop into, and in turn derive from, politics and the policies of governments. Indeed, it is here where much of the scholarly work on environment and society in Asia is being directed. In Chapter 5, Sangbum Shin looks at environmental policy institutions in comparative perspective. His chapter provides an overview of policymaking processes in East Asian countries, examining how policy institutions have responded to major environmental problems, including climate change. He looks at the roles played by government agencies, legislation and policies, in the process exposing some of the channels by which nongovernmental actors have roles to play as well. In particular, Shin is interested to compare environmental institutions with an eye toward revealing some common patterns across the region. In doing this he tries to identify the extent to which these patterns correlate with economic development. Overall, Shin finds that East Asian governments' environmental institutions are very much top-down entities, with this being most true in Northeast Asia and somewhat less so in Southeast Asia. Generally speaking, government agencies are by far the most important and powerful environmental policy actors across the region, although some nongovernmental actors have significant influence in Southeast Asian contexts and civil society is becoming more environmentally engaged across the whole region. Central governments tend to be more powerful than sub-national ones, undermining the ability of regional institutions and actors to play a greater role in crafting and implementing environmental policies. Shin points out that regional cooperation among countries to address shared environmental challenges is much more active in Southeast Asia, despite some serious issues requiring cooperation across the whole of East Asia. He shows that both domestic and international factors influence environmental policy across the region. Shin argues that more effective policies for addressing environmental problems in East Asia will require institutional reform. In contrast to existing top-down practices, "environmental decentralization" will be needed if countries of the region are to address successfully climate change and other environmental challenges. In short, more cooperation and participation by local actors, both governmental and nongovernmental, from across the region can help to make environmental policy more effective. This would not only have environmental impacts within the region, but might also have significance as the region's role in global environmental problems, not least climate change, grows in importance.

In Chapter 6, Mary Alice Haddad turns more specifically to the politics that underlie environmental policy. As Haddad points out, most countries of the region have experienced simultaneous and interconnected economic development and environmental crises. Sometimes this has resulted in civil unrest in response to environmental pollution and other ecological problems. Haddad argues that the first instinct of regional governments is to suppress any political unrest that might emerge from developmental pressures on the environment. While some of this still occurs, particularly in China, generally speaking in the countries analyzed by Haddad – China, Japan, South Korea, and Taiwan – governments reversed course and have, in recent decades, arguably embraced environmental protection and "green growth." This is somewhat

surprising considering the pro-business inclination of these countries' governments and the general weakness of environmental ministries and indeed environmental nongovernmental organizations. The move toward something akin to pro-environment policies is happening across the region despite the significant variety in political regimes. A central question asked by Haddad is whether and how democracy – and democratization – has shaped environmental politics in East Asia. She provides an overview of environmental politics in the four countries, explains the process of political development in each, and attempts to make comparisons. Importantly and significantly, Haddad shows how environmental protection was one of the first issues – indeed, *the* first in most cases – around which civil society activism developed in all four of these countries. She determines that the type of political regime – the amount of democracy in each country – was less important in explaining this than was the timing of the different environmental movements with respect to domestic and international political opportunities. Haddad concludes that democracy matters for environmental movements, but more important for the region, and possibly for other regions, is how well environmental groups are able to time their actions in the process of ongoing political development.

Building on Haddad's analysis, in Chapter 7, Fengshi Wu and Bo Wen examine nongovernmental movements and environmental protests in East Asia, focusing particularly on China, Japan, and South Korea. Wu and Wen argue that since the mid-twentieth century environmental activism stoked by pollution has greatly influenced wider public awareness of the environment and improved environmental governance. Unlike in the West, however, where such developments were largely a function of economic development, in East Asia they have been more closely tied to political development and specifically to the process of democratization. This helps to explain why environmental governance across the three countries examined in the chapter is at different stages, with China lagging Japan and South Korea. Wu and Wen demonstrate that the differences in environmental activism in these countries are generally explained by political culture and each country's progress toward democracy. For example, environmental nongovernmental organizations have had a bigger role in national politics in South Korea than in Japan, despite the latter's longer history of environmentalism. Due to the former country's more radical political transformation in the 1980s, such organizations had a role in creating a democratic and participatory political culture. At the other end of the spectrum, in China the impact of such organizations has been constrained by an authoritarian regime that limits their scope of action and works hard to prevent them from influencing the wider political culture. Wu and Wen also examine how different kinds of environmental activism can result in different environmental policy responses across the country cases. They assess the impacts of environmental activism across three dimensions: public environmental awareness, policy responses (and their actual environmental effects), and long-term institutional reform. As one would expect, Wu and Wen found major differences across the three countries. In China, nongovernmental organizations are not as closely tied to victims of pollution as in the other countries, whereas in Japan and South Korea they have merged with resistance movements. The consequence is that organizations in these last two countries, especially South Korea, have had bigger impacts on raising public awareness and fostering effective environmental policies by government.

A complete picture of environmental politics and policy anywhere in the world must include the role played by corporations and wider industrial interests. In Chapter 8, Phillip Stalley fills in this part of our picture by examining the responses and responsibilities of businesses to environmental challenges in East Asia. As Stalley points out, economic success in the region has come at great environmental cost, with countries across the region becoming some of the largest sources of pollution worldwide. The environment and people have suffered as a

consequence. As environmental challenges have increased across East Asia, governments of the region have slowly moved toward striking a balance between economic growth and environmental protection, at least in principle. Stalley shows that a major aspect of doing this involves improving the environmental behaviors of corporations. Strategies have ranged from stronger environmental regulations, market-oriented policies and raising awareness among consumers through increasing environmental disclosure and implementing certification schemes. This attempt to promote "green industry" in the East Asian "factory to the world" has, according to Stalley, generally resulted in more environmental responsibility among the region's corporations. This change is explained by more stringent environmental governance, pressure from publics and the forces of economic globalization. Having said this, the extent to which this has happened varies greatly among countries. Stalley identifies the reasons for the differences, such as inadequate environmental governance – a failure of many governments to implement existing environmental regulations and standards – due to lack of government capacity in some cases or a lack of political will in others. Even where progress seems to be underway, Stalley cautions us to question the reliability of statistics and notes that there may be much by way of industrial behavior that is hidden from view, particularly among the millions of small and medium-sized enterprises spread across the region.

Air, land and water

In Chapters 9 and 10 we look at specific environmental threats in East Asia, starting with air pollution. Air pollution is common across much of East Asia, particularly in its urban areas and industrial zones. This pollution is on the rise, with severe consequences for human and environmental health locally, and growing consequences for those living farther afield as it contributes to acid rain continents away and climate change globally. In Chapter 9, Maria Francesch-Huidobro introduces the problem of air pollution, describing how it is measured before undertaking a case study of two major regional cities – Hong Kong and Singapore – to illustrate the role that institutions play in controlling it. As Francesch-Huidobro notes, stemming the decline in air quality in Asian cities requires addressing a number of issues at the same time, including economic growth, population pressures, demand for transport, and increasing consumption of energy. At least in the two cities that Francesch-Huidobro's chapter examines in detail, air pollution policies are largely influenced by two interlocked factors, namely the balance between governmental and nongovernmental actors' involvement in environmental policymaking, on one hand, and the "ecology of public administration" that determines how environmental issues are governed, on the other. The chapter shows the connections between these factors, especially the ways in which governmental and nongovernmental actors "network" to develop policies for improving air quality. Francesch-Huidobro's case studies reveal that the government of Singapore has adopted orderly forms of collaboration with nongovernmental organizations, in the process co-opting them to a substantial degree without conceding the legitimacy of the state to dictate policy, whereas in Hong Kong policy has been "disarticulated," with much less effective action by the government to learn from the input of nongovernmental actors. Indeed, in the latter city, environmental organizations are considered by government to be hindrances to its overarching goal of economic development, and there is distrust of independent organizations (much like in China more generally). Nevertheless, because it lacks an electoral mandate, the Hong Kong government must at least be seen to be entertaining the ideas of outside groups even if there is very limited evidence that they have significantly influenced policy. For better or worse, this is not an unusual response in East Asian efforts to manage air pollution: governments remain central, with environmental advocates having limited input to policy, and then normally only when governments are already receptive to their ideas and expertise.

In Chapter 10, Angel Hsu builds on the preceding chapter by looking at how the burgeoning problem of smog is being addressed in China, and what this implies for the rest of East Asia. Hsu's chapter describes the causes of air pollution in China, the composition of that pollution and its consequences for the country and its neighbors. It would be an understatement to say that this is an environmental challenge of the greatest magnitude; hundreds of millions of people are affected in China alone, with many millions of them suffering – and more than a few dying early – as a consequence. Indeed, air pollution in most Chinese cities is so bad that the term "air quality" seems inappropriate. Many people in urban and industrial areas routinely wear face masks as they try to avoid inhaling pollutants, and affluent people are doing what they can to avoid the problem, for example by buying air purifiers for their homes or even emigrating to rural areas to escape the problem altogether. Hsu shows that China's smog is an extremely complex environmental problem, involving a wide range of economic and policy actors. Like many other environmental problems, smog is directly associated with economic activity; more economic activity – in short, more burning of polluting fuels and use of polluting chemicals – results in reduced air quality. Consequently, as the chapter reveals, environmental governance to address smog effectively in China requires the involvement of a full range of governmental, industrial and civil society actors, ideally working in concert. Much as with responses to other environmental problems across the region, this is easier said than done, but it is possible. For example, China's urban smog became widely known internationally shortly before the 2008 summer Olympics, held in Beijing. The Chinese government was able to greatly improve air quality in the city during the games, thereby demonstrating the capacity of government to act if needed. Alas, the city's smog returned soon after the Olympics ended, rising to even higher levels than before the games, thus showing what happens when government priorities change. China's air pollution is not just a domestic problem for the Chinese. Much of it is taken by winds to other countries near and far, in turn affecting their air quality. What is more, the Chinese experience with governing air pollution alongside fast paced economic growth offers lessons for other communities in the region undergoing rapid development. As such, smog in China is a classic case of environment and society in Asia, writ large.

Moving on to other aspects of environment and society in Asia, in Chapter 11 Dickella G.J. Premakumara and Toshizo Maeda examine a growing ecological threat: municipal solid waste. This form of waste is one of the most urgent environmental and public health concerns in the region, particularly in urban centers. Population growth, economic development, material consumption, and expansion of cities have resulted in massive increases in the volumes of municipal solid waste in most of East and Southeast Asia. Premakumara and Maeda review this trend, compare a number of cases and use them to propose solutions through regional collective action. While unsustainable production and consumption practices, which do far too little so far to "reduce, reuse, and recycle," are leading causes of municipal waste in the region, Premakumara and Maeda argue that one leading cause of the problem is the rapid rise and expansion of a new "consumer class" whose members want to emulate the high consumption – and thus highly polluting and material-intensive lifestyles – of the world's most economically developed societies, particularly in the West. At the same time, people and industries across the region have greatly increased their demand for natural resources for improved living standards and for industry, the byproduct of which is a much higher level of solid waste byproduct. Premakumara and Maeda point out that systems for managing municipal solid waste face many problems in addition to growing volumes of waste material, including new types of waste, some of it quite hazardous, difficulties in collecting it, and finding suitable locations in which to dispose of it, inadequate regulations, perennial lack of funding, and low public awareness, among other obstacles. Nevertheless, their chapter shows that good practice can take root, as evidenced by

policies implemented in urban areas of Japan, Singapore, and South Korea. Less economically developed East Asian societies, including China and most countries of Southeast Asia, have made some progress, too. They can make more if their governments (and citizens) give a higher priority to dealing with solid waste. Importantly, Premakumara and Maeda find that effective policies and measures are most likely to arise from localized solutions supported by help from outside, whether in the form of technical expertise or investment, which builds local capacity and supports solutions that are appropriate for local circumstances.

Like air, water is essential to life. In Chapters 12 and 13 we examine two prominent aspects of the issue in Asia, first by focusing on its scarcity and pollution, and second by looking at how it is controlled via dams. In Chapter 12, M. Dinesh Kumar, P.K. Viswanathan and Nitin Bassi describe and analyze the problems and challenges of water scarcity and pollution in South and Southeast Asia. South Asia is one of the world's regions that often lack water, making irrigation systems essential to its management. Unfortunately, water scarcity in this sub-region is experienced among some of the world's poorest populations. In South Asia, scarcities are exacerbated by shortages of surface water, meaning that much of what is available is extracted from the ground, thereby contributing to long-term shortages for people and agricultural users. Scarcity, in turn, aggravates poverty because people must often pay much of their limited income to those who control wells. What is more, as countries of the region become more urbanized, demands on water systems have increased in terms of both supplies and pollution. In most of the countries of Southeast Asia, water is much more abundant. Nevertheless, much as in South Asia, problems of supply and pollution also exist due to weak regulatory and management institutions. In both sub-regions, availability of water is a function of a multiple socioeconomic factors, including demand by households and industry, dependency of society on agriculture, the degree of urbanization, economic and political structures and of course government capacity. Yet there are also significant differences in the sources of water scarcity between South and Southeast Asia. For example, South Asia has experienced harmful diversions of water from lakes and rivers, creating scarcities, while Southeast Asia is experiencing increasing pollution of ample supplies and sometimes annual problems arising from natural disasters. Both regions are suffering the water-related effects of climate change, not least growing unpredictability of natural water cycles and weather events. With respect to managing common water supplies, specifically those in shared riparian systems, Southeast Asia – with its weak-but-useful Mekong River Commission – offers lessons to countries of South Asia, where cross-border cooperation is less formalized. At the same time, Southeast Asia can learn from experiences in South Asia. For example, poor countries of the former can avoid the uncontrolled exploitation of water and resulting impacts on rural economies that have been experienced in the latter.

In Chapter 13, Darrin Magee examines some of these issues in greater detail by exploring the role of large dams, thousands of which have been constructed across Asia in the last half-century. As he shows, dams can help to solve water problems by controlling and managing supplies, but they can also create problems of their own. Indeed, dams have sometimes resulted in unrest that has contributed to political change. By definition, dams have significant impacts on the environment by altering river courses, affecting water quality and sometimes eliminating seasonal variations in water flow that societies have come to rely on over centuries. Dam construction and flooding of reservoirs can displace entire communities, even cities. In his chapter, Magee looks at these issues in some detail, showcasing the scale of dam building in East Asia and the impacts this has had on social and ecological systems. He finds a common dominant narrative of dams across the region. This narrative entails strong governments working with international development banks and well-connected local financiers to undertake major dam projects officially intended to control floods, irrigate agricultural areas, generate electricity, and

provide drinking water. Many of these benefits are realized, at least for some of the population. However, there are also many officially unintended consequences, including disrupted ecosystems, socioeconomic impacts for displaced communities and, paradoxically, flooding, among many other adverse effects. The most affected communities are often those that are already marginalized economically, politically, and ethnically. Consequently, those communities frequently have little say in deciding whether to build dams, where to locate them, and how to compensate those most affected. When compensation is paid, it is almost never considered adequate by recipients, with those being resettled routinely showing declines in wellbeing as a consequence. Significantly, Magee points out that these harms cannot be easily quantified, whereas the benefits that dams can bring are easier to measure in terms of kilowatts of electricity generated, hectares of land irrigated and so forth. This is worth bearing in mind as dams become more attractive as sources of "green" renewable energy to reduce carbon emissions across the region.

Dams are often justified by their potential to enhance agriculture and food production. This is understandable given the importance of these issues for Asia, where they are vital to the livelihoods and survival of billions of people. In Chapter 14, Amy Zader examines food and agriculture. She is especially interested to highlight the implications of security, globalization, and technology in this context. Zader points out that most of East Asia is shifting, or has already shifted, from agrarian to industrial societies, with major consequences for the production and consumption of food. What is more, agriculture is no longer a local pursuit in the region. With globalization, food is being exported and imported in enormous quantities, and multinational corporations now have major operations in the region. As societies in Asia develop, diets are changing, becoming more like those in the West. Drawing lessons from across the region, albeit focusing mostly on China, South Korea, Taiwan, and Japan, Zader explores the options for making agriculture more sustainable in the future. As she points out, food security has been a central concern of governments, arguably more so than in many Western countries. As a consequence, governments of East Asia often have a direct role in agriculture to avoid shortages that might undermine national security. But globalization has made it more difficult for governments to control what happens, even as technology allows increased yields and trade makes it possible to both export and import foodstuffs. Zader argues that agriculture in East Asia faces many challenges. Among these are the need to make food production more ecologically sustainable, coping with burgeoning demands for food among urban residents, improving the livelihoods of subsistence farmers, managing the introduction of new agricultural technologies, and coping with the impacts of climate change. One potentially promising response is the rapid growth in organic agriculture, although it is being held back by pressures on farmers to use chemicals to push up yields. In the longer term, climate change poses the greatest threat to agriculture in the region, in part due to the likelihood that water for irrigation will become scarce. Ultimately, it may be how governments and societies plan for and adapt to climate change that most determines the security of regional agriculture in future decades.

Fisheries, forests and wildlife

Land-based agriculture is the largest source of food across Asia. But food is also taken from the sea, making the marine environment of East Asia a vital resource for all local communities. In Chapter 15, Tabitha Grace Mallory begins three chapters devoted to marine resources by exploring the political, economic and security challenges of fisheries in East Asia. This region's marine fisheries are the most productive anywhere, making them vital to local food security and economic development, and they are significant to local cultures. People in Asia are more reliant on fish as a source of protein than anywhere else, with the increase in fish consumption

resources have slowed this transformation. The authors argue that forest governance in the region remains poor, but they see some reasons for hoping that it will become more effective with time.

One reason that preserving and protecting forests is so important is because they are the homes of much of Asia's wildlife. Destroying forests destroys biodiversity; preserving forests can preserve biodiversity. A question then becomes whether and how that biodiversity is used by society. In Chapter 19, Kyle Swan and Kristen Conrad look at this relationship. They focus on the ways by which cultural and environmental values affect the consumption of wildlife in China and some Southeast Asian countries sharing similar values. Swan and Conrad begin their chapter by pointing out fundamental ways of thinking about the environment generally and wildlife in particular. Broadly speaking, several Western conceptions suggest that wildlife deserves protection for a variety of reasons; human ends can and should be compromised if that is necessary to preserve environmental goods. Swan and Conrad point out that this "preservationist" view conflicts with traditions common in Chinese-influenced cultures, which put people's needs first, where the consumption of wildlife is seen as fundamental to traditional medicine and religion. If nothing else, this conflict in perceptions about the how to treat wildlife can contribute to difficulties in managing or protecting it. For example, if regulations for wildlife protection fail to consider the values of regional cultures, they may face opposition from those who consume the wildlife. In the countries examined in this chapter – Cambodia, China, Laos, and Vietnam – attitudes about the consumption of wildlife are much more permissive than in the West, with many species being important for cultural rituals and practices. Indeed, consumption of wildlife can give status to people in these societies, which helps to explain why they – and China in particular – are driving much of the global demand for wildlife. National and international policies and programs to regulate the trade in wildlife and its consumption need to reflect such values in their strategies. That is, if they are to be effective, solutions to environmental and related issues in the region will be more likely to succeed if they are compatible with local cultural beliefs. Indeed, Swan and Conrad argue that many of the policies that environmentalists have recommended to protect wildlife are counterproductive because they fail to do this. Preservationist approaches to environmental protection in the region, including with respect to the consumption of wildlife, must attempt to fit local cultures. Swan and Conrad thus conclude that approaches that build on local culture are more likely to be successful.

Energy and climate change

Beginning with Chapter 20, we undertake an in-depth analysis of climate change and society in East Asia, examining its causes and impacts from a regional perspective, and exploring some options for mitigating it. In Chapter 20, Bo Miao describes the drivers of climate change in East Asia and the energy dilemma that is presented by it. Miao focuses especially on China – quite justifiably given its enormous contribution to this problem – comparing its experience with that of two neighboring countries, Japan and South Korea. Miao begins by pointing out that the most important driver of climate change in East Asia is the region's enormous consumption of fossil fuels, especially the burning of coal in China. Indeed, one consequence of China's growing use of fossil fuels is its status as the largest national source of greenhouse gases causing climate change. Its per capita emissions are below those of many Western countries, but it is catching up quickly. Chinese officials are aware of this, and the country arguably has the most ambitious program for reducing reliance on coal, in particular. This includes heavy investments in alternative sources of energy, such as wind farms, hydroelectric dams, and nuclear power stations. However, all of these efforts have not kept pace with increasing

demands for inexpensive energy – i.e., coal – as China's economy expands. In other words, even while energy efficiency improves, total emissions of greenhouse gases are increasing. Nearby in Japan and South Korea, national contributions to climate change are also very significant, but the sources of their emissions differ from China. In particular, these countries are less dependent on coal; they rely instead on somewhat less polluting fossil fuels, namely oil and natural gas, which meet about half their energy needs. Nuclear power has until recently also been a major source of energy in Japan, although this may change if reactors shut down after the Fukushima Daichi nuclear accident are not restarted. Japan and South Korea are planning to move more toward alternative forms of energy, but their plans may not be as ambitious as those of China. All three of these countries have committed to limiting – and in the case of Japan, reducing – their greenhouse gas emissions, but overall this will be difficult because the region will remain largely reliant on coal and other fossil fuels for the bulk of energy well into the future. (In Chapter 23, we look at some of the pathways for increasing the use of renewable, low-carbon forms of energy.)

Asian societies should have a great incentive to reduce reliance on coal and other fossil fuels that contribute to climate change. This is because all of them are vulnerable to its effects, often in very serious ways. Benjamin K. Sovacool looks at some of these vulnerabilities in Chapter 21, in the process considering how countries in the Asia-Pacific region can adapt to the impacts of climate change that cannot be avoided. Asia's vulnerabilities to climate change are numerous, not least from increased and more severe flooding, storms and droughts, and (for coastal countries) sea level rise. These impacts in turn challenge the ability of Asian societies to ensure food security, protect infrastructure and prevent loss of life from natural disasters. It is worth bearing in mind that responding to these vulnerabilities will be very costly. Many countries of the region are already poor, meaning that climate change will inevitably divert resources away from economic development. One of Sovacool's objectives is to examine how these vulnerabilities can be lessened through adaptation measures. The Asia-Pacific region may be the region of the world that is most at risk to the impacts of climate change, in part because so many countries there are relatively poor and still developing economically, but also due to population density, geographic vulnerability, reliance on local biodiversity, and the like. While some countries are more vulnerable than others, Sovacool observes that none of them is immune. Efforts by countries of the region to prepare for and adapt to climate change vary in their approaches, such as planting mangrove trees in Bangladesh, experimenting with climate-hardy crops in Cambodia, and hardening coastal infrastructure in the region's island countries. The key to success, according to Sovacool, is combining infrastructure, organization, and social adaptation to strengthen communities and organizations across the region. Importantly, he finds that success requires that improved local knowledge and assets must be combined with capacity building and improvements in governance. Some forms of adaptation are unique to local areas while others can be useful in many countries. It is likely that small-scale projects that get local communities directly involved – arguably those that are more democratic – will be more successful in fostering genuine adaptation to climate change in countries of the Asia-Pacific region.

As Sovacool notes, one of the most significant impacts of climate change in the region is from flooding. In Chapter 22, Faith K.S. Chan, Daniel A. Friess, James P. Terry and Gordon Mitchell look in detail at the challenges of flooding in coastal East Asia. Over half of Asia's people live in coastal areas. Hundreds of millions of people live in especially vulnerable delta regions and coastal cities where populations are increasing as people move in search of employment and services. These people will be extremely vulnerable to the effects of sea level rise, with livelihoods affected by impacts on fisheries and agriculture, and lives threatened during storms. Arguably, these people are suffering the effects of climate change already, with many

coastal areas across Asia being affected by uncommonly severe floods and storms. In their chapter, Chan and colleagues look at these and other vulnerabilities to flooding in East Asia, using China's Pearl River Delta as their case study. They assess coastal vulnerability to flooding and examine whether and how strategies for adaptation to climate change, and specifically flood risk management, can be enhanced. East Asia's delta cities are worth studying both for the lessons they can provide but also because they are now hubs of economic activity that is important for other world regions. This is especially true of the Pearl River Delta, where the growth in both economic output and population has been phenomenal in recent decades, and where flooding has been a recurring problem. Climate change increases the chances of severe rainstorms, which will flood the delta's rivers, and storm surges – which often come alongside heavy rain – that will inundate coastal environments. Unfortunately, the same can also be said of other East Asian deltas, making the experience of the Pearl River Delta worth understanding in detail. Chan and colleagues observe that East Asia's coastal regions lack holistic strategies for flood risk management and more general adaptation to climate change. The region's governments are largely devoted to piecemeal engineering solutions, such as flood protection barriers, which are costly and which the authors of this chapter believe are less effective than land use planning, awareness building and public engagement (like that practiced in some European countries). They also note a lack of collaboration and cooperation to manage climate-related flood risks across East Asia. This will have to change if the region's growing population is not to suffer unavoidably.

Asian societies do not only suffer from climate change; they also contribute to it. The extent to which the region can or cannot limit its use of fossil fuels will have both regional and global impacts. With this in mind, in Chapter 23 Christopher M. Dent details renewable energy strategies and policies in East Asia, focusing on efforts to foster and implement low carbon economic development. According to Dent, the challenge of climate change has combined with that of energy (in)security to compel East Asian governments to develop renewable energy policies and to support "green energy" industries. East Asian demand for energy will almost certainly increase for some time as the region's economies expand. Efforts by local governments to increase the availability and use of renewable energy reflect this likelihood. Indeed, renewable energy has become a defining attribute of the region's industrial policies, part of what Dent calls their "new developmentalism." His aim is to understand the region's actual prospects for a major transition to "low carbon" development, something that is not guaranteed given the region's current reliance on fossil fuels, especially coal. Dent's chapter looks at the evolution of industrial policies and related state capacity, thereby identifying the importance of renewable energy programs and strategies in the region. He draws on case studies from the region, especially China and Japan, to determine how and why specific renewable energy policies have become prominent. Ultimately, his analysis helps us to understand the extent to which these policies are becoming intrinsic aspects of a new development paradigm that will enable the region to become much less reliant on carbon-based fuels. He believes that renewable energy will take hold, but the ways that this will happen will vary from one country to another, even as most countries of the region continue to remain reliant on forms of energy and development that harm the environment.

The transition to truly low-carbon economies will reduce the environmental impact of development, but it will be a long and slow process as societies become more aware of alternatives. Even as low-carbon energy development increases pace in East Asia, economic development will continue to trump environmental protection. In Chapter 24, we explore the notion of how to fuel Asian economies with less carbon-intensive fuels. Sarah Van Eynde, Bettina Bluemling and Hans Bruyninckx do this through a case study of low-carbon development in China. China

is a vital case for the region and the world because it has accounted for about three-quarters of the growth in world energy consumption in recent years. Other Asian economies have large and growing appetites for energy, and combined they disproportionately explain why global carbon dioxide emissions continue to increase despite the slowdown in the global economy and the threat of climate change. As observed in the preceding chapter, one response to these trends has been a growing interest in low-carbon development – improving energy efficiency and reducing the amount of fossil fuels necessary to support economic growth. It is important to note that this does not necessarily mean that the upward trend in carbon emissions will be reversed anytime soon. Indeed, one might argue that the continued focus on rapid economic growth dooms the region (and the world) to growing greenhouse gas emissions from carbon for at least some decades. In short, low-carbon development in practice is likely to slow the increase in greenhouse gas emissions, which is welcome, but it will hardly solve the problem of climate-changing pollution. This may be explained by the manner in which low-carbon development is interpreted and implemented in the region. Chapter 24 looks at this in some detail while also describing the emergence, scope, and purpose of low-carbon development.

As noted in Chapter 24, one of the strategies for simultaneously achieving greater energy security and reducing carbon emissions is nuclear power. Japan has until recently relied quite heavily on this form of energy, and other countries of the region have been developing it, with China planning to build many new plants in coming years. In Chapter 25, Rajesh Basrur, Youngho Chang and Swee Lean Collin Koh look at this phenomenon in the context of the Fukushima Daiichi nuclear accident in Japan. How has this event affected what looked to be – and might yet be – a nuclear renaissance in Asia? As Basrur, Chang and Koh point out, the accident has reinforced the thinking of those who were already critical of nuclear power, and it increased the burden for those who have been trying to promote it as an alternative to fossil fuels and almost certainly means that additional safeguards will be demanded of future plants, increasing the costs associated with building and operating them. The accident pointed to flaws in nuclear risk management, plant construction and operation, and political leadership. Nevertheless, it looks likely that nuclear power still has a future in Asia due to the growing demand for energy. Fukushima may turn out to be a temporary setback in the region, at least outside Japan. (Its greater impact may be outside the region. For example, Germany's plans to shut down nuclear power stations were probably accelerated as a consequence of events in Fukushima.) This is partly because other forms of energy are seen to have their own problems, whether environmental or economic. What is most likely to happen is that nuclear energy will become part of a mix of alternatives to fossil fuels that, when combined, help to limit and eventually reduce the use of fuels that make the greatest contribution to climate change (coal, oil, and natural gas). Governments of the region are more likely to recognize that nuclear energy comes with certain dangers. These dangers, if they are to be mitigated, make this form of energy more economically and politically costly than it might have been before the Fukushima accident. As such, even for longstanding supporters of nuclear energy, its attractions may be less bright than before. The search for low-carbon economies in Asian societies will remain a difficult one.

Conclusion

In the final chapter of this handbook, we (the editors) look back at the other chapters, describing many of the lessons that they convey about environment and society in Asia now and in the future. At this stage it is worth reiterating the importance of our topic: for billions of people in Asia, the environment–society nexus is one that certainly affects their wellbeing to some degree,

and for millions of them may directly affect their health and even their survival. The seriousness of the topic for Asia cannot be overstated, not least because much of the region is more directly dependent on local environmental conditions and resources than more developed parts of the world, and because its ecosystems and communities are particularly vulnerable to environmental changes. Furthermore, what happens in the region matters for the rest of the world. The relationships between environment and society in Asia will largely determine environmental conditions and developments globally, the region's contribution to future climate change being the most prominent example of this. Additionally, the ability of Asian societies to avert environmental harm and to cope with the harm that cannot be averted will affect their ability to participate in the global economy and provide resources and services to the rest of the world.

Part II

Human contexts
