



China and the global environment

LEARNING FROM THE PAST,
ANTICIPATING THE FUTURE

Katherine Morton

Lowy Institute Paper 29

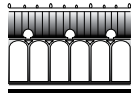
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Executive summary

One of the greatest dilemmas of the early 21st century is how to satisfy the demands of densely populated states in the context of a global environmental crisis. As the world's biggest polluter and prominent emerging world power, China is at the centre of the global debate. Worsening pollution trends, increasing resource scarcity, and widespread ecological degradation have serious implications for China's ongoing modernisation drive. The spillover effects across borders also pose a challenge to its relations with the outside world. Although China's per capita CO₂ emissions are low relative to the United States and Australia, they already exceed the world average. In 2007, China overtook the United States to become the world's largest aggregate emitter.

In the lead up to the Copenhagen Climate Summit in December 2009, China's position on mitigating CO₂ emissions has received considerable attention from both scholars and practitioners. While Chinese participation in a global agreement on emissions reduction is imperative and therefore merits serious attention, it is important not to lose sight of broader questions relating to the capacity to adapt. A critical question is whether China's evolving system of environmental governance can respond effectively to deal with environmental crisis both within and beyond territorial boundaries. Current analyses tend to highlight either negative or positive future scenarios depending on whether the focus is upon worsening environmental trends, or the emergence of new environmental policies and institutional reforms. All

too often, historical patterns of governance are overlooked. Seen from the perspective of Chinese history, it is evident that a form of strong and clearly directed environmental statecraft has existed in China for centuries and continues today.

It is within the broader context of historical transformations inside China, rising environmental challenges, and changing power relations at the global level that this paper is situated. A major aim is to locate the contemporary debate over China's environmental crisis within a longer time-frame. What lessons can be drawn from China's past? How has the Chinese approach towards the environment changed over time? And what is the potential for enhancing international cooperation?

From a policy perspective, history matters because it forces consideration of how best to adapt to environmental change on the basis of past practice. A deeper understanding of the Chinese experience is critical for the purpose of arriving at a more complete understanding of China's current approach towards dealing with environmental problems. More broadly, it offers important lessons for the global effort in tackling large-scale environmental change. A central theme running through this paper is the importance of learning from the past in order to anticipate the future.

A second aim of the paper is to investigate contemporary changes in environmental governance by looking beyond the state to consider the growing influences of market forces and citizen participation. In assessing the potential for a more inclusive form of environmental protection, special attention is given to identifying the limits of state control and the opportunities that can be gained from broader public engagement. In the contemporary era, any assessment of China's potential to take a leadership role in responding to environmental crisis requires a detailed understanding of what is taking place at the domestic level. Equal attention also needs to be given to the ways in which China's environmental challenges are linked to global developments. Hence, a third aim of the paper is to locate China's environmental governance within a broader global context.

The paper begins by tracing the historical relationship between the environment and state power. Climate, water, and forests provide useful

prisms through which to interpret China's environmental statecraft across time. State practices aimed at adapting to climate change, controlling water systems, cultivating land, and managing forests have dramatically transformed the Chinese landscape with important consequences for national security. The second chapter continues the theme of environmental statecraft from a contemporary perspective. It begins by discussing the idea of ecological civilisation (*shengtai wenming*) that underpins the current government response towards the environment. Reminiscent of traditional Chinese conceptions of nature, this new philosophy provides a future vision for both domestic and foreign policy. The chapter then focuses upon the major shifts in government policy-making that have occurred in response to a more fluid economic and social environment. Consideration is also given to the difficulties involved in implementing these policies at the local level.

Moving beyond the state, the third chapter provides a fresh perspective on environmental governance from the vantage point of some of China's leading advocates and entrepreneurs. A select number of cases are used to illustrate the extent to which environmentalism from below can bring about reforms within the confines of a semi-authoritarian state. In linking domestic transformations with global engagement, the fourth chapter revisits the theme of climate change introduced in the first chapter. It begins with a short overview of China's participation in international environmental negotiations as the necessary backdrop to its current position on global climate change. The Chinese approach towards climate mitigation and adaptation is discussed in general before focusing on two climate related challenges — clean energy and melting glaciers on the Tibetan Plateau. The latter case leads into a broader discussion about transboundary environmental challenges as the new frontier of international environmental cooperation.

The fifth chapter assesses the implications for enhancing Sino-Australian environmental cooperation on the basis of a revised understanding of what constitutes the common interest. It begins with a brief overview of current developments in bilateral environmental cooperation with a focus on new priorities, shared experiences, and mutual benefits. From a broader regional perspective, particular

attention is given to assessing the effectiveness of the Asia-Pacific Partnership on Clean Development and Climate with a view to identifying weaknesses and building on existing strengths. The final discussion looks at the potential for Australia to play a facilitating role in addressing transboundary environmental problems.

The paper provides three important lessons for the purposes of strengthening collective action to address climate change and worsening trends in environmental degradation. First, the Chinese experience is highly valuable. It reminds us of the interdependency between humans and nature and of the ways in which climate, water, and forests are inextricably linked. An historical perspective reveals that climate change is only one aspect of a multifaceted human-nature dynamic. Chinese history also reveals that the environment can affect the fortunes of nations in unexpected ways. Far from exogenous to national security, the environment has been central to China's long-term economic development and political stability.

Second, in the present era China is beginning to take a more prominent role in global efforts to tackle climate change. But its future approach towards international engagement may not necessarily be aligned with liberal notions of global governance. The legacy of environmental statecraft persists and the pursuit of an ecological civilisation is informed by state socialism rather than liberalism. 'Clean energy for a harmonious world' is currently helping to create unity rather than divisions across the global north and south divide. It may also help to elevate equity concerns on the political agenda. But the possibility also exists that China's state-centric approach will run counter to a more progressive agenda of multi-level, deliberative, and inclusive approaches towards environmental governance.

Third, a critical test of the extent to which China is willing to accept more environmental responsibility does not simply lie in the acceptance of a global emissions target. Working collectively to address climate change and environmental degradation is equally important at the regional level. It is within this space, between the national and the global, that Chinese participation is likely to matter most. Melting glaciers, transboundary pollution, depleted fish stocks, and the downstream

effects of public infrastructure projects cannot be resolved in the absence of Chinese support. The environment is not only central to national security; it is also a major source of regional peace and stability.

In looking more closely at China's responses to environmental problems at both the domestic and global levels, the picture that emerges is encouraging, albeit uncertain on account of contradictory tendencies in development planning. What is clear is that China's environmental future is now inextricably linked to decision-making processes at multiple levels of governance from the local to the global. Energy security, climate mitigation, and the aspiration to attain a balance between human and environmental needs can only be achieved on the basis of unprecedented levels of cooperation. Competitive pressures are likely to continue to constrain negotiations at the international level in the years to come. Difficult trade-offs and tensions over burden sharing will not disappear either before or immediately after the Copenhagen Summit. Resolving them will require ongoing diplomatic mediation and political commitment. The challenge ahead lies in building a collective response that learns from the experiences of the past rather than repeats unsustainable patterns of behaviour.

Introduction

At a time when international attention is focused on preparing for a future that is environmentally insecure, China is in the spotlight as a major polluter and contributor to global climate change. At the international level, it is now widely recognised that the traditional model of resource intensive industrialisation is no longer viable. There is a growing awareness that we may have reached a critical threshold, beyond which environmental costs are likely to exceed economic benefits. A fundamental problem is that concerns over ecological resilience are resurfacing at a time when densely populated states such as China, India, Brazil, and Indonesia are on the rise economically.¹ Consequently, one of the greatest dilemmas of the early 21st century is how to satisfy the demands of densely populated states in the context of a global environmental crisis?

As the world's biggest polluter and prominent emerging world power, China is at the centre of the global debate. At the beginning of the industrial revolution in the late 18th century, China was an economic superpower, home to 30 per cent of the world's wealth. Its total wealth declined to 5 per cent of the global total by the middle of the 20th century, and it is expected to rise again to around 20 per cent in the coming decade. However, if environmental concerns are taken into consideration the future looks less compelling. The relative resource abundance enjoyed by the early industrialising nations is no longer available, and consumption patterns that emulate the United

States can no longer be sustained because they would easily overwhelm supporting natural systems.

It is no surprise, therefore, that questions regarding China's environment are now at the forefront of national and international concern. As more reliable information has become available, the sheer magnitude of the problems has slowly come to light. It is important to bear in mind, however, that China's environmental crisis has been a long time in the making. Problems of landslides, flooding, deforestation, and increased silt loads in rivers have existed in China for centuries. The uniqueness of the current environmental crisis lies in its scale and interdependence with the outside world.

China's environmental crisis: a brief overview²

China has a vast territory (9.6 million km²) with huge natural resources, but its per capita resource base is low — 22 per cent of the world's population lives on 7 per cent of the world's arable land with only 8 per cent of the world's natural resources.³ China's natural resources are also unevenly distributed: the areas south of the Yangtze River have about 80 per cent of the nation's water resources but lack land, while the reverse situation exists in the north of China.⁴ Consequently, 27 per cent of China's grain is produced in the north leading to the over-exploitation of ground water beyond the 'safe yield' where recharge can balance withdrawal.⁵

Agriculture has long been an important foundation of the Chinese state, yet only about 30 per cent of China's land is suitable for cultivation. The widening gap between a growing population and a shrinking land resource base is giving rise to serious concerns over food security.⁶ Overall, rapid economic growth has led to a precarious situation in which energy and resource demands are now outpacing supply.

Uneven development and the growing divide between rich and poor further complicate the environmental predicament. In effect, the poorest regions of China are also the most ecologically fragile. As in other countries, the poor carry a disproportionate burden of environmental degradation but are also most in need of development

opportunities. The situation is made worse by the fact that dirty factories are relocating away from large urban cities and into rural areas where regulatory control is weaker. Uneven development is leading to a situation whereby those most able to afford protection will benefit, thus reinforcing pre-existing inequities.⁷

Sobering environmental statistics are now widely reported in the Chinese and international media. Urban pollution problems are reminiscent of London in the 1950s or Tokyo in the 1960s, only more severe. In the late 1990s, air pollution in Chongqing was significantly worse than in London in 1952, and levels of organic mercury in the Songhua River in northeast China were reported to be up to five times higher than in the Minamata Bay in the 1960s.⁸ A total of 16 out of the top 20 most polluted cities in the world are now in China. One year after the Olympic Games, air quality in Beijing has improved but airborne particulates (TSP)⁹ are still three times above World Health Organisation guidelines.¹⁰



Atmospheric pollution in Lanzhou

In 2007, China overtook the United States to become the world's biggest emitter of carbon dioxide (CO₂) emissions.¹¹ Although its per capita

emissions are still relatively low (in 2005 China emitted 3.9 tons of CO₂ per capita compared with 25.6 tons in Australia and 24.5 tons in the United States), they already exceed the world average. Sulphur dioxide (SO₂) emissions are also the highest in the world and the average daily discharge of polluted water is comparable to that of the United States, Japan, and India combined.¹² Consequently, over 70 per cent of China's rivers and lakes are seriously contaminated. Despite efforts to enforce regulatory controls, 300 million people in China still do not have access to clean water.¹³

The negative trends relating to ecological degradation are just as worrying. Up to 90 per cent of China's grasslands have become degraded, desertification covers one-third of China's land base, and acid rain is widespread.¹⁴ The average pH value of acid rain in south-central and southeastern regions of China is often equivalent to vinegar. Forest resources are also scarce (18 per cent of the total land area) and wetlands have been reduced by 60 per cent. Of particular concern is the fact that water scarcity has reached a critical threshold. Two-thirds of China's approximately 660 cities are water stressed. Most of the water supply to major cities depends upon ground water pumped from aquifers. But these are drying up, or becoming depleted due to salinisation. In the North China Plain, per capita water supply is as low as 757 cubic metres, dangerously below the international minimum standard for human sustainability.¹⁵

The spillover effects across borders also present security concerns at the regional and global levels. Analyses of the likely international impacts typically highlight three worst-case scenarios: (1) transboundary pollution leading to potential conflicts with neighbouring states; (2) increasing demand for resources from other countries leading to higher levels of competition; and, (3) the ecological footprint of China's investment activities overseas leading to tensions over international rules and norms. Perhaps not surprisingly, from a global security perspective, the emerging environmental crisis is generally cast in highly negative terms.

While this catastrophe-oriented interpretation helps to raise the profile of environmental problems, it fails to consider the ways in which

these problems are also linked to the broader processes of globalisation; it ignores the relevance of historical transformations inside China; and more broadly it overlooks the emergence of new institutions, social practices, and forms of international cooperation that may counter negative trends and provide an alternative pathway to development.

China's environmental governance in the 21st century: a new turning-point

As we move into the second decade of the 21st century, a critical question is whether China's system of environmental governance can respond effectively to deal with the crisis both within and beyond its territorial boundaries. What lessons can be drawn from China's past? How has the Chinese approach towards the environment changed over time? And what is the potential for enhancing international cooperation? Historically, there has been a strong tendency within elite government policy circles to privilege domestic concerns. It is becoming increasingly obvious, however, that this position is no longer tenable. China's environmental problems cannot be easily isolated from the global context. By the same token, tackling environmental problems at the global level no longer makes sense in the absence of active Chinese participation.

In many ways, international negotiations in the lead up to the Copenhagen Climate Summit in December 2009 represent an important turning-point. Expectations both inside and outside of China are rising. China may not have arrived at a threshold at which unrestrained economic development is no longer tenable, but it has arrived at a political tipping-point at which it is no longer possible to postpone governance reforms. Enhancing international environmental cooperation, especially at the regional level, is also of fundamental importance for China's relations with the outside world.

This paper contributes to the contemporary debate over China's environmental crisis in three significant ways. First, it provides an historically informed perspective that reveals the continuities as well as changes in environmental governance in China over time. Second,

attention is given both to understanding the historic role of the state and the emerging new influences of non-governmental organisations and corporations. And third, it identifies the limits of current practice by locating environmental governance within a broader transnational context.



Grasslands on the Tibetan Plateau

Learning from China's past

In international climate negotiations, historical experience is largely drawn upon as a defence against the dominant interests of the industrialised states; it is used justifiably as a means of political leverage to ensure that the developing world does not have to carry an unfair burden of responsibility. The unfortunate consequence of this approach is that history is cast in negative rather than positive terms. Consequently, historical studies do not tend to receive the political limelight that they justly deserve.

History provides a valuable perspective on the contemporary debate

over global climate governance because it forces consideration of how best to adapt to abrupt environmental change in light of past practice. Historical environmental data is essential for reconstructing the past in order to predict future possible scenarios. And more broadly, by revealing the human-environment dynamic over time, historical perspectives can facilitate a better understanding of how to respond to environmental crises on the basis of learning from the past.

China has one of the longest environmental histories in the world from which to draw important lessons. Stimulated by the pioneering work of a number of eminent Western historians, environmental history is now a growing area of academic research.¹⁶ The intention of this paper is not to attempt to advance our understanding of China's environmental history, but rather to draw on existing works in order to enrich analysis of contemporary environmental governance (*huanjing zhili*). In the Chinese context the term itself was not widely used until the late 1990s when it became apparent that managing the environment by central fiat was no longer possible in the context of an expanding market economy. International ideas about the importance of internalising environmental externalities and expanding the opportunities for public participation also influenced the shift away from a narrower and more technical focus upon environmental management (*huanjing guanli*).¹⁷

Studies on environmental governance in China tend to start with the 1970s, coinciding with the first United Nations Conference on the Human Environment in 1972. Yet, if we look further back in time it becomes clear that the legacies of a more distant past continue to inform contemporary practice. In studying China's environmental history two narratives emerge that are of direct relevance to understanding the nature of Chinese environmental governance in the early 21st century. The first is the dynamic interplay between the environment and human civilisation. The second is the centrality of the state in modifying nature for its own ends. In effect, a form of strong and clearly directed environmental statecraft has existed for centuries.

Climate, water, and forests provide useful prisms through which to view China's changing environmental governance over time. The Chinese experience highlights the ecological interdependency between

these three domains. The linkages can be assessed scientifically, and also from an historical perspective. Simply put, climatic factors have determined agricultural productivity that, in turn, has been highly dependent upon water conservancy and forests.

Climate

A growing concern with global warming over the past four decades has encouraged scientists and historians to devote greater attention to historical patterns of climate change that were previously considered to be more or less constant across time and space.¹⁸ Annual mean temperature reconstructions, combined with modelling and empirical studies of the responses of plants and animals, reveal that since the end of the last ice age 12 000 years ago, there have been periods both warmer and cooler than the present.¹⁹ Reconstructing China's past climate history is now at the leading edge of scientific and historical inquiry. As a predominantly agricultural economy, climate is still of great import to China and, therefore, it comes as no surprise that Chinese climatologists produced some of the earliest studies on the history of climate. In creating institutions to adapt to climate change, agricultural concerns have historically dominated the governing agenda, as they continue to do so today.

Water

Seen historically as an unrelenting force of destruction as well as creation, China's rivers have been central in the state's perpetual struggle to adapt to climatic changes, provide food security to an ever-expanding population, and control floods. Hydraulics has played a central role in increasing agricultural productivity since the birth of Chinese civilisation. Irrigation made it possible for northern China to become a major producer of grain by reducing the reliance upon seasonal fluctuations in rainfall. Harnessing waters in the south has also provided a source of energy and a necessary means of transportation. Seen from a more negative perspective, China's water history is a salutary reminder of the dangers of hubris. Contemporary concerns over water scarcity are now refocusing attention on earlier historic records with a view to

assessing the prospects for future water security.²⁰ Towards this end, learning the lessons of the past, both good and bad, will be essential.

Forests

Water and forests are inextricably linked in China's history. As Stanley Dennis Richardson aptly remarked, water conservancy and forestry are 'the Siamese twins of land use' and 'attempts to separate them involve dire risks.'²¹ Forests have traditionally provided timber, fuelwood, and medicine, as well as a number of lucrative economic crops such as rubber and bamboo. Historic records reveal a high level of biodiversity with 300 bamboo species alone still in existence in the early 1980s.²² The ecological services provided by forests have been equally, if not more, important. Forests have played a key role in watershed protection by absorbing rainfall and safeguarding against soil erosion and the loss of agricultural production downstream. As in the case of water, the history of forests provides important insights into the dire consequences of mismanagement. Global climate change is now providing the opportunity to restore the important status of trees as a natural buffer against carbon dioxide emissions.

Governing from above and below

An enduring legacy of China's past is the central role of the state in managing environmental problems. However, a traditional command and control system no longer captures the important shifts that have taken place over the past two decades. In the contemporary era, China's system of environmental governance is more fragmented and less hierarchical based upon a pluralistic approach that embraces regulations, legislation, market-driven incentives and, to a lesser degree, public participation. Changing ideas about the economics of resource utilisation have weakened state controls with the additional benefit of encouraging corporate involvement. The emergence of environmental social organisations combined with growing media attention has also helped to bring about a more inclusive form of environmental protection.

On a more sober note, however, the decentralisation of decision-making power to local authorities has had a contradictory impact on environmental reform: fiscal and administrative decentralisation has provided local officials with the authority to manage environmental problems but, at the same time, it has empowered local vested interests against the imposition of state regulatory controls.²³ Conventional wisdom dictates that protecting the environment is more effective if it is relevant to local circumstances. Paradoxically, in the Chinese context economic decentralisation has not provided the positive environmental benefits that one might expect. Instead, it has led to a growing disjuncture between ongoing environmental reform at the central level and poor implementation at the local level. Reinforcing the earlier point about environmental statecraft, this is not something new. The traditional dynastic record reveals that central oversight was a constant feature of local governance and environmental management.

Linking domestic and global governance

Clearly, any assessment of China's potential role in international environmental cooperation requires a deeper understanding of what is taking place inside China. Equal attention also needs to be given to the ways in which China's environmental challenges are linked to global developments. Interdependence matters, both ecologically and politically. It is no longer possible to view environmental governance in China purely from a domestic perspective and, likewise, outsider accounts that ignore developments within China are of limited value.

At least at the policy level, China's environmental reforms are increasingly aligned to international standards. Growing integration with the outside world has provided the opportunity for a two-way flow of ideas, funds, and technologies. International environmental cooperation is no longer simply about scaling up support inside China. Chinese ideas and practices can also inform developments at the international level.²⁴

In thinking about the linkages between domestic and global governance, less attention has been given to the spaces that lie in between. In particular, emerging transboundary problems are often overlooked.

From a Chinese perspective, this remains relatively uncharted terrain. The difficulties of environmental cooperation in the Mekong River Delta have been widely reported.²⁵ Similar concerns have been raised in relation to the Tumen River Delta and transboundary acid rain in China's northeast.²⁶ Melting glaciers on the Tibetan Plateau and the consequences for countries downstream in South and Southeast Asia further highlight the fundamental importance of cross-border cooperation for the purposes of regional peace and security.

Overview of the paper

It is within the broader context of historic transformations inside China, rising environmental challenges, and changing power relations at the global level that this paper is situated. The first chapter provides an historical framework for understanding the dynamic relationship between the environment and state power with an emphasis upon the way in which political decisions affect environmental change and vice versa. The recurring themes of China's past — climate, water, and forests — are also introduced as a way of linking Chinese history with contemporary debates. The second chapter on environmental governance during the reform era continues the focus on evolving ideas and practices at the elite level with due consideration given to the limits of state control and the widening implementation deficit at the local level.

Moving beyond the state, the third chapter investigates the growing importance of market dynamics and the emergence of civil society. Contributions of corporations and non-governmental organisations are illustrated by a small number of case studies located in Beijing, Guangdong, Gansu, and Inner Mongolia. The fourth chapter looks at developments in China through a wider lens by investigating China's participation in global environmental efforts with an emphasis upon mitigating and adapting to climate change. This chapter also looks at environmental problems across China's borders, and addresses the future potential for a new transnational paradigm of environmental governance. In so doing, particular attention is given to the new climate challenge on the Tibetan Plateau.

Drawing upon lessons from the past and present, the final chapter discusses the implications for Sino-Australian environmental cooperation and, in particular, the role of Australia as a facilitator in efforts to address transboundary environmental problems at the regional level. Overall, the paper weaves together historical, socio-political, economic, and strategic strands of inquiry that together provide a more complete picture of China's environmental crisis and what it means for global governance.

Seeking common ground

Success in dealing with global environmental challenges such as climate change will require an unprecedented level of cooperation across all levels of governance from the local to the international, encompassing both formal and informal institutional arrangements. This is a daunting task, not least because it requires a deeper understanding of the historical experiences, political motivations, and economic concerns of the major stakeholders involved. What this paper makes clear is that China is by no means an environmental laggard. On the contrary, relative to its stage of development it has put in place an impressive framework of environmental regulations and legislation that is being further strengthened by new developments taking place in the corporate sector and within civil society.

For China, waiting until economic development goals have been reached before focusing on taking care of the environment is no longer a viable option. Unchecked pollution, the finite nature of China's resource base, and growing urbanisation mean that major adjustments will have to be made along the way.²⁷ To this end, difficult choices have yet to be made in striking a balance between human and environmental needs. What is more important, enhancing food security or protecting fragile ecosystems? How is it possible to increase the rate of urbanisation while simultaneously improving environmental services? And what is the correct balance between securing a reliable energy supply and mitigating CO₂ emissions? In the absence of further environmental reforms, especially improvements in accountability, transparency, and

access to information, these dilemmas are likely to become even more intractable over time.

Promising developments at the international level are, in part, a consequence of what is taking place at the domestic level. They are also a reflection of changing international ideas about the relationship between the economy and the environment. In recent years, a renewed emphasis upon closing the gap between economic development and environmental protection has helped to overcome fears that the latter will impose high economic costs. A wealth of studies in environmental economics, culminating in the 2005 Stern Review report on the economics of climate change, have made an important contribution by advancing the idea that a protected environment is good for the economy.²⁸ What is needed now is a similar radical transformation in thinking about the relationship between the environment and national security.

A rich scholarship on environmental security already exists. It has received more attention in recent years with important consideration being given to human impacts. However, the idea that the environment is good for national security has yet to penetrate the minds of many political elites. China's muted response to transboundary issues reflects a residual fear that addressing problems across borders will somehow run counter to its national interest. Consequently, the pathway to enhancing environmental cooperation lies in unravelling the knot of national security.

It is precisely at this point that an important lesson can be drawn from China's past. A deeper investigation into the Chinese experience reveals that environmental protection has been a source of national security rather than a constraint. Just as economic transformation has relied upon a rich and diverse resource base, political stability has depended upon a certain degree of ecological resilience. Seen from this perspective, the prospects for striking a compromise between immediate state imperatives and fairness to future generations appear much brighter. It is becoming clearer that in a more complex, interconnected, and uncertain world the national security interests of all states are fundamentally linked to prudent environmental stewardship.

Chapter 1

The legacy of environmental statecraft in China

Historically, the natural environment has played an important role in the making of Chinese civilisation: China's climate history reveals a significant correlation between changes in temperature and human development; the availability of natural resources has determined the intensification and expansion of agricultural production; and patterns of internal migration have been shaped by an ever-changing landscape. This has not been a one-way process. Tracing the relationship between the environment and Chinese civilisation across time reveals a two-way dynamic in which human decisions and actions have also affected environmental security. The role of the state in intervening to transform nature can be interpreted as a form of environmental statecraft that is still in evidence today.

This chapter explores the historical antecedents of Chinese environmental governance. In many contemporary studies, the emergence of a common set of rules and institutions for dealing with environmental problems tends to be traced back to the late Maoist period, coinciding with the first United Nations Conference on the Human Environment in 1972. Yet, if we reach further back in Chinese history, it is evident that a nascent form of environmental governance has existed for centuries.

State intervention is the central thread that binds China's present

with its past. Of particular importance is the way in which state practices have transformed water systems and forest coverage leading to both positive and negative consequences for China's economic transformation. China's pre-eminence as an economic superpower in the 18th century relied upon a high level of ecological resilience that was unmatched by any other state at the time. Two centuries later, its re-emergence as a world power is also closely associated with issues relating to resource security and environmental sustainability. A central lesson from China's past is that environmental factors can affect the fortunes of nations in unexpected ways.

Environment and the making of Chinese civilisation

China was one of the world's first centres of plant and animal domestication. A recent discovery by Cambridge University archaeologists suggests agriculture may have originated in China rather than in the Fertile Crescent (the region stretching from the Mediterranean to the Persian Gulf, generally believed to be the birthplace of the first world civilisation).²⁹ Climate reconstructions dating back 5000 years reveal that the legendary origins of the Chinese states of Xia, Zhou, and Shan coincided with the Yangshao warming period between 3000-1000BCE when the mean annual temperature was approximately 2 degrees centigrade higher than in the mid-20th century.³⁰ A warm climate in the middle and lower reaches of the Yellow River created the conditions for the emergence of an agrarian society. Soils rich in minerals produced high crop yields and dense forests and water systems sustained farming, hunting, and fishing.³¹

Climate studies conducted by Wu Chen reveal that in north China during the late quaternary (0.5-1 million years ago on the geologic time scale) the dominant climate pattern alternated between cold and dry and warm and wet periods.³² During the Tang Dynasty (618-907), cooler temperatures combined with worsening environmental conditions on the North China Plain forced major urban centres to shift southwards to the Yangtze River basin. Exchanges between the arid north and warmer wet south helped to develop and enrich agricultural production.³³ And

as settlement spread, the river systems facilitated the diffusion of crops and technology.

Climate change and dynastic cycles

Climate history reveals both positive and negative implications for the evolution of Chinese civilisation. A consensus is now emerging among paleoclimatic scientists and historians that climate was a significant factor shaping imperial prosperity and decline. In the late ninth century, for example, prolonged drought led to a disastrous harvest that precipitated the fall of the Ai Emperor.

During the early modern era, China's climate history conforms to the European Little Ice Age pattern. Records compiled by the geographer Zheng Sizhong reveal an annual temperature reduction of 1 degree centigrade between 1470 and 1850 with a particular cold period in the mid-17th century when the annual temperature fell to below 4 degrees.³⁴ Extreme cold combined with prolonged drought exacerbated political upheavals and rebellions leading to the fall of the Ming and the establishment of the Qing in 1644.³⁵ A colder climate during the first half of the 19th century also placed additional pressure on food supplies thus compounding the problems of imperial rule.

Atmospheric records contained in a stalagmite recently discovered in a cave in Gansu province reveal that a weak Asian monsoon, leading to a reduction of rainfall in China's northwest, was also closely associated with dynastic fortunes.³⁶ A remarkable feature of the Chinese landscape is the widespread erosion caused by the uneven seasonal and regional distribution of rainfall combined with prolonged heavy precipitation.³⁷ In the 1930s, the eminent climate historian Zhu Kezhen claimed that north China was unique among the world's most populous regions on account of the variability in rainfall and frequency of natural disasters.³⁸

Chinese environmental statecraft

Imperial intervention in response to natural disasters was one of the most visible ways in which emperors sought to control cosmic forces

and, at the same time, consolidate their imperial power. The classical Chinese conception of wise leadership was predicated on achieving a balanced approach towards the human-nature relationship known as *tian ren he yi* — harmony between heaven and humanity. This anthropocosmic worldview supported a seamless connection between the divine, human, and natural worlds in which each part resonated in harmony with the other.³⁹ Organic cosmology rooted in the philosophy of *qi* (material force) formed the basis for the interconnection between mind and spirit.

Cosmic principles could also be modified by human action. In the Daoist tradition, the pursuit of individual self-cultivation aimed to develop harmony with nature and other humans while recognising the movements of the Dao, the eternal path. In contrast, Confucian philosophy linked ideas of resonance with notions of proper ethical and political order.⁴⁰ Emperors ruled by virtue of their heavenly mandate (*tianming*) but they were ‘not the passive victims of an unpredictable heaven.’⁴¹ Instead, the Emperor was conceived as the mediator between heaven and earth with the responsibility to maintain harmony. It is fair to say, that from a Confucian standpoint, a concern with order in human society was more pervasive than a concern with environmental protection *per se*.

Philosophical traditions and value systems shape perceptions of nature and, in turn, guide the way in which political decision-makers respond to environmental change. However, as noted by many environmental historians, it is important to distinguish between philosophical persuasion and cultural expression on the one hand and actual practice on the other. As argued aptly by Nicholas Menzies, ‘cultural and ethical values alone do not determine the treatment of the environment.’⁴²

Throughout the course of Chinese history it is in the practice of statecraft that the gap between the philosophical ideal of harmony and the physical exploitation of the environment emerges.⁴³ Chinese environmental statecraft does not simply correspond to a single pattern of destructive practices: many positive examples of reforestation, sustainable rice paddy farming, and biogas development were in evidence centuries ago. Official interpretations also varied and did not

conform to a single narrative of human domination. Most famously, in the mid-17th century the Qing official, Chang Ying, extolled the virtue of environmental stewardship. As a prelude to contemporary debates over inter-generational equity, he argued:

Families may grow kudos from imperial exams and enjoy commercial opportunities, but true interests of lineage rely on land stewardship across the generations.⁴⁴

It is, however, fair to say that on balance the Chinese approach towards harnessing nature proved to be more destructive than harmonious. In seeking to expand food-grain production as the foundation of a resilient empire, the state played a major role in accelerating environmental decline. Towards this end, interventions were most extreme in relation to river systems and forests.

Whoever controls the Yellow River controls China?

Since ancient times, frequent flooding in China has encouraged the development of innovative hydraulic engineering practices. The Chinese sage and legendary hero Yu the Great (progenitor of the Xia dynasty (2200-1600BCE)) tamed the waters by dredging river outlets, clearing forests, and cutting a canal through a mountain. His interventions allegedly helped to divert flood-prone rivers for the benefits of agriculture by allowing silt to re-fertilise fields. Yu is accredited with coining the famous adage, ‘Whoever controls the Yellow River, controls China’. For some, his name lives on as an enduring reminder of grandiose schemes to control unruly waters. For others, he is a symbol of human ingenuity in the face of a recalcitrant nature.

Over the past two millennia, China has experienced at least 16 000 floods, increasing in intensity since the Sui dynasty (581-618).⁴⁵ Uncertainties relating to monsoon rains, spring melt in mountains, and cyclical weather patterns have reinforced the unpredictability of the nation’s major river systems. North China, in particular, is prone both to flooding and drought as a result of the seasonal concentration

of rainfall and increasing siltation of the Yellow River. Originating on the high Tibetan Plateau, the Yellow River flows eastwards 5500km through nine provinces before arriving at the Bo Hai Gulf. Flowing across the Loess Plateau it carries more sediment than any other major river in the world. Sediment deposited as fine silt raises the riverbed and leads to flooding that is further exacerbated by soil erosion upstream. The river is also renowned for changing its course; it is not uncommon for the river mouth to shift hundreds of kilometres with catastrophic consequences.

It is sobering that the Yellow River has killed more people than any other feature of the earth's surface.⁴⁶ In the 1887 flood, for example, over two million people perished by drowning or starvation owing to the loss of food crops. At the height of political turmoil in 1931, up to four million people died in devastating floods that were exacerbated on account of government neglect.⁴⁷ Taming the waters via dykes, canals, levees, and artificial flood basins has been a central feature of water governance throughout Chinese history. In the case of the Yellow River, the problem is that any benefits gained from dyke building have been frequently undermined by the costs of countering the silting of the riverbed, itself a losing battle. Not surprisingly, in the late 19th century a visiting foreign delegation renamed the river 'China's sorrow'.

Seen through the lens of state power, China's unruly waters provided the impetus for an elaborate bureaucratic system of governance that reinforced the pre-existing power hierarchy. In strategic terms, waterways were also an important means of unifying the Empire. The construction of the Grand Canal during the Sui dynasty (581-618) linked the lower Yangtze valley with the capital of Luoyang on the Yellow River in modern-day Henan province. Six hundred years later, a Grand Canal was built to connect the lower Yangtze region to the imperial capital in Beijing.

Although hydraulics played a central role in shaping imperial power, the state did not always practise hegemonic control. Karl Wittfogel's powerful image of 'hydraulic despotism' captures the imagination, but it is by no means synonymous with Chinese environmental statecraft. His theory that all great ancient civilisations become

despotic on account of the need to recruit large numbers of labourers in order to maintain hydraulic systems is overly deterministic from a Chinese perspective.⁴⁸ First and foremost, the imperial state was not monolithic. In her carefully documented account of fighting famine and river control in north China over the past three centuries, Lillian Li reveals an important differentiation between north and south. Simply put, the imperial state was more visible in north China on account of lower agricultural productivity and a more 'austere way of life'. In contrast, local governance played a stronger role in the south because wealth produced from a more fertile land in the Lower Yangtze Valley created powerful lineages and local elites that became active in water management.⁴⁹

Second, at various points in Chinese history, despotic tendencies were counterbalanced by a keen interest in ethical governance. The classic example here is Emperor Kangxi (1661-1722), the second ruler of the Qing dynasty, who took a personal interest in both effective and fair conservancy projects:

If officials are not clear (*qing*), then it harms the people. If water is not clear (*qing*), that, too, is of no benefit to the people. All the muddiness (*zhuo*) in the world is like this. As for officials that are not clear, I have a method to correct them. As for water that is not clear, I have a policy to manage it.⁵⁰

His words still resonate today, and reveal a more nuanced understanding of environmental statecraft that is in tune with contemporary concerns over sustainability and fairness. A similar pattern emerges in relation to forests that were, of course, inextricably linked to water systems: China's upland forests provided critically important watershed protection against floods and drought by absorbing rainfall and preventing soil erosion.

Behind the great green wall

Traditional land use in China is generally viewed as a process of deforestation for the purpose of agricultural expansion. During the Tang and Song dynasties, forests were totally cleared from the Central Shaanxi Plain. In the centuries that followed, the expansion of the waterways provided the means for transporting timber from mountain forests in China's southwest to the industrial centres of Shanghai, Hangzhou, and Suzhou in the Yangtze basin, which soon became the most densely populated region of China. By the 19th century, Chinese environmental history is a familiar story of converting forests and wetlands to farmland leading to increased siltation in rivers and, in turn, more flooding.

Deforestation was not simply a consequence of demographic change; it was also determined by economic, social, and political factors. Inequitable systems of land tenure and ill-defined property rights led to more rapid clearance. Forestry resources were also greatly diminished on account of state sovereignty claims made in the pursuit of military power. Forest clearance in the Qinling Mountain Range, for example, was used as a means of uncovering rebels during the suppression of the White Lotus Rebellion (1796-1801).

It would be misleading, however, to interpret the history of China's forests simply in terms of exploitation. As argued convincingly by Nicholas Menzies, in some parts of China, forests were also protected: trees provided strategic buffers against invading armies from the steppes of Central Asia; they were worshipped as spirits; conserved as a source of income; and managed as a buffer against desertification and flooding.⁵¹

As early as the Qin period (221-206BCE), shelter belts or palisades (tree plantations) were planted alongside the Great Wall by Emperor Qin Shihuang as part of a defensive barrier to slow the advance of troops. Elm trees were also planted along the Yellow River to act as a strategic barrier to prevent invading tribes from accessing water for their horses. Logging bans in China also have a long history. For example, the forests of Wu Tai Shan (Mountain of Five Terraces) in Shanxi were protected by an

imperial logging prohibition for 100 years in the late 16th century.⁵²

Traditional management of forests recognised both the economic value of forests as a source of fuel and medicines and their ecological value with respect to watershed services.⁵³ By late-Qing times, widespread reforestation was being promoted to preserve fuel supply and hydrological systems. It was also increasingly understood that reforestation and soil conservation were the key to preventing silt build-up. As in the case of water protection, the state was not the only guardian of the forests. Clans and village communities developed innovative systems of forestry governance, often mixing methods of protection with economic production. As noted by Mark Elvin, most of the forests that survived in late imperial times were either protected by 'state prohibitions' or were under some form of 'religious or kinship-based collectivity.'⁵⁴

Rise to world power and environmental decline

According to the environmental historian J. R. McNeill, 'China was, from about AD 650 to 1800, almost always the most ecologically resilient and resourceful state on earth.'⁵⁵ At the height of Chinese economic power, the Qing controlled a vast portfolio of ecological diversity ranging from tropical to subarctic with large available stocks of timber, grains, fish, metals, and fibres. An ecologically diverse portfolio meant that a failed crop or dwindling resources in one part of the empire could be offset by the extraction of resources elsewhere. This translated into 'insurance and resilience for the state' that was unmatched by any other state until the era of the European overseas empire.⁵⁶

Territorial expansion further prevented ecological breakdown. The incorporation of the Muslim western region of Xinjiang into the Qing domain in the 18th century allowed agricultural production to expand westwards. A wealth of natural resources in the 'New Region' (the literal meaning of 'xin-jiang') also enhanced the capacity of the state to offset scarcities in other parts of the Empire.

By the late Qing, the state was also relying more upon merchants and markets to achieve adequate grain supplies and price stability.⁵⁷ In his detailed study of the relationship between the environment and economy

in Lingnan (modern-day Guangdong and Guangxi), Robert Marks provides valuable insights into the shift towards relying on markets rather than state granaries and bureaucrats for ensuring food security.⁵⁸

The precise tipping-point at which an ecologically resilient state by world standards became an ecologically vulnerable state remains a matter of intense debate. The general consensus among environmental historians is that China experienced rapid environmental decline during the 19th century. Drawing upon the rich and expanding scholarship, we can identify at least four main causes.

Technological and institutional 'lock-in'

First, environmental statecraft had its limitations. Unifying the empire through large-scale hydraulic engineering was enormously costly with respect to maintenance. Mark Elvin has coined the phrase 'technological lock-in' to refer to the huge investments in capital and labour that were required to maintain the Grand Canal

thereby mortgaging a substantial proportion of future productivity and social-political organizing capacity ... the penalties for neglecting maintenance (prior to the arrival of the steamship in the late-nineteenth century and the possibility of safe and cheap transport by sea) were close to prohibitive.⁵⁹

China's intensely constructed agricultural landscape meant that it was particularly 'vulnerable to environmental disruption by neglect.'⁶⁰ The continuing imperative to maintain irrigation and waterways stimulated the evolution of administrative structures that soon became overly cumbersome. In particular, the supervision of an ever-expanding bureaucracy was almost impossible to sustain.⁶¹

Natural calamities

Second, as noted earlier, the responsibility of rulers to prevent natural disasters is deeply entrenched in the Chinese experience. But, over time, the task became overly burdensome on account of the overexploitation

of land. Coinciding with foreign invasions and civil wars, the end of the 19th century witnessed an unprecedented number of natural disasters. From the mid-17th century until the end of the 18th century, China experienced few famines and floods. However, this changed significantly during the 19th century when natural disasters multiplied.⁶²

Between the mid-16th century and the late 17th century, heavy rainfall and flooding were relatively high, declining during the 18th century and reaching a new peak in the early 20th century.⁶³ Droughts also became more prevalent towards the end of the 19th century. Over one million people perished in the great flood in 1850, and between 1876 and 1879 severe droughts in north China (including Shanxi, Hubei, Hunan, and part of Shandong) led to an estimated 13 million deaths.

Strategic disruption

Third, military power has always played a significant role in the reconstruction of the Chinese landscape. In ancient China, as in the case of other ancient civilisations, 'the most damaging aspect of social organisation as it affected the environment was its direction towards war.'⁶⁴ Intentional inundation is a common characteristic of Chinese civil wars. One entry in the Bamboo Annals (*Zhushu Jinian*) in 358 BCE reveals that an army from the state of Qu deliberately diverted waters from the Yellow River to augment defence.⁶⁵ Another famous example is the catastrophic attack that took place at the end of the Ming dynasty when Li Tzu-cheng flooded Kaifeng in 1642.⁶⁶

The importance of waterways as a defence against invaders is also well known in Chinese military history. Jurchen invasions during the Southern Song (1127-1279) were often frustrated by the inability to cross the Yangtze River (the first bridge was not constructed until 1957). Building river embankments could also easily translate into military contexts. In the modern era, the famous example is that of the Nationalist army, which in 1938 deliberately breached the dykes of the Yellow River in order to hold back a Japanese advance — thousands of lives were lost.⁶⁷

Ecological disruption to satisfy military aims gathered momentum during the political turmoil of the 19th century. Qing historian Gu Yanwu

has documented the annual burning of grasslands in Inner Mongolia to prevent tribal attacks leading to serious erosion.⁶⁸ And in the mid-19th century, temples and monastic forests were deliberately burned during the Taiping rebellion in a bid to bring about a ‘Heavenly Kingdom’.

Energy crisis

Fourth, resource security concerns became more prevalent during this period in Chinese history. Ecological pressures combined with population growth led to resource scarcity. Timber, as the main energy source, was particularly vulnerable. Iron production relied on a relative abundance of wood south of the Yellow River, which also determined the location of furnaces. To a certain extent increasing urban demand could be met by the expansion of plantation forests.⁶⁹ However, timber was also being used for building houses and ships that increased supply constraints. Alternative fuels such as charcoal and dry reed were also in short supply. Although the utilisation of coal in north China dates back thousands of years, production stagnated following a series of natural and human-made disasters between the 12th and 14th centuries. High transportation costs also limited the potential for large-scale utilisation in the south. Unlike Europe, China was not in a position to overcome resource constraints through the supply of resources from its colonies.⁷⁰

In light of these multiple pressures, it is not surprising that ‘the agroecosystem as a whole proved to be unsustainable.’⁷¹ China had also lost many of its ecological buffers — forests, wetlands, and open lands — that had been displaced by the cultivation of land and a growing population. In the mid-18th century China’s total population reached over 400 million. In Guangdong, cultivatable land had already exceeded its limits with only 10 per cent of forests remaining. Agricultural intensification further encouraged state-sponsored land reclamation with conflicts arising over land, water, and forests.⁷²

By the end of the 19th century, the looming threat of Western imperialism, Japanese encroachments, and rising internal conflicts led to a muted response to the build-up of environmental problems at a time when action was most needed.⁷³ These pressures continued unabated

during the Republican era (1911-49). Thus by the time the Communists came to power in 1949 the seeds of environmental crisis had already been sown. It was during the Maoist period (1949-78), however, that the human domination of nature reached its climax.

To conquer nature: Mao’s legacy

Traditional thinking on the need for a balanced relationship between humans and nature was completely overturned during the revolutionary years when both people and nature were ‘remoulded’ to conform to a socialist modernisation project.⁷⁴ Mao’s dictum of conquering nature (*ren ding sheng tian*) reached its apogee during the Great Leap Forward (1958-61) when at least 13 million hectares of forests were cleared to fuel backyard iron smelters; the famine that ensued, as a result of economic dislocation, the Sino-Soviet split, natural disasters and arrant policies, led to the worst recorded famine in history. The Cultural Revolution era (1964-78) wreaked further havoc on the natural environment that continues to burden environmental protection efforts to this day.

Water control projects became the symbol of revolutionary zeal. In particular, the pursuit of a Soviet-inspired engineering plan for the middle reaches of the Yellow River proved disastrous. The multi-purpose Sanmenxia (Three Gate Gorge Dam) was constructed to generate hydropower, to divert water for irrigation purposes, and to control floods. Limited attention was given to the realities of managing China’s unique problem of silt. With prestige factors outweighing practical concerns, the high dam was built without silt traps upstream, and without a mechanism for flushing silt through the dam. As a consequence, the build-up of sedimentation led to the displacement of over 400,000 people and hydropower generation was considerably reduced.⁷⁵

Forestry projects did not fare much better. In 1949, China’s forest coverage comprised only 8.6 per cent of total land. During the early years of the Communist government, shelter-belt planting to protect against soil erosion continued culminating in the Three-North Shelter Belt (*san bei fang lin*). The China Land Reform Law of 1950 claimed state ownership over forests and barren lands. All private forests were

merged into small cooperatives and placed under the jurisdiction of village brigade leaders. In 1955, the government announced a national program to plant 105 million hectares of land over a 12-year period. According to official statistics, 10 million hectares were planted during the first five-year plan (1953-57).⁷⁶ Planting trees was highly labour-intensive. For example, in 1958 more than 700 000 people were involved in planting a 1700km shelter belt in northern Gansu. But, as noted by Richardson, statistics at the time were often contradictory and unreliable. In the absence of quality control measures and incentives to maintain the forests, the survival rate was worryingly low.⁷⁷

Despite the obvious negative environmental effects of Mao-era policies, political rhetoric at the time defined environmental degradation as a purely capitalist construct. Some Western commentators supported such a distorted view by praising the Chinese concept of development, which allegedly prioritised social welfare above technical advancement.⁷⁸ In reality, under socialism, as with capitalism, natural resources were treated as capital rather than income; production targets mattered and not the net social benefits.

Since the onset of the economic reforms in the late 1970s, China has suffered the worst of both worlds, caught between the inefficiency of state-owned enterprises and thousands of uncontrollable capitalist township and village enterprises. Ecological resources are still undervalued, but considerable efforts have been made to reduce the rate of over-exploitation by liberalising procurement prices. The legacies of environmental statecraft remain and are most visible in the continuing predilection for large-scale engineering projects.

Rapid economic growth has further exacerbated China's environmental crisis placing an additional burden on state resources. On the more positive side, the reform and opening process has created new opportunities for a more pluralistic approach towards the environment that takes into account market dynamics, the needs of the Chinese people, and processes of international integration. As will become clear in the following chapters, the capacity of the state to deal with its environmental problems has reached a critical juncture at which further reforms can no longer be delayed.

Re-emergence of world power and the continuing environmental challenge

The historical perspective outlined in this chapter reveals the strong environmental undercurrents of socio-economic and political transformation in China. In exploring the origins of environmental governance, a central thread connecting China's present with its past is the dynamic relationship between the environment and civilisation. The forces of nature have been both revered and feared at various points in Chinese history. Despite centuries of control and the evolution of hydraulic engineering principles, the Yellow River still sunders its banks on a regular basis. It now sustains a population of 150 million people and the constant struggle to provide food security is emblematic of the difficulties involved in balancing human and environmental needs. Not surprisingly, attitudes towards the human-nature relationship have not conformed to a singular interpretation. Instead, multiple strands of thinking have shaped the human impulse to both transform and protect nature for its own ends.

An historical perspective also exposes the central role of human decisions and actions in determining environmental security. State intervention to maintain agricultural productivity and mitigate floods and drought through irrigation is deeply ingrained in the Chinese experience. An important lesson is that far from exogenous to statecraft, the environment has played a significant and multi-purpose role. From a Chinese perspective, environmental statecraft is not simply a question of environmental protection narrowly defined, but also a means of sustaining economic development, ensuring social stability, and consolidating power and authority.

If we project this image of environmental statecraft onto the world stage it raises a fundamental question about political leadership in the face of an environmental crisis. As this chapter suggests, throughout the course of Chinese history, the environment has shaped the fortunes of Chinese rulers. It has also influenced the rise and decline of Chinese power. In light of these historic trends, what are the future prospects for environmental leadership in the early 21st century?

The environmental historian Bao Maohong has argued that China is by no means destined to repeat the failures of its past history, nor is it doomed to replicate the environmental excesses of the Western industrial experience. Instead, in his view, the potential exists for a 'green' rise that reconnects with the origins of Chinese civilisation:

Green rise is undoubtedly a peaceful rise, it will not only be a symbol of the great rejuvenation of the Chinese nation, but it will also explore a new and unique development path, which will be an exemplary role model for the whole world to follow. China's rise is definitely not a threat to the world. On the contrary, it gives new inspiration to the entire world to trade into a higher level of civilisation.⁷⁹

One can argue about the likelihood of this vision becoming a reality in practice. And, indeed, the chapters that follow will illuminate the contemporary challenges involved in seeking a more sustainable path to development. Regardless of what transpires in practice, it is becoming increasingly clear that China's response to the build-up of environmental pressures will, for better or worse, define the nature and influence of its rising power in the early 21st century.

Chapter 2

Governing from above in the new century

In the contemporary era, the role of the Chinese state in governing the environment is more fragmented, yet remains pivotal on account of its powerful influence over development planning. China's environmental crisis is first and foremost perceived by the leadership as a development problem that requires fixing from above with support from the market and citizens from below. A revival of traditional statist-Confucian values is further reinforcing a hierarchical approach that places harmony and order at the centre of the agenda. No longer seen as feudal and reactionary, selected elements of traditional culture and political thinking have now become an essential component of the political discourse on China's environmental future.⁸⁰

This chapter continues the theme of environmental statecraft from a contemporary perspective. It begins with a discussion of the idea of ecological civilisation (*shengtai wenming*) that frames the current government response towards the environment. Reminiscent of traditional Chinese conceptions of nature, this new cultural philosophy provides a future vision for both domestic and foreign policy. Attention then turns to more practical concerns relating to the major shifts in government policy-making that have occurred during the reform era in response to a more fluid economic and social environment. The chapter concludes with a discussion of the

limits of state control and the problem of the implementation deficit at the local level.

Building ecological civilisation

In recent years, harmonious development (*hexie fazhan*) has become the new political catchphrase in Chinese policy discourse. This expression first appeared over 30 years ago at China's First National Conference on Environmental Protection held in 1973. At the time it simply referred to the need to balance development with nature. Nearly 30 years later, at the Third Plenary Session of the Sixteenth Party Central Committee in 2002, the original definition was further expanded to include four more balancing aspects: urban and rural, economy and society, development across regions, and domestic and international.

The Chinese Communist Party (CCP) now promotes a scientific outlook on development (*kexue fazhanguan*), one that is defined as harmonious, people-centred, and resource conserving.⁸¹ Accredited to President Hu Jintao, the new doctrine was enshrined in the party constitution at the CCP National Congress in 2007.⁸² It essentially constitutes a delicate balancing act between maintaining economic growth and promoting environmental renewal. In pursuit of a 'moderately prosperous society' (*xiaokang shehui*), the goal is to quadruple per capita income from 2000 levels by 2020 while at the same time safeguarding environmental protection and social justice.

As part of this broader policy agenda, ecological civilisation (*shengtai wenming*) is presented as the new guiding principle for understanding the relationship between humans and nature that promises to transform the processes of industrialisation and, in turn, reconnect Chinese civilisation with its environmental genesis. It represents a cultural foundation for the realignment of China's socialist modernisation drive as well as a future vision for environmental leadership at the global level.

In the context of policy discourse, ecological civilisation is generally presented as a hybrid concept that brings together traditional Chinese culture with a revised form of socialism and a modern understanding of ecological security. From a traditional Chinese perspective,

ecological harmony opposes both anthropocentrism and ecocentrism and instead views 'humans as the core but not rulers of nature.'⁸³ In this way, a selective use of traditional cultural concepts has the potential to have a moderating influence upon the excesses of both socialist and capitalist ideology.

As the dominant marker of civilisation, it is generally assumed that the pursuit of a resource-intensive mode of industrialisation and modernity as practised in the West has led to China's environmental downfall. Some argue that capitalism is largely to blame and that only socialism can provide the solution.⁸⁴ As remarked upon by Pan Yue, Vice-Minister of China's Ministry of Environmental Protection (MEP), 'socialism provides a system that protects the realization of an ecological civilisation.'⁸⁵ Tracing the idea back to Karl Marx and Friedrich Engels, some scholars equate ecological civilisation with a revolutionary understanding of the organic unity between humans and nature.⁸⁶

Putting aside the problems involved in promoting a Marxist interpretation of environmental welfare,⁸⁷ Zhang Junhua's framework for achieving ecological civilisation makes sense on pragmatic, if not ideological grounds. He makes four important suggestions: (1) expand environmental education and awareness raising; (2) reinforce legal institutions including an investigative system for enforcing environmental responsibility; (3) apply a system of environmental ethics to all forms of production and consumption; and, (4) strengthen the democratisation and internationalisation of environmental governance.⁸⁸

Far from simply a technical response to environmental pollution problems, ecological civilisation calls for 'a complete transformation of existing economic, political, social, and cultural modes of modernisation.'⁸⁹ It is also seen as a means of safeguarding the global environment by exposing inequities within the international economic order that allow industrialised states to alleviate their environmental pressures at home by transferring pollution overseas. Bringing cultural ethics into the global debate provides an important platform for the articulation of an authentic Chinese approach towards ecological security that places equal attention upon cultural revival, social justice, and environmental restoration.⁹⁰

The next decade will be pivotal in determining the extent to which China will be able to fulfill its aspiration to become an ‘eco-industrial civilisation.’⁹¹ Although the discourse on ecological civilisation is now widespread, it has yet to permeate through the domestic policy agenda. It is widely acknowledged that environmental policies in China suffer from a huge implementation deficit. Indeed, for many the making and remaking of environmental narratives merely serves as a reminder of promises not kept. The gap between declaratory goals and actual performance is a common feature of environmental governance in general. But these ideas do at least represent the possibility of an alternative development path. In appealing to global environmental norms, they also signal the promise of enhanced environmental responsibility towards the outside world.

The remainder of this chapter reviews the major policy and institutional changes that have taken place during the reform era at the elite level of governance. A more detailed description of contemporary environmental policy-making, especially in relation to water and forests, highlights both opportunities and challenges. What becomes clear is that China’s potential to bring about environmental renewal is dependent upon a broader reformist agenda that recognises the limits of state-led environmental governance.

Contemporary trends in governing from above

During the first 15 years of reform and opening (1978-92), the Chinese government’s concern with environmental issues was partial at best; far greater emphasis was placed upon economic imperatives in the Deng Xiaoping spirit of ‘to get rich is glorious’. Resistance to environmental protection was predicated on the assumption that rising incomes would inevitably lead to rising environmental concern — ‘the more rich, the more ecological’ thesis. Despite this apparent ambivalence, in 1993 environmental protection became a fundamental state policy (*jiben guocce*). Leadership concern for the environment did not begin to gather momentum until the mid-1990s, signaled by the first appearance of a Chinese President, Jiang Zemin, at the Fourth National Conference on

Environmental Protection held in July 1996. An extract from the General Secretary’s speech contained the following prescient observation:

Some comrades ignore the work of environmental protection. They believe that it is the most important to develop the economy and environmental protection can be put aside at the moment ... many economically developed countries took the same approach of serious waste of resources and ‘treatment after pollution’, thus causing grave damage to the resources and ecological environment of the world. This is a serious lesson drawn from the developed world. We should never take such an approach.⁹²

In this case, a rhetorical shift in concern was matched by concrete changes in practice. In 1996, environmental priorities were integrated into the state’s 9th Five-Year and Long Term Plans to 2010, and investment in environmental protection as a percentage of GNP rose from 0.67 per cent during the 7th Five-Year Plan (1986-90) to around 1.3 per cent during the 10th Five-Year Plan (2001-05), just below the average ratio of OECD countries. Pollution control became the new policy mantra supported by a raft of regulatory controls and new legislation culminating in the Criminal Law on ‘disrupting the protection of environmental resources’ adopted at the Eighth National People’s Congress in March 1997. Offenders (including government officials in breach of environmental regulations) became liable for up to seven years’ imprisonment and substantial fines.

In the late 1990s, state environmental concerns further increased in response to four environmental disasters: the appearance of red tides in the Bohai Sea, severe flooding in the Yangtze, Songhua and Nen river basins, foam floating on the Yellow River (*Huang He*), and sandstorms in Inner Mongolia and Xinjiang. In response to the 1998 floods, the State Council endorsed a National Plan for Ecological Environmental Construction forbidding logging in natural forests and the reclamation of land for farming. This represented an important shift in policy thinking away from pollution control and towards natural resource management.

At a broader level, the most significant trend in environmental governance over the past decade has taken place at the attitudinal level: there now exists a growing realisation within elite circles in Beijing that the pursuit of economic growth at all costs is no longer environmentally nor socially sustainable. Changing attitudes have, in turn, led to new institutional developments that coalesce with traditional social practices.⁹³

State regulatory control

As the key administrative authority for environmental protection, the Ministry of Environmental Protection (MEP) is responsible for nationwide supervision. It provides vertically integrated support for environmental protection bureaus (EPBs) at the provincial, municipal, county and township levels. Starting from humble beginnings as a National Environmental Protection Office in 1974, it was upgraded to become a State Environmental Protection Agency in 1998, and then a full Ministry in March 2008. Its functional role has also expanded beyond pollution control to include nature reserve management, biodiversity, desertification, wetland conservation, mining, marine pollution, and nuclear safety.

But, as in the case of other countries, China lacks a centralised regulatory authority capable of mainstreaming environmental concerns into development policy-making. It also experiences the familiar problem of poor interagency coordination as well as weak implementation at the local level. Although environmental protection offices have also been established within key state agencies such as the National Development and Reform Commission (NDRC), and the Ministry of Science and Technology (MST),⁹⁴ there is limited crossover between the various lines of bureaucratic authority. Far from being concentrated in one institution, the responsibility for environmental protection is spread among a number of state agencies including the Ministry of Water Resources, Ministry of Land and Resources, and Ministry of Agriculture.

Following a decision to place sustainable development under the auspices of the NDRC, key strategic priorities relating to cleaner

production, energy efficiency, a low-carbon economy, and climate change now fall outside the authority of the MEP. Climate policy in China was originally placed under the mandate of the China Meteorological Administration. In 1998 the State Council established the National Coordination Committee on Climate Change and transferred administrative responsibility to the NDRC. A National Leading Group on Climate Change led by Premier Wen Jiabao was created in 2007. Both the NDRC and Ministry of Foreign Affairs play leading roles in international climate negotiations with support from MST and MEP.

While a strong emphasis upon sustainable economic planning under the auspices of the NDRC is a promising sign, and indeed imperative if China is to succeed in transforming its current development trajectory, it is by no means sufficient to address the broader ecological concerns underlying China's environmental crisis. In the absence of stronger interagency coordination, there exists a real risk that solving one problem will merely lead to the creation of another — commonly referred to by ecologists as the problem displacement phenomenon. A good example is the recent shift to biofuels as a green alternative to oil-based fossil fuels. Recent scientific research reveals that, in addition to the destruction of habitat and reduction in vital food supplies, biofuel crops can release more CO₂ emissions into the atmosphere than can be absorbed by growing the crops.⁹⁵

For the past three decades, environmental policy-making in China has been based upon the dual principles of 'prevention first' and 'polluter pays'. The Environmental Impact Assessment (EIA) methodology was adopted from developed countries and remains mandatory policy for all medium and large investment projects.⁹⁶ Other policy instruments such as the 'three simultaneities' (*san tongshi*, requiring pollution controls to be integrated into the design, construction and operation phases of all investment projects), pollution fees, and discharge permits have been in operation for many years.⁹⁷ Pollution fees are levied on enterprises for emissions exceeding national standards — in theory a high percentage of fees is then returned to the enterprise on the condition that the funding is used exclusively for environmental protection. As will be explained later, the problem is that the enforcement of these kinds of

policies is inherently weak; the incentive is still to pollute first and clean up later, and the capacity to regulate enterprises, especially in rural areas, remains severely limited.

More recently, a new generation of policies aim to further integrate environmental considerations into production processes as well as safeguard against potential harms. Similar to the German concept of a recycling economy, the idea of a circular economy is now widely promoted as a means of increasing efficiency in resource flows and material throughput based upon the three 'Rs': reducing consumption, reusing resources, and recycling byproducts. The approach aims to promote sustainable production and consumption by improving auditing in Chinese enterprises, establishing eco-industrial parks, and creating eco-cities in key designated regions.⁹⁸ Prototype eco-cities are now spreading across China, although the extent to which they are genuinely creating a sustainable model of urban living remains in question.⁹⁹

In relation to rural areas, two pilot initiatives stand out as examples of a more integrative approach. First, in an effort to expand rural coverage, the State Council held its first national teleconference on environmental protection in 2008. This was followed by the establishment of a central fund totaling RMB1 billion to subsidise pollution treatment facilities and ecological demonstration work in up to 700 designated rural villages. Second, in 2007, MEP and the China Insurance Regulatory Commission launched a 'green insurance' initiative to protect against potential damage from the production, storage, and transportation of hazardous materials. One year later, Ping'an Insurance Company located in Hunan Province paid compensation to over 120 households whose fields had been contaminated by hydrogen chlorine leakage from a nearby pesticide company.¹⁰⁰

It is too early to gauge the effectiveness of these new policies. However, at this advanced stage in environmental policy-making some positive impacts are visible. For example, a nationwide campaign is helping to promote cleaner production methods in Chinese factories, strict vehicle emissions standards imposed in major cities are leading to a reduction in particulate emissions, and reforestation programs are beginning to reap some rewards.

Legal reforms

In addition to an expanding regulatory framework, the law is also playing an increasingly important role in environmental governance. During his tenure as director of the environment agency, Xie Zhenhua (now Vice-Minister of NDRC) was a major driving force behind the government's keen interest in environmental legislation.¹⁰¹ As a lawyer he was firmly committed to the legal axiom *ubi jus, ibi remedium* (where law prevails there is a remedy). In 1998 he famously remarked:

Public investment and participation in the environmental field must be supervised under law. This requires that the public understand the relevant laws and what rights and responsibilities individuals must take to protect the environment ... Our best work and strongest support is a reliance upon a legal practice and supervisory system.¹⁰²

Since the promulgation of the first state Environmental Protection Law in 1979, China has passed more than 40 environmental protection-related laws, together with a large number of regulations. More recent laws such as the Cleaner Production Law (2002), the Renewable Energy Law (2005), and the Circular Economy Promotion Law (2008) are progressive even by international standards.

It is common knowledge, however, that China's legal system is inherently weak: legal provisions are often unclear and prone to subjective interpretation, or captured by local interests; and few avenues exist for citizens to seek redress. The majority of legal and regulatory disputes are handled outside of the court system. All too often the law has tended to reinforce administrative authority rather than act as an independent check and balance upon the state system. That said, the Chinese media have reported a small but growing number of cases where citizens have filed lawsuits against polluting enterprises. For example, in October 2000, fishermen from Laoting County in Hebei took their case to court after losing the majority of their stock when a paper mill upstream in Qian'an County discharged wastewater into their aquaculture farms.¹⁰³ Other court cases have involved a farmer

from Huairou County outside Beijing whose ducks had been poisoned by polluted water from the wastes of a nearby pig farm,¹⁰⁴ or the orange growers from Maling County in Guizhou who lost their harvest allegedly on account of waste gas from a nearby factory.¹⁰⁵

The fact that ordinary citizens are pursuing a legal means of redress suggests a rise in public confidence in China's legal system. The hope is that this kind of citizen action will have a cumulative effect and eventually lead to genuine legal reforms.¹⁰⁶ There are already signs that the legal system is enforcing stronger punitive action against polluters. In the wake of a rising tide of environmental disasters, special environmental courts have been established in Wuxi, Guiyang, and Yunnan. Over the past five years, a growing number of government officials and company executives have been removed from office for breaching environmental regulations. More recently, company executives have been sentenced to prison for dumping arsenic into a lake in Yunnan Province.¹⁰⁷ In a high-profile case in Yancheng, Jiangsu Province, the chairman of a chemical company that had discharged toxic chemicals into the city's water supply received an 11-year prison sentence.¹⁰⁸

Strengthening the legal parameters of economic activity remains an ongoing task. In the meantime, appealing to mass consciousness (*qunzhong yishi*) continues to fill the void created by a weakly institutionalised legal system. The Maoist legacy of 'models' for nationwide emulation still endures — individuals, villages and townships are held up as exemplary models for the public to follow. The practice is being further enhanced through international cooperation. For example, a number of villages and townships in Zhejiang Province have been awarded Global 500 titles by the United Nations Environment Programme (UNEP) for having 'ecologically friendly environments'.¹⁰⁹ The eco-city concept advocated by Japanese aid officials in the late 1990s also meshes comfortably with the Chinese historic predisposition towards moral suasion.

Information as the new power

Information provides a new source of environmental governance that may well reinforce the tendency to rule from above. For decades, state

capacity to monitor and regulate environmental problems has been severely constrained on account of the difficulties involved in data collection. Historic records remind us of the enormous challenges involved in collecting data on the nation's dwindling environmental resources. Just one example from the writings of a forestry official working at the Imperial Forestry Bureau in the 1940s illustrates the hardship experienced in trying to access environmental data in China's remote areas, in this case the northern part of Yunnan Province:

The long and arduous march, often in drizzling rain or blinding snow, up steep slopes, across deep gorges, through uninhabited wilderness or brigand-infested country by a slow train of pack animals along rough and often untrodden trails, requires some persistence and frequently arouses exasperation that can only be felt by those who have travelled.¹¹⁰

Over 60 years later, even under conditions of peace and growing prosperity, accessing environmental data in remote regions remains an arduous task. Losses in biodiversity, including forests, and the impacts of climate change are still poorly understood as a consequence of limited field data.

Pollution monitoring also presents many problems. The first nationwide survey of industrial pollution was not completed until 1988.¹¹¹ The number of monitoring stations in China increased rapidly during the reform period from 1144 in 1984 to 2223 in 1996. Over 5000 professional and industrial-use monitoring stations are now in operation nationwide.¹¹² Although the reliability of pollution monitoring has increased considerably, and is more in keeping with international standards, caveats remain. MEP monitors emissions from over 8 million industrial enterprises but hundreds and thousands of enterprises at the township and village level remain outside of its control. There is a lack of data on pollution emissions from rural and semi-urban areas in particular.

Recently installed Geographic Information Systems (GIS) are helping

national assessments by providing satellite imaging to reflect ground level problems. It is not too much of an exaggeration to claim that information has become the new power within the state environmental system. GIS technology is now used extensively for building databases on national resources, forecasting and preventing natural disasters, and monitoring national shelterbelt development. In the lead-up to the Beijing Olympic Games in 2008, the city had an opportunity to showcase its air quality monitoring system that included ultraviolet and infrared radiation spectroscopy technologies to monitor trace gases in the atmosphere as well as microwave radars to monitor the correlation between pollutants and traffic.¹¹³

Unsurprisingly, by 2009 total annual investments in environmental information technologies reached RMB200 million.¹¹⁴ In 2008, China launched its own satellite for monitoring the environment and natural disasters. Plans are also under way to create an environmental information transmission system that links the national database with municipal and county networks. In the future, of critical importance will be the extent to which surveillance at the macro-level can be correlated with field investigations at the micro-level. Despite the enormous technological advances that have been made, GIS is still a rather blunt instrument when it comes to monitoring the local impacts of global climate change.

In returning to the bigger issue of state-led environmental governance, a general overview of contemporary trends presents a fairly positive picture. Clearly important advances have been made that may well help to improve environmental conditions over time. Such a cursory approach, however, fails to capture the complex challenges involved in alleviating environmental pressures in practice. Above all, we have little sense of the limits of state control both in regard to policy-making and implementation. To reveal a more complex picture, we shall now return to the earlier themes of water and forests that remain critical indicators of the state's capacity to carry out environmental stewardship.

Water and the survival of the Chinese nation

Ten years ago, then Vice-Premier Wen Jiabao announced that water scarcity threatened 'the very survival of the Chinese nation'. Over half of China's cities are now seriously water stressed. Most of the water supply to major cities depends upon groundwater pumped from aquifers. But these are drying up, or becoming depleted due to the accumulation of salts in the soil. In the North China Plain, where most of China's grain production is located, per capita water supply is as low as 757m³ — dangerously below the international minimum standard of 1000 m³.¹¹⁵ According to some estimates, the water table is falling by more than 1 metre per year.¹¹⁶ Water shortages became particularly acute in 2008 when China experienced its worst drought on record since the late 1950s. Up to 4 million people faced severe water shortages, and an estimated 19 million hectares of cropland were affected.



Yellow River turns red

Widespread pollution of both surface and groundwater supplies across China further constrains availability. According to a recent report by the Yellow River Conservancy Commission, 50 per cent of the river is now biologically dead and up to 70 per cent is so polluted that it is unfit to be used even for irrigation purposes. Most of China's rivers and three-quarters of its lakes are seriously polluted. Organic pollution (biological oxygen demand, chemical oxygen demand, and ammonium) can be used as enriched nutrients

for the purposes of irrigation. But toxins (mercury, chromium, phenol, cyanide, and arsenic) render water unusable.¹¹⁷

In the immediate term, it is the survival of the Chinese people that is most at stake. Poor communities living in rural areas carry the heaviest burden because they are the most vulnerable to water contamination. Despite the advance of regulatory controls, up to two-thirds of industrial wastewater is still released into rivers untreated. There now exist more than 50 different types of waterborne diseases in China — over an extended period of time, high fluoride intake can lead to deformation and paralysis and arsenic can cause skin and other cancers.¹¹⁸ High levels of toxicity are also closely linked to abnormal pregnancy outcomes. Particularly shocking is the increase in designated ‘cancer villages’. In Xiaojidian village, for example, located on the tributary of the Yellow River in Shandong Province, 50 residents out of a total of 1300 have died of stomach or esophageal cancer in the past five years.

Under such conditions, it is hardly surprising that water conflicts are now on the rise — 51 000 water pollution incidents were recorded in 2005 alone.¹¹⁹ Conflicts are occurring between factories and farming communities as well as between upstream and downstream water users. China’s so-called ‘many dragon management system’ means that water flowing across jurisdictional boundaries is governed on the basis of special interests rather than collective rules for sharing resources.

In bringing about a secure water future, the Chinese Government faces two parallel challenges. The first involves reconciling supply concerns with growing demands for equitable distribution. Above all, allocating water resources efficiently and fairly remains a central task. In the case of the Yellow River, upstream diversions have had a serious impact upon downstream areas. Since the early 1970s, the river has run dry, failing to reach the sea for prolonged periods of time.¹²⁰ The Yellow River Conservancy Commission was set up in 1998 to coordinate water resources across all 11 provinces. Similar to other coordinating mechanisms across China, it has failed to deliver substantial benefits. As a consequence, responsibility has now shifted back to the Water Resources Ministry in Beijing. But once again, there is little evidence

to suggest that a centralised approach is more effective. In general, upstream users continue to benefit at a cost to their downstream counterparts.¹²¹

A second major challenge involves shifting from a supply-driven mode of water governance to a conservation model that recognises the importance of conserving water rather than simply rediverting it. Today, in order to produce RMB10 000 of goods, Chinese industries use approximately 100m³ of water, ten times more than the international standard. Up to 65 per cent of China’s water is used for agricultural purposes, although irrigation is no more wasteful than in many other countries. As noted by Kenneth Pomeranz, ‘limited supplies make waste a more pressing problem.’¹²² And correcting quality and wastage issues is part of the answer to dealing with water shortages.¹²³

There are signs that a conservationist approach may be gathering momentum. Fixing leaky pipes, relining irrigation ditches, or installing drip irrigation can make a difference depending on the local conditions. However, this kind of approach stands in stark contrast to the overwhelming emphasis placed upon infrastructural development. A continuing reliance upon large-scale engineering projects that pay inadequate attention to the environmental and human costs involved is one of China’s most enduring legacies affecting its environmental future.

Symbolic in this regard is the south–north water transfer scheme (*nanshui beidiao*) that aims to alleviate flooding in the south and water scarcity in the north by diverting water from the Yangtze to the North China Plain. The scheme was officially approved by the State Council in 2002. Three planned routes have been designed to connect the Yangtze with the Huang, Huai, and Hai Rivers. Construction is now underway on the eastern route that brings water from the lower Yangtze in Jiangsu Province to Tianjin city on the coast. The middle route runs between the Three Gorges in Sichuan and Beijing. And the western route, yet to begin construction, aims to redirect water from the Yarlong Tsangpo, Dadu, Tongtian and Jinsha Rivers into the Yellow River. Looming problems include large-scale soil salinisation, polluted sewage water intrusion, and adverse effects upon aquatic life along the

route. Controversies over the viability of the western route in particular mean that the project is unlikely to proceed unabated. But if completed, it will be ‘the largest construction project on earth ... carry[ing] almost 45 billion cubic metres of water per year.’¹²⁴

The Three Gorges Dam (*San Xia*) is also a living reminder of how an engineering mindset casts a long shadow over China’s environmental landscape. It is expected to generate 18GW of electricity (equivalent to 7 per cent of total electricity production) upon completion. The human and ecological implications are vast: officially, 1.2 million people have been relocated, with critics suggesting that the real figure is more in the range of 1.5 to 2 million. The Yangtze Dolphin, an endangered species, is further threatened and much of China’s finest scenery and wetlands habitat has now been destroyed.¹²⁵ Equally worrying is the silt build-up behind the dam that is already placing it under jeopardy, blocking downstream regions of vital nutrients as well as stalling potential power generation. To deal with this problem, efforts are underway to build further dams upstream leading to a vicious cycle of sediment accumulation that cripples the ability of dams to control floods and reduces the capacity for power generation.

China has the highest number of large dams (above 15m high) in the world: 22,000 or almost half of the world’s total compared to 6575 in the United States, 4291 in India and 2675 in Japan. It is not the emphasis upon engineering solutions per se that is the problem. China’s infrastructure is still underdeveloped and cleaner energy demands are vast. What is of concern is the obsession with scale, a failure to anticipate the full environmental, economic, and social costs of hydropower projects, and a lack of appreciation for the many human benefits that nature provides: naturally flowing rivers moderate floods and droughts, supply habitat for fisheries, birds and wildlife, and purify polluted water and recycle nutrients.

In his seminal work published in 1973, Ernst Friedrich Schumacher observed that small operations could lead to large impacts. He argued that large development projects were not suitable because of the unknown risks involved in large-scale technological advancement. ‘There is wisdom in smallness if only on account of the smallness and

patchiness of human knowledge, which relies on experiment far more than understanding.’¹²⁶ It is possible to think in these terms with respect to China’s reform and opening process in general — small steps crossing the river rather than great leaps into the abyss. However, this has not been the case for megaprojects. In the words of Vaclav Smil, they ‘symbolize the frequent failure of our designs to minimize environmental damage, to anticipate risks, and to approach the harnessing of natural resources with at least some humility.’¹²⁷

From a deeper cultural perspective, Dai Qing, the pioneer of Chinese environmental activism, has captured the essence of the problem in her sustained critique of China’s unrestrained development in the post-1979 era. By quoting the Daoist philosopher Laozi, she reminds us that real power lies in knowing one’s limits, *zhizhi keyi budai* (to know one’s limits is to be invincible).¹²⁸ Herein lies the potential for a less conflictual relationship between power and the environment in the contemporary era.

***Yi ke shu ye buneng zaikanle!*¹²⁹ (Not one more tree should be cut!)**

On the surface it would appear that forests have become the single most important indicator of environmental renewal. China has been a world leader in afforestation since the late 1990s. Satellite images reveal a wave of tree plantations sweeping across the nation. It is certainly the case that forestry policy has changed dramatically over the past decade, leading to some impressive results. However, the sustainability and recovery rate of current forestry programs is still unknown, especially in poor and remote regions where forest ownership and user rights remain unclear. Most at stake is the irreversible decline of natural forests in China’s northeast and southwest.



Afforestation in Gansu

At the onset of reforms in 1979, only 115 million hectares of forests had survived. Natural forests could only be found in the Greater Hinggan and Changbai mountain ranges in Heilongjiang, Jilin, and Liaoning, remote parts of Guangdong, Yunnan, Sichuan, and the river valleys across the Qinghai–Tibetan Plateau. Most of the remaining natural forests were located in areas surrounding temples.¹³⁰

Over the past 30 years, massive tree planting campaigns, combined with aerial seeding and the expansion of shelterbelts, have helped to bring about a dramatic reversal of long-term negative trends. Forest coverage increased to 154 million hectares in 1998 and reached 159 million hectares in 2006 (representing 16.5 per cent of total land area). In the contemporary era, forestry cover includes natural, commercial timber plantations to support the paper industry and light industrial manufacturing, economic forests (orchards, rubber, and bamboo), shelterbelts to combat erosion and desertification, and nature reserves.¹³¹ Recent additions to the list include ‘ecological forests’ and ‘urban forests’. The former have been introduced for the purposes of

soil and water conservation, and the latter as a means of improving living conditions in Chinese cities.¹³² As discussed later, recognition of the value of forests also extends to carbon sequestration as a deterrent against global climate change.

Forest tenure reform has also played a critical role in the expansion of forest coverage, although many problems persist. In the early 1980s, the forestry three-fix policy was introduced to provide rural households with rights to use forests for subsistence purposes. Contracts between farmers and state authorities were encouraged for the purposes of managing forests over a specified period of time.¹³³ Despite appearances to the contrary, by 1985 almost 50 per cent of replanting in China was being driven by private initiative.¹³⁴ The role of the state re-emerged as a central force in the late 1990s when it became apparent that the economic gains of forestry could not outweigh the ecological benefits.

A year before Wen Jiabao made his speech about water security, China experienced devastating flooding of the Yangtze River that raised alarm bells over unsustainable forestry practices upstream. More than 3000 people lost their lives, 5 million homes were destroyed, and 52 million acres of land were inundated.¹³⁵ In the wake of the crisis, a number of economically focused studies revealed the real value of forests by internalising their ecological benefits. In one famous study, the water storage value of China’s forests was estimated to be three times higher than the value of the wood, sending a strong message that ‘not one more tree should be cut!’¹³⁶ The government responded to rising concern by introducing a logging ban in the middle and upper reaches of the Yangtze River.

Over the past decade, forestry policy has changed quite dramatically, with important implications for environmental governance more broadly. The urgent need to protect forests on a grand scale has reinforced the role of the state. Since 2000 the State Forestry Administration has concentrated its efforts on six key forestry programs. The Natural Forest Protection Program aims to protect approximately 60 million hectares of forests in the upper reaches of the Yellow and Yangtze Rivers, and 35 million hectares in northeast and Inner Mongolia. Under the Conversion to Cropland and Forests

Program, plans are underway to convert all cultivated lands on slopes higher than 20 degrees back to forests or grasslands over a 30 to 50 year period.¹³⁷ By the end of 2003, almost 80 000km² of cropland had been reforested or reverted back to grassland.

The Key Shelterbelt Development Program supports further protection within the Yangtze basin and continues the centuries-long campaign to prevent desertification in the 'Three North' regions; the Sandification Control Program focuses on the cities of Beijing and Tianjin that are most prone to dust storms; the Wildlife Nature Reserve Development Program aims to augment the protection of forests within nature reserves; and the Forest Industrial Base Development Program is a new approach that hopes to promote fast-growing and high-yielding timber plantations as well as foster new industries such as bioenergy and biomass.¹³⁸

Recent reports on the implementation of the above programs reveal mixed results. While aggregate statistics relating to the number of nature reserves created (831 during the period 2001-06), conversion rates of cropland, and exports of forestry products appear remarkable on paper, implementation is still weak at the local level and the long-term trends remain unsustainable. Few nature reserves are managed effectively and illegal logging and mining are commonplace. China's complex system of forest ownership and user rights is a significant obstacle to bringing about reform. The transfer of land to farmers has proven haphazard at best; and many are denied adequate compensation to offset their losses.¹³⁹

The hope is that these difficulties can be resolved over time. Yet, time is running out for China's natural forests that are now on the edge of extinction. According to a Greenpeace China report released in 2006, only 0.1 per cent of China's natural forests covering 55 448km² (or 2 per cent of total forested area) are under strict protection.¹⁴⁰ The last remains of ancient forestry ecosystems can be found in West Sichuan Province, across the China-Burma border, in the outer area of the U-shaped turn of the Yarlung Tsangpo in Tibet, and in the northern parts of Inner Mongolia, Xinjiang, and Heilongjiang.

It's all the fault of local officials?

Governing by central fiat has its limitations. As the Chinese saying goes, '*yuan shui jiu bu liao jin huo*' (distant water is useless in fighting the fire at hand). But at the same time, decentralisation is also leading to problems. A wealth of studies convey a strong impression that weak compliance at the local level is the predominant cause of the failure to implement more sustainable public policies. The general image is one of 'agency capture' in which self-seeking local officials collude with local enterprises to pursue profits at a cost to the environment.

The traditional tug-of-war between the state and its localities has a long history. Even in the post-1949 era, Mao Zedong stressed the need for 'local self-reliance' and, therefore, the scope existed for communes to pursue local interests, albeit heavily circumscribed under party controls.¹⁴¹ Growing fragmentation between the centre and its localities is a central feature of the post-1979 reform era. As suggested by Jean Oi, local governments now behave more like 'local states' in 'coordinat[ing] economic enterprises in [their] territory as if [they] were a diversified business corporation.'¹⁴² Municipal governments invest in local industry, have control over collective enterprises, and compete with other localities for foreign investment. Under these conditions, it is hardly surprising that market reforms have led to the profligate pursuit of economic self-interest at the cost of the community's environmental health.

To make matters worse, local EPBs suffer from an inherent conflict of interest: they are responsible to the central environment agency in Beijing and also form part of the local government machinery. On balance, the power of local governments prevails because they provide environment agencies with their annual budgetary funds, and they also have decision-making authority over the allocation of personnel and resources. A vicious circle exists whereby EPBs are dependent for regulatory enforcement upon local governments that, in turn, depend upon local enterprises as an important source of tax revenue and employment.

The central government has attempted to address the lack of incentives for environmental protection at the local level by adopting

the responsibility system (*huanjing baohu mubiao zeren zhi*) whereby poor performance ratings in meeting specified environmental targets can adversely affect political careers. The system was introduced in the late 1990s and it does appear to have had some effect on galvanising local mayors and vice-governors into environmental action.¹⁴³ Unfortunately, with the onset of the global financial crisis, the system has been put on hold. It is, therefore, difficult to see how China's RMB4 trillion stimulus package can be monitored effectively to ensure against investment in heavily polluting and energy-intensive industries.

Hope now lies with the new measures on open environmental information, introduced in May 2008. Under these guidelines, environmental agencies are required to disclose information on enterprises exceeding discharge quotas. For their part, corporations are under the obligation to disclose discharge data within a certain period of time or pay a fine of up to RMB100 000 (roughly US\$14 500). Over time these measures may help to improve regulatory compliance in China, but they are unlikely to provide a substitute for active public participation. As will become clear in the next chapter, the public right to information is the touchstone of effective pollution control.

The importance of local capacity

While the importance of incentives cannot be underestimated, it is too simplistic to assume that non-compliance at the local level is the sole cause of the failure to implement environmental protection in China, a view that is commonly reinforced by the central government. Blaming local officials is too simplistic. A deeper investigation into local environmental governance reveals mixed performance across diverse socioeconomic and biophysical contexts.¹⁴⁴

The degree to which regions in China differ in their environmental performance is more difficult to evaluate. Empirical studies are still limited both in volume and geographic scope. Many of the earlier studies on the implementation of environmental policies focused upon the richer eastern provinces and municipalities, namely Guangzhou, Shanghai, and Jiangsu.¹⁴⁵ What is becoming more evident over time is that the uneven spatial distribution of China's economic growth is

leading to a situation whereby the ability to act environmentally will be higher in the more developed regions of China where local government financial and institutional capacities are stronger.

Beyond the issue of compliance, weak capacity in environmental governance is also a key factor in determining the success of local implementation. Local officials are not necessarily motivated exclusively by self-interest — if they are, the consequences for the environment in China are dire indeed, and enhancing environmental protection would represent little more than a leap of faith. Professional pride and satisfying community concerns are also motivating factors. From a broader perspective, local environmental action is likely to vary according to the funding, skills, and institutional capacities of the EPBs, the political commitment of local leaders, and the level of public awareness.¹⁴⁶

The problem of accountability

While it is certainly true that institutional reforms are required to ensure a smoother process of policy implementation, it is also the case that much more needs to be done to nurture bottom-up forms of sustainable governance that draw upon localised understandings and practices.¹⁴⁷ Those who have most to lose from poor environmental governance are often invisible. Seen from the vantage-point of the marginalised, the problem of implementation looks quite different. It is not stronger oversight by central authorities that is required but, instead, democratic decentralisation that genuinely promotes empowerment and learning.¹⁴⁸

Bin Wu's empirical study of farmer innovation in Shaanxi Province reveals the sustainability value as well as the long-term benefits that can accrue from promoting farmer self-organisation and know-how in marginal rural areas.¹⁴⁹ Similar studies looking at forestry governance in Yunnan Province demonstrate the importance of downward accountability that allows local communities and ethnic minorities 'to bring their knowledge and practices, as well as aspirations and needs, into the governing process.'¹⁵⁰ After all, organic unity between humans and nature can be most clearly expressed by those living the experience.

This is not to suggest that the retreat of the state is a necessary

condition for effective environmental governance, but rather it is to make the point that a lack of accountability seriously limits the potential to achieve positive environmental outcomes. The accountability deficit inherent in China's political system pervades environmental action at all levels of the administration from the local to the national. It is the single most important constraint on China's evolving system of environmental governance. It is also the reason why a reinvented form of environmental statecraft will not suffice in bringing about an ecological civilisation. In the struggle to transform China's modernisation drive, traditional Chinese values of moderation, adaptation, and harmony are now more prescient than ever. Arguably, they will have the greatest impact when combined with modern democratic values of openness and accountability. The difference between environmental statecraft and environmental governance is that the latter is a more pluralistic form of social organisation that combines state-led regulations with market-led initiatives and a high degree of citizen participation. Put differently, what is required is a harmonious balance between a strong environmental state and a strong empowered and environmentally conscious society.

Chapter 3

Beyond the state: green advocates and entrepreneurs

It is only by looking beyond the state that we can arrive at a more complete understanding of the evolving patterns of environmental governance in China today. Command and control measures now coexist with new forms of environmental action that reflect greater openness and pluralism within Chinese society. The agents of environmental change are no longer restricted to political, bureaucratic, and local elites, but also include non-governmental organisations (NGOs), corporations, the media, and international organisations. Coinciding with the shift towards a market-based economy, it is increasingly understood within policy-making circles in Beijing that economic incentives are an important driver of environmental protection. Equally significant, albeit far more circumscribed, is the guided support for citizen participation.

This chapter looks at some of the environmental advances taking place beyond the dominant realm of the state. It investigates the recent orientation towards the market as well as the growing influence of citizen participation. A select number of cases illustrate the ways in which corporations and NGOs are contributing to a more inclusive form of environmental governance. Focusing on some of China's leading advocates and entrepreneurs also provides critical insights into the shifting boundaries of environmental reform.

Bringing in the market

Since the late 1990s, the Chinese government has been experimenting with a number of market-based incentive schemes to meet the requirements of an environmental mandate from above. Market-based taxes (modified to 50 per cent market rate) were initially introduced in the cities of Jilin, Hangzhou, and Zhengzhou. In early 2002, a sulphur dioxide quota system was introduced in seven provinces and cities. More recently, carbon emissions trading has been set up in Beijing, Shanghai, and Tianjin. In its first year of operation, the Beijing Environment Exchange traded over 30 million metric tons of carbon.¹⁵¹ Although still in their infancy, these exchanges represent a significant shift toward market solutions for dealing with environmental problems.

The emissions trading concept is now being extended to include natural resources. For example, the first pilot futures market for the trading of forest assets was established in Fujian in 2004. Within three years of operation, the Fujian Yong'an Forestry Elements Market had traded over 200,000 hectares of forests and provided purchasing loans totaling US\$63.8 million.¹⁵² An experiment with water trading is also taking place in Tongliang County in Chongqing.¹⁵³

The principle behind these trading schemes is simple: governments set the ambient level of pollution or resource extraction rate and tradable permits allow for the allocation of emissions or resources below the prescribed threshold. The problem is that the schemes have not been uniformly implemented. In the case of emissions trading, interpretations differ widely — ‘many cities simply exchange emissions between old and new plants.’¹⁵⁴ Similar problems exist in trading natural resources. As environmental economists would predict, in the absence of clearly defined user rights and consistent monitoring, it is proving difficult to sustain a system of equitable distribution. The obvious risk is that resources will simply flow to the money, with negative consequences for poorer communities. Nevertheless the willingness to experiment is a positive step in the direction of a broader approach towards environmental governance. If a strong feedback mechanism can be put in place, there is no reason why improvements cannot be made along the way.

Beyond the application of market instruments, China's entry into the World Trade Organization (WTO) in 2001 and its subsequent adoption of the ISO 14000 international certification system have helped to encourage a shift towards cleaner production and the development of an indigenous environmental protection industry that enjoys strong backing from the government.¹⁵⁵ In the late 1990s, most of the approximately 9000 enterprises involved in environmental equipment and services were small, with low scientific and technological capabilities.¹⁵⁶ The output value of China's environmental industry increased to 1.9 per cent of GDP in 2001, and it is now worth more than RMB100 billion.¹⁵⁷ If we take the solar power industry as an example, exponential growth over the past decade has meant that China now dominates the world market. Shi Zhengrong, CEO of Suntech based in Wuxi outside of Shanghai, is one of China's billionaires. His company was floated on the New York Stock Exchange in 2005, and it is now the largest producer of solar-cell modules in the world, although domestic sales constituted only 1.5 per cent of total sales in 2007.¹⁵⁸ Preferential tax breaks and land allocation rights for factories are helping to stimulate the domestic market for solar powered water heaters — there are now over 2000 companies involved. Half the residents of Kunming use solar heaters, and the coastal city of Rizhao has now become totally dependent upon solar energy for its hot water.¹⁵⁹

Pressures from consumers are also sending a clear signal to the market. Indeed, enhancing consumer sovereignty offers an alternative means of enforcing environmental protection. An environmentally safe labeling scheme is still in the process of development in China. The Ministry of Agriculture first introduced the green food label (that refers to food that has been grown under strictly controlled chemical use) in 1990. This was followed by the Three Green Project initiated by the Environment Agency in 1999 to ‘cultivate a green market’, ‘promote green consumption’, and ‘provide a means for improving food quality’. China's labeling scheme is now more in line with international standards, although monitoring capacity is still weak, and national standards for organic food do not, as yet, exist. Following the milk

scandals in 2008, when thousands of children (mostly aged two and younger) were affected by contaminated infant formula, food labeling has taken on an additional sense of urgency.

It is likely that the shift towards harnessing the market for environmental purposes will become even more visible in the future. New proposals have been put forward to place a monetary value on scarce resources such as water and coal. A heated debate continues over the adoption of a green GDP indicator to ensure that economic growth statistics reflect environmental externalities (major obstacles include the complexities involved in calculating the value of natural assets and ensuring compliance at the local level).¹⁶⁰ And new measures are in place to encourage environmental disclosure across the Chinese banking sector and capital markets.

The Ministry of Environmental Protection, in partnership with the Chinese Banking Regulatory Commission, launched a 'green credit' policy in 2007 that was quickly followed by a Green Securities Policy in 2008. These measures aim to restrict lending to polluting enterprises and raise the environmental standards of listed companies.¹⁶¹ They do not, however, obviate the need for public accountability. All 30 companies listed on the environmental blacklist by the Bank of China have subsequently received loans.¹⁶² Within the context of a global financial crisis, encouraging green investment is proving particularly challenging for the simple reason that banks are desperate to lend.

Bringing in the market is now part of an evolving approach towards environmental governance. However, in the absence of a fully functioning market economy, nationwide progress is likely to be slow and more successful in the developed coastal regions of China that can afford to pay. An important determinant of success will be the extent to which corporations are willing to take the lead rather than simply walk in the shadow of the government.

Greening corporations

Chinese enterprises are usually associated with contributing to increasing levels of pollution rather than promoting sustainability.

Their foreign counterparts have fared little better; they are more likely to be labeled as environmental culprits rather than saviours. Multinationals operating in China are often accused of taking advantage of lax regulations and treating the local environment as a cheap haven for waste. It would seem, however, that attitudes are slowly changing.¹⁶³ Following the trend in industrialised countries, corporations in China are beginning to reveal some green credentials.

In November 2004, the previously named State Environmental Protection Administration awarded environmentally friendly status to eight leading Chinese enterprises.¹⁶⁴ By 2009 the total figure had risen to 38, with many located in Jiangsu Province. Multinationals now sponsor environmental campaigns, support cleaner production in Chinese factories, and participate in energy efficiency projects. Dow Chemical was one of the first multinationals to sponsor a cleaner production program in China targeting medium-sized enterprises. And B&Q is now taking the lead in certifying its timber products sold in home furnishing stores across China.¹⁶⁵ Other corporate initiatives involve partnerships with research institutes and NGOs. For example, in response to a European ban on pesticide-laden tea products from China, the Yunnan Entomological Society has been working with tree plantations to develop non-toxic pest control methods.¹⁶⁶

Of course, these positive cases are still fairly limited, but they may have an important demonstration effect, especially at a time when corporations can no longer isolate themselves from environmental harm. The egregious breaches of health, safety, and environmental regulations seen in the past are unlikely to be tolerated in the future; indeed tougher sanctions are already in place. As noted by Guo Peiyuan, pressures for corporate change are coming from various directions — government, overseas purchasers and investors, media, and the Chinese people.¹⁶⁷

The problem is that it is difficult to gauge the effectiveness of corporate contributions in practice. With the benefit of hindsight, it is now clear that ambitious plans to build eco-cities, such as Dongtan on Chongming Island outside Shanghai, that can generate all their energy needs from renewable sources, are not living up to expectations.¹⁶⁸ Grand plans

to build the world's first commercial direct coal-liquefaction plant in Inner Mongolia announced by the state-owned Shenhua Group in 2005 have recently been postponed due to energy efficiency problems.¹⁶⁹ And anecdotal evidence suggests that corporate-funded projects in rural areas often fail to generate positive outcomes for the community.

So what exactly is the potential for corporations to play more of a leading role in environmental protection? In reality, we still have limited knowledge of what actually works. Independent field studies are rare, especially in relation to natural resource management. The two cases illustrated below are by no means representative, but they do provide a clearer picture of both the pitfalls and promises of corporate environmental governance in contemporary China.

The elephant in the forests

Asia Pulp and Paper (APP), a subsidiary of Sinar Mas Group, is the second-largest pulp and paper producer in Asia with assets worth over US\$14 billion. In order to increase annual production of paper and packaging to 10 million tonnes by 2010, the company is expanding its plantations of fast-growing Eucalyptus and Acacia, mostly in China and Indonesia. In 2000, APP China formed a partnership with the Qingyuan Forestry Corporation (owned by the Forestry Bureau in Qingyuan city, Guangdong Province) to manage plantations and processing mills. The local forestry corporation was responsible for negotiating land-use rights with farmers and communities. But this proved to be little more than a façade: consultations were inadequate and land-use rights were transferred without consent. Tensions increased when outside labour was brought in to administer the tree planting.¹⁷⁰ In theory, corporate-community partnerships can provide an important source of income, rural employment, and technical support. But in this case, a lack of tenure security, government interference, and poor environmental planning undermined community involvement.

Two years after the contract was signed, the provincial government intervened to stop the construction of the processing mills located on the upper reaches of the Beijiang, a major tributary of the Pearl River. This

was out of concern that the mills would pollute and threaten the water supplies for residents living downstream. In response, APP cancelled its afforestation plans. At the time, much of the blame for failure was placed upon the government rather than the corporation. However, a few years later, a damning report by Greenpeace China revealed the extent of APP's environmental negligence casting this particular story in a totally different light.

In 2002, the company set up a pulp mill on Hainan Island as well as a large-scale forest-pulp-paper integration program in Yunnan Province. On-the-ground investigations conducted by Greenpeace in 2004, and later confirmed by the State Forestry Administration, revealed that despite a commitment to sustainable forestry, the company had cleared large tracts of natural forests in both locations to supply its mills. Such malpractice incurred considerable costs to the natural environment, local communities, and the company's reputation.

This case reinforces the importance of stricter surveillance as well as greater awareness building of the multiple benefits that natural forests deliver. As well as providing critical pools of biodiversity, China's natural forests offer scientists the opportunity to conduct baseline surveys on climate change. They also provide a reservoir of medicinal uses including anti-cancer and anti-HIV compounds.¹⁷¹ Seen in this light, privileging short-term profit over long-term sustainability makes little sense. Fortunately, more sustainable practices now exist. While the case that follows is unique, it does offer a positive exemplar of corporate involvement in the forestry sector that could be replicated in other parts of China.

Ecological renewal meets private capital

By the late 1990s, it had become clear to Beijing residents that soil erosion and desertification in northern China were directly affecting the nation's capital — sandstorms were increasing both in frequency and intensity. In 2000, then Premier Zhu Rongji made a symbolic gesture of travelling 180km north to Duolun County in Inner Mongolia Autonomous Region to plant trees. His direct action caught the attention of a Hong

Kong businessman, Lo Suikei, who had set up a wholly foreign-owned enterprise on the mainland in the mid-1990s. In forecasting the business opportunities that could arise from private forestry, in 2002 he set up the Beijing Dr Forest Forestry Development Co. Ltd (BDFFD), also known as *shengtai yewu fazhan* (ecological business development).¹⁷²

The new company set out to improve forestry management and provide benefits to the local communities in Xilinguole, Inner Mongolia. With a permit to use state-owned land for 70 years, it initiated a restoration project covering 80 000mu (1318 acres) of seriously degraded grasslands. Given their status as overseas Chinese, it took the company two years to set up a local counterpart agency in Inner Mongolia. In recognition of the many problems that plagued government-run afforestation programs, especially in relation to maintenance, a particular emphasis was placed upon consultations with local communities, government officials, and forestry specialists. For Lo Suikei, consultation continues to be a dominant factor behind the company's apparent success.

From a business perspective, the devil is in the numbers. On average it costs BDFFD RMB18 (US\$2.60) to plant and maintain a tree for five years (RMB3.6/US\$0.52 per tree per annum). At the aggregate level, 5000mu of forests costs around RMB5 million (US\$717 000).¹⁷³ This includes maintenance costs. Local staff are employed to plant and cultivate forests. The expectation is that the company will see a return on its investment within the next 10 years. If carbon offsets are factored into the equation, this may come sooner. A poplar or pine tree at full maturity has an average mass of one cubic metre, which offsets approximately 1.83 tons of carbon. Notably the market value of a ton of CO₂ in 2008 was between US\$6 and US\$8.

The first phase of the project focuses upon environmental renewal, which takes around five years. By 2008, 6000mu (988 acres) covering a total of 330 000 trees, mostly poplar and pine, had been planted with a survival rate of 95 per cent.¹⁷⁴ In the second phase, plans are under way to develop eco-tourism in partnership with local communities. Real estate opportunities are now opening up to satisfy the demands of Beijing residents seeking sanctuary away from the city. It is too early to

tell whether the project will realise its full potential both ecologically and economically. But in the meantime, it merits continuing attention. Such positive examples of 'hands on' corporate involvement in sustainable forestry in China are rare.

Bringing in the people

Relative to the opportunities that exist in a developing market economy, corporations are far behind in taking the lead in environmental protection. Paradoxically, relative to the opportunities that exist in a closed political system, NGOs are way ahead. The rising number of environmental NGOs (*minjian zuzhi*) suggests that democracy in the sense of representative elections need not exist before citizen participation can have meaning. According to official statistics, there are over 3000 environmental NGOs now operating nationwide.¹⁷⁵ The emergence of Chinese civil society (*gongmin shehui*) is creating the necessary associational space for citizens to voice and act upon their environmental concerns. Within this space the Chinese print, television, and new media also play a critical role in raising environmental awareness and promoting ideas for environmental improvement.

Even in Western industrialised countries a clear boundary between the state and civil society does not exist, and few NGOs can genuinely claim to be completely autonomous from the state. The relationship between NGOs and the state is even more blurred in the Chinese context.¹⁷⁶ Government regulations on social organisations — first promulgated by the State Council following the student-led pro-democracy campaign in 1989 — are highly restrictive. In effect, the Chinese authorities are intolerant of any social movement or organisation that is perceived to pose a direct threat to the regime or national stability. Consequently, self-censorship remains a unique characteristic of Chinese environmental activism. Although this does not necessarily impede effective action, it does restrict the ability of NGOs to fulfill their reformist potential as advocates of environmental protection. In effect, bringing about reforms from below remains limited by the refusal to relinquish control from above.¹⁷⁷

That said, human ingenuity can flourish even under highly restrictive conditions. The pioneering role of environmental NGOs in China has attracted a lot of attention. It is generally assumed that they enjoy a higher level of autonomy relative to other NGOs by virtue of the fact that their agendas mesh comfortably with that of the central government. As in the case of other developing countries, environmental NGOs are stepping into the void left by the state to provide basic environmental services such as water and sanitation, low-cost energy supply, and environmental education. By engaging with the state, NGOs can deliver practical benefits as well as practise creative forms of advocacy that draw their strength from representing the interests of the people.

Citizen action on environmental issues is by no means limited to formal organisations. Spontaneous protests against polluting industries are now commonplace across China. According to the conservative estimates of the Ministry of Civil Affairs, there were more than 60 000 environmental protests in 2006. The majority of protests are highly localised and limited to rural areas. However, more recently large-scale demonstrations have taken place in urban areas facilitated by the spread of mobile communications. In June 2007, up to 20 000 people took to the streets in the resort city of Xiamen in protest over the construction of a chemical factory close to residential areas. Massive public opposition caught the attention of the central authorities in Beijing and the project was suspended pending an environmental review.

Environmental NGOs

From the outset, it is important to note that Chinese environmental organisations are notoriously difficult to categorise. A large number remain under government control. These semi-official organisations (*ban guanfang zuzhi*) include the China Environmental Science Foundation, the China Wildlife Conservation Association, and the China Environment Protection Fund.¹⁷⁸ Many are also academic in nature, although the boundaries between scholarship and activism are often blurred. The Centre for Biodiversity and Indigenous Knowledge (CBIK) in Yunnan Province is a good example of a research-based

NGO that is relatively independent from government, primarily focused on research and consultancy, and also engaged in advocating on behalf of poor ethnic communities. A growing number of more independent organisations also exist. Most attention to date has focused upon a small number of high-profile NGOs in Beijing, such as Friends of Nature and Global Village, which were set up in the mid-1990s. Over the past decade, this trend has spread nationwide, especially in Yunnan Province, which benefits from a concentration of international donor support.¹⁷⁹

In reality, environmental NGOs vary greatly with respect to the scope of their activities, the degree of government autonomy, and access to resources. Not all of them have official legal status. What they have in common is a strong desire for environmental improvement. To this end, many prioritise the importance of environmental education. Others focus on advocating alternative solutions for restoring degraded ecosystems, or improving the effectiveness of pollution control mechanisms.

Many NGOs are no longer confined to working in local spaces. The campaign against the construction of 13 hydroelectric dams along the Nu River is just one example of how local NGOs are now more enmeshed in global networks of ideas, partnerships, and funding commitments. In this case, local NGOs in Yunnan mobilised against the dams by joining forces with the International Rivers Network and journalists and NGOs based in Beijing. Wang Yongcheng, a renowned photojournalist and director of Green Earth Volunteers in Beijing, led an expedition of journalists, volunteers and scientists to the Nu River in early 2004. Their photographs were released nationwide, which helped to galvanise public opinion as well as attract the attention of the central leadership. In response to the campaign, as well as protests from countries downstream that would have to live with the adverse effects, Premier Wen Jiabao placed a moratorium on the dam-building project until further assessments could be carried out.¹⁸⁰

This kind of campaigning proves the exception to the rule. More typical are the activities of the two environmental NGOs described below that are working at the vanguard of environmental reform, but in

a more engaged manner. They offer examples of social entrepreneurship that, if left to flourish, may well accumulate over time and help to tip the balance of power more in the direction of sustainability.

A tribunal of public opinion

Ma Jun is one of China's leading environmentalists working at the front line of efforts to promote freedom of information and public participation. As a former investigative journalist, he is best known for his contribution to the public understanding of water issues that culminated in his book on China's water crisis, *Zhongguo Shui Weiji*, in 1999.¹⁸¹ He is now the Director of a Beijing-based NGO called the Institute of Public and Environmental Affairs (IPE) that has taken the bold initiative of addressing the accountability deficit that undermines China's current system of environmental governance.

As a means of holding egregious polluters to account, in 2006 IPE launched the first public water pollution database via a website portal that presented environmental quality data from 31 provinces and 300 cities. Easily accessible in both Chinese and English, the database is presented as a series of maps using GPS technology. Over 20,000 Chinese and multinational corporations are currently listed.¹⁸² To provide broader coverage, additional databases are now available that expose companies failing to meet air pollution standards and deal with hazardous waste.

Corporate violations are documented on the basis of local media coverage, citizen complaints, and EPB reports. The New Measures on Information Disclosure have helped in gaining access to data from local EPBs that have a tendency to withhold information that may incriminate local business interests. Companies are also encouraged to disclose bad pollution habits on a voluntary basis by receiving a special mention for their cooperative attitude on the website. A commission of 20 NGOs nationwide are involved in the verification process as a safeguard against misinformation.

Environmental disclosure has recently been extended to expose violations throughout the manufacturing supply chain. This means

that suppliers can be screened for their environmental track records by multinationals operating in China, such as Walmart, Nike, and GE. There are currently over 30 000 corporate violations listed on the database.

For auditing purposes, engineering firms are employed to carry out third-party accreditation under the supervision of local NGOs. Positive results are beginning to show: a textile company in Zhejiang Province upgraded its pollution control technology in order to continue its supplier contract with Walmart; and National Panasonic has now been taken off the database following its agreement to comply with the recommendations of the audit commission. More typical, however, is a brewery located on the tributary of the Yellow River in Gansu Province that prefers to pay a RMB5000 fine to the local EPB twice a year rather than invest RMB3.9 million to build a wastewater facility.

A recent partnership between IPE and the US-based Natural Resources Defense Council has led to the creation of a Pollution Information Transparency Index that provides annual assessments of environmental disclosure in 113 Chinese cities. Not surprisingly, coastal cities performed better than poorer inland cities, but this did not exclude the latter from making innovative contributions.¹⁸³ Clearly, this is a trend that is developing fairly rapidly in China, supported by the government and a growing number of environmental organisations.

So why is public disclosure so important? Seen from the NGO perspective, the database provides 'an important tool for citizens to become informed and then create pressures on companies to take action.'¹⁸⁴ At the time of writing, media reports revealed that over 600 school children in Fengxiang County, Shaanxi Province, were suffering from lead poisoning on account of the gross negligence of a nearby lead and zinc smelting group. This is by no means an isolated incident. In 2006 more than 250 children living in the village of Xinsi in Gansu Province were reported to be suffering from lead poisoning, with up to five times the blood-lead levels considered safe by the World Health Organization. Local villagers were unaware of the significant health risks involved in living next to a lead factory, and their children now live with the consequences of severe intellectual impairment.¹⁸⁵

Pollution disasters are now threatening the lives of thousands of

people nationwide. In the absence of a fully functioning legal system, informal governance is essential. Above all, enhancing public accountability is a critical means of ensuring due diligence. In the words of Ma Jun, ‘what is needed is a tribunal of public opinion.’¹⁸⁶

Seeding ecological renewal in an arid landscape

Located 1600 kilometres away from Beijing, in one of the driest and most polluted regions of China, Zhao Zhong, a former nuclear engineer, is pioneering new approaches to environmental protection that empower local communities and encourage creativity from the bottom up. In 2007, with help from the US-based international organisation, Pacific Environment, he set up the first environmental NGO in Gansu Province, called Green Camel Bell. Under the supervision of the Lanzhou Science and Technology Association, the mission is to bridge the gap between the government and the people based on the principle ‘from the public, to the public’.

Located in Lanzhou city, Green Camel Bell is one of the many local NGOs that provide pollution data to the Institute of Public and Environmental Affairs in Beijing. For a small grassroots organisation, the task is overwhelming. Lanzhou is home to some of China’s worst polluting industries including chemicals, cement, iron, and steel. During the winter months, pollution levels are so high that the city is no longer visible by satellite. The Yellow River running through the city of 2 million people frequently runs red as a consequence of severe industrial contamination.¹⁸⁷ A petrochemical spill in 2006 provided an opportunity for the NGO to become more directly involved in pollution control efforts by helping the plant that was responsible, PetroChina, to set up a viable monitoring system. It is also working with local breweries situated on the tributaries of the Yellow River to improve environmental auditing.¹⁸⁸

Other activities include a ‘civilising’ campaign with Lanzhou Zoo to educate visitors about animal protection and the importance of maintaining a clean environment; setting up eco-villages in the earthquake areas of Gansu; and producing a map of Lanzhou city that

details the major cultural and natural heritage sites. More recently, Green Camel Bell has been working in rural areas to help facilitate access to clean water and improve community resource management.

Gansu is one of the driest regions in China — the average per capita water availability is only 110m³, roughly 3 per cent of the world average. With annual rainfall of around 300 millimetres, farmers are particularly vulnerable to climate variability. River run-off during the dry season is now dangerously low, leading to a dramatic reduction in agricultural productivity.¹⁸⁹ Adaptation techniques such as rainwater harvesting that have existed in China for at least two millennia, are now being modified to suit modern agriculture and changing biophysical conditions.¹⁹⁰ The new rain harvesting agricultural approach aims to alleviate water constraints by integrating rainwater harvesting, water-saving irrigation, and effective crop rotation.¹⁹¹

For the visitor travelling to rural areas the sight of sunflowers sprinkled across a semi-arid terraced landscape comes as a surprise. Growing sunflowers seems to be an unlikely choice for cash strapped farming communities that are seriously water deficient. But, the flowers provide an important means of survival at a time when farmers are under increasing pressure to migrate to a more hospitable natural environment. Unlike traditional corn crops, sunflowers can absorb salt from degraded underground aquifers; sunflower seeds can be sold on the open market; and the stalks provide a source of biogas. Sunflowers are also providing an opportunity for a new form of community governance. For example, Green Camel Bell is working with farmers in Huining County on the Loess Plateau to set up a cooperative to manage planting and ensure fair trade in seeds and fertilisers. A microcredit scheme is in place that allows farmers to retain profits within the cooperative and invest in future technical assistance programs.

Zhao Zhong is committed to strengthening community participation by working with the government, international agencies, and corporations. In general, NGO-led community projects depend upon funding from international donors. In the case of Green Camel Bell, the risks associated with financial dependency are now more evenly spread. The NGO also receives corporate funding from Lenovo, the Chinese

computer manufacturer. Funding arrives indirectly via a Non Profit Incubator — an intermediary organisation that manages corporate funding for NGOs and charities. A major advantage is that NGOs are given discretionary power over how the monies are spent with negligible interference from the corporations. In a more direct fashion, Green Camel Bell is also working with a Chinese water equipment corporation, Jing Shui Zhu, that is trying to expand its sales into the rural market. The corporation provides the equipment at lower cost, and the NGO conducts the necessary training. This kind of engagement between NGOs and corporations represents a new era in environmentalism from below that has yet to be fully realised.

Old visions, new horizons

No single panacea exists for governing environmental problems. Following decades of intense theoretical debate, it is becoming clearer that implementing environmental goals relies upon effective bureaucracies and state regulatory controls, economic incentives, and public participation. The state plays a key role but it cannot alone determine the exact requirements and scope of environmental protection; it is also constrained by self-serving behaviour. A market approach can help to provide efficiency gains through the utilisation of financial incentives. But it cannot guarantee better environmental outcomes for the simple reason that environmental problems are caused as much by social and cultural practices as by patterns of consumption and production. Many theorists have argued that without public involvement, environmental governance is doomed to fail because effective implementation relies upon public consultation and engagement. They reflect the argument advanced by the American ecologist Barry Commoner that external constraints such as the state and the market will only work if they are ubiquitous.¹⁹²

In the Chinese context, public participation is the weakest link. As the above cases highlight, this is not a consequence of social inertia. On the contrary, environmental organisations are flourishing within a limited political space. The problem is that environmentalism beyond

the state remains tightly controlled. Predictably, the booming economy is tending to focus attention on market-oriented solutions rather than political reforms. Such an approach is essential, but it is not enough to bring about a more sustainable and equitable society. In the words of William Lafferty and James Meadowcroft:

... the most exquisite economic device may remain a textbook curiosity unless the legal parameters which regulate economic activity are modified. But such changes are the result of political processes and decisions. Politics constitutes the key mediating mechanisms through which human societies can self-consciously adjust social practices into less environmentally destructive patterns.¹⁹³

The question then arises of what particular mode of political governance is best suited to perform this mediating role. As many commentators have suggested, it is unrealistic to assume that multiparty elections at the national level based on universal suffrage will lead to the prioritisation of environmental concerns over economic interests.¹⁹⁴ Indeed, as we are witnessing in the response to global climate change, political elites in established democracies are capable of pursuing political goals that are at odds with the emerging public environmental consciousness.¹⁹⁵ What the Chinese experience makes clear is that political leadership for the environment is just as likely to emerge from within an authoritarian state. Yet, it is also the case that the implementation of environmental goals cannot work if decision-making power is highly concentrated; this inevitably increases the risk that powerful vested interests will hold sway over broader public concerns.

The dilemma for the Chinese government is that an incremental approach towards reform, the preferred choice of the CCP, is inadequate for the purposes of addressing the environmental crisis. Environmental problems are already outpacing reforms and the gap is growing wider. A more radical approach is warranted. And that entails political risks. Just as 30 years ago Deng Xiaoping took an enormous risk in charting a new direction of reform and opening in the economic realm, similar

leadership is now required in the socio-political realm, which will arguably be even more difficult.

Above all, an open society that nurtures critical public engagement and the free exchange of information and ideas is imperative. Open access to policy-making channels via the media, NGOs, epistemic communities, and public consultative fora provides a vital feedback mechanism as well as an important source of creative solutions. The underlying rationale is that building a more sustainable future in China will only work if the people who stand to benefit actually own the process.

Chapter 4

Global environmental leadership: climate change revisited

China's environmental leadership challenge is double-sided. Internally, it faces the difficult predicament of how to balance economic growth with environmental protection. Historically, no other country has been able to achieve high per capita GDP on the basis of low per capita energy consumption.¹⁹⁶ Externally, China is facing mounting international pressure to play a more active role in global environmental governance that is commensurate with its emerging status as a major world power. For a developing country, taking a leadership role in international environmental negotiations is also historically unprecedented.

As in the case of other developing countries, China is confronted with the difficult dilemma of meeting basic environmental needs, such as clean water, while simultaneously seeking to mitigate and adapt to global climate change. But unlike other developing countries, China is now on track to overtake Japan as the second largest economy in the world, and it is now the world's largest emitter of CO₂ emissions. Although average per capita emissions are still low (China emits 6 tons per capita compared to an average 25 tons in the United States), they are rising rapidly and in some cities have reached European levels. This incongruous position means that China falls under a separate category in international climate negotiations that has yet to be

defined. Joining the industrialised club of Annex 1 countries would be premature, if not unjust. Under changing economic circumstances, a continuing reliance upon ‘developing country’ status as a justification for inaction is equally untenable.

The ambiguity inherent in China’s status supports the commonly held view that a simple North–South divide is inadequate for the purposes of reaching a global agreement on climate change. Michael Grubb, in an article written in 1995, warned that

one of the greatest dangers is that the North–South apartheid that permeates all the Rio agreements and the steps now being built on them, so obviously necessary in 1990, may increasingly become a millstone around the neck of more creative, sustainable, and genuinely equitable solutions.¹⁹⁷

In retrospect, his concern was entirely justified. Principles of equity and fairness have featured strongly in international negotiations on climate change. The problem is that the ethical debate has been too caught up in the question of burden-sharing between the global North and South, which has distracted attention away from local variance in the distribution of climate impacts as well as the potential for creative solutions at multiple levels of governance.¹⁹⁸

In the lead up to Copenhagen, the political stakes are high. Undoubtedly, reaching a global agreement will depend upon the willingness of industrialised nations, especially the United States, to lead by example, which in turn will depend upon a more assertive response from the Chinese government. Active Chinese leadership support is important not simply because of China’s emissions trajectory. It is important because it could potentially break the deadlock between the global North and South that has severely hampered progress in multilateral environmental negotiations for almost three decades.

As this chapter makes clear, China’s contribution to global climate governance cannot be narrowly defined on the basis of a commitment to mandatory emissions targets. The broader portfolio of policies directed

at the domestic level also needs to be taken into account. Although difficult questions remain over the issue of burden-sharing, especially in relation to the transfer of funds and technologies, a willingness to engage is now evident from recent official policy papers. Renewed commitments on the part of industrialised states are helping to shift the debate in a more positive direction. More pragmatically, a growing awareness of vulnerability to climate impacts means that it is now in China’s self-interest to act. In light of recent scientific advances that have revealed the urgency of the global climate challenge, the real problem is more one of timing. As aptly described by Zhang Junhua, ‘China is in the same space, but in a different time zone.’¹⁹⁹

This chapter makes the link between domestic and global environmental governance with a view to identifying key changes and continuities. In reference to the earlier discussion on climate change from an historical perspective, it aims to locate climate concerns within a broader global context. The chapter begins with an outline of China’s participation in international environmental negotiations as the necessary backdrop to its current position on global climate change. The Chinese approach towards climate leadership at the global level is discussed in detail before focusing attention on two climate-related challenges — clean energy and melting glaciers. Whereas the former represents the core tenet of China’s current response to climate mitigation, the latter is indicative of the future challenge that lies ahead in relation to climate adaptation that has yet to be addressed. This leads into a broader discussion about transboundary environmental challenges as the new frontier of international environmental cooperation.

China’s encounter with international environmental responsibility: from Stockholm to Copenhagen

China has been participating in environmental governance at the international level since its involvement at the United Nations Conference on the Human Environment in 1972. It also participated at the Rio Conference on the Environment and Development in 1992 and was one of the first developing countries to formulate its own Agenda

21 involving the integration of environmental goals into strategic development plans at the national and local levels. China has signed and ratified numerous environmental treaties including the Kyoto Protocol. Unlike many other developed nations, it has also ratified the International Convention on Biological Diversity, which was followed by a National Biodiversity Action Plan that recognises the value of forests for biodiversity conservation.

A brief review of China's changing position in international environmental negotiations provides a useful backdrop to the contemporary debate over leadership on global climate change. In general, official responses have tended to evolve in tandem with China's level of economic development, which in turn has been closely linked to a broadening of its foreign policy agenda. It is perhaps not mere coincidence that, since the establishment of the People's Republic of China in 1949, the environment has figured fairly prominently in China's diplomatic efforts. The first International Conference on the Human Environment at Stockholm in 1972 coincided with China's first appearance on the international stage following the communist revolution. The Conference was boycotted by the former Soviet Union and Eastern Europe. In breaking rank with other communist states, Premier Zhou Enlai agreed to participate at the request of Maurice Strong, then Secretary General of the Conference and leading architect of the United Nations environmental programme. China took the lead in arguing the case for war as a source of environmental degradation, which was later included in the final declaration (Principle 26).²⁰⁰ Even at this early stage of international environmental negotiations the Chinese leadership was acutely aware of the propensity for superpowers to evoke double standards. As reported by the international media at the time:

China erupted this morning with devastating force at the United Nations environment conference with a blistering attack on the Vietnam War and the way that 'policies of plunder, aggression and war frenziedly pursued by the superpowers had become the main cause of increasingly serious pollution and damage to the environment.'²⁰¹

Twenty years later, China's contribution at the 1992 Earth Summit was more muted, but no less tenacious. The Chinese delegation joined forces with other developing countries in supporting the charge of economic imperialism: that the South was subsidising the massive consumption of the North. The Chinese spokesperson for environmental affairs, Dr Song Jian, famously remarked that 'one should not give up eating for fear of choking.'²⁰²

Despite this apparent ambivalence, during this period environmental reforms at the domestic level began to gather pace regardless of proclamations being made at the international level. Elizabeth Economy has explained Chinese government behaviour on the basis of a two-level game, described by Robert Putnam as the ability to secure domestic interests while at the same time leveraging foreign policy concerns.²⁰³ The mismatch between Chinese responses to environmental problems at the domestic and international levels continues in the contemporary era. It is further reinforced by the view that responsibility for the global environment starts at the domestic level.

In 1990, Qu Geping, then Administrator of China's National Environmental Protection Bureau, made the following statement:

Whether in terms of land area or population, China is a large country, which has a definite impact on the world's environment. If China's environmental problems can be solved, it will represent a major contribution to improving the quality of the world environment.²⁰⁴

This sentiment still strikes a chord with policy-makers in Beijing. The difference, compared with nearly two decades ago, is that now even stalwart defenders of Chinese sovereignty concede that the environment is a global issue requiring a global solution. Scepticism over the motives of richer nations is also becoming less obvious. Ten years ago, appeals to global environmental norms, including international efforts to tackle climate change, were simply dismissed as a pretext for exerting political leverage over China's future economic development. Current concerns over environmental cooperation at the international level have more

to do with perceived inequities in the distribution of responsibility reinforced by a residual distrust of Western support for environmental concerns. On balance it is fair to say that the current policy orientation of the Chinese government is turning towards global concerns, but remains domestically focused.

Climate leadership in a state of flux: same space, different time²⁰⁵

At first glance, it would seem that China's stance on international climate negotiations has changed very little. It remains committed to the principle of common but differentiated responsibility based on historic cumulative emissions. Mandatory emissions targets are not accepted, and demands for international funds and technologies to offset the costs of abatement continue to dominate the Chinese response. Behind this declaratory position, however, lies a more cooperative framework of action. In recent years, as noted by Zhang Haibin, climate change has risen on the political agenda, leading to the creation of new institutions and more flexible policies towards climate mitigation.²⁰⁶ In international climate negotiations, China's approach is shaped by both normative and practical considerations relating to moral responsibility, burden-sharing, and vulnerability. In combination, these factors tend to influence China's willingness to accept greater responsibility at the global level.

Moral responsibility

Since ratifying the United Nations Framework Convention on Climate Change in 1993, China has argued that developed countries should take the lead in efforts to mitigate global climate change. Given that CO₂ emissions can remain in the atmosphere for up to 100 years, and that industrialised states are responsible for the current state of the global environment, the moral reasoning behind this position is difficult to dispute. The refusal until recently of the United States and Australia to accept mandatory emissions targets on the basis that it would harm their respective economies gave some justification to the Chinese response and fuelled suspicions of Western hypocrisy. Consequently,

building trust remains the *sine qua non* of effective collective action between China and the industrialised world.

More recently, a renewed commitment on the part of industrialised states to accept more aggressive emissions targets means that China is now faced with the question of how to mitigate the impact of its own present and future contributions. The European Union currently supports a stabilisation target of 450 parts per million CO₂ equivalent (which takes into account the warming effects of other greenhouse gases such as methane and nitrous oxide). It has also pledged a 20 per cent reduction in emissions by 2020 from 1990 levels (increasing to 30 per cent if a strong agreement is reached at Copenhagen). The new Japanese administration has pledged an even higher cut of 25 per cent on a similar basis. In comparison, mid-term pledges by the United States and Australia are much more modest (17 per cent cut from 2005 levels and between 5 and 25 per cent cut from 2000 levels respectively).

China has not made a commitment to binding targets. However, four policy changes over the past few years appear promising. First, the Chinese government now supports the Clean Development Mechanism and accepts the principle that the burden borne by industrialised countries can be offset by abatement elsewhere.²⁰⁷ Second, rather than seeking a unilateral transfer of funds and clean technologies, it is now promoting technological cooperation on a reciprocal basis. Third, moving beyond mitigation on a voluntary basis, the new policy focus is upon nationally appropriate mitigation (NAM) commitments that are measurable, reportable, and verifiable. And fourth, China has implemented stringent targets for expanding renewable energy and reducing energy intensity.

Despite initial scepticism, it would appear that China has benefited considerably from its participation in the Clean Development Mechanism that was set up as a means for industrialised states to offset their emission reduction targets through cooperation with developing countries. By 2008, the NDRC had ratified 1598 CDM projects accounting for nearly 25 per cent of the world's total.²⁰⁸ According to representatives at the NDRC, the preference now is to reduce project funding for renewable energy and focus more on high-cost energy efficiency projects.²⁰⁹ China

also supports the inclusion of forest-based carbon offsets as part of the Clean Development Mechanism on the proviso that this is not used to offset the emissions targets of developed states.²¹⁰

Overall, China's position is that parties to the Kyoto Protocol should adopt appropriate measures to mitigate and adapt to climate change on the basis of their respective capacity. The obligation, therefore, lies with richer countries to help enhance resilience and build adaptive capacity in developing countries. In 2008, the Chinese government called for richer countries to set aside 1 per cent of their GDP for this purpose. In establishing a fair system of distribution, there exists a strong moral imperative to ensure that funds are directed to the most vulnerable regions in Africa, Asia, and the Pacific, where the very survival of nations is at stake.

A global agreement on climate change beyond 2012 requires a re-negotiation of the principle of responsibility so that it is cast less in oppositional North-South terms, and more in positive terms on the basis of reciprocity across all states with an emphasis upon supporting the most vulnerable communities that are least able to cope. This would place a higher burden of responsibility upon China and India relative to the Maldives and Bangladesh for example.

Burden-sharing

At a more practical level, a difficult question confronting policy-makers in China is how to apportion responsibility for emissions that are embedded in a globally integrated economy. China's pattern of development inevitably affects the international mode of resource allocation and the global environment; the procurement of raw materials from overseas is expanding China's ecological footprint across the globe with serious repercussions for sustainable resource management.²¹¹ It is essentially a two-way process. China's environment is also affected by globalisation through the activities of multinationals. As noted by many commentators, in an increasingly interdependent global economy a significant proportion of pollutants in China are generated by foreign firms. Moreover, consumers in other parts of the world benefit considerably from the export of Chinese manufactured goods, thus

rendering the 'polluter pays principle' problematic.

Of particular relevance to international climate negotiations is the fact that a very different picture of global carbon emissions emerges if we take into account the issue of international trade. According to a study by Bob Harriss and Shui Bin, in 2003 China's carbon emissions would have been 14 per cent lower if it had not manufactured the products it exported to the United States, and, in turn, US emissions would have been 6 per cent higher if it had produced the goods domestically.²¹²

The problem of industrialised states transferring pollution to the developing world 'as a form of environmental colonialism' is widely discussed among academics and policy-makers in China. Equally, the investment activities of Chinese corporations overseas are attracting international criticism. At the opposite end of the global supply chain, proponents of a cap-and-trade system in the United States are considering placing a border tax on imports from countries that have not committed to binding carbon emissions targets. Carbon leakage raises enormous challenges that will take time to resolve at a practical level.

Vulnerability

With so much of the political debate caught up in burden-sharing, it is important not to lose sight of the fact that it is also in China's self-interest to act.²¹³ China not only contributes to global climate change, but is also affected by it. The National Assessment Report on Climate Change published in late 2006 revealed that China's average annual temperature could increase between 1.3 to 2.1 degrees by 2020 and as much as 3.3 degrees by 2050.²¹⁴ It is predicted that precipitation in three of the seven major rivers will drop by 30 per cent in the second half of the century, leading to a 37 per cent decline in wheat, rice, and corn yields. Major cities in coastal areas will face serious challenges due to rising sea levels that could reach up to 0.16m by 2030 — the Yellow, Yangtze, and Pearl River Deltas are most vulnerable. Extreme weather patterns are also likely to increase. This is already evident from the increasing frequency of hurricanes, floods, snowstorms and cyclones that have struck China with devastating humanitarian consequences. Seen from this perspective, disasters are no longer an aberration but

can be closely linked to complex ecosystemic change. Model-based projections of future climate change show an increase in the frequency and severity of most types of extreme weather events.²¹⁵

For many states, both industrialised and developing, climate change is now seen as a major security threat and framing climate change as a security problem is gathering momentum within academic and policy-making circles. For the Chinese government, a recent report on addressing climate change in 2008 recognises that the People's Republic is particularly vulnerable to the destructive impacts of global warming.²¹⁶ However, the official position is that climate change is a development problem; it is considered to be part of a broader environmental agenda, and in keeping with China's overall approach towards international environmental cooperation the policy orientation remains inward-looking.

That said, there are signs that the Chinese government is willing to accept more responsibility for tackling climate change, especially in relation to improving energy efficiency and reducing dependency on fossil fuels. Above all, moving towards a low-carbon economy is seen as the most viable means of solving domestic environmental problems while at the same time carrying a higher burden of responsibility at the global level. Energy cooperation is closely linked to the Chinese concept of a harmonious world (*hexie shijie*) thus providing a counterbalancing narrative to the international discourse on energy security and the future potential for geopolitical rivalry over scarce resources.

The idea of a harmonious world was first presented to the international community by President Hu Jintao in a speech to the United Nations in October 2005, and further elaborated upon in the December 2005 White Paper on 'China's Peaceful Development Road'.²¹⁷ In parallel to the concept of a harmonious society, the international interpretation sanctions an authentic Chinese approach to world order. In reconnecting with Confucian orthodoxy, harmony not only relates to families and domestic order but also to order between states. It serves the multiple aims of reinforcing the peaceful rise of China thesis, reconciling domestic and international tensions, and strengthening soft power.²¹⁸

This is not to suggest that actual practice conforms to the ideal. Nor is it to underestimate the extent to which China is involved in strategic competition over energy and resources at the global level. The political discourse merits attention because it reveals the fundamental importance of energy concerns in Chinese domestic and foreign policy. 'Clean Energy for a Harmonious World' is now central to China's Western Development Plan, and it is central to China's response to global climate change.

Clean energy for a harmonious world

In China, as elsewhere in the world, the assumption that prosperity can be supported by an inexhaustible supply of natural resources no longer holds sway. It has been shaken by rising energy prices, supply constraints, and widespread ecological degradation. Heavily dependent upon coal, the sustainability of China's industry-led development trajectory is now under question. Over 80 per cent of the nation's electricity supply is generated from coal, which accounts for approximately 70 per cent of overall energy supply compared with 18 per cent oil, 6 per cent hydropower, 2 per cent natural gas, and 1 per cent nuclear.

The government's 50-year energy plan seeks to reduce coal from 67 per cent of total energy consumption in 2003 to 55 per cent in 2020, and 40 per cent in 2050. To help facilitate this target, between 2006 and 2009, up to 54.07 GW of inefficient coal-fired plants were closed down, equal to more than the total installed electricity capacity of Australia.²¹⁹ In 2005, the State Council passed the Renewable Energy Promotion Law, which sets a target of producing 15 per cent of electricity from clean energy sources by 2020. Under China's Renewable Energy Long and Mid Term Development Plan, targets have also been set to increase the use of renewable energy to 10 per cent of total energy consumption by 2010 and then 15 per cent by 2020.²²⁰

Towards this end, an overwhelming priority is currently placed on hydropower development because it is seen to be the most accessible — untapped hydropower is estimated to be around 300GW.²²¹ Nuclear power takes second priority. There are now 11 nuclear power units in

operation nationwide and the plan is to double capacity to around 40GW by 2020. Natural gas development is the third priority, with ongoing plans to launch large-scale exploration in the coming decade. China currently only consumes around 7-8 million cubic metres of natural gas compared with 700 million cubic metres in the United States. It is expected that wind power capacity will surpass 100GW by 2020, and solar will likely generate up to 1.8GW within a similar timeframe.²²²

In addition, the government currently invests over RMB27 billion per year on energy conservation. It is important to emphasise that the rising trend in energy consumption in China is a fairly recent phenomenon that could not have been predicted a decade ago. Between 1980 and 2000, China succeeded in controlling energy consumption — GDP quadrupled while consumption doubled. By 2000, economic activity required two-thirds less energy per output than in 1978.²²³ But over the last nine years, energy demand has exceeded the rate of economic growth largely as a consequence of massive investment in infrastructure and heavy industry that has stimulated demand in energy and raw materials. On the basis of calculations put forward by Daniel Rosen and Trevor Houser, ‘China now accounts for 48 per cent of global cement production, 49 per cent of global flat glass production, 35 per cent of global steel production, and 28 per cent of global aluminum production.’²²⁴

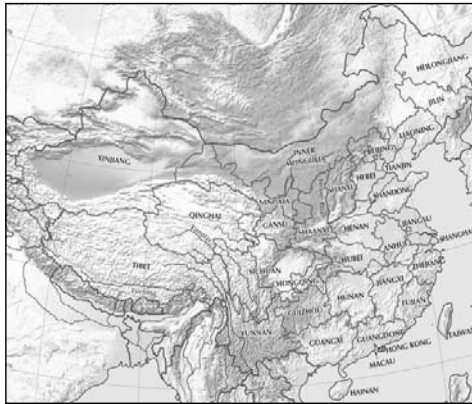
In an attempt to de-link CO₂ emissions from economic growth, the government has adopted an ambitious policy of reducing energy intensity for each unit of GDP by 20 per cent by 2010. Given that a few highly inefficient industries account for a large proportion of carbon emissions, this approach may well make a difference to China’s overall emissions trajectory. A recent report by Greenpeace China revealed that in 2008 the top three Chinese power companies emitted more than the total greenhouse gas emissions of the United Kingdom in the same year.²²⁵ In many ways, the concentration of emissions allows for more targeted solutions. It also raises the question of whether global climate mitigation efforts should be targeting states or corporations.

On the issue of energy intensity targets, two important points need to be kept in mind: first, in China ‘booming investment and booming

investment into energy-intensive heavy industry are increasingly the same thing.’²²⁶ This means that energy policy alone will not be sufficient to address burgeoning carbon emissions; this will also require financial reforms and broader structural adjustment measures. Second, under conditions in which a structural energy mix remains constant, energy intensity declines naturally with economic growth even while absolute energy consumption continues to increase.²²⁷

Hu Jintao’s recent pledge at the United Nations Summit in September 2009 to introduce carbon intensity targets (that aim to reduce the amount of carbon dioxide emitted for each unit of GDP) is an encouraging development. They will help to promote controls on non-energy related emissions as well as support more accurate reporting for the purpose of developing China’s carbon market. However, as in the case of energy intensity targets, they will not necessarily lead to an overall reduction in carbon emissions. Ongoing debates among energy researchers at the NDRC in Beijing are currently focused on long-term, low-carbon scenario planning up to 2050, with relevant targets integrated into five-year development plans. Research is underway to develop emissions scenarios that rely upon both peak and baseline indicators. The general consensus is that China’s carbon emissions will peak at around 2030 and then start to decelerate. Options for baseline reductions are linked to 2004. Given that the current targets supported by the Chinese government are already difficult to achieve, it is highly doubtful whether more progressive targets currently under discussion behind closed doors will see the light of day at Copenhagen.²²⁸

Unsurprisingly, energy concerns have tended to dominate the climate debate in relation to China. The shift towards a low-carbon economy is critical if China is going to succeed in reversing its negative trend in carbon emissions. However, in future years, dealing with the impacts of climate change is likely to be just as important. In general, climate adaptation policies are still at a very early stage of development in China and tend to be heavily biased towards agriculture. The majority of Chinese reports on climate adaptation are narrowly defined and highly technical with limited attention given to broader concerns relating to prevention, preparedness, and crisis management.

Melting glaciers on the Tibetan Plateau²²⁹

Tibetan Plateau

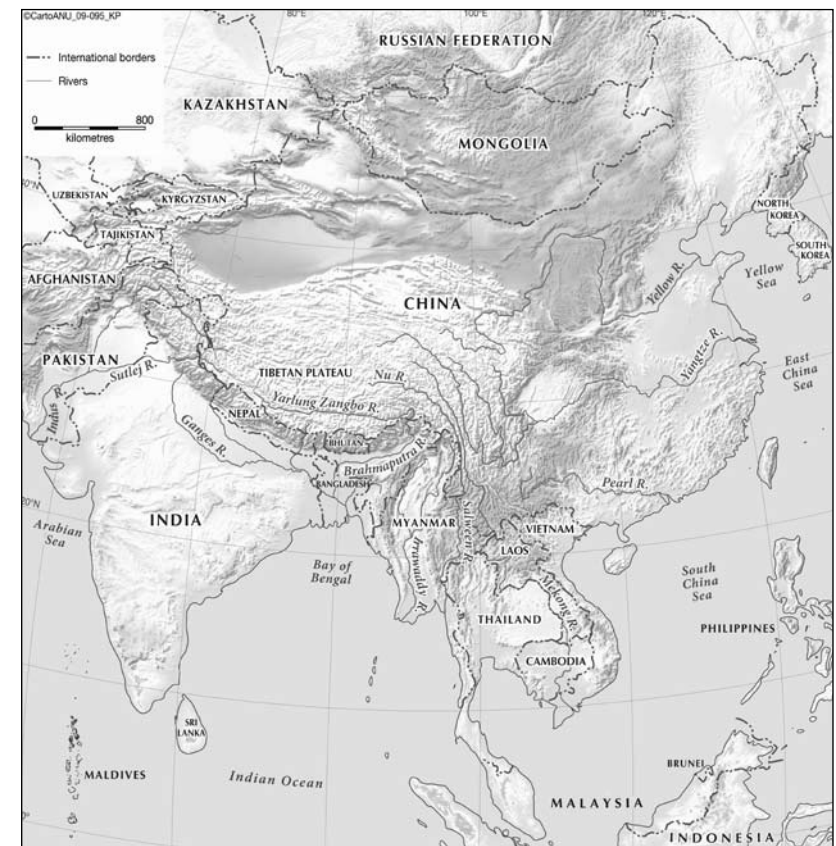
well as large-scale humanitarian disasters. No other region in the world has this strategic ecological importance.

Covering an area of approximately 2.5 million square kilometres, the Tibetan Plateau equals one-quarter of China's land mass and includes parts of northern India, Nepal, and Bhutan. It is the largest high-altitude landmass on earth with an average elevation of 4500 metres. As the largest freshwater reserve outside the polar ice caps, it is also known as Asia's water tower or the Third Pole. The region as a whole is highly sensitive to global climate change. Ice core records from the Dasuopu glacier in Tibet reveal that the last 50 years have been the warmest over the past 1000 years.²³⁰ Over the past three decades, the average temperature has increased by almost 1 degree Celsius, and Chinese climate scientists predict a further temperature rise of between 2.0 and 2.6 degrees Celsius by 2050.²³¹

With the exception of the Karakorum, warming temperatures are leading to an accelerated melting of the Himalayan Hindu Kush glaciers that feed Asia's great rivers — the Yellow, Yangtze, Mekong, Salween, Indus, Ganges, and Brahmaputra. Glaciers in northwestern China have shrunk by 21 per cent.²³² And data from the International Commission

Melting glaciers on the Tibetan Plateau are a vivid reminder that climate change is already having a significant impact on China and neighbouring states in South and Southeast Asia. Warming temperatures in this part of the world could dramatically affect the ecosystems and the millions of people they support, leading to geopolitical tensions as

for Snow and Ice reveal that the Himalayan glaciers are shrinking faster than anywhere else and could totally disappear sometime between 2035 and 2050.²³³ The retreat of the glaciers is likely to have dramatic adverse effects on biodiversity, people, and livelihoods with long-term implications for water, food, and energy security. Glacial melt also triggers a higher incidence of natural disasters — landslides, flooding, and glacial lake outbursts — that can, in turn, lead to internal displacement and the destruction of critical infrastructure.



Major asian rivers

The water security implications are particularly troubling. Collectively the basins provide water for up to one-quarter of the world's population. The contribution of snow and glacial melt to the major rivers ranges from 5 to 45 per cent of average flows increasing to 70 per cent of summer river flows to the Ganges and Indus Rivers. The Indus River irrigation systems in Pakistan depend on glacial melt from the eastern Hindu Kush, Karakorum, and Western Himalayas for about 50 per cent of total run-off. Overall, climate change is damaging the seasonal regulating capacity of glacial water flows.

Higher temperatures are also associated with the thawing of the permafrost (the frozen soils overlying the plateau that provide much-needed moisture) that has lost up to 5 metres in thickness over the past 50 years.²³⁴ The loss of moisture due to the melting of the ice stored in the soils is exacerbating worsening trends in desertification and grasslands degradation. Of additional concern is the potential release of between 60 to 190 billion tons of carbon locked up in the permafrost thus creating the conditions for an acceleration of global warming. Warming temperatures may also be accompanied by a weakening of the Asian summer monsoon that in turn is affected by aerosols (small particles suspended in the atmosphere) and greenhouse gases. Research conducted by climate scientists at Lanzhou University has revealed that over the last 100 years the Asian Monsoon has become dryer leading to less precipitation on the high Tibetan Plateau.²³⁵

Scientific uncertainties still remain over the actual extent of glacial melt as well as the feedback loops from the permafrost and Asian Monsoon. However, on the basis of current knowledge it is likely that higher temperatures will increase flooding in the rainy season and reduce water in the dry season thus affecting food production in the provinces downstream as well as the livelihoods of millions of people. The consequences for a region that is already highly prone to both floods and drought would be dire.

Ironically, the melting of the glaciers is allowing easier access to the Plateau's rich natural resources in a similar fashion to the way in which the exposure of the polar region is leading to greater competition for scarce resources and renewed geopolitical tensions. At the same time,

ambitious plans are underway to develop the region's hydropower potential, which may well lead to a vicious cycle of sediment accumulation that cripples the ability of dams to control floods and reduces the capacity for power generation. Climate change is already bringing about changes in flow regimes that will, in turn, affect the performance of hydroelectricity schemes.



Environmental migrants

Centuries before in China, hydraulic installations were referred to as the ‘artificial clouds and rains of the people’.²³⁶ In the 21st century, China now has one of the most ambitious cloud-seeding programs in the world. The so-called ‘big gun’ project aims to increase rainfall near the Yellow River source area in Qinghai Province: planes and artillery fire silver iodide crystals that can collect water and become heavy enough to fall as snow.²³⁷ Geoengineering is seen by many as a new panacea, but it is clearly no substitute for a comprehensive climate adaptation program.

Overall, the impacts of climate change will be greatest on poor communities that are least able to adapt. Tibetan pastoralists depend upon the grasslands for their survival and climate change is already leading to historically unprecedented pressures. For example, at the source of the Yellow River, over one-third of the grasslands have already transformed into semi-desert conditions.²³⁸ Lakes are drying up and aquifers have become severely depleted. As environmental security analysts would predict, this is leading to increased migration largely under the auspices of a government-controlled scheme to promote the regeneration of the grasslands. In effect, Tibetan nomads are now placed under the broader category of ecological migrants. Statistics are difficult to verify but anecdotal evidence suggests that since 2000, up to 1 million Tibetan nomads have been resettled across the Plateau. Recent studies have shown that the migration scheme is reinforcing existing patterns of inequality and heightening ethnic tensions.

A major problem is that we still do not know enough about climate impacts on the grasslands. Field investigations are few and far between. What we do know is that placing disproportionate blame upon overgrazing by nomads is misleading and may even lead to negative environmental consequences. Marc Foggin and Daniel Miller have both argued persuasively that grassland ecosystems have evolved over the centuries with the presence of graziers, and when mobility is removed there is an increased risk of degradation.²³⁹

On the basis of current knowledge a number of important lessons can be drawn for future climate adaptation efforts. First, the melting of the glaciers cannot simply be framed as a development problem. What

is happening on the Tibetan Plateau crosses the political threshold into the security realm. This is not to suggest that conflicts between China and neighbouring states are inevitable. But a security frame of reference is important for the purposes of identifying the point at which development is no longer possible. It places an emphasis upon risk management strategies and conflict prevention that are critical determinants of an effective adaptation strategy.

Second, the path towards a more sustainable and secure future on the plateau will, in part, depend upon retaining links with the past. If we lose the ice from the glaciers and we lose the knowledge of the original custodians of the land, we are not going to be able to understand how things behaved in the past in order to establish likely scenarios for the future. Just as ice cores from the glaciers can provide a wealth of information about monsoon failure, precipitation, and levels of radiation from nuclear testing, Tibetan nomads are a vital source of information about land-use change and the extent of climate impacts at the micro level.



Deliberation on the Plateau

Third, climate mitigation and adaptation policies are not always mutually compatible. In the interests of mitigating climate change, hydropower is an obvious option because it provides cleaner energy. But in the absence of climate-sensitive development planning, the prospects

for adaptation are seriously undermined. The effects on downstream countries may also create the conditions for cross-border conflicts as well as exacerbate the looming water crisis in China and the Asia region as a whole.

Fourth, climate adaptation in this part of the world requires a regional approach. The problem is that the region lacks institutions to deal with the crisis. A consultative process for considering adaptation options and identifying collective responses does not, as yet, exist. What is needed is an inclusive dialogue mechanism that can bring together many stakeholders including vulnerable communities at risk, corporations involved in infrastructure development, and national and local governments.

Transboundary challenges: the new frontier of environmental cooperation

Melting glaciers are a salutary reminder of ecological dependency. For centuries, as one of the most remote and physically demanding places on earth, the Tibetan Plateau has captured the imagination as an exotic and distant place. And the lives of Tibetan nomads have appeared far-away from the everyday realities of modern life. The melting of the glaciers has revealed the physical connection with the rest of the globe that has hitherto been poorly understood. Global climate change is characterised by complexity, interconnectivity, and uncertainty. A clear picture of how the region as a whole is likely to be affected over the next decade is currently beyond our grasp. But one thing seems certain; the Tibetan Plateau is now on the global security and climate agenda and it is likely to stay there for a long time.

From a regional perspective, climate impacts have a profound influence on how we perceive future stability in the most populated region of the world that is already prone to cross-border tensions and ethnic conflicts. The serious transboundary implications of melting glaciers highlight the current deficit in regional environmental cooperation. It is precisely in the space between the national and the global that institutions for governing the environment are sorely lacking.

At the bilateral level, the Indus Waters Treaty negotiated between India and Pakistan in 1960 with the help of the World Bank is a rare example of a successful resolution of a major dispute over international waters.²⁴⁰ As a consequence of partition in 1947, the basin was divided between the two countries — headwaters in India and the lower basin in Pakistan — creating the potential for major conflict. A proposal to divide the Indus waters equally between the two countries and at the same time enhance water availability was accepted by both sides. As noted by Ashok Swain, the fact that the treaty has endured for four decades despite a nuclear stand-off between the two countries is testament to the high value that is attached to water resources for domestic agricultural production.²⁴¹ Notably, in this case the agreement works on the basis of a separation of waters rather than a shared arrangement.²⁴²

Multilateral agreements that encourage water-sharing on the basis of a common regional framework have yet to develop. In general, environmental cooperation lags far behind economic cooperation.²⁴³ Currently there is a general lack of policy guidance and political will in tackling environmental concerns because states in the region tend to privilege the right to develop as a sovereign prerogative regardless of the consequences. Political sensitivities continue to pose a major obstacle to advancing regional cooperation. Even scientific research is constrained on account of national security concerns. Hence, overcoming distrust is the single biggest impediment to enhancing cooperation at the regional level.

Given that the sources of all the major rivers in the region are located in China, support from Beijing will be a critical determinant of the extent to which environmental cooperation beyond borders is possible. It is clear from previous discussions that China is not an environmental laggard with respect to global cooperation. On the contrary, it would appear that the Chinese government is increasingly willing to participate in efforts to tackle global climate change, albeit on its own terms. Notwithstanding the implementation deficit, at the domestic level environmental efforts have been impressive relative to China's stage of development. The problem is that to date environmental protection has tended to stop at the Chinese border.

For China, transboundary challenges represent the new frontier of environmental cooperation. In general, progress in dealing with transboundary issues has been slow on account of sovereignty concerns, unresolved territorial disputes, and mistrust on all sides. Attempts to establish an Acid Deposition Monitoring Network in East Asia and a Transboundary Biosphere Reserve in the Tumen River Delta have been thwarted by Chinese opposition. And despite continuing tensions over its dam-building projects on the Mekong, the Chinese government still refuses to become a member of the Mekong River Basin Commission. It is widely known that ambitious hydropower projects that have already led to the displacement of over 23 million people inside China have the potential to pose serious risks for millions more living in downstream countries.²⁴⁴ Equally worrying is the destruction of Burma's northern frontier forests by Chinese loggers. Following the logging ban imposed by the central government in China in 1998, the importation of illegal logs from across the China–Burma border has increased exponentially to meet timber demand.²⁴⁵

In November 2005, the explosion of a state-owned petrochemical plant in Jilin Province that released tons of toxic benzene into the Songhua River affecting water supply in Harbin as well as the Russian city of Khabarovsk, placed a spotlight on the need for pre-emptive action to set up monitoring and information disclosure systems across the Sino-Russian border. This provided an important lesson that will hopefully in the future lead to more sharing of environmental information and data. At the very least the incident helped to reinforce the importance of crisis management across borders.

Climate change revisited

In the contemporary era, it is no longer possible to view environmental governance in China purely from a domestic perspective and, vice versa, outsider accounts that ignore developments inside China are of limited value. Interdependence matters: ecologically, economically, and politically. Centuries ago, China's climate challenge was largely a matter of agricultural security. This legacy still resonates today; agriculture is

the central focus of current adaptation policies. What has changed is that climate variability is no longer seen as simply a local concern.

Scientific advances in recent years have strengthened our understanding of the interdependent relationship between humans and nature. On the basis of IPCC reports, we now know that the observed increase in global average temperatures since the mid-20th century is 'very likely' to have been caused by anthropogenic greenhouse gas concentrations. In contrast to pre-industrial history, climate change is now a global problem because the location of emissions is irrelevant to the outcome, and the failure to act involves ecosystemic risks on a global scale.

As argued in the first chapter, in the Chinese context the environment has always been a matter of national security. At the global level, the security consequences of environmental degradation are now more evident. When freshwater resources drop below 1700m³ per capita a state is no longer deemed able to meet its health, hygiene, and food security needs. When ambient emissions reach a certain threshold they threaten the health of local populations as well as the ecosystems that humans rely on for their survival. Global climate change also exposes the interdependencies between states. Collective environmental leadership is therefore imperative.

This chapter suggests that China is now taking a stronger role in tackling global climate change. It is in the same space, but working in a different time zone. Resolving this contradiction will require a fundamental shift away from blame and shame politics towards a closer form of international cooperation based upon trust, openness, and mutual benefit. The security implications of the current environmental crisis are likely to prove to be the most difficult to resolve. It is one thing to agree that the environment is central to the national interest, and quite another to build a regional consensus around the importance of ecological security. Such an approach need not focus on conflict. The rivers flowing from the Tibetan Plateau hold the potential for peace-building and cross-border cooperation on a scale that cannot be compared to any other region in the world.

Chapter 5

Implications for Sino-Australian environmental cooperation

This chapter assesses the implications for enhancing Sino-Australian environmental cooperation on the basis of a revised understanding of what constitutes the common interest. It begins with a brief overview of the main trends in bilateral environmental cooperation with a focus on water, forests, and climate change. Following an analysis of new priorities, shared experiences, and mutual benefits, discussion turns to the nature of environmental cooperation within the regional context. Particular attention is given to assessing the effectiveness of the Asia-Pacific Partnership for Clean Development and Climate (APP) with a view to identifying weaknesses and building on existing strengths. The chapter concludes by discussing the potential for Australia to play a facilitating role in addressing the consequences of climate change via a regional dialogue on ecological security.

The means and ends of Sino-Australian bilateral cooperation

Sino-Australian environmental cooperation dates back to the early years of China's reform and opening in the 1980s. It is only fairly recently, however, that a strategy for the environment has been fully incorporated into Australia's development assistance programs.

In 2003, the two countries formed a climate partnership aimed at information exchange and the implementation of practical solutions for reducing emissions in the industrial and agricultural sectors. A year later, the Australian Greenhouse Office (now Department of Climate Change) and the NDRC signed a Memorandum of Understanding on Climate Change Activities. More recently, the two countries have initiated a Ministerial Dialogue on Climate Change focused on scientific research cooperation, building capacity to adapt to climate impacts, and developing clean energy technologies. In the latter case, the Australia-China Joint Coordination Group on Clean Coal Technology is responsible for implementing new initiatives. Between 2004 and 2015, the Australian government is planning to spend A\$94.6 million on climate and water-related projects in China.²⁴⁶

In recent years, China has participated in multiple climate dialogues with the United States, Japan, and a host of European states. The EU-China Partnership on Climate Change was established in 2005, and more recently the United States and China have signed a Memorandum on Climate Change Cooperation. A common concern linking all these initiatives is the development of clean energy. Energy cooperation holds the promise of improved foreign relations at a time when China's growing power is leading to tensions and misunderstandings. Two recent policy reports published in the United States highlight the foreign policy benefits that are likely to accrue from strengthening energy cooperation. In the words of Kenneth Lieberthal and David Sandalow, "clean" energy — a key component of addressing climate change — provides a more politically attractive framework for US-China bilateral cooperation than does climate change per se.²⁴⁷

Inevitably, Sino-Australian climate cooperation is also shaped by foreign policy considerations. On the economic front, Australia stands to gain immensely from working with China on the adoption of clean energy technologies. How Australia can benefit from environmental cooperation is a critical question that is sometimes missing from foreign policy debates. The following brief review of trends in Sino-Australian cooperation provides the necessary backdrop for identifying common interests and mutual benefits.

Forests

Following the normalisation of relations in 1972, one of the first technical cooperation programs between Australia and China focused on forests. Between 1981 and 1989, the forestry departments of Queensland and Guangxi Zhuang Autonomous Region were involved in large-scale afforestation that aimed to improve yields from the industrial plantations of eucalyptus trees.²⁴⁸ Bilateral cooperation in forestry has continued under the auspices of the Australia China Agricultural Cooperation Agreement that provides funding for forestry-oriented exchange missions between respective government agencies.

Between 2002 and 2008, Australia contributed A\$12.25 million towards forestry planning and management in Qinghai Province. More recently, it has been involved in supporting China's efforts to establish a system of third-party forestry certification. As yet, China does not have its own national certification system. The Asian region as a whole is currently the smallest contributor to the Forest Stewardship Council with only 2.57 per cent of forested areas certified in 2009.²⁴⁹ Negotiations are underway to establish joint cooperation on illegal logging that would involve region-wide systems for verifying the legality of timber imports.²⁵⁰ This is an important step in the direction of containing transnational environmental crime at a regional level. As a test case for enhancing much needed transparency and accountability, it may well prove beneficial in the longer term.

Water

China and Australia share a common interest in integrated water basin management as both countries face the difficult problem of establishing an efficient and fair system of water allocation that extends beyond jurisdictional boundaries. Prolonged drought in Australia's largest river system, the Murray-Darling Basin, underscores the salience of water and climate related concerns in both countries. The environmental strategy, as part of AusAID's China-Australia Country Program 2006-2010, places a strong emphasis upon supporting a market-based approach towards the allocation of water resources.²⁵¹ Transferring knowledge related to Australia's experiences in sustainable water allocation could

well prove useful in the Chinese context. In particular, technical support to ensure that water allocations fall within the ecological limits of a river or aquifer is sorely needed. The Australian experience of investing property rights in water access licenses for irrigation may also have some relevance, although this remains a difficult option in the context of subsistence agriculture.

As we have seen from previous discussions, economic instruments are now being incorporated into environmental governance in China. And it is clear that integrated water basin management is imperative under conditions of worsening water quality and conflicts between upstream and downstream users. On a more cautionary note, it is also important to recognise that a market approach cannot guarantee fair outcomes. Closing the governance gap in China requires a fair and open consultative process over water entitlements. Current AusAID projects are still at an early stage of implementation and, therefore, it is too early to tell whether community groups are actively participating in river basin management. Undoubtedly, this will be an important determinant of success. Without community participation, there is a real risk that interventions will become part of the problem rather than the solution.

Climate

The Australia–China Climate Change Partnership is focused on a small number of flagship projects that aim to reduce carbon emissions by using clean coal technologies, building monitoring capacity, and expanding the use of renewable energy.²⁵² The Australian government has pledged to invest A\$20 million in the Australia–China Joint Coordination Group on Clean Coal technology. The Gaobeidian power station in Beijing has been selected as a pilot site for carbon sequestration with the aim of capturing upwards of 3000 tonnes of carbon each year. Support is also being given for a feasibility study on the development of a solar city in Weihai on China’s northeastern coast. In cooperation with BP Solar and the Chinese Academy of Sciences, the plan is to install up to 100MW of solar PV and solar thermal capacity to generate sufficient electricity to power over 50 000 households.²⁵³ Finally, Australia is transferring

its expertise in national carbon accounting systems for the purposes of enabling more accurate reporting in keeping with Intergovernmental Panel on Climate Change (IPCC) guidelines. In the past, political sensitivities over carbon emissions have prevented the development of accurate reporting. Hence, this may well have a positive impact on overall climate governance.

Moving forward: new priorities, shared experiences, and mutual benefits

Perhaps more so than any other bilateral partners, Australia and China share a strong interest in the twin imperatives of water conservancy and forestry that underpin broader efforts to deal with climate change. The potential, therefore, exists to establish a more integrated approach to the environment by focusing on the linkages between water, forests, and climate. Such a holistic approach makes sense from both historical and scientific perspectives. The benefits of such an approach are multiple: first, it would help to ensure that environmental projects were carefully coordinated with long-term goals. Second, both countries could learn from the process, which would help to place the relationship on an equal footing. Third, it would lessen the problem of donor duplication that inevitably arises when many countries pursue the same priorities. It would expand the current focus on clean coal and energy efficiency that tends to dominate the bilateral and regional climate agenda through the APP. And fourth, it would help to alleviate the problem of single-sector approaches that reinforce technocratic silos within governing structures and further entrench a narrow approach towards the generation and utilisation of knowledge.

A second characteristic of the bilateral environmental relationship is that it is heavily biased towards cooperation between government agencies with limited scope for building partnerships with non-governmental organisations (NGOs) and corporations. This stands in stark contrast to China’s bilateral relations with the United States and Europe. For example, the China–US Center for Sustainable Development aims to encourage multinational corporations to invest in research

and development and engage with counterpart agencies in designing sustainable towns.²⁵⁴ The US-based International Institute for Energy Conservation is working with the Chinese automobile industry to create energy efficiency standards, and British Petroleum has recently conducted a feasibility study with researchers from the Chinese Academy of Sciences to establish a Clean Energy Commercialisation Centre.²⁵⁵ More recently, the Carbon Trust Fund in the UK has signed an agreement with China Energy Conservation Investment Corporation to lead the development of energy efficient and environmental protection industries in China.²⁵⁶

Third, both countries are highly vulnerable to climate change and yet adaptation initiatives have only recently been integrated into the portfolio of climate-related programs. The effects of climate change on the hydrological cycle and its consequences for water resources are particularly serious in the Murray–Darling and Yellow River Basins. In both cases, water storage is so low that there is insufficient water to meet critical human needs. Just as farmers and urban residents living in the North China Plain are experiencing a frequency of drought conditions, Australian farmers and residents living in major cities in southwest and the southern and eastern parts of the continent have experienced severe water shortages in recent years.²⁵⁷

As mentioned earlier, adaptation has received limited attention in China. Far more emphasis has been placed upon mitigation in keeping with the general trend at the global level. The UK government is currently leading efforts in this realm with an initial emphasis upon the agricultural sector. A joint program between British and Chinese scientists is assessing the impact of climate change on agricultural production in Ningxia Hui Autonomous Region, classified as China's first experimental zone on climate adaptation.²⁵⁸ The opportunity now exists for Australia to play a stronger role in climate adaptation efforts in China, possibly in collaboration with the UK and US governments.

Fourth, shared experiences in building resilience at the community level have yet to be explored. In general, community programs are less visible; more attention has been given to applying market incentive approaches towards environmental governance. It is commonly

understood, however, that bottom-up processes as a counterbalance to state planning are equally important, especially in the Chinese context. The limited attention given to community participation is also a reflection of relatively weak partnerships with Chinese NGOs and community organisations.

Fifth, it is in the interests of both countries to locate bilateral cooperation within a broader regional context. Efforts are already underway to extend cooperation beyond bilateral concerns as part of the overall strategy. But progress has been slow. A major problem is that regional environmental cooperation is still weak relative to the enormity of the environmental problems in the region. Dense networks of overlapping informal linkages now exist, and in the last few years climate and energy issues have been prominent on the agenda of regional institutions including APEC and the East Asia Summit. However, a regional institution that is fully effective in the sense of addressing the multiple challenges involved in tackling climate change has yet to emerge. Perhaps Prime Minister Kevin Rudd's proposed Asia-Pacific Community can play a role here.

The APP stands out as the only regional climate institution in existence. It was initially introduced as a more effective alternative to the global Kyoto process. Mired in political controversy at the time of its inception, for some it signaled a new dawn in climate change policy, for others it merely reinforced the power of the coal lobby. Given that Sino-Australian climate cooperation is embedded within the APP, an important question to address is whether the current process holds the potential to evolve into an effective institution for regional climate governance.

How effective is the APP?

The Asia–Pacific Partnership for Clean Development and Climate is a multilateral public–private initiative of the Bush Administration to address air pollution, energy security, and climate protection. It involves governments, firms, and industry associations from seven countries (including initially the US, Australia, Japan, South Korea,

China, and India with Canada joining later in October 2007). These countries account for over 50 per cent of global CO₂ emissions, 48 per cent of global energy use, and half of the global population. In this sense the group is potentially representative enough to make a difference, yet small enough to make forging consensus easier than it is in a formal multilateral setting such as Copenhagen.

The core rationale behind the establishment of the APP is that it provides a more effective means of addressing climate change than the existing multilateral framework at the global level. The underlying assumption is that efforts to reduce greenhouse gas emissions are more likely to succeed if focused on practical and concrete measures. APP is essentially a problem-solving style institution with a strong belief in technology as a solution. Its stated purpose is to:

Create a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment, and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient technologies and practices among the partners through concrete and substantial cooperation so as to achieve practical results.²⁵⁹

According to Noriko Fujiwara, the main concerns of the APP are threefold: (1) to reduce the level of energy demand and greenhouse gas emissions in emerging economies; (2) to create a level playing field in markets for major commodities — steel, aluminum and concrete; and, (3) to develop cleaner technologies for a low-carbon economy.²⁶⁰

At the time of its creation in July 2005, the partnership posed a direct challenge to the Kyoto Protocol. According to Alan Oxley, former chairman of the General Agreement on Tariffs and Trade, the APP represented ‘a new and realistic framework for tackling global climate and emissions issues.’²⁶¹ Initial enthusiasm for an alternative approach failed to eventuate, however, in part owing to resistance by the Japanese government, which remained committed to the global process. As a consequence, at its launch in January 2006, the partnership was framed

as a complement to the Kyoto Protocol rather than a substitute. At the 2007 APEC Summit in Sydney, Australian and Chinese leaders issued a joint statement on climate change and energy issues that helped to influence the positions of the Chinese and US governments thereby creating the conditions for a more consensual partnership.

Contrary to some fears, the APP has not undermined international climate cooperation or led to any defections from the Kyoto Protocol. In fact, it has re-legitimised the Kyoto process by testing the commitment of key developing states such as China and India. Three years after its establishment the more appropriate question to address is how can it best be improved?²⁶²

The APP is highly decentralised and informal. A Policy Implementation Committee is chaired by the US with representatives from each participating country. There are no common legally binding rules or targets and the institution lacks a permanent secretariat as well as a general budget. Task forces have been set up to establish work plans in three key energy supply sectors — cleaner fossil fuel, renewable energy, and power generation and transmission — and five key energy-intensive industries — steel, aluminum, cement, coal mining, and building and appliances.

Overall, the institution reveals strong industry-specific patterns. The major impact has been on the generation and diffusion of cleaner production processes to reduce energy intensity. As noted earlier, energy intensity (the unit of energy per unit of GDP) is only a relative measure because intensity can improve while aggregate emissions grow. Hence, the link between project outcomes and a reduction in emissions is tenuous. With respect to actual technology transfer outcomes, reports from the sixth meeting on policy and implementation are mixed: Australian, US, Canadian, and Korean reports are all positive; the Japanese report is more circumspect; and both the Chinese and Indian governments highlight potential problems. For example, the Chinese report confirms that a lack of funding and capacity are still the biggest barriers to success and calls for more research, academic participation, and collaborative technology projects. The Indian report raises the question of weak procedures for project approval. Of course,

these responses reflect each government's entrenched formal position on climate change.

In the available documentation, references to climate change are largely absent with limited attention given to environmental outcomes in meeting reports. This would suggest that energy priorities trump environmental needs and that a lack of targets and clear environmental guidelines may ultimately undermine the broader objective of addressing climate change. It will be interesting to see whether in the future the APP can be aligned with European Union sectoral targets.²⁶³ Chinese carbon-intensity targets are equally stringent and could also be incorporated into an agreed set of targets, principles, and norms.

The APP does have benefits however. As noted by Thomas Brewer, technology transfer is enabled by myriad meetings and informal networking that in turn create the necessary social space for learning to take place.²⁶⁴ Reports from the seventh meeting on policy and implementation held in Queensland in May 2009 are principally focused upon information-sharing over national climate initiatives. Participants are thus involved in a process of confidence-building that may well help to ease tensions at the global level.

On balance it would appear that the APP does not constitute the kind of malign influence on climate governance that some critics have suggested. It could develop into a more effective institution, especially with the introduction of sectoral targets. Technology transfer does appear to be facilitating new forms of collaboration between government and industry, and some demonstration projects have exceeded initial expectations. However, the lack of institutional arrangements for ensuring openness and accountability risks undermining the effectiveness of technological cooperation. Particularly in relation to government–industry cooperation, vested interests need to be held to account. An over-emphasis upon clean coal distracts attention away from other important areas of climate cooperation. And joint projects on energy conservation are few and far between. Overall, APP falls far short of a regional institution that is capable of tackling climate risks in a comprehensive and accountable manner.²⁶⁵

At this stage, the regional climate agenda needs to move beyond

technological solutions to consider integrated plans for sustainable development, climate adaptation, and risk management. What is required is a repertoire of multiple response strategies that are linked to the creation of a regional order. The critical question is whether such an organisation could evolve on the basis of the existing APP arrangement, or whether a new regional climate institution is needed to advance a more comprehensive agenda. In the discussion that follows, a proposal is put forward for the establishment of a regional dialogue on ecological security that would complement rather than compete with the AP6 process.

Regional dialogue on ecological security

Appeals to climate security have tended to receive a particularly cool reception within the policy-making establishment in China. As noted earlier, for the Chinese government the environment is perceived *ipso facto* as a development problem that requires a transformation of resource intensive processes of industrialisation. Applying a security frame of reference evokes fears that environmental problems will be used as a pretext to undermine China's growing influence in the world. The tendency among many Western security analysts to present the relationship between the environment and security in highly antagonistic terms also fosters a zero-sum logic and runs counter to the Chinese discourse on ecological civilisation and peaceful development.

When former UK Foreign Secretary, Margaret Beckett, promoted the idea of climate security at the United Nations Security Council in April 2007, representatives were divided over the benefits of taking a security approach towards global environmental crises. Disputes over the relationship between environmental change and security continue to undermine the potential for a policy consensus to emerge. As noted by many scholars, 'securitising' the environment risks adding a military dimension that is more likely to undermine rather than strengthen environmental protection. It could also distract attention away from dealing with the causes as opposed to the symptoms of environmental degradation. A unidirectional approach towards conflict overlooks the

critical question of whether states and societies can adapt: alarmist accounts of environmental refugees flooding across national borders, or large-scale conflicts over water resources need to take into account the positive feedback loops that can be created through technological progress, policy reform, and social innovation.²⁶⁶

Where consensus is developing is over the link between climate and energy security. Reducing the complex problem of climate change to one of emissions provides a practical solution and, at the same time, helps to reconcile industry and societal interests both within and between states. There is now an emerging global consensus that transitioning to a low-carbon economy is a prerequisite for maintaining stable climatic conditions. However, a sole focus on emissions reduction downplays the complexity of the climate challenge by ignoring its consequences. In a thoughtful article on climate security published in 2008, Maria Julia Trombetta makes the following observation:

Climate change is only one aspect of a larger human made environmental change. As humankind pushes the boundaries of the carrying capacity of the planet, the impact of climate change is going to increase especially on those who live in marginal, vulnerable areas. Reducing emissions will not solve all the other environmental problems or increase the resilience of vulnerable populations.²⁶⁷

From a more holistic perspective, as argued by Barry Buzan, an ecological approach towards security forces us to recognise ‘the maintenance of the local and planetary biosphere as the essential support system upon which all other human enterprises depend.’²⁶⁸ Ecological security conveys a sense of the interdependency between humans and nature that is sometimes missing from debates on climate mitigation. It is deeply embedded in Chinese history and culture and universally applicable to all states and peoples. It was a former Communist leader who first proposed the idea of an Ecological Security Council. In an address to the United Nations General Assembly in December 1988, Mikhail Gorbachev warned: ‘the relationship between man and the

environment has become menacing ... the threat from the sky is no longer missiles but global warming.’²⁶⁹

At a practical level, ecological security raises the question of how to respond to climate impacts and worsening environmental degradation. It stresses the importance of taking precautionary measures, managing risks, and building resilience in order to adapt. According to the Fourth Assessment Report of the IPCC, climate adaptation is a ‘process thorough which societies make themselves better able to cope with an uncertain future’. This involves appropriate adjustments ranging from technological options to the establishment of early warning systems for disaster relief, institutional reforms, and behavioural change. Current efforts are centred on national adaptation plans similar to the Agenda 21 approach to sustainable development. As yet, planning and cooperation at the regional level are non-existent.

Consequently, there is an opportunity for Australia to play a leading role in facilitating a regional dialogue on ecological security. Seeking greater clarification over how to respond to climate vulnerability across the region is both timely and politically expedient. As many commentators have argued, the vulnerabilities of Asian states to climate disasters underscore a sense of urgency. Recent studies reveal that three-quarters of the world’s low-lying coastal areas are in Asia, and cities, in particular, are at serious risk from rising sea levels, typhoons, and tsunamis. Climate disruption combined with rapid population growth and urbanisation means that freshwater availability, particularly in large river basins, is projected to decrease, and variations in crop yields could lead to severe food security risks in several developing countries.

Launching a regional dialogue on ecological security does not imply the design of a new blueprint for climate adaptation. Much can be achieved by building on the region’s diverse experiences in disaster relief operations. And we have much to learn from the centuries-old experiences of local communities. In light of the region’s rapid industrialisation drive and advancing population, attention also needs to focus on reducing the risk of ‘maladaptation’ as in the case of building infrastructure that is not designed to cope with extreme weather events, or planting crops that are no longer able to survive prolonged drought.

In short, an ecological security agenda blends the old with the new. It is also where sustainable development, conflict prevention, and crisis management converge.

As a nation with strong cultural and security connections with the region, and with a long history of adapting to environmental change, Australia is well positioned to take the lead in facilitating a dialogue on ecological security. Building a collective response to disruptive climate change and worsening environmental trends is now an urgent task. For the most populated region in the world, the consequences of climate change are dire. If ignored, the worst-case scenarios put forward by security analysts may well eventuate.

Conclusion

Learning from the past, anticipating the future

The sixtieth anniversary of the People's Republic of China presents a symbolic moment to reflect on China's past, present, and long-term future. After three decades of rapid reform and opening, China is now on track to become a major global power. Its rising impact on world affairs has led some commentators to argue that it is likely to dominate the international system over the next half century similar to Britain in the 19th century and the United States in the second half of the 20th century. However, enormous political, social, and environmental challenges continue to constrain China's capacity to benefit fully from its economic achievements. Above all, the Chinese government faces a Herculean task in rebalancing its economic growth with environmental protection. This is a challenge that affects the future course of Chinese civilisation as well as its engagement with the rest of the world. A critical question is whether it is possible to pursue an alternative path to modernisation on a scale that is unprecedented in world history. Are densely populated emerging states such as China destined to follow the same path as the industrialised nations?

Just as thousands of years ago Yu the Great diverted the build-up of environmental pressures by cutting a tunnel through a mountain, the Chinese leadership is now looking for a similar short-cut diversion away from the well-trodden path of industrialisation

and environmental degradation. Although it is clear that a simple engineering fix does not exist, and indeed such a mindset is just as likely to worsen rather than alleviate environmental conditions, it is also evident that an incremental process of transformative change may not be adequate to address the urgency of environmental crises at both the local and global levels.

What is to be done? There is no single panacea for dealing with disruptive climate change and large-scale environmental degradation. To propose one policy solution is to imply that there is one single pattern of behaviour underlying environmental degradation. The historical evidence in China and globally suggests otherwise. Solutions are multiple and likely to prove just as complex as the problems they aim to resolve. Although win-win scenarios are politically seductive in the short term, they often mask difficult trade-offs. What is the optimum balance between energy security and carbon emissions reduction? How is it possible to promote a more sustainable form of industrialisation while at the same time protecting those who are most vulnerable to worsening environmental conditions? These questions are at the centre of many intense intellectual debates, but we simply do not have many of the answers. Climate change itself is characterised by complexity, interdependency, and uncertainty, and therefore it is important to acknowledge that uncertainty is a condition with which decision-makers need to come to terms.

A central theme running through this paper is the importance of learning from the past in order to anticipate the future. Current debates over China's role in environmental governance, especially at the global level, are deeply polarised over the question of responsibility. In global climate negotiations, history is often seen in negative terms, as a stumbling-block to arriving at a consensus over the need to act. But there is also a more positive side: it is not only the historical patterns of industrialisation that require our attention. We can also learn from different historical and cultural experiences of environmental governance, both good and bad.

Environmental statecraft in the 21st century

An understanding of ecological dependency is deeply embedded in Chinese history and culture. Indeed, the new philosophy of ecological civilisation is reminiscent of traditional Chinese conceptions of nature in which the human and physical worlds are deeply intertwined. From a political perspective, ecological civilisation is important on two accounts. First, by shaping public expectations it broadens the basis upon which the legitimacy of the ruling Chinese Communist Party can be evaluated. Second, it provides an alternative standard for assessing China's level of environmental engagement with the outside world.

However, it remains to be seen whether a reinvented philosophy will have any palpable effect on the human impulse to transform nature for its own ends. China still lacks an institutional guarantee that ecological civilisation will work in practice. The limits to economic growth have not been clearly defined. And ongoing political constraints on entrepreneurship and creativity within Chinese society prohibit major advances in environmental reforms.

In many ways, the urgent need to respond to growing environmental degradation and global climate change is reinforcing China's historic predisposition towards a hierarchical form of governance. Recent efforts in shifting towards a low-carbon economy are reinforcing the need for state planning on a long-term basis. China may not sign up to a global target to reduce global emissions, but policy-making at the domestic level is quintessentially predisposed towards targets and long-term plans. Energy supply constraints and inefficiencies are forcing recognition of the need to strengthen market mechanisms, but at the same time residual fears over self-sufficiency endorse a central role for the state in the allocation of resources. Climate adaptation efforts are also likely to take a top-down approach as is already evident in the recently released national plan for climate adaptation.

Historically, the environment has been central to China's national security. But this does not imply that a conventional national security response is required to deal with the current environmental crisis.

This is not primarily an issue for defence planners. Nor is it solely the responsibility of the economic planning agency. On the contrary, environmental stewardship is diffuse; it requires a concerted effort on the part of government agencies, corporations, and social organisations.

As yet, it is unclear as to whether a modern form of statecraft can develop in China that is more inclusive and less dependent upon state intervention. What is clear is that a more sustainable future cannot be arrived at by design. Central planning is not a viable substitute for private enterprise and public participation. Today in China there exists a fundamental tension between top-down planning and implementation. It is not only a political mandate from above that will determine China's environmental future. Ensuring checks and balances on the concentration of power in the hands of the few, and further unleashing the entrepreneurial spirit and creativity of the Chinese people, are equally if not more important.

Undoubtedly, the flow of ideas, technologies, and environmental practices across borders will also have some influence upon the changing nature of environmental governance in China. Deepening levels of international cooperation at the state, corporate, and non-governmental levels are already helping to shape the reform agenda; they are also having a demonstration effect on capacity building. But it is important to bear in mind that the internationalisation of environmental governance is a two-way process. China is no longer simply involved in a process of adapting to Western values and ideas; it is now seeking actively to spread its own cultural values and environmental practices via its engagement in global environmental governance and its investment activities overseas.

Our collective future

The relationship between China and the global environment is usually cast in either highly positive or highly negative terms depending upon whether the focus of attention is upon recent environmental reforms, or worsening trends of environmental degradation. A focus upon market opportunities and technological innovation tends to dominate

the economic debate, while a catastrophically oriented perspective tends to drive the security agenda. Historical perspectives are largely absent, and limited attention is given to the ways in which Chinese interpretations of environmental governance may contribute to overall global efforts.

This paper provides three important lessons for future collective action to address climate change and worsening trends in environmental degradation. First, the Chinese experience is highly valuable. It reminds us of the interdependency between humans and nature and of the ways in which climate, water, and forests are inextricably linked. By taking a longer-term perspective, it becomes clear that climate change is only one aspect of a multifaceted human-nature dynamic. Chinese history also reveals that the environment can affect the fortunes of nations in unexpected ways. The challenge ahead lies in building a collective response that learns from the experiences of the past rather than repeats unsustainable patterns of behaviour.

Second, China is beginning to take a more prominent role in global efforts to tackle climate change. But the future approach towards international engagement may not necessarily be aligned with liberal notions of global governance. The legacy of environmental statecraft persists and the pursuit of an ecological civilisation is informed by state socialism rather than liberalism. Clean energy for a harmonious world is currently helping to create unity rather than divisions across the global north and south divide. It may also help to elevate equity concerns on the political agenda. But the possibility also exists that China's state-centric approach will run counter to a more progressive agenda of multi-level, deliberative, and inclusive approaches towards environmental governance.

Third, a critical test of the extent to which China is willing to accept more environmental responsibility does not simply lie in the acceptance of a global emissions target. To a certain degree, the Chinese government's insistence that domestic action is the most important indicator of environmental commitment should be taken seriously. Western countries face similar constraints in aligning ambitions at the international level with legislative processes at the domestic level

as witnessed by current political debates in Australia and the United States. For China, the litmus test of whether it is prepared to work collectively to address climate change and environmental degradation also lies at the regional level. It is within this space, between the national and the global, that Chinese participation is likely to matter most. Melting glaciers, transboundary pollution, depleted fish stocks, and the downstream effects of public infrastructure projects cannot be resolved in the absence of Chinese support. The environment is not only central to national security; it is also a major source of regional peace and stability. Ecological security at the regional level is in the interests of all states regardless of their level of economic development.

China is now an important force on the world stage. Reminiscent of 200 years ago, it is once again faced with the enormous challenge of sustaining power on the basis of a degraded environment and serious resource scarcity. However, this time the prospects appear brighter. The task of satisfying the material needs of the Chinese population is less overwhelming; exchanges with richer countries allow the transfer of knowledge and technology; and the region is in a state of relative peace and stability. The opportunity now exists to accelerate reforms and build cooperation. Competitive pressures are likely to continue to constrain negotiations at the international level in the years to come. Difficult trade-offs and tensions over burden sharing will not disappear either before or immediately after the Copenhagen Summit. Resolving them will require ongoing diplomatic mediation and political commitment.

To sustain political momentum over the longer term we need to avoid a zero-sum approach and accept an undeniable reality: that energy and resource security, climate mitigation and adaptation, and the aspiration to attain a balance between human and environmental needs can only be achieved on the basis of unprecedented cooperation at multiple levels of governance. International cooperation is no longer an option; our collective future depends upon it.

Notes

- ¹ Over the past four decades, protracted debates over the biophysical constraints on economic growth have occurred at times of crises, specifically during the temporary oil shocks of the 1970s and 1980s, and more recently with the cost of oil rising to over US\$100 per barrel in 2008. The rise of large developing states is leading to a re-evaluation of earlier predictions.
- ² Detailed and candid descriptions of China's environmental problems are now readily available in English on the website of the Ministry of Environmental Protection, see <http://english.mep.gov.cn>.
- ³ Richard Louis Edmonds, *Patterns of China's lost harmony: a survey of the country's environmental degradation and protection*. London, Routledge, 1994.
- ⁴ See Liu Changming, He Xiwu and Ren Hongzun, eds, *Zhongguo shui wenti yanjiu* [Studies on China's water problems]. Beijing, Qihou Chubanshe, 1996. For a more recent update on China's water crisis see Ma Jun, *China's water crisis*, translated by Nancy Yang Liu and Lawrence R. Sullivan. Norwalk, CT, Eastbridge, 2004.
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