26. The evolution and transformation of China's climate change response strategy: From preventing 'black swan' events to reducing 'grey rhino' risks

Jiahua Pan

China has long known the havoc extreme weather events can wreak on its people and society. After the founding of the People's Republic of China (PRC), infrastructure construction on a massive scale—especially in the area of water conservation projects—greatly improved the country's ability to deal with natural disasters. The increased flow of ideas into China from the outside world since the start of its reform and opening-up has improved understanding of global climate change, and has helped to raise public awareness about 'black swan' events—that is, events that are as difficult to predict as they may be socially and economically devastating. As China continues apace on its course towards industrialisation, global climate change, of which surface temperature rise has been the primary symptom, not only threatens the climate security of the world as a whole, but has also become a source of serious 'grey rhino' risks—that is, obvious dangers that are nonetheless overlooked, potentially jeopardising the prospect of sustainable development in China. China's climate change response strategy has evolved, starting with an exclusive emphasis on defensive measures that were passive and reactionary and transforming into one with a greater focus on tackling the challenges head-on with proactive measures. This strategic transition has also helped advance the construction of an ecological civilisation. It is incumbent on China, given its international obligations to help achieve global ecological security, to work together with other signatories to meet the targets set out in the Paris agreement. Just as importantly, this is also what needs to be done to realise a harmonious coexistence between humanity and nature.

Deepening understanding and broadening the scope of action

When China's policy of reform and opening-up was first adopted towards the end of the 1970s, climate change was exclusively a topic of scientific study. It was subsequently included among the environmental and development issues on which China engaged with international politics, marking the beginning of the country's

involvement in the international effort to respond to climate change. As reform and opening-up unfolded and China's economy grew, strategic deliberation on the issue also deepened. Thinking shifted from the realisation that climate abnormality was attributable to climate change in the 1980s, to becoming alert to 'black swan' extreme weather events that merit special preventive measures in the 1990s, and then to arriving at a fuller understanding of what climate change really means—finally becoming what China is now: an active player in the global campaign to tackle the problem. At the same time, the country went through a similar process in regard to action plans and their execution. In the early 1990s, China primarily saw itself as a country that was morally a follower or an observer of such efforts. By the late 1990s, however, the country had established itself as an active player among developing countries both committed to and capable of proactively pushing for the protection of their development rights and greater climate justice. By 2010, China had, with its notable achievements in transformative development, become a world leader in efforts to safeguard the ecological security of planet Earth, respond to climate change and, in particular, to meet the challenges posed by 'grey rhino' risks. For analytical purposes, we divide the history of China's thinking and action on climate change into five stages: disaster prevention, involvement in scientific study, defending emission rights, coordinating development and taking a leadership role.

Stage one: 1978–89

Climate disaster prevention was the theme of the first stage of China's response to climate change, which started in 1978 and lasted until 1989, when climate change was perceived as extreme weather events. During this period, responding to climate change was not yet officially on the government's policy agenda. Once the policy of reform and opening-up was adopted, economic growth took centre-stage in all policy deliberation and formulation and became the country's top priority. Even though concepts such as the greenhouse effect, global warming and climate change were beginning to appear in the Chinese media, they did not garner serious attention from the public and so were never regarded as a development issue. While the release of *Our Common Future* (also known as the Brundtland Report) by the World Commission on Environment and Development (WCED 1987) did help raise awareness inside China about issues of ecological destruction and environmental pollution, climate change was largely seen as a problem of climate abnormalities causing extreme weather events. In addition to a limited number of articles providing a general introduction to the topic (for example, Zhang and Liu 2013), at that time Chinese research on 'climate change' was limited mostly to studies of the impact of meteorological disasters and discussions of policy responses (Xu 1990). Policies related to this issue in the five-year plan for national economic

and social development called for improvements in forecasts for calamitous weather and earthquakes, and work to reduce damage caused by natural disasters.¹ Almost no mention was made of either mitigation of or adaptation to climate change.

Stage two: 1990–97

The second phase in China's involvement in international action on climate change was from 1990 to 1997. The government's climate change response policies during this period mostly revolved around engaging in and keeping up with actions taken by the rest of the international community. In response to the release of a scientific evaluation report prepared by the Intergovernmental Panel on Climate Change (IPCC) on the science behind, impact of and countermeasures for climate change, the Intergovernmental Negotiating Committee was established in 1990 under the auspices of the United Nations. The committee's mandate was to oversee and coordinate negotiations among governments over climate change-related international agreements and treaties. To participate in this process, the Chinese Government set up the National Climate Change Coordination Task Force in 1990, under the State Council's Committee on Environmental Protection. There are two reasons we consider this a notable period in China's participation in scientific research: 1) the Chinese task force was headed by Song Jian, a state councillor primarily responsible for science, technology and environmental protection; and 2) the office for the task force was set up inside the China Meteorological Administration (CMA) (Zou 2008). The CMA, as the body charged with executing China's participation in the IPCC, organised a team of Chinese researchers to compile a scientific evaluation report on climate change (IPCC 1990). That work began in 1988 and was completed by 1990. In 1990, then premier Li Peng, representing the Chinese Government, signed the UN Framework Convention on Climate Change (UNFCCC). State councillor Song, State Scientific and Technological Commission (now Ministry of Science and Technology) deputy commissioner Deng Nan, CMA chief Zou Jingming and China Environmental Protection Administration (now Ministry of Environmental Protection) chief Qu Geping were on hand at the signing ceremony.²

1 In both the ninth five-year plan, released in 1990, and the tenth five-year plan, the only climate-related provision dealt with the prevention of weather disasters.

2 Despite their membership of the coordinating team, agencies in charge of environmental protection did not play a leadership role in China's involvement in international efforts on climate change. China's involvement was due largely to the fact that the signing ceremony for the UN Framework Convention on Climate Change took place at the UN Conference on Environment and Development (UNCED), also known as the Earth Summit, in Rio de Janeiro in 1992, which China attended.

Stage three: 1998–2006

The third phase of China's international involvement in efforts to tackle climate change began in 1998 and lasted until 2006. The Chinese Government in this period focused mostly on asserting and defending the country's rights to development and, as such, attached relatively less importance to domestic actions than it might have. With the conclusion of negotiations over the Kyoto Protocol³ in 1997, the Chinese Government came to the realisation that climate change was not simply a scientific and environmental issue, and was also a development issue. This led to the establishment in 1998 of the National Climate Change Response Policy Coordination Task Force, with Zeng Peiyan, then chair of the National Planning Committee, appointed as its head. The office of the task force was also moved from the CMA to the National Planning Committee, a central government body in charge of macroeconomic development planning and management. In 2003, chair of the National Development and Reform Commission (NDRC), Ma Kai, became the head of the task force. The Kyoto Protocol, acceptance of which by many signatories was grudging at best and resentful at worse, took effect in 2005. Instead of succumbing to mounting pressure from many developed countries to act aggressively to reduce its greenhouse gas emissions, China stood its ground on its status as a developing country and its right to pursue economic development. The government maintained, however, that China was committed to the principle of common but differentiated responsibilities as reflected in the Kyoto Protocol and was prepared to take action—albeit with financial support from developed countries—to reduce emissions and adapt to climate change. China's active involvement in the implementation of the Clean Development Mechanism⁴ set out in the Kyoto Protocol is testament to that commitment.

Stage four: 2007–13

The next stage, covering the period 2007–13, was defined by a strategic emphasis on coordinated development. In 2007, the Chinese Government began to shift the focus of its climate change policies towards coordinating domestic action and international engagement. In particular, action plans would be introduced and executed domestically, while on the international front, China's resolve to reduce emissions would be affirmed while the country worked to wean itself off dependency

3 The Berlin mandate adopted at the 1995 UN climate conference in Berlin marked the onset of a negotiation process that culminated in the Kyoto Protocol in 1997, which called on developed countries to reduce their own greenhouse gas emissions and provide developing countries with the funding and technologies needed to pursue low-carbon development. However, opposition from a small number of countries, including the United States, caused an eight-year delay in the protocol's implementation, which did not begin until 2005, amid lingering resistance.

4 The Clean Development Mechanism is the twelfth clause in the Kyoto Protocol. It requires developed countries to help developing countries reduce their emissions by providing financial and technological support, and allows the emissions reductions attributable to such support to count towards the developed country's total emissions reduction achieved.

on financial support from developed countries. Due in large part to the development and increased strategic significance of the issue of climate change, the government decided in 2007 to elevate the standing of the climate change leadership group by granting it more powers and greater authority. In addition, a department dedicated to climate change response-related matters was established under the NDRC. In June of that year, the State Council decided to set up a leadership group to oversee climate change responses, energy conservation and emissions reduction. The Chinese premier was to be the group's head, with the chair of the NDRC as its chief of staff. Negotiations at the Bali climate change conference in 2007 produced, among other things, agreements regarding the second commitment period for the Kyoto Protocol and long-term actions for developing and developed countries. In the same year, the State Council officially released the 'National Plan on Responding to Climate Change', which had been jointly drafted by a number of government agencies, including the NDRC (State Council 2007). Prior to the 2009 UN climate conference in Copenhagen, while continuing to maintain the country's status as a developing country, the Chinese Government was anything but a foot-dragger on concrete climate action. It submitted its emissions reduction target for the year 2020, which was based on its 2005 emissions level, and made clear its decision not to seek financial assistance from developed countries. The twelfth five-year plan for economic and social development (2011–15) contained an entire chapter on responding to climate change—a first in the history of the five-year plans.

Stage five: 2014 – present

The year 2014 marked a strategic turning point in China's policy response to climate change. Proactivity replaced passivity, taking the lead replaced following others, domestic actions were ramped up and playing a leadership role on the international stage became an important objective. At the Asia-Pacific Economic Cooperation (APEC) senior officials informal meeting in 2014, leaders of the United States and China issued a joint statement (Office of the Press Secretary 2014),⁵ setting out agreements that had been reached on core issues in the Paris climate accord and committing their respective countries to emissions reduction goals. In September 2015, the leaders of the two countries issued another joint statement⁶ reaffirming their determination to work together to push the Paris climate change talks towards a successful outcome.

5 In the statement, the leaders of the two countries announced their respective national action plans for responding to climate change in the years beyond 2020, in recognition of the fact that such actions must form an integral part of any concerted effort to achieve low-carbon transformation of the economy and to keep temperature rise below 2°C. The US target is to reduce its aggregate emissions to 26–28 per cent below its 2005 level by 2025 and to make good faith efforts towards achieving the higher end of that range. For its part, China intends to reach peak carbon dioxide emissions by 2030—possibly earlier—and to increase to about 20 per cent the share of non-fossil fuel energy in its total primary energy consumption. Both sides agreed to continue to pursue these objectives and to intensify efforts over time.

6 Chinese President Xi Jinping met with then US president Barack Obama in Washington, DC, on 25 September 2015. The two sides announced their respective plans to deepen cooperation in fighting climate change.

On 3 September 2016, Chinese President Xi Jinping and US president Barack Obama submitted their legal instruments for formal approval of the Paris agreement to then UN Secretary-General Ban Ki-moon at the G20 summit in Hangzhou, China. China's thirteenth five-year plan also contained calls for more aggressive actions to respond to climate change. In his report to the nineteenth National Congress of the Communist Party of China (CPC), President Xi made it clear that, for China, modernisation meant modernisation of the harmonious coexistence of nature and human beings. It was incumbent on China, President Xi averred, to take the lead in international cooperation on climate change responses and to engage in, contribute to and lead efforts to build a global ecological civilisation (Xi 2017: 71).

Since it was first introduced to the issues of climate change and responses to it, the Chinese Government's understanding has deepened, and it has continued to ramp up efforts to tackle the problem. Policy priority shifted gradually from shaky disaster forecasting to engaging in scientific and technological research, to asserting and defending the country's rights to pursue economic development, to coordinating action on the domestic and international fronts and, finally, to the situation today—working to fulfil China's domestic responsibilities as well as meeting its international obligations.

Internal drivers of development transformation

Some of the causal factors behind this shift in policy orientation and prioritisation were related directly to the country's domestic situation. At the top of the list were changes over time in carbon dioxide emissions from the burning of fossil fuels. Second, the dynamic evolution of the mutual impacts of economic development and environmental amenity indicated the need to augment the country's climate change response capabilities. Third, China's rapid economic expansion had already come up against physical-spatial constraints. In the face of problems related to climate change—which are essentially global in scope—China must, in addition to doing what is in the best interests of the Chinese people, contribute its fair share towards international efforts to achieve global climate security.

Emissions trajectory and associated sense of responsibility

Before the start of its reform and opening-up, China ranked much lower than developed countries in terms of both aggregate and per capita greenhouse gas emissions, even though some other low-income countries such as India and those in Africa were ranked even lower (Figures 26.1a and 26.1b). The country's aggregate emissions accounted for 6 per cent of the global total, while China was one-fourth of the global average in terms of per capita emissions. The reform and opening-up

ushered in an era of brisk economic growth, which also led to significant increases in the country's carbon dioxide emissions. Even so, China reached only one-half of the global average in terms of per capita emissions by 1989.

Figure 26.1(a) Changes in aggregate carbon dioxide emissions in selected countries and regions, 1971–2015 (1 million metric tonnes)

Figure 26.1(b) Changes in per capita carbon dioxide emissions in selected countries and regions, 1971–2015 (metric tonnes)

Source: IEA (2017).

By 1998, that percentage had grown to two-thirds. Both aggregate and per capita emissions levels rose sharply after 1998 and, by 2006, in terms of aggregate emissions, China became number one in the world and, at the per capita level, it surpassed the global average. By 2013, China was emitting more carbon dioxide than the United States and the European Union combined, and exceeded the EU average in per capita terms. China was initially something of an onlooker while it was trying to better understand the issue of climate change and, by 1998, it used its voice to draw attention to the issues of climate justice and development rights (Pan 2002a, 2002b). By 2006, China had become the 'world's factory' as a result of shifts in international trade patterns; it had high emissions on the production side, but still low emissions on the consumption side (Pan et al. 2008). By 2013, in comparison with not just other developing countries but also some developed countries, China was already among the largest carbon emitters in the world. Scientific research and evaluation have shown carbon dioxide emissions are the chief contributor to climate change, so, as China's carbon emissions followed an upward trajectory, so, too, did its sense of responsibility and obligation to act.

Strong growth and greater economic prowess

Prior to its reform and opening-up, China's gross domestic product (GDP) was just 5 per cent of that of the United States, and represented just 1.5 per cent of global GDP. After just 10 years of rapid economic growth under the new reform policies, in 1989, the volume of the Chinese economy had reached 10 per cent of that of the United States, and accounted for more than 2 per cent of the global total. These numbers grew to 16 per cent and 4 per cent, respectively, by 1997, and to more than 25 per cent and 6.6 per cent, respectively, by 2006. When the era known as the economic 'new normal' started in 2013, the Chinese economy was half the size of the United States', and accounted for 10.85 per cent of the aggregate size of the global economy. China has been the world's second-largest economy since 2010 and has maintained a medium to high rate of economic growth since 2014. By 2017, China's contribution to the global economy was about 15 per cent (World Bank 2017). However, at less than 80 per cent of the global average, per capita income in China is still far lower than in developed countries, although it is higher by a considerable margin than many low-income countries. According to classification criteria used by the World Bank and the International Monetary Fund, China is now ranked among the world's upper-middle-income countries. After the launch of China's 'Belt and Road Initiative' (BRI), outbound investment grew at a phenomenal rate. All of this has helped to greatly strengthen the country's capacity to respond to climate change, both domestically and at the international level.

Pressure from the growing need to protect and preserve nature and the environment

China is an ecologically fragile country. The Chinese people have lived since time immemorial with the constant threat to their survival and quality of life posed by natural disasters, primarily in the form of catastrophic weather events. Although China sent an official delegation to the UN Conference on the Human Environment in Stockholm in 1972 and this was followed by the establishment of the Office of Environmental Protection under the State Council, before the launch of its reform and opening-up, and possibly until as late as 1989, ecological deterioration was the main environmental problem the country faced. After the Framework Convention on Climate Change was signed at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, the Chinese Government became one of the first countries in the world to introduce a national plan for promoting sustainable development (State Council 1994). However, this did not immediately make the environment a top priority, as it came in last among the three areas of focus for sustainable development, after population and resources. In 1998, what had been the Environmental Protection Administration—a body under and not a part of the State Council, and not even a ministerial-level governmental agency—was upgraded to become a ‘state administration’, rendering it institutionally on a par with all other ministries.⁷ It would be another 10 years, however, before the organisation was officially named the Ministry of Environmental Protection and became a constitutive organ inside the State Council, in 2008. The focus of the organisation’s work evolved over the decades. Before 1998, its chief tasks related to setting national standards for various environmental indicators, but no cap was placed on the aggregate level of allowable pollutants. In 2008, a cap on aggregate pollution was introduced that made allowances for historical accumulations. It was not until 2013 that quality control for the various environmental media started. The focus of air pollution abatement efforts shifted from sulfur dioxide to nitrogen oxide and to particulate matter (PM) 2.5—all of which are attributable to the burning of fossil fuel. Reducing emissions of carbon dioxide from fossil fuel combustion would, therefore, help manage air quality. In addition, the continuing worsening trend of water quality in China is related to climate change-induced changes to the country’s hydrological landscape. A retreating snowline and melting glaciers caused

⁷ In 1988, the Chinese Bureau of Environmental Protection, which was an agency under the former Ministry of Urban and Rural Construction and Environmental Protection, was separated from that ministry and placed under the direct administration of the State Council. In 1993, the administrative ranking of this organisation was upgraded to subministry, one level below ministry. In 1998, with the approval of the first plenum of the ninth National Congress of the CPC, and in accordance with pertinent provisions in the State Council’s organisational reform plan, the organisation was further upgraded to ministerial level, and renamed the State Administration for Environmental Protection. In 2008, with the approval of the first plenum of the eleventh National Congress and in accordance with State Council provisions, the Ministry of Environmental Protection was established (State Council 2008).

by temperature rises are expected to lead to a 20 per cent increase in total lake surface area on the Qinghai–Tibet Plateau (Ding 2017). Even under the assumption of a 1.5°C temperature rise, an estimated one-third of glaciers across Asia are expected to disappear (Kraaijenbrink et al. 2017), effectively depriving the Yangtze, Yellow, Mekong and Yarlung Tsangpo rivers of their source water. This means that responding to climate change is something China does not because others have asked it to, but because it is something it wants to do (Xi 2014).

Spatial constraints on physical expansion

China has a vast territory and large population, and it takes a prodigious amount of high-energy and resource-intensive production and consumption to improve the country's infrastructure and its people's living standards. This entails rapid growth and places enormous demands on sources of energy and other raw materials as the process of industrialisation and urbanisation continues.

However, the accumulation of material wealth and increases in consumption are bound to hit a 'ceiling' sooner or later (Pan 2015). Once the construction of regional infrastructure such as railways, highways and airports reaches saturation point, basic material needs such as those for housing, transportation and food have been adequately met and population growth begins to taper off, pressure on the national economy to continue to expand physically will also begin to ease, before dissipating altogether.

We can see this by looking at the production of steel and iron to meet the needs of infrastructure and housing construction (NBS various years). China's production of raw steel was 61,000 tonnes in 1950, 23.74 million tonnes in 1977, 61.59 million tonnes in 1989, 100 million tonnes in 1996, 423 million tonnes in 2006, 779 million tonnes in 2013 and 823 million tonnes in 2014. The number dropped slightly in 2016, to 808 million tonnes (NBS 2017). In 2016, 2.06 billion mobile phones and 290 million computers were produced in China. According to data from the National Bureau of Statistics (NBS), by 2016 the average living area for each Chinese was 40.8 sq m—36.6 sq m for urban residents and 45.8 sq m for rural residents (NBS Office of Household Survey 2017). By the end of 2017, there were 310 million motor vehicles in China, including 217 million cars. The fact that overcapacity exists in areas such as iron and steel, coal and building construction indicates that the national economy is on the verge of reaching the upper limits of its physical expansion. The beginning of the 'new normal' era in 2013 was in fact a sign of the constraints imposed by the 'ceiling'—a constraint that forced the transition from focusing exclusively on quantitative growth to paying equal attention to qualitative improvement. This also suggests that, regardless of whether the need to limit greenhouse gas emissions places constraints on growth, the amount of room available for further physical expansion of the national economy has been diminishing and is on course to become negative.

Future outlook

So far, the evolution of China's climate change policy response has largely reflected the changing world order and international conditions. Further policy changes in the future will be driven increasingly by China's commitment to helping other countries work together on issues that affect all of humanity.

Grasping the international economic and political landscape

The international economic and political landscape of the twenty-first century is markedly different from that of the twentieth century. It behoves China to continue to make whatever necessary adjustments to its climate change response strategies and policies befit the changes taking place in the world at large.

The opposition between a global West and a global East that defined the world order in the Cold War era was displaced in the 1990s by the division of the world into a global North and a global South, during which the G7 called the shots when it came to the world order and the direction of development. Since the beginning of the twenty-first century, the North–South bifurcation has itself been replaced with a tripartite division into developed countries, emerging economies and developing countries (Pan and Chen 2016). The G7 has also been replaced with the more inclusive G20, comprising emerging economies in addition to the G7 countries.

As far as future needs, technologies and the demographic outlook are concerned (UN 2017), this tripartite division covers five distinct types of economies. Developed countries can be further divided into two groups: the 'super saturated' and the 'technologically expansionary'. The former includes EU countries and Japan, which have already maxed out their allowable development space and have begun to see zero or even negative population growth; while the latter, represented by the United States and Australia, are still growing in population size, have ample room within their own territories for further growth and development and have enormous innovative capacity.

Among the emerging economies, we can identify three subtypes. China is representative of the subtype characterised by a population size that is about to peak and set to shrink in the long term, that has medium to high incomes and is on the verge of maxing out the available physical space for further development within its national borders. We might call this subtype 'near-saturated'. Then there is the subtype of which India is representative, which might be called 'consumption expansionary'. These countries are growing at a relatively brisk rate in terms of population size, although that growth is expected to plateau in the long run; they have low to medium incomes and plenty of physical space within their borders to accommodate further

growth in the national economy. Finally, there is what we might call the ‘population expansionary’ category, which includes low-income high population–growth countries with large areas within their territories that are as yet undeveloped and which are vulnerable to the impacts of climate change (see Figure 26.2).

As for greenhouse gas emissions, EU countries and Japan will see negative growth, the United States will see its emissions decline despite its growing population largely thanks to technological advances, while China will differ little from other developed countries as far as this issue is concerned. Emissions levels in India are expected to experience strong growth until 2050. As for Africa, even assuming minimal increases in per capita emissions, the prospect of a continent-wide population of 4 billion and the vast amounts of energy and resources needed to meet their basic needs may prove to be the most challenging obstacle to the world meeting the emissions targets set in the Paris agreement. Against this backdrop, an appropriate choice for China would be to help defend and strengthen the Paris agreement, including its emissions reduction targets and the verification mechanism specified therein, and to play a leadership role in international efforts to achieve zero emissions after 2050.

Figure 26.2 Future demographic trends (1,000 people, medium fertility rate)
Source: UN (2017).

A world leader in low-carbon development and transformation

China will speed up its low-carbon development and transformation. According to data released by the International Renewable Energy Agency (IRENA 2017), in terms of both the growth rate and the aggregate scale of generation capacity for renewable energy, China surpasses not just other developing countries, but also—and by a significant margin—some developed countries. In 2007, China contributed 15 per cent of total global generation capacity for renewable energy, while the US contribution stood at only 11 per cent (Table 26.1). By 2016, China's contribution had risen to 27 per cent, while the US share stayed at 11 per cent. Over the period 2006–17, the world's total renewable energy generation capacity grew by 100 per cent—higher than the growth rate in the United States. By contrast, the growth rate for China was 270 per cent, which does not even taken into account growth in China's solar and bioenergy sectors. Finally, China is number one in the world in terms of both the growth rate and the existing stock of electric vehicles.

Table 26.1 Generating capacity for renewable energy in selected economies (megawatts)

	2007	%	2016	%	2016/2007 (%)
World	990,968	1.00	2,007,658	1.00	1.03
Africa	22,938	0.02	38,285	0.02	0.67
China	148,543	0.15	545,916	0.27	2.68
India	41,867	0.04	90,748	0.05	1.17
Germany	35,602	0.04	104,704	0.05	1.94
United States	107,917	0.11	214,776	0.11	0.99

Source: IRENA (2017).

Risk management and disaster prevention in a warming world

According to IPCC scientific evaluation reports, global temperature rise will continue unabated. Like 'grey rhinos', the climate change risks are huge, although incremental and gradual. Faced with the prospect of a retreating snowline on the Qinghai–Tibet Plateau, rapidly melting glaciers and a sharp reduction in the amount of source water for some of the country's major rivers, the Chinese Government would be wise to engage in long-term thinking when it comes to issues such as the spatial distribution of industry and the layout of cities. Sea level will most likely continue to rise—and by a significant amount—constituting another potential threat. For the Yangtze River Delta, Pearl River Delta and Bohai Bay areas, in particular—which together make up the most economically vital and population-

dense region in China—the risks are serious and clear. Planting trees can help augment the land's capacity for carbon sequestration and draining lakes to restore farmland could help boost the country's resilience and mitigate its vulnerability. Rapidly growing low-income countries are also potential source countries for climate refugees—yet another looming global-scale challenge.

China's proposal for climate governance

The construction of an ecological civilisation that is unfolding in China has facilitated the world's transition to a path of sustainable development. During the negotiations leading up to the signing of the Paris agreement and since it came into effect, China has, together with the United States, made significant contributions to moving the process forward. To meet the targets set in the Paris agreement, the world must work together and seek to secure benefits for all.

China, for its part, should play a leading role wherever and whenever it can, including sharing with other countries its own ideas about solutions to the problems of global climate security. Now and in the future, whatever the world order may be, China must take its international obligations seriously and behave accordingly. In fact, what China has done in the area of emissions reduction and developing renewable resources is powerful testament of how it already holds itself to these high standards. Of course, China's actions will not be enough on their own, nor can China provide low-income developing countries with the funds they need to deal with climate change.

President Xi has announced the Chinese Government's goal of realising nationwide modernisation by 2035 (Xi 2017: 71). By that time, the Chinese economy will conceivably exceed that of the United States in aggregate size, but will still be less than one-third the US level in per capita terms.⁸ China's leadership role in the world in dealing with global climate change cannot consist of it directly providing others with the things they need. Nor is teaching others how to procure the things they need the solution. If people do not change the way they think, there is little chance the right actions will be taken voluntarily.

China's solution should essentially follow a Chinese path towards the construction of an ecological civilisation. This requires China to show others the way, so all parties will be willing to take appropriate actions, coordinate their efforts and work together to build a shared future for humanity and to realise the harmonious coexistence of humanity and nature.

⁸ According to data made available by the World Economic Information Network (2017), in 2017, US GDP was US\$19.36 trillion—1.58 times China's GDP of US\$12.24 trillion. Per capita GDP in the United States was US\$59,500—6.92 times that of China, which was US\$8,600. This means that, by 2035, while a doubling of China's per capita GDP and zero growth in the US figure would result in China surpassing the United States in terms of the aggregate size of the economy, in per capita terms, China will still be less than one-third the US figure.

Conclusion and discussion

Ever since China first became internationally involved in efforts to address climate change, the country's strategies and concrete actions have undergone profound changes, reflecting not only the industrialisation and urbanisation processes domestically, but also the evolving international economic and geopolitical situation. In broad outline, we can trace these changes to two decades before the beginning of reform and opening-up, when the primary concern in China was grappling with weather-related disasters and catching up with scientific understanding of global climate change. Back then, China was at best a follower on the international stage, with relatively limited engagement. Given the situation at the time in terms of the aggregate and per capita size of the Chinese economy, aggregate and per capita carbon emissions, the country's capacity for mitigation and adaptation, its own understanding of the issue and what was expected of it by others in the world, the country's main policy focus was reducing the damage caused by natural disasters to ensure steady development of the national economy. In other words, the emphasis was on preventing 'black swan' events.

Now that China has overtaken the United States in aggregate emissions and the European Union in per capita emissions, the impact of climate change on the country is becoming increasingly pronounced—as are the adverse impacts of environmental pollution and ecological degradation on economic development and people's welfare. Data on water shortages, melting glaciers and sea level rise, among other things, point towards the emergence of 'grey rhinos'—something to which policymakers must pay close attention.

Meanwhile, an economically much more powerful China is also far more capable and effective than it has ever been in dealing with extreme weather events. Given the enormous size of the Chinese territory, marked regional disparity in economic development levels and the devastating impact natural disasters have historically had on the society and the economy, it is all but inevitable that Chinese people are particularly cognisant of and sensitive to the risks associated with 'black swan' weather disasters. With the two-track negotiations leading to the Bali climate road map and the appointment of the Chinese premier as head of the leadership group overseeing the country's climate change response policies and actions, the exclusive focus on events that are difficult to predict and socially and economically devastating has been replaced with a more balanced approach that also includes heightened awareness of and improved preparedness for 'hidden in plain sight' dangers that tend to be overlooked or dismissed.

As the second decade of the twenty-first century opened, China embarked on a new leg of its journey towards greater prosperity for all—the economic 'new normal'—and the construction of socialism with Chinese characteristics has

also turned a new page. The international community has heightened expectations of what China can and will do, and China has met those expectations by taking on greater responsibilities as a key global player. China no longer just follows; it now also tries to lead. The 'inaction' approach adopted by developed countries represented by the United States, the rapid industrialisation and urbanisation of South Asian countries with growing populations and the enormous potential emissions and climate risks faced by developing countries in Africa all constitute sources of 'grey rhino' risks that could trigger calamitous weather disasters that may, in some cases, turn into catastrophes.

China has seen surface temperature and sea level rises higher than the world average. The glaciers that have always supplied source water for China's major rivers are melting away. Moreover, its vulnerable coastal region is also the most developed and economically vital in the country. Pushing forward the construction of an ecological civilisation in China and meeting head-on the challenges posed by grey rhino risks are of paramount importance to China's rejuvenation and its future prospects for sustainable development. What was a national strategy of responding to climate change has evolved into a 'Chinese solution' to the challenges of grey rhino climate risks—a solution that places equal weight on strengthening domestic actions and taking a leading role on the international stage.

References

- Ding, Y. (ed.) (2017), *The impact of cryospheric changes on lakes*, in *Cold Region Hydrology*, Beijing: Beijing Science Press.
- Intergovernmental Panel on Climate Change (IPCC) (1990), *Climate change: The IPCC response strategies*, IPCC First Assessment Report, Geneva: IPCC. Available from: www.ipcc.ch/publications_and_data/publications_ipcc_first_assessment_1990_wg3.shtml.
- International Energy Agency (IEA) (2017), *CO2 Emissions from Fossil Fuel Combustion 2017 Highlights*, Paris: IEA.
- International Renewable Energy Agency (IRENA) (2017), *Renewable Energy Statistics 2017*, Abu Dhabi: IRENA.
- Kraaijenbrink, P. D. A., Bierkens, M. F. P., Lutz, A. F. and Immerzeel, W. W. (2017), Impact of a global temperature rise of 1.5 degrees Celsius on Asia's glaciers, [Letter], *Nature* 549(14 September): 257–60. Available from: www.nature.com/nature/journal/v549/n7671/full/nature23878.html?foxtrotcallback=true. doi.org/10.1038/nature23878.

- National Bureau of Statistics (NBS) (various years), *China Statistical Yearbook*, Beijing: China Statistics Press.
- National Bureau of Statistics (NBS) (2017), *2016 National Economic and Social Development Statistical Bulletin*, Beijing: China Statistics Press.
- National Bureau of Statistics (NBS) Office of Household Survey (2017), *Continuing brisk growth of people's income and increase in standard of living: A report on achievements in economic and social development since the 18th CPC National Congress (part VII)*, 6 July, Beijing: NBS Office of Household Survey.
- Office of the Press Secretary (2014), US–China joint announcement on climate change, 12 November, Beijing, Washington, DC: Office of the Press Secretary.
- Pan, J. (2002a), *A conceptual framework for analysis of human development potentials and demand for greenhouse gas emissions*, Global Change and Economic Development Working Paper 2002-10, Beijing: Chinese Academy of Social Sciences.
- Pan, J. (2002b), Human development rights and developing countries' basic emissions needs, *Chinese Social Sciences Today* (6).
- Pan, J. (2015), *Ecological Construction and Environmental Protection in China*, Beijing: China Social Sciences Press.
- Pan, J. and Chen, Z. (2016), *A Transformative Agenda: Sustainable development goals for 2030*, Beijing: Social Sciences Academic Press.
- Pan, J., Phillips, J. and Ying, C. (2008), China's balance of emissions embodied in trade: Approaches to measurement and allocating international responsibility, *Oxford Review of Economic Policy* 24(2): 354–76. doi.org/10.1093/oxrep/grn016.
- State Council (1994), *China's Agenda 21: White paper on China's population, environment and development in the 21st century*, 25 March, Beijing: State Council.
- State Council (2007), *Notice on the release of the PRC national plan on climate change response*, State Council Document No. [2007]17, Beijing: State Council.
- State Council (2008), *11th Five Year Plan for National Economic and Social Development of the People's Republic of China*, State Council Document No. [2008]11, Beijing: State Council.
- United Nations (UN) (2017), *World Population Prospects: The 2017 revision*, DVD edn, New York: Population Division, Department of Economic and Social Affairs.

- World Bank (2017), Open data, Washington, DC: The World Bank. Available from: data.worldbank.org/.
- World Commission on Environment and Development (WCED) (1987), *Our Common Future*, Oxford: Oxford University Press.
- World Economic Information Network (2017), 2017 world GDP ranking (nominal gross domestic product world ranking), [in Chinese], *World Economy*. Available from: www.8pu.com/gdp/ranking_2017.html.
- Xi, J. (2014), Xi Jinping meets with US Secretary of State Kerry, *Xinhuanet.com*, 14 February. Available from: news.xinhuanet.com/politics/2014-02/14/c_119341954.htm.
- Xi, J. (2017), Secure a decisive victory in building a moderately prosperous society in all respects and strive for the great success of socialism with Chinese characteristics for a new era, Speech to nineteenth National Congress of the Communist Party of China, Beijing.
- Xu, G. (1990), The impact of climate change on Xinjiang's agriculture in the 1990s: Evaluation and policy responses, *Meteorological Study of Desert and Oasis* (6): 2–5.
- Zhang, Z. and Liu, Y. (2013), A meta-quantitative analysis of studies in China on climate change, *Modern Intelligence* 7(33): 125–9.
- Zou, J. (2008), National climate change response leadership group, *World Environment* (2): 93.

This text is taken from *China's 40 Years of Reform and Development: 1978–2018*,
edited by Ross Garnaut, Ligang Song and Cai Fang, published 2018 by
ANU Press, The Australian National University, Canberra, Australia.

doi.org/10.22459/CYRD.07.2018.26